

ADDENDUM 01 – MADISON ES – CR BLDG



Addendum No: 01
Project: Madison Elementary School – 2 Story Classroom Building
School District: Madera Unified School District
Prepared By: PBK Architects, Inc.
7790 N Palm Avenue
Fresno, California 93711
PBK Project No: 230278
DSA App No: 02-122191

Issue Date: 01/08/2024
To Drawings + Specifications dated 12/06/2024



NOTICE TO PROPOSERS

- A.** The following changes, omissions, and/or additions to the Project Manual and/or Drawings shall apply to proposals made for and to the execution of the various parts of the work affected thereby, and all other conditions shall remain the same.
- B.** Careful note of the Addendum shall be taken by all parties of interest so that the proper allowances may be made in strict accordance with the Addendum, and that all trades shall be fully advised in the performance of the work which will be required of them.
- C.** Bidder shall acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject Bidder to disqualification.
- D.** In case of conflict between Drawings, Project Manual, and this Addendum, this Addendum shall govern.

GENERAL ITEMS

- 1.1** Refer to **Bid No 121224-D Madison ES-: New Two-Story Classroom Building**, add the following scope to project.

- **SUMMARY OF WORK:** Construction of the work for this project, Madera Unified School District, Madison Elementary School – Temporary Relocatable Classrooms. The work is defined as all material, labor, equipment, and services necessary to do all work shown on the drawings and called for in the Specifications. The following specific trade requirements shall not be excluded from their proposal. Exclusion of any required scope specified shall be grounds for rejection. The scope of work for each trade shall remain as required by the Contract Documents.
- **PROJECT MILESTONES:** Temporary Classrooms buildings shall be fully functional and ready for District occupancy no later than **June 30, 2025**. Liquidated damages shall apply for each calendar day of delay per contract.

- 1.2** Refer to **02-123006_DWG_A : Madison Elementary School – Temporary Relocatable Classrooms** (DSA Approved), revise as follows:

- Add 02-123006_DWG_A : Madison Elementary School – Temporary Relocatable Classrooms

(dated 12/20/2024) in its entirety with the attached (31 pages).

1.3 Refer to 02-123006_SPC_A : Madison Elementary School – Temporary Relocatable Classrooms: Project Manual (DSA Approved), revise as follows:

- Add 02-123006_SPC_A : Madison Elementary School – Temporary Relocatable Classrooms (dated 12/20/2024) in its entirety with the attached (292 pages).

1.4 Refer to 02-123006_103_A : Madison Elementary School – Temporary Relocatable Classrooms: Special Inspections (DSA Approved), revise as follows:

- Add 02-123006_103_A : Madison Elementary School – Temporary Relocatable Classrooms (dated 12/20/2024) in its entirety with the attached (20 pages).

DRAWINGS

ELECTRICAL

1.5 Sheet ES.1 ELECTRICAL OVERAL SITE PLAN, revise as follows:

- Extents of electrical, technology, and FA pathway to be modified
- Refer to attached Sheet ES.1 ELECTRICAL OVERALL SITE PLAN. Revisions have been clouded. (1 Sheet)

1.6 Sheet E5.1 ELECTRICAL SINGLE LINE DIAGRAM, revise as follows:

- Single line diagram to be modified
- Refer to attached Sheet E5.1 ELECTRICAL SINGLE LINE DIAGRAM. Revisions have been clouded. (1 Sheet)

END OF ADDENDUM 01



IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-123006 INC:
REVIEWED FOR
SS ☒ FLS ☒ ACS ☒
DATE: 12/20/2024



MADISON ELEMENTARY SCHOOL - TEMPORARY

DECLASSIFICATION



PROFESSIONAL SEAL



PROJECT NUMBER

DATE _____

A APPLICATION NO.
02-123006

FILE NO.
20-30

PTN NO.
5243-169

DRAWN BY
Author

REVISION

SUBMIT

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NDA

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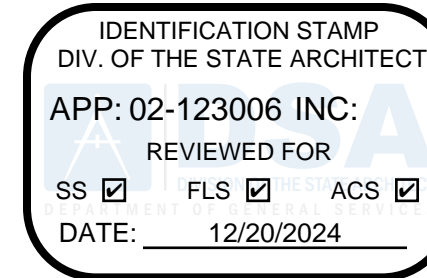
DISCLAIMER: THIS DOCUMENT IS PROVIDED AND INTENDED TO BE USED AS A MEANS TO INDICATE AREAS OF COMPLIANCE WITH THE CALIFORNIA GREEN BUILDING STANDARDS (CALGREEN) CODE. DUE TO THE VARIABLES BETWEEN BUILDING DEPARTMENT JURISDICTIONS, THIS CHECKLIST IS TO BE USED ON AN INDIVIDUAL PROJECT BASIS AND MAY BE MODIFIED BY THE END USER TO MEET THOSE INDIVIDUAL NEEDS. THE END USER ASSUMES ALL RESPONSIBILITY ASSOCIATED WITH THE USE OF THIS DOCUMENT, INCLUDING VERIFICATION WITH THE FULL CODE.

12/17/2024 1:53:19 PM



2022 CALIFORNIA GREEN BUILDING STANDARDS CODE

NONRESIDENTIAL MANDATORY MEASURES, SHEET 2 (January 2023)



ARCHITECT
FRESNO
7790 North Palm Avenue
Fresno, CA 93711
559-448-8400 P
559-448-8467 F
PBK.com

MADISON ELEMENTARY SCHOOL - TEMPORARY
RELOCATABLE CLASSROOMS

109 Stadium Rd, Madera, CA 93637
DSA SUBMITTAL



PROFESSIONAL SEAL



PROJECT NUMBER
230278

DATE
12/10/2024

DSA APPLICATION NO.
02-123006

FILE NO.
20-30

PTN NO.
65243-169

DRAWN BY
Author

REVISIONS

DESCRIPTION DATE

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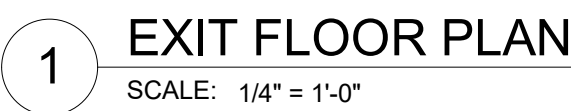
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**MADISON ELEMENTARY SCHOOL - TEMPORARY
RELOCATABLE CLASSROOMS**

109 Stadium Rd, Madera, CA 93637

DSA SUBMITTAL



PROFESSIONAL SEAL



PROJECT NUMBER
230278

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20 30

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65243-169

DRAWN BY
Author

REVISIONS

[illegible]

DSA SUBMITTAL

EXIT ANALYSIS

GO.7

1

XX-XX

SITE HATCHES

1

1

PBIK

MADISON ELEMENTARY SCHOOL - TEMPORARY
RELOCATABLE CLASSROOMS

DSA SUBMITTAL

AS.0

SITE HATCHES

1. REFER TO NOTE 6 UNDER WOOD NOTES ON SHEET **S1W50** FOR FOUNDATION REQUIREMENTS PER DSA IR 16-1
2. ALL IMPERVIOUS SURFACES SHALL BE SLOPED AWAY FROM BUILDINGS MIN 1% FOR DRAINAGE AND MAX 2% FOR ACCESSIBILITY, TYP.

AB	ANCHOR BOLT	MIN	MEDIUM
AC	ASPHALT CONCRETE	MM	MINIMUM
ACG	ACOUSTICAL CEILING TILE	MP	METAL PANEL
AF	ABOVE FINISH FLOOR	MTL	METAL
AL	ALUMINUM	NIC	NOT IN CONTRACT
B	BT	NT	NOT TO SCALE
BD	BOARD	HM	HOLLOW METAL
BLDG	BUILDING	O	OVER
BLK	BLOCKING	OBSC	OBSCURE
BUR	BUILT-UP ROOFING	OC	SUSPENDED OPEN CELL SYSTEM
CEM	CEMENT	OD	OUTSIDE DIAMETER
CJ (OR)	CONTROL JOINT	OH	OPPOSITE HAND
CL	CHAIN-LINK FENCE	OP	OPAQUE GLASS
CLR	CLEAR	OPP	OPPOSITE
CMU	CONCRETE MASONRY UNIT	P	PAINT
CONC	CONCRETE	PERIM	PERIMETER
CONT	CONTINUOUS	PG	PAGE
CP	CEMENT PLASTER	PL	PLASTIC LAMINATE
CPT	CARPET	PLT	PLATE
DBL	DOUBLE	PLY	PLYWOOD
DELA	DELTAL	PO	POLISHED
DES	DENSIFIED SEALED CONCRETE	PTH	PATH OF TRAVEL
DSS	DURABLE SEALED & STAINED	PRT	PORT
DTL	DRAWING	PT	PRESSURE TREATED
DWGS	DRAWINGS	RB	REFLECTED BASE
(E)	EXISTING	RCP	REFLECTED CEILING PLAN
EACH	EACH	RECOMM	RECOMMENDATION
EAJ (OR)	EXPANSION JOINT	REQD	REQUIRED
ELEV	ELEVATION	REQMTS	REQUIREMENTS
EPF	EPOXY PAINT	SC	SINGLE CHANNEL
EPF	EPOXY FLOOR	SC	SQUARE
ESP	EGG SHELL PAINT	SDP	SELF DRILLING SCREW
EXT	EXTERIOR	SGF	SEMGLOSS PAINT
FF	FACTORY FINISH	SH	SINGLEHUNG
FIBERGLASS	FIBERGLASS	SIMILAR	SIMILAR
FIN	FINISH	SHMT	SHIMMED METAL SCREW
FLASHING	FLASHING	SPEC	SPECIFICATION
FLOOR	FLOOR	SO	SQUARE
FP	FACTORY PAINT	SO	SOLID SURFACE
FOF	FACE OF FINISH	SS	STAINLESS STEEL
FIR	FIRE RATED	STD	STANDARD
FRP	FIBER REINFORCED PANEL	STRUCT	STRUCTURAL
FT	FACTORY	T	TOP
GA	GALVANIZED	TYP	TO TYPICAL
GALV	GALVANEZ	UNCL	UNLESS NOTED OTHERWISE
GB	GYPSSUM BOARD	V	VARIABLES
GP	GLOSS PAINT	VERT	VERTICAL
GL	GALVANIZED SHEET METAL	VT	VINYL TILE
HM	HOLLOW METAL	VTV	VINYL TRACKBOARD
HORIZ	HORIZONTAL	WVC	WOOD VAIL COVERING
IC	ICOLLOW STRUCTURAL SECTION	w	WITH
INSUL	INSULATION	WC	WOOD COVERING
INSUR	INSULATOR	WGB	WOOD RESISTANT GYP BOARD
INT	INTERNATIONAL SYMBOL OF ACCESSIBILITY	WP	WOOD PROOF
MAX	MAXIMUM	WS	WOOD RESISTANT WOOD SCREW
MDF	MEDIUM-DENSITY FIBREBOARD		

PBIK

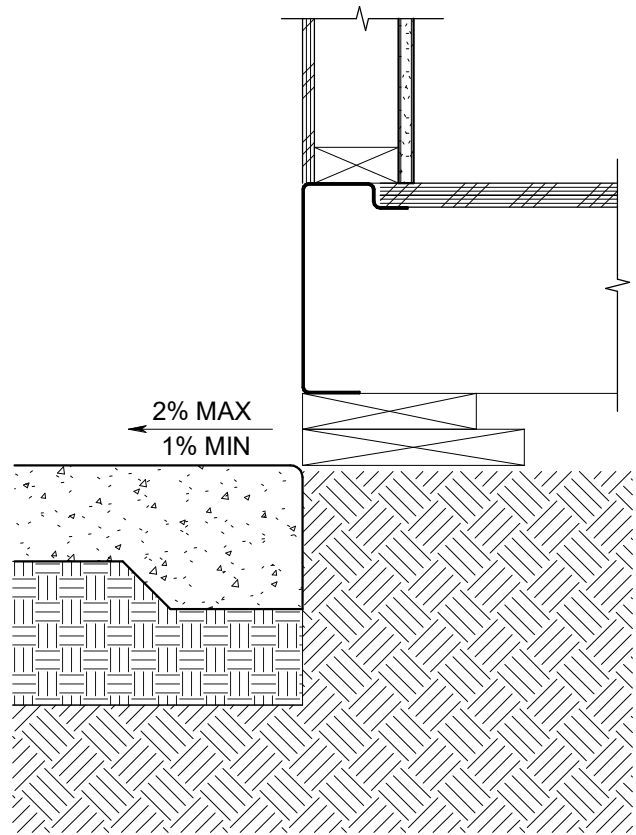


DSA SUBMITTAL

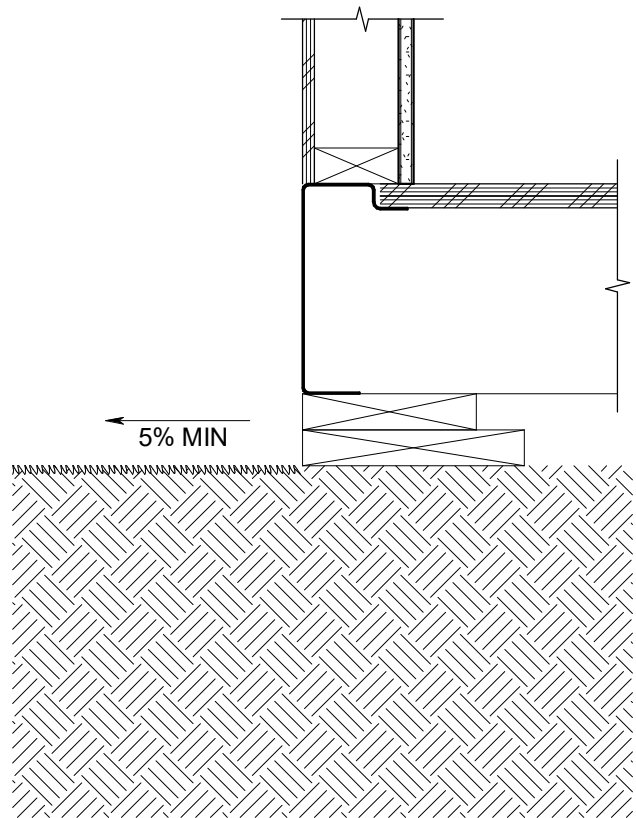
AS.1

NOTES:

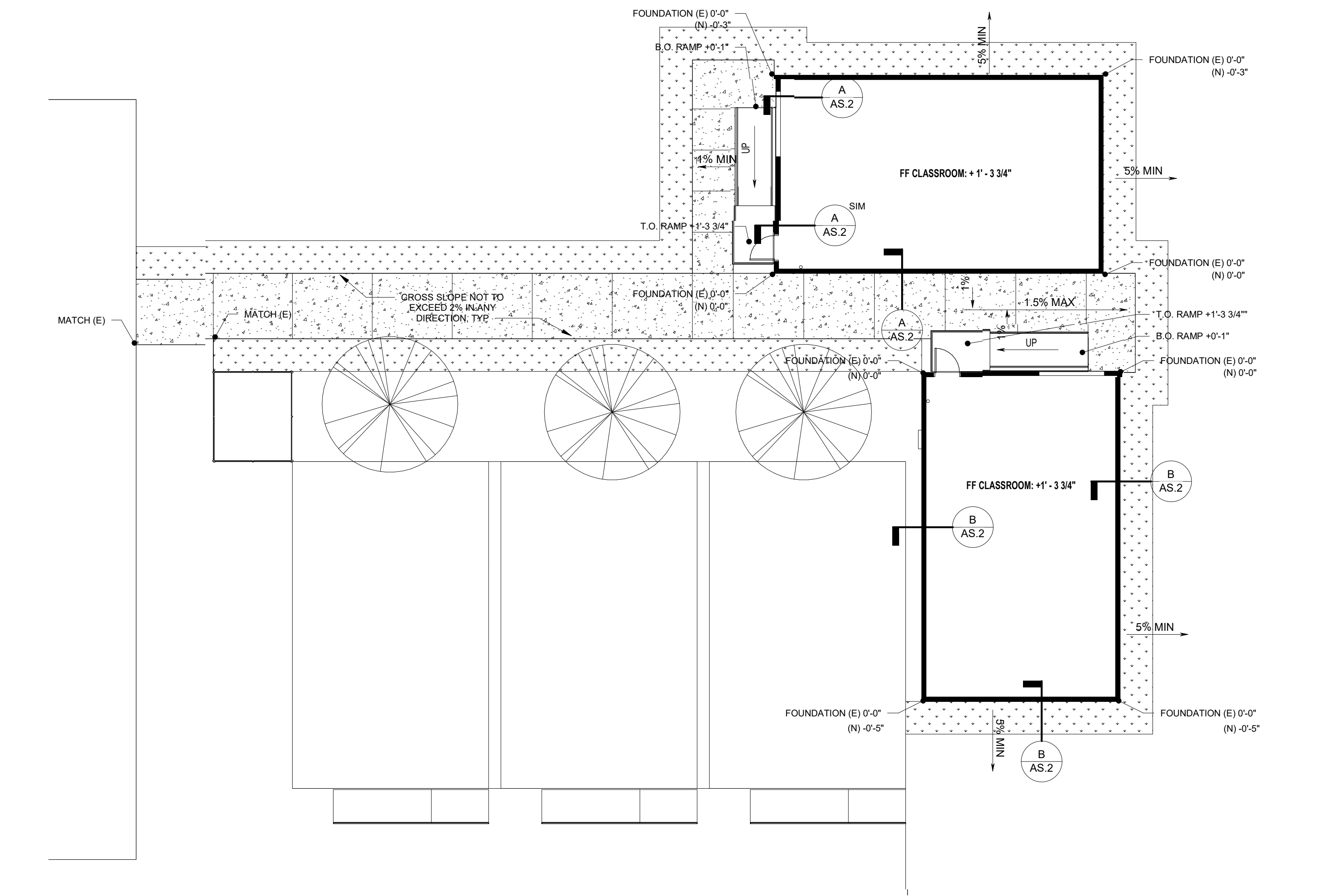
1. USE PRESSURE TREATED WOOD SIGNED AND STAMPED FOR "GROUND CONTACT"
2. REFER TO NOTES ON S1W50 FOR FOUNDATION AND WOOD NOTES.



SECTION A

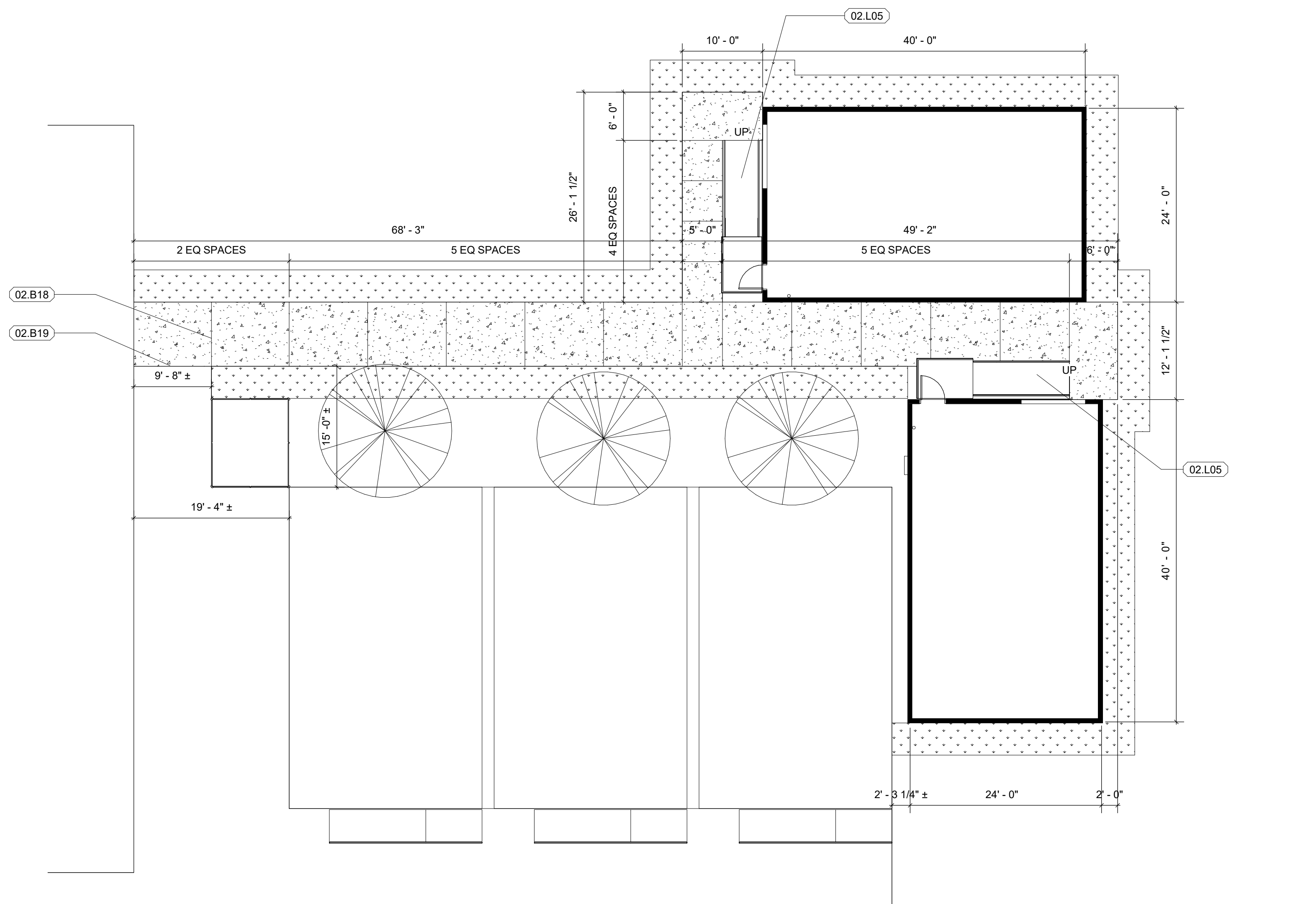


SECTION B



1 GRADING SITE PLAN

SCALE: 1" = 10'-0"



2 ENLARGED SITE PLAN

SCALE: 1" = 10'-0"

XX-XX

02.B18 CRACK CONTROL JOINT, SEE DETAIL 1/AX.1
02.B19 EXPANSION JOINT, SEE DETAIL 1/AX.1
02.L05 ACCESSIBLE MODULAR RAMP PER DETAIL 1/S5R

SITE HATCHES

CONCRETE

TURF

1. REFER TO NOTE 6 UNDER WOOD NOTES ON SHEET **S1W50** FOR FOUNDATION REQUIREMENTS PER DSA IR 16-1
2. ALL IMPERVIOUS SURFACES SHALL BE SLOPED AWAY FROM BUILDINGS MIN 1% FOR DRAINAGE AND MAX 2% FOR ACCESSIBILITY, TYP.

AC	ANCHOR BOLT	MED	MEDIUM
AB	ASPHALT CONCRETE	MIN	MINIMUM
ACT	ACoustical CEILING TILE	MP	METAL PANEL
AF	AFire FINISH FLOOR	MTL	METAL
ALL	ALUMINUM	NIC	NOT IN CONTRACT
@	@	NTS	NOT TO SCALE
BD	BOARD	HM	HOLLOW METAL
BLDG	BUILDING	OV	OVER
BLK/G	BLOCKING	OBSC	OBSCURE
BUR	BUILT-UP ROOFING	OC	SUSPENDED OPEN CELL SYSTEM
CEM	CEMENT	OD	OUTSIDE DIAMETER
CJ (CR)	CONTROL JOINT	OH	OPPOSITE HANG
CL	CHAIN-LINK FENCE	OP	OPAQUE GLASS
CLR	CLEAR	OPP	OPPOSITE
CMU	CONCRETE MASONRY UNIT	P	PAINT
CONC	CONCRETE	PERIM	PERIMETER
CONT	CONTINUOUS	PG	Pipe GRID
CP	CEMENT PLASTER	PL	PLASTIC LAMINATE
CPT	CARPET	PLT	PLATE
CI	INTERGRAL COVE	PLY	PLYWOOD
DBL	DOUBLE	PO	POLISHED
DI	DIAMETER	POT	PATH OF TRAVEL
DS	DENSIFIED SEALED CONCRETE	PRT	PORT TOILET PARTITION
DSS	DENSIFIED SEALED & STAINED	PRT	PRESSURE TREATED
DET	DETAIL	RBS	REBUILT BASE
DWG/ES	DRAWINGS	RCP	REFLECTED CEILING PLAN
E	EXISTING	RECOMM	RECOMMENDATION
EACH	EACH	REQD	REQUIRED
EJ (JR)	EXPANSION JOINT	REQMTS	REQUIREMENTS
ELEV	ELEVATION	S	SINGLE GLAZED
EP	EPOXY PAINT	SQ	SQUARE
EPF	EPOXY FLOOR	SOS	SELF DRILLING SCREW
ESF	EGG SHELL PAINT	SDG	SEMI-GLOSS PAINT
EXT	EXTERIOR	SH	SINGLE-HUNG
FF	FACTORY FINISH	SHG	SIMILAR
FG	FIBERGLASS	SMS	SHEET METAL SCREW
FIN	FINISH	SPEC	SPECIFICATION
FLASHG	FLASHING	SQ	SQUARE
FLOOR	FLOOR	SQ	SOLID SQUARE
FP	FACTORY PAINT	SS	STAINLESS STEEL
FFP	FACE OF FINISH	STD	STANDARD
FIRE	FIRE RATED	STRUCT	STRUCTURAL
FR	FIBER REINFORCED PANEL	TOP	TOP OF
FT	FACTORY	TYP	TYPICAL
FOOTING	FOOTING	UNO	UNLESS NOTED OTHERWISE
GA	GALVANE	VAR	VARIES
GAUGE	GALVANE	VERT	VERTICAL
GB	GYPSPUM BOARD	VT	VINYL TILE
GSM	GLOSS PAINT	VTB	VINYL TACKBOARD
GL	GALVANIZED SHEET METAL	VWC	VINYL WALL COVERING
H	HOLLOW METAL	W	WITH
HORIZ	HORIZONTAL	W/	WALL COVERING
HSS	HOLLOW STRUCTURAL SECTION	WO	WOOD
INSUL	INSULATION	WGB	WATER RESISTANT GYP. BOARD
INSUR	INSPECTOR OF RECORD	WR	WATER PROOF
IP	INTERNATIONAL SYMBOL OF ACCESSIBILITY	WR	WATER RESISTANT
MAX	MAXIMUM	WS	WOOD SCREW
MDX	MEDIUM-DENSITY FIBREBOARD		



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MADISON ELEMENTARY SCHOOL - TEMPORARY RELOCATABLE CLASSROOMS

109 Stadium Rd, Madera, CA 93637

DSA SUBMITTAL



PROFESSIONAL SEAL

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DSA SUBMITTAL

**ENLARGED
PARTIAL SITE
PLAN**

AS.2

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DSA SUBMITTAL

SITE DETAILS

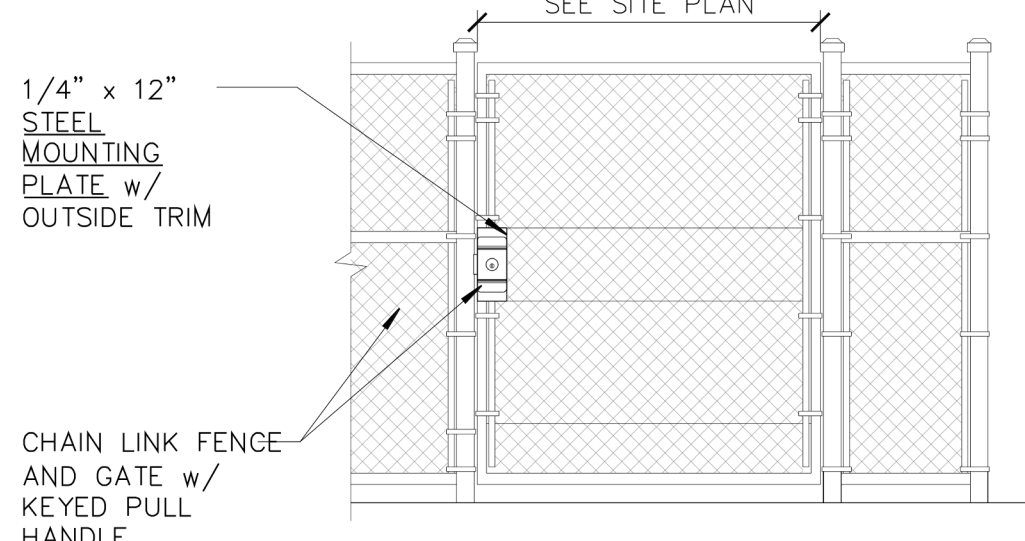
AX1.1

DSA 103 SPECIAL INSPECTION EXEMPTION

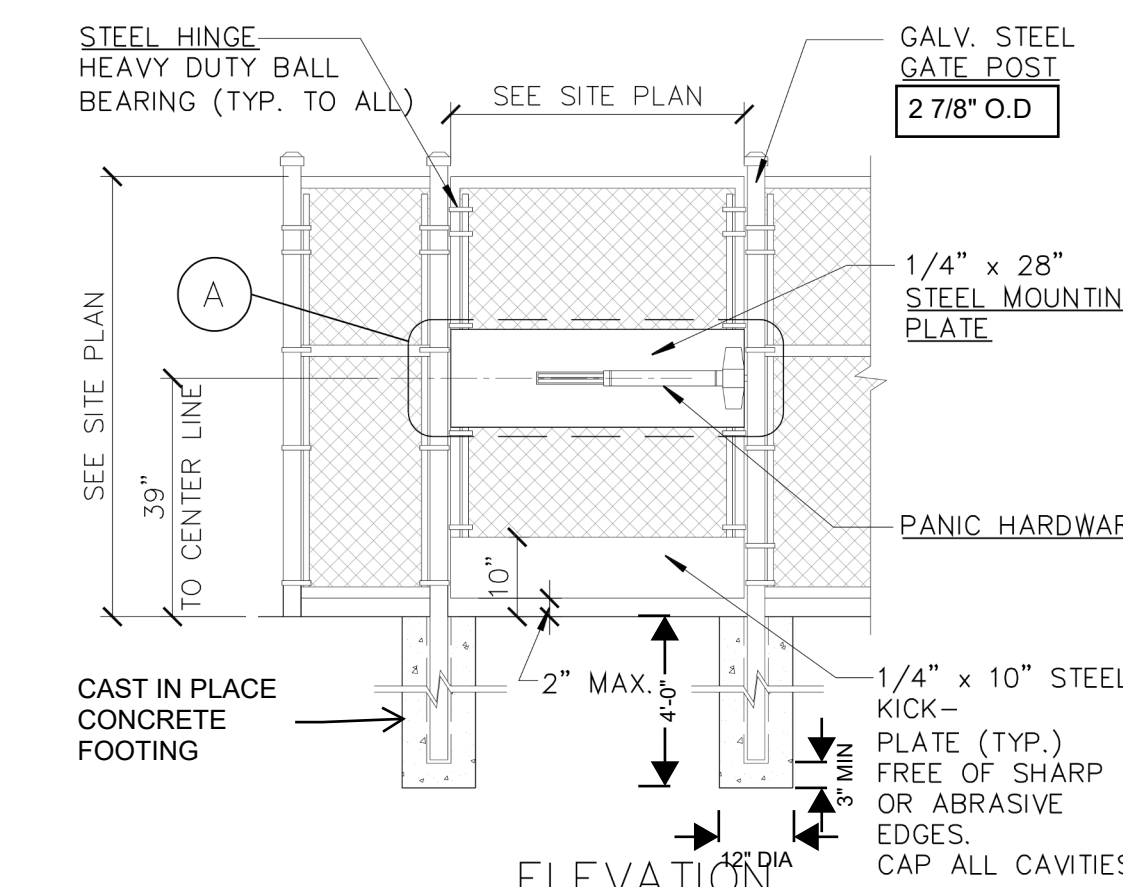
1. Solid-clad and open-mesh fences, gates with maximum leaf span of 10', and gates with a maximum rolling section of 10' all having an apex height less than 8'-0" above lowest adjacent grade. When located above circulation or occupied space below, these gates/fences are not located within 1.5x gate/fence height (max 8'-0") to the edge of floor or roof.

NOTES:

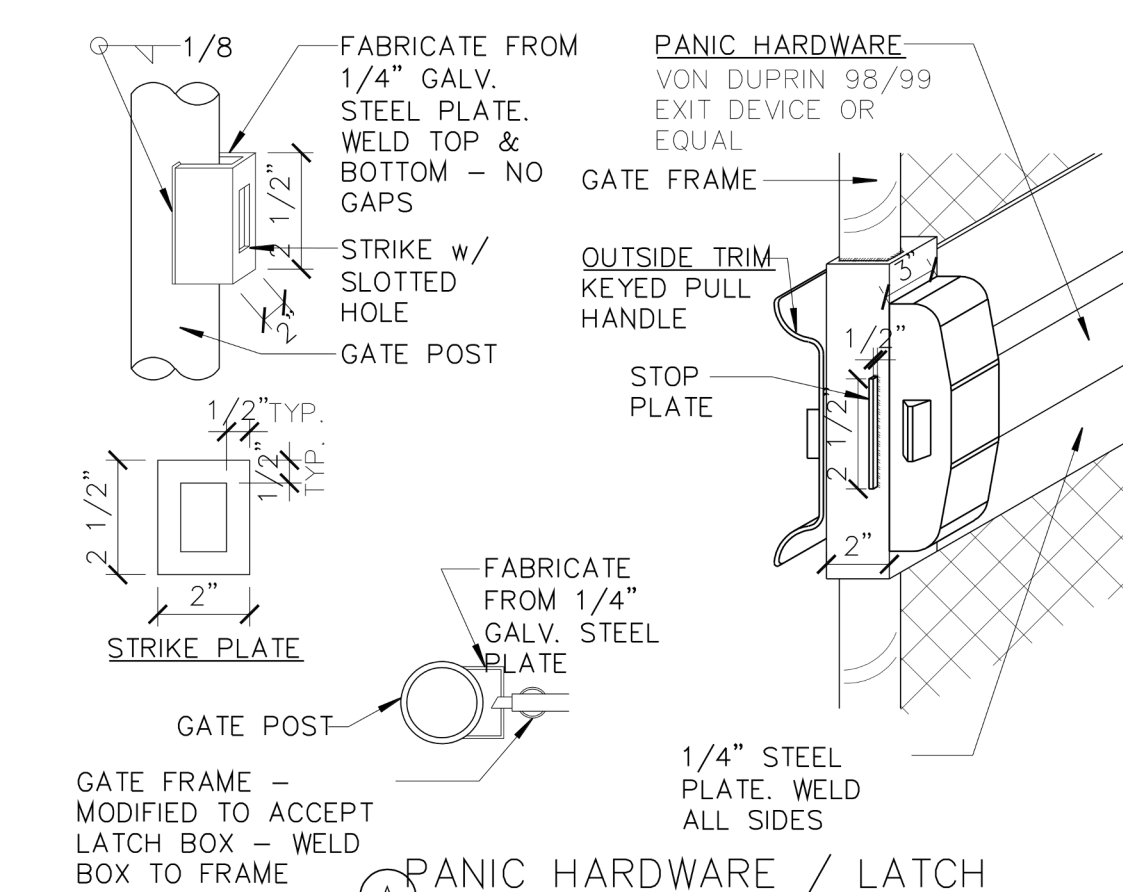
1. PROVIDE/VERIFY MANEUVERING CLEARANCES
2. ALL HARDWARE TO BE EXTERIOR GRADE
3. ALL FENCE AND GATE COMPONENTS SHALL BE HOT DIP GALVANIZED LOCKING HARDWARE EXCLUDED.
4. 5lb. MAX OPERATING PRESSURE (SEE GATE PLAN)



ELEVATION
(EXTERIOR SIDE)

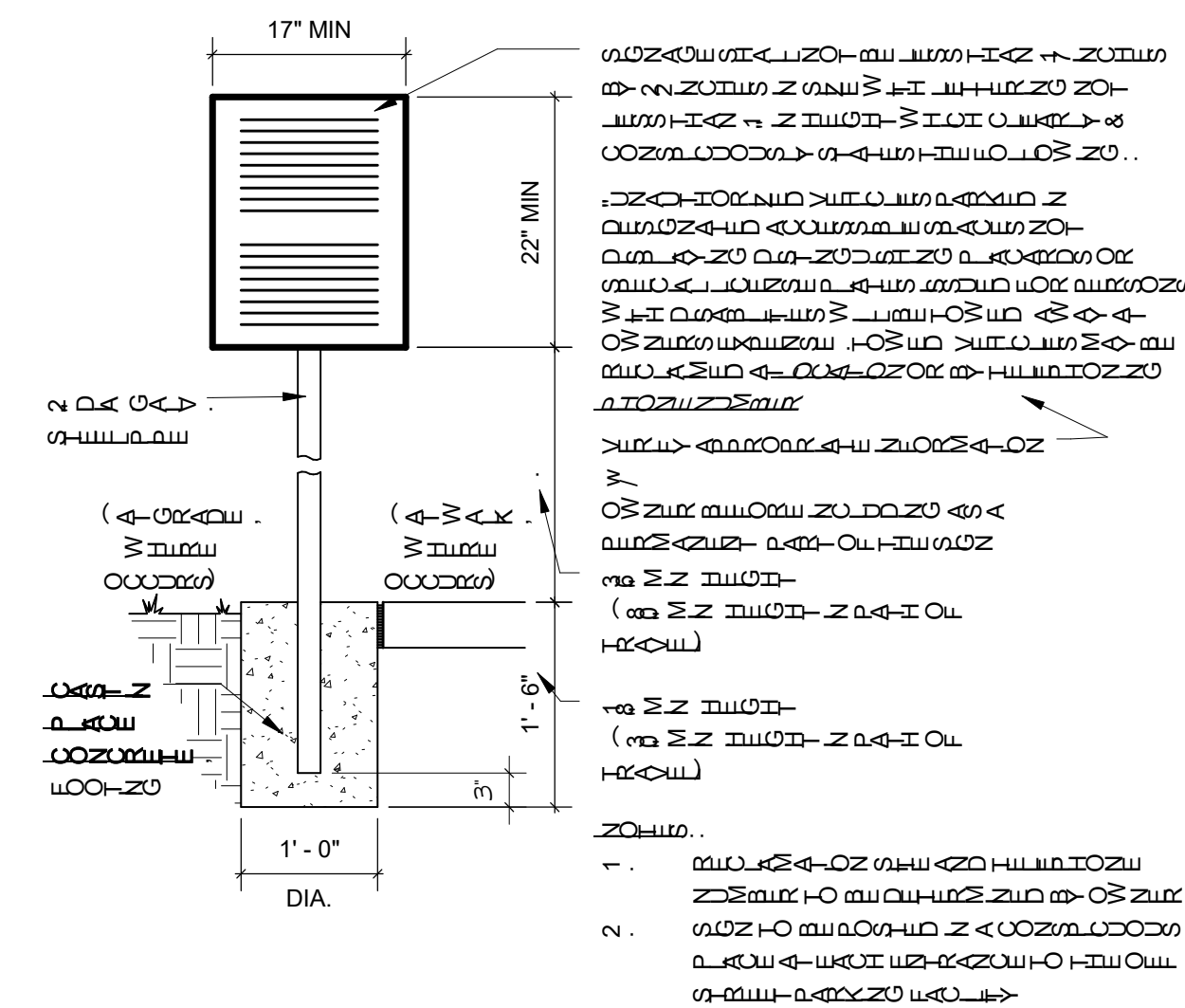


ELEVATION
(INTERIOR SIDE)



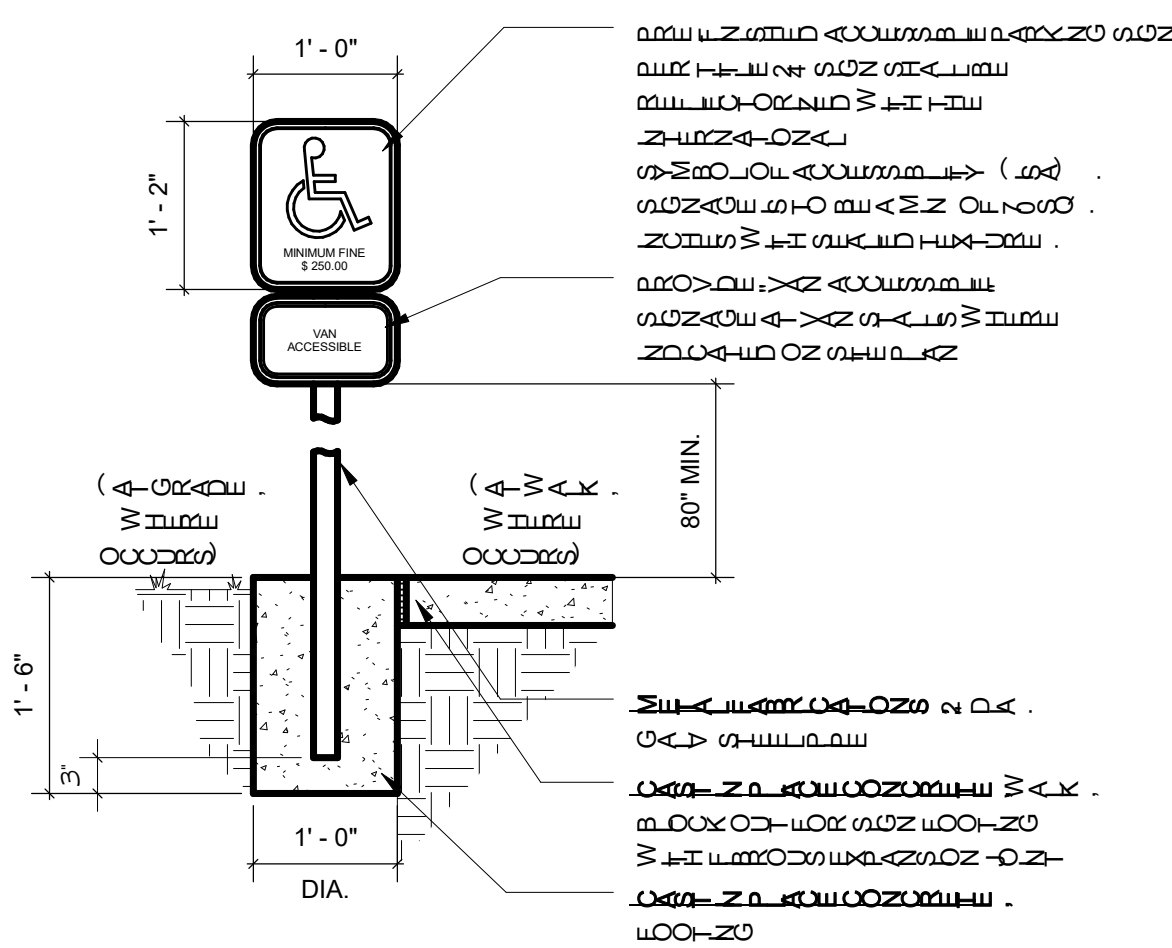
CHAIN LINK GATE - PANIC HARDWARE

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



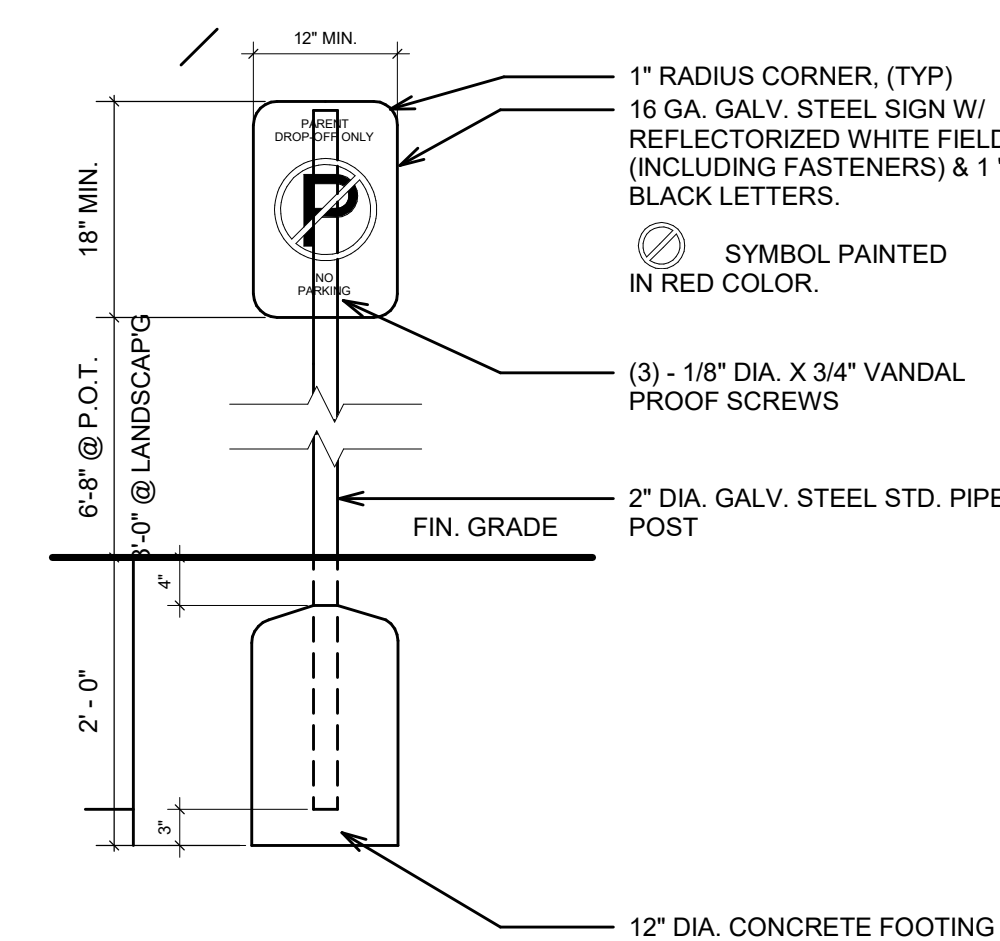
ACCESSIBLE ENTRY SIGNAGE

SCALE: 3/4" = 1'-0"



ACCESSIBLE SIGNAGE

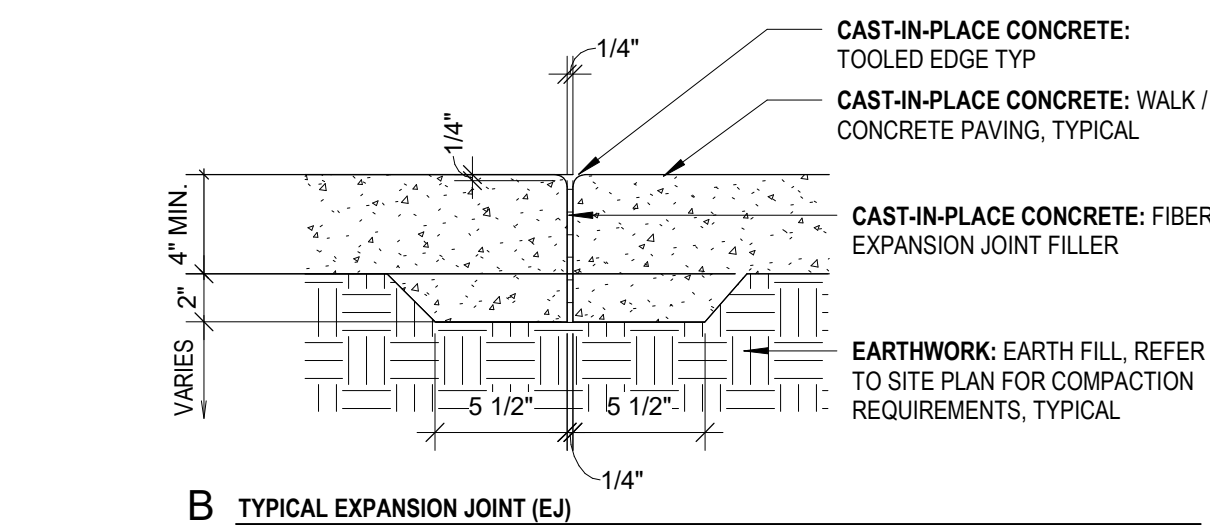
SCALE: 3/4" = 1'-0"



CAR LOADING SIGN

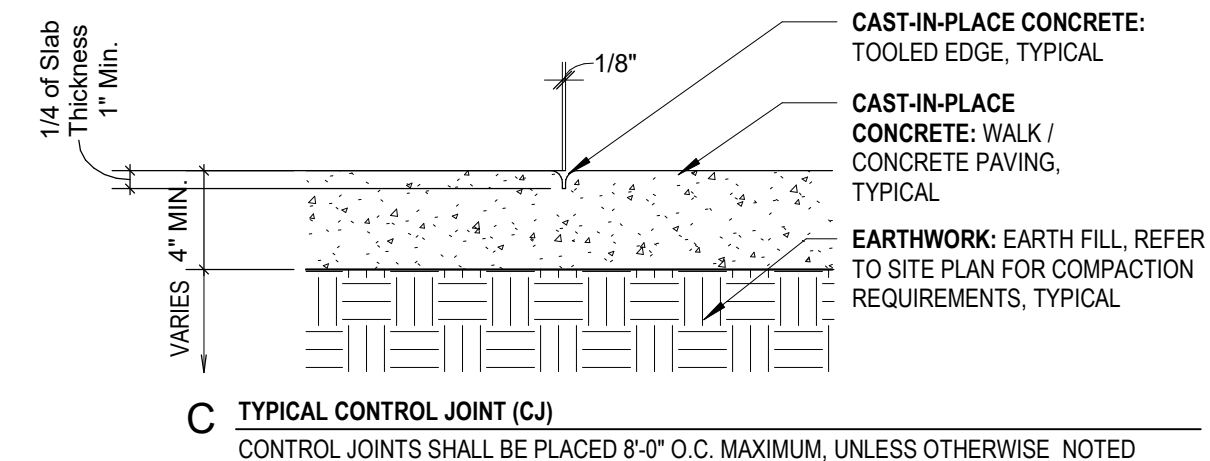
SCALE: 3/4" = 1'-0"

NOTE:
Concrete batch plant inspection is not required for items given in CBC Section 1705A.3.3.2 subject to the requirements and limitations in that section.



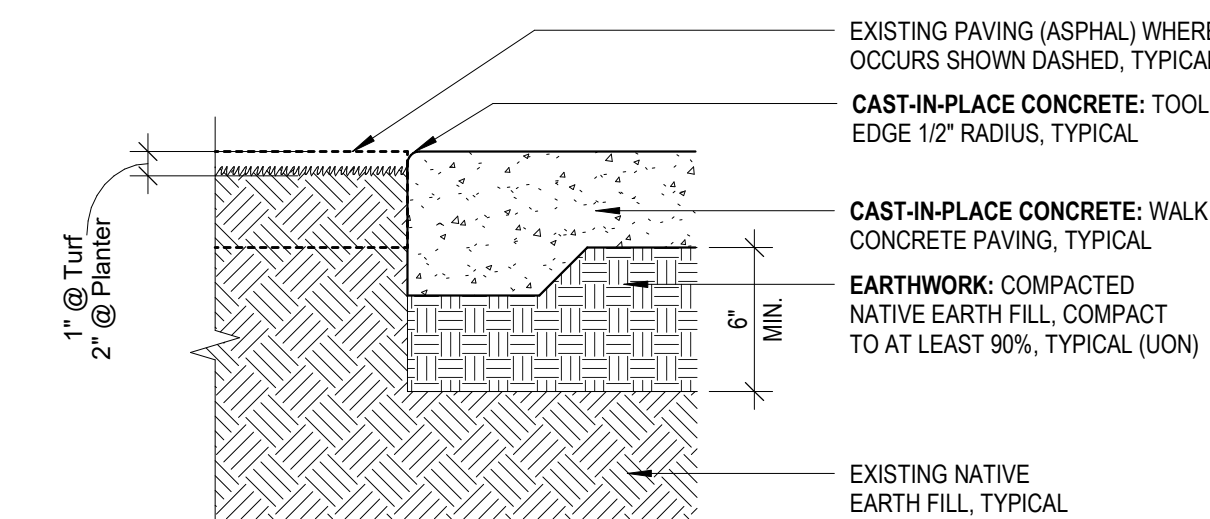
B TYPICAL EXPANSION JOINT (EJ)

EXPANSION JOINTS SHALL BE PLACED 30'-0" OC MAXIMUM, UNLESS OTHERWISE NOTED

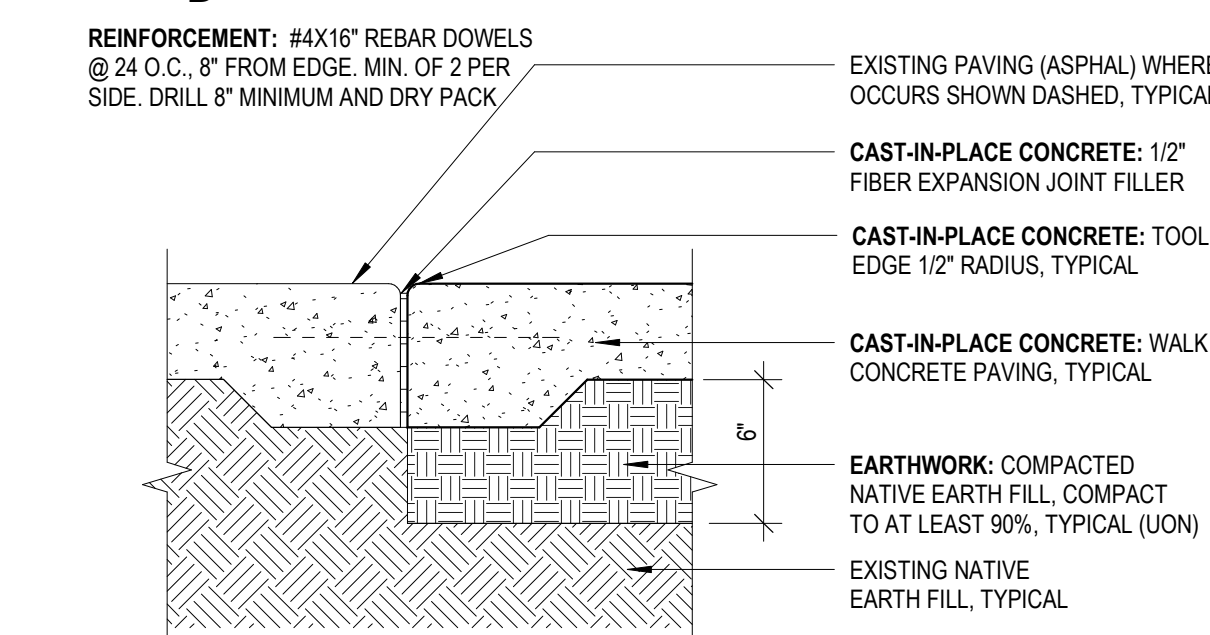


C TYPICAL CONTROL JOINT (CJ)

CONTROL JOINTS SHALL BE PLACED 8'-0" O.C. MAXIMUM, UNLESS OTHERWISE NOTED



D WALK/PAVING @ EDGE OR EXISTING AC PAVING CONDITION



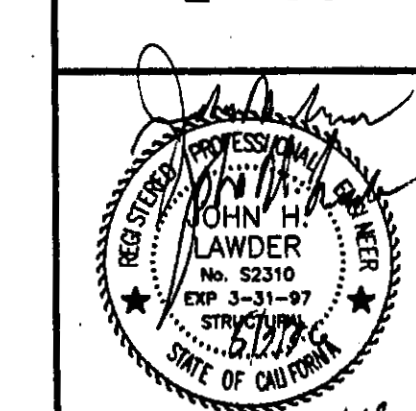
E NEW TO EXISTING WALK / CONCRETE PAVING

SLOPE CONCRETE WALKS 2% (+/-) INTO CORRESPONDING DRAIN, UNLESS NOTED OTHERWISE

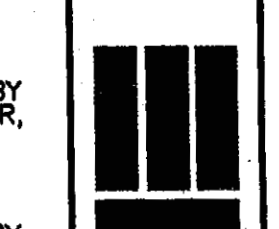
CONCRETE WALK / PAVING

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

RIGID STEELFRAME MODULAR BUILDING
APPLICABLE TO RELOCATABLE CLASSROOMS
24' x 40' TO 180' x 40' (7,200 S.F.)



ENVIROPLEX, INC.
4777 E. CARPENTER ROAD STOCKTON, CA. 95215

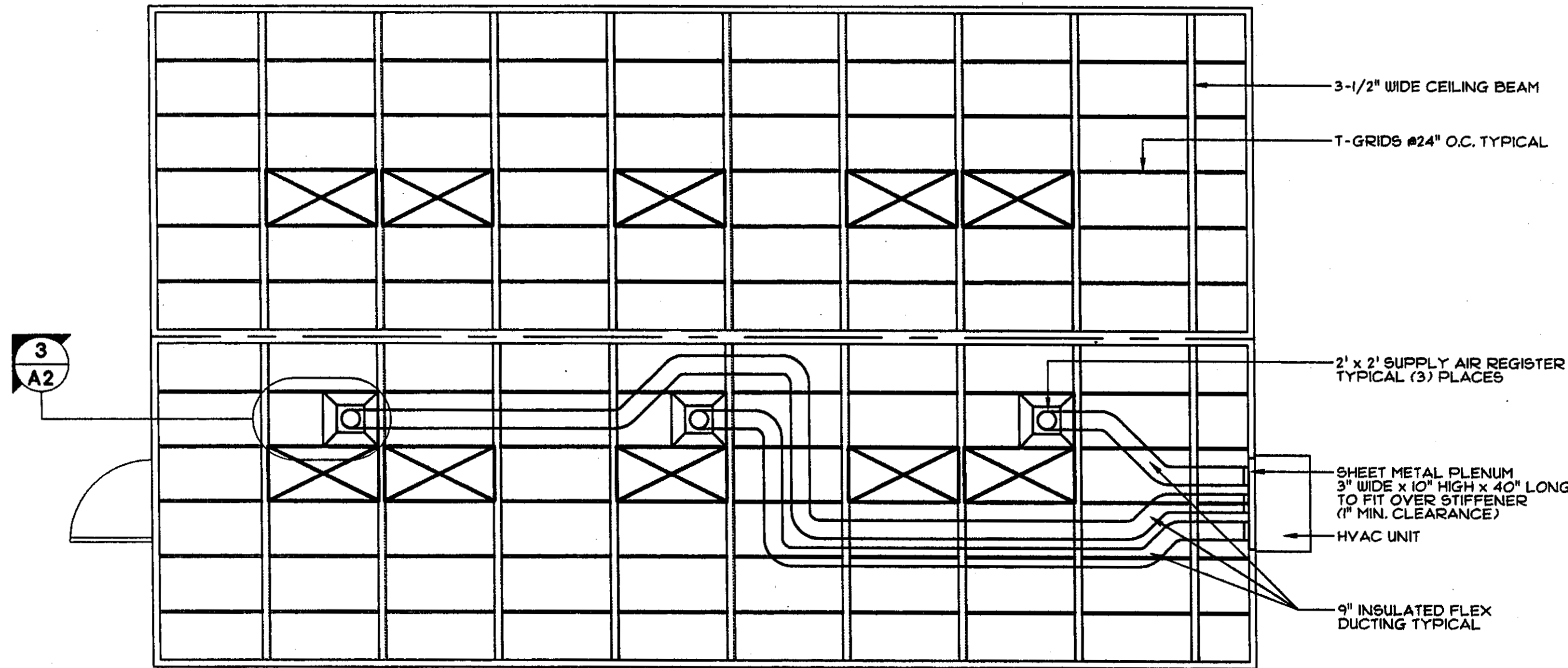
COVER SHEET
ABBREVIATIONS
SHEET INDEX[illegible]

DATE:

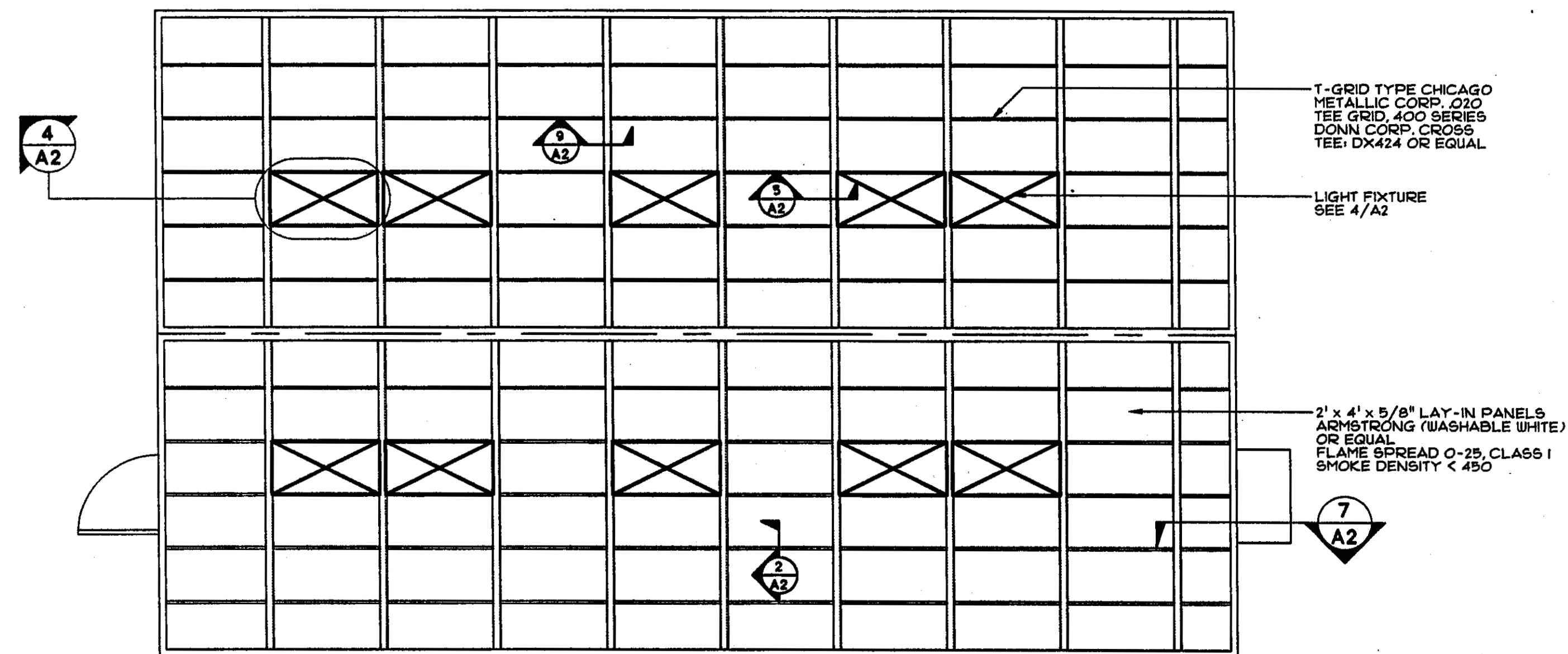
THIS MODULAR BLDG. HAS BEEN ENGINEERED BY A REGISTERED STRUCTURAL ENGINEER AND PREVIOUSLY REVIEWED & APPROVED BY THE DIVISION OF THE STATE ARCHITECT, FIRE & LIFE SAFETY AND ACCESS

AO

[illegible]

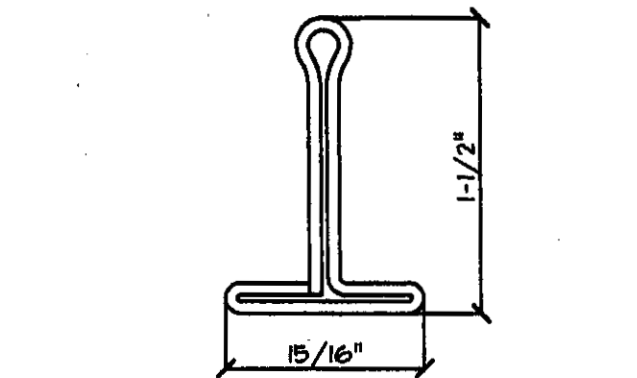


1 24' x 40' MECHANICAL PLAN
SCALE: 1/4"=1'-0"



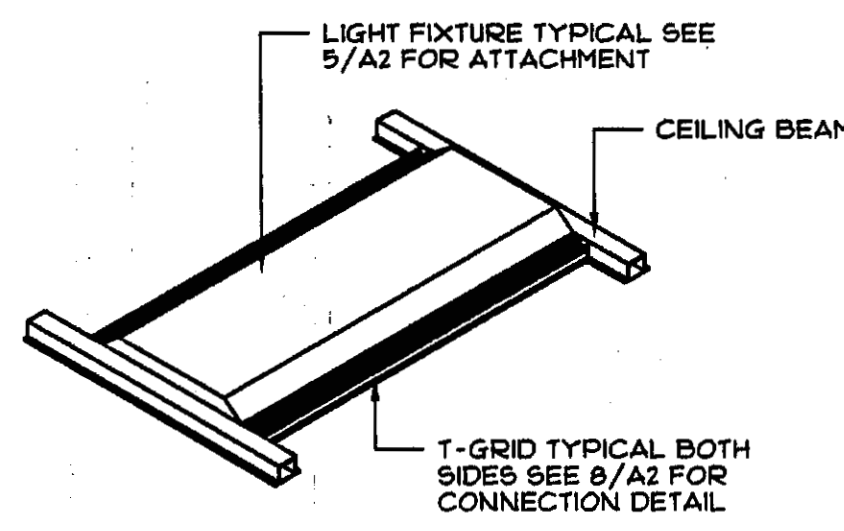
NOTE: CEILING TILE & LIGHTING SYSTEM IN THIS MODULE ARE NOT SUSPENDED. THE BUILDING HAS A FIXED CEILING AND LIGHTING FIXTURE SUPPORT SYSTEM WHICH IS MECHANICALLY FASTENED TO STEEL CEILING BEAMS.

6 24' x 40' REFLECTED CEILING PLAN
SCALE: 1/4"=1'-0"

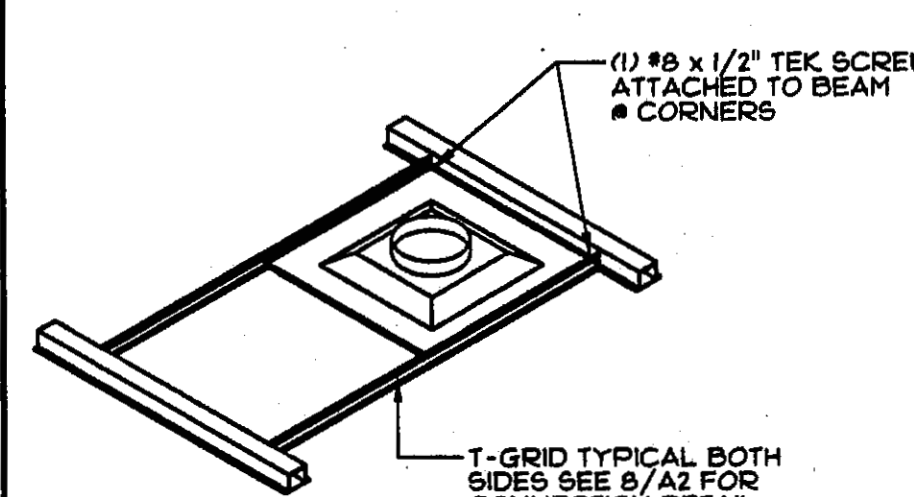


NOTE: T-GRID TO BE DOWN CORP. CROSS TEE 1 DX424 OR CHICAGO METALLIC CORP. 020 TEE GRID, 400 SERIES OR EQUAL.

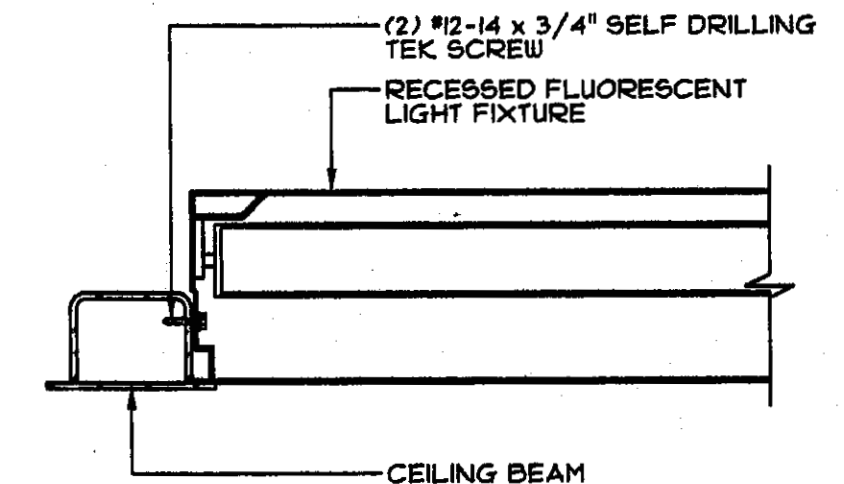
2 TYPICAL T-GRID
SCALE: FULL



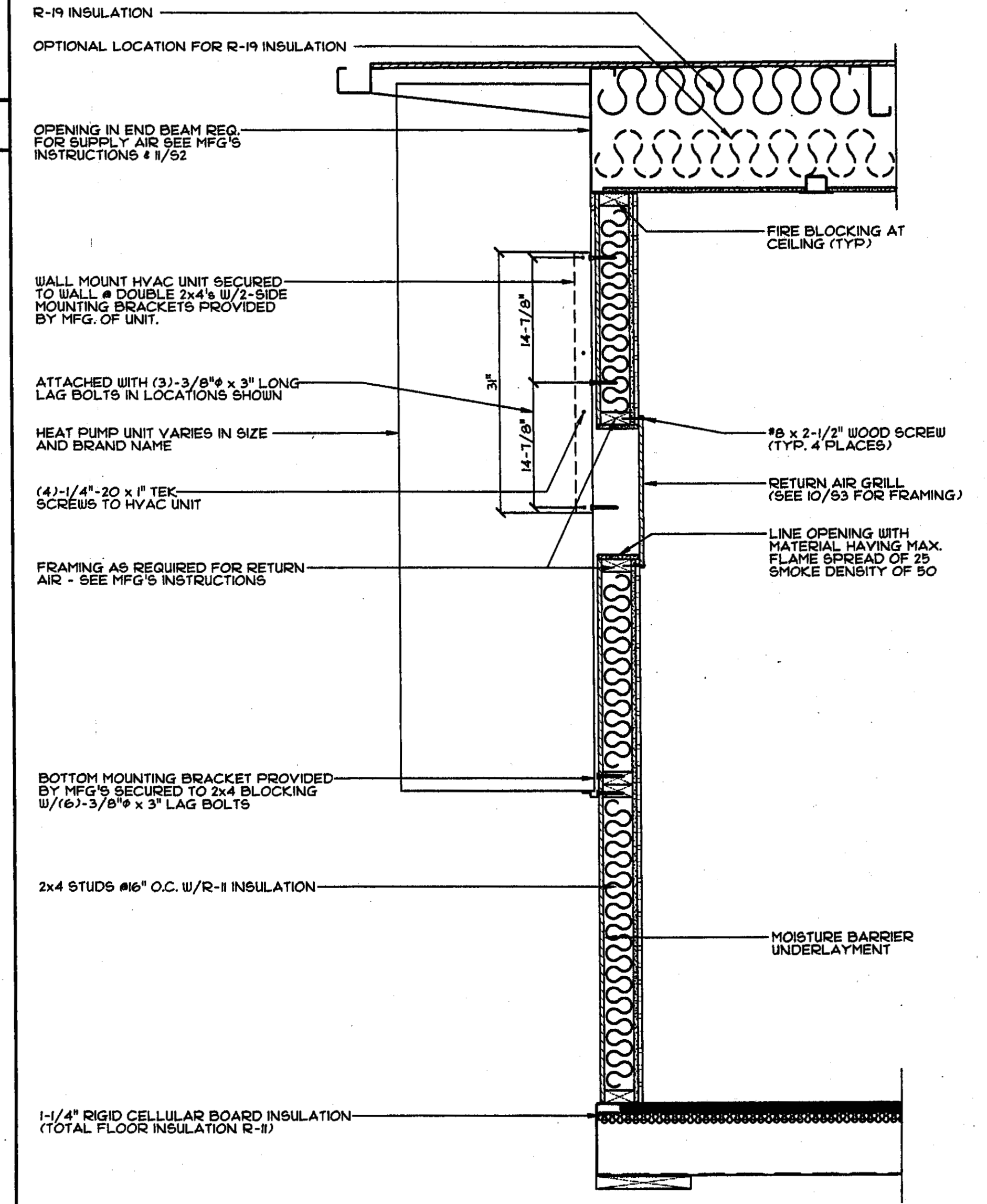
4 DROP-IN LIGHT FIXTURE
SCALE: 1/2"=1'-0"



3 SUPPLY AIR REGISTER
SCALE: 1/2"=1'-0"



5 LIGHT FIXTURE SUPPORT
SCALE: 3/4"=1'-0"

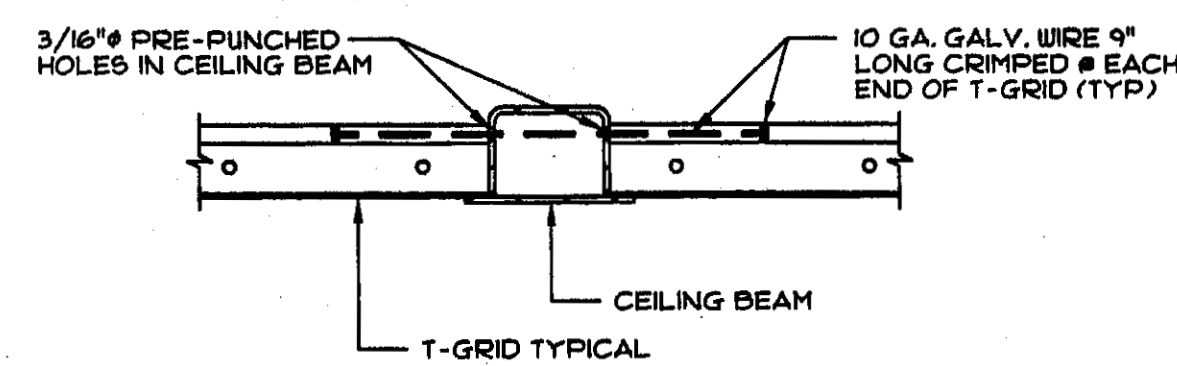


7 HVAC @ WALL SECTION
SCALE: 1"=1'-0"

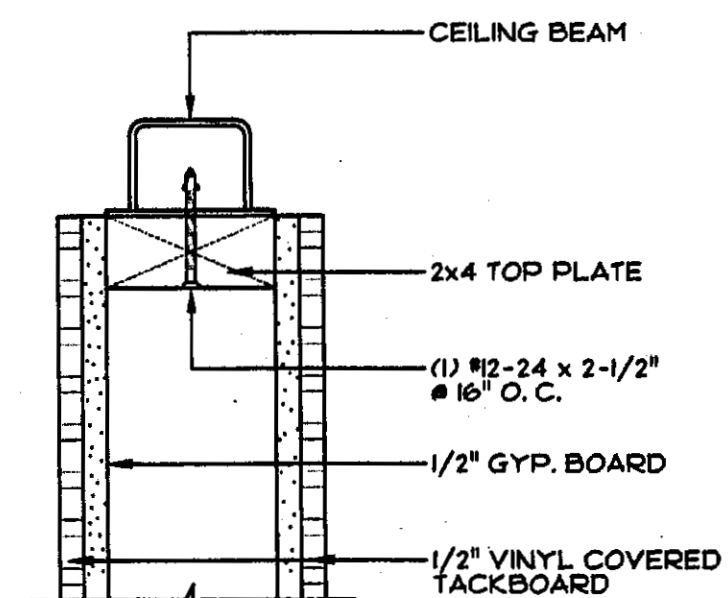
HEAT PUMP
SINGLE PACKAGE WALL MOUNTED AIR TO AIR ELECTRIC HEAT PUMP UNIT SHALL BE RATED IN ACCORDANCE WITH ARI STANDARDS 240-TT. (UL, LISTED)
REFERENCE BRANDS: SUN HV42H-1-08-C (OR EQUAL)
BARD WH42H-AXXXXXB (OR EQUAL)
INTERHERM PWTB-042KB10 (OR EQUAL)
WIRING AND MNTG. INSTALLATION OF UNIT PER MANUFACTURER'S INSTRUCTIONS.
A) TWO SPEED INDOOR BLOWER MOTOR TO REDUCE INDOOR NOISE LEVEL.
B) RECIRCUIT 8 KW HEAT STRIP (HEATER CAN BE SERVICED ELECTRICALLY BY 60 AMP BREAKER, COMPRESSOR BY 50 AMP BREAKER.) MAXIMUM TOTAL AMPS: 68 # MIN. 240 VOLTS. MINIMUM CIRCUIT AMPACITY: HEATER 50 AMPS, COMPRESSOR 33.3 AMPS.
C) LOW TEMPERATURE OUTDOOR THERMOSTAT TO ASSIST CIRCUITING DURING THE HEATING MODE.
D) COOLING: 39,406 BTU HR (95°F) HEATING 43,000 BTU HR (47°F)
E) WEIGHT: 910# MAX
AIR FILTERS:
AN APPROVED TYPE TESTED IN ACCORDANCE WITH TEST METHODS SFM-12-TI-A5 SHOWN IN PART 12, TITLE 24, CALIFORNIA CODE OF REGULATIONS. PREFORMED FILTERS HAVING COMBUSTIBLE FRAMING SHALL BE TESTED AS A COMPLETE ASSEMBLY. AIR FILTERS IN ALL OCCUPANCIES SHALL BE CLASS 2 OR BETTER, AS DEFINED IN THE TEST METHOD ABOVE. AIR FILTERS SHALL BE ACCESSIBLE FOR CLEANING OR REPLACEMENT.

2. CONTROLS:
THERMOSTAT: WHITE-ROGERS IF92 DIGITAL (TAMPER PROOF). MAX +60" FROM FLOOR (+48" MAX IF NON-SEALED TYPE).
3. DUCTS: MAY BE CLASS 9" OR 10" FACTORY MADE AIR DUCTS SHALL BE APPROVED FOR THE USE INTENDED OR SHALL CONFORM TO THE REQUIREMENTS OF UMC, STANDARDS NO. 6-1. EACH PORTION OF A FACTORY MADE AIR DUCT SYSTEM SHALL BE IDENTIFIED BY THE MANUFACTURER WITH A LABEL OR OTHER SUITABLE IDENTIFICATION INDICATING COMPLIANCE U/UMC STANDARD NO. 6-1 AND ITS CLASS DESIGNATION. THESE DUCTS SHALL BE INSTALLED IN ACCORDANCE WITH THE TERMS OF THEIR LISTING. INSULATION APPLIED TO THE EXTERIOR SURFACE OF DUCTS LOCATED IN BUILDING SHALL HAVE A FLAME SPREAD RATING OF NOT MORE THAN 25 AND A SMOKE-DEVELOPED RATING OF NOT MORE 50 WHEN TESTED AS A COMPOSITE INSTALLATION INCLUDING INSULATION, FACING MATERIALS, TAPES AND ADHESIVE AS NORMALLY APPLIED. MATERIAL EXPOSED WITHIN DUCTS OR PLENUMS SHALL HAVE A FLAME SPREAD RATING OF NOT MORE THAN 25 AND A SMOKE DEVELOPED RATING OF NOT MORE THAN 50

8 H.V.A.C. SPECIFICATIONS

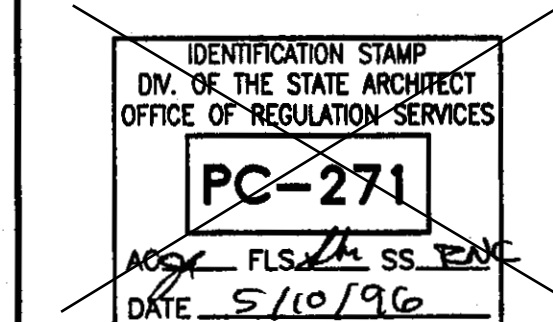
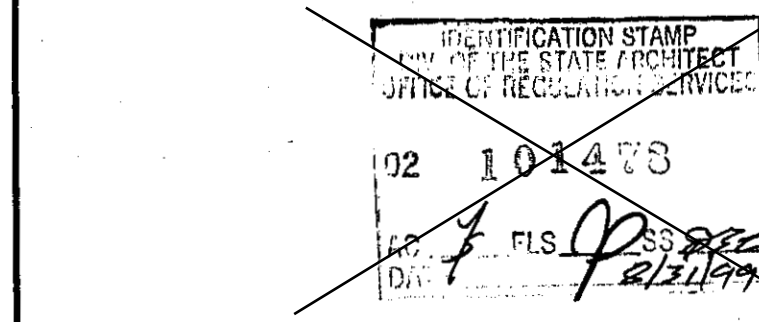


9 T-GRID CONNECTION DETAIL
SCALE: 3/4"=1'-0"



10 WALL ATTACHMENT DETAIL
SCALE: 3/4"=1'-0"

DIVISION OF THE STATE ARCHITECT OFFICE OF REGULATION SERVICES

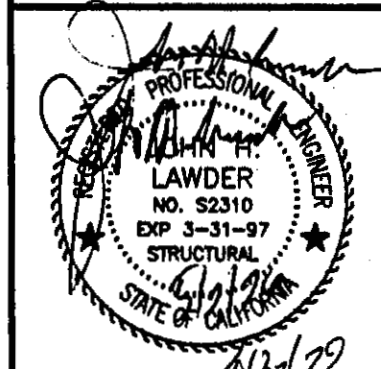


DESIGN CRITERIA
ROOF: DEAD LOAD - 8.0 PSF
ROOF: LIVE LOAD - 20.0 PSF
FLOOR: DEAD LOAD - 8.0 PSF
FLOOR: LIVE LOAD - 50.0 PSF
(OPTIONAL) FLOOR: LIVE LOAD - 70.0 PSF
(OPTIONAL) FLOOR: LIVE LOAD - 125.0 PSF
WALLS: DEAD LOAD - 8.0 PSF
WIND: 80 MPH; EXPOSURE: C
qs=16.4 PSF; Ce=1.06; Cq AS REQ.
SEISMIC: ZONE 4, R=6, C=2.75

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11 APPROVALS

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-123006 INC:
REVIEWED FOR
SS ☒ FLS ☒ ACS ☒
DATE: 12/20/2024

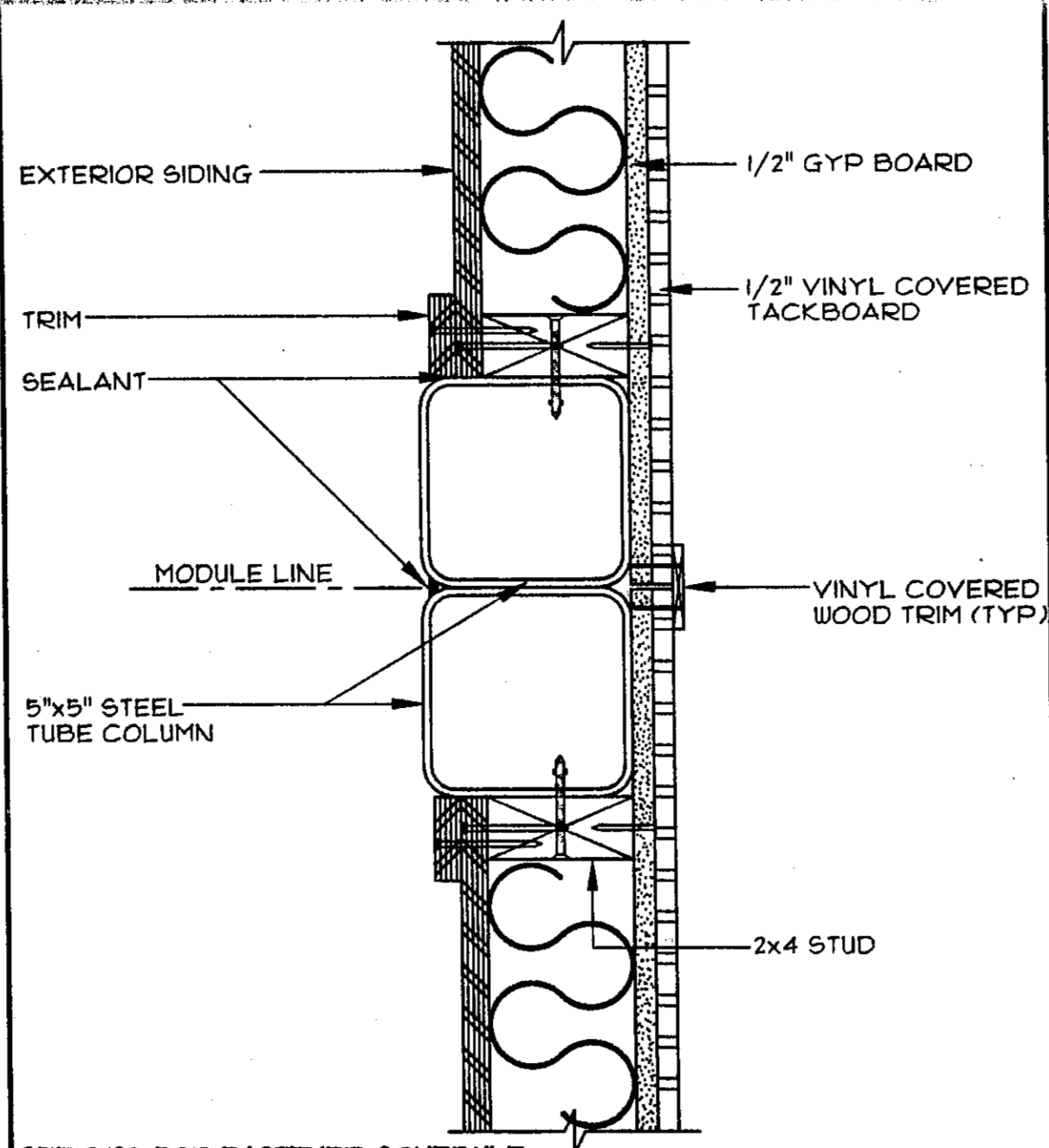


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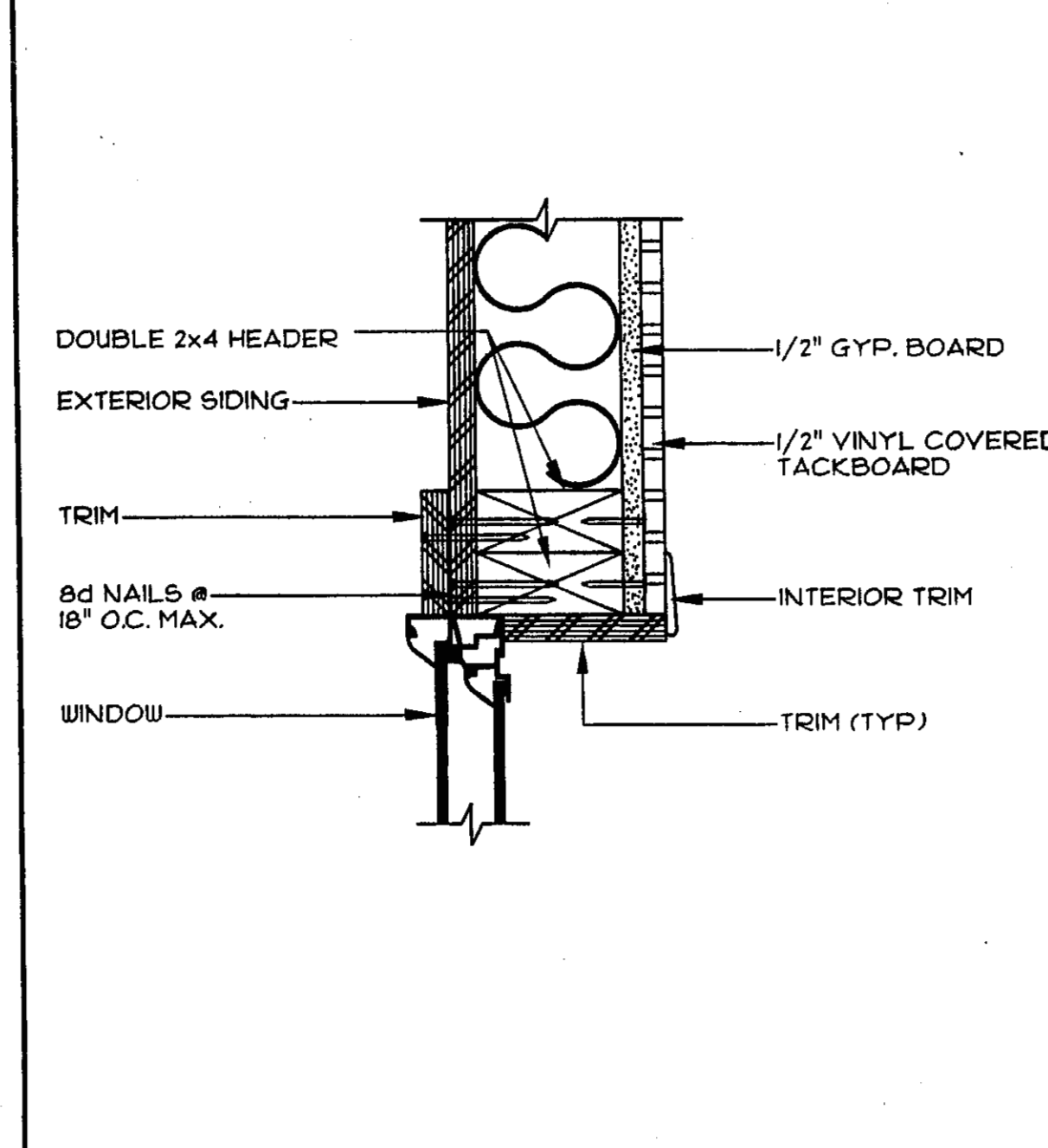
MECHANICAL & REFLECTED CEILING
PLANS - HVAC @ WALL SECTION
DETAILS - HVAC SPECIFICATIONS

REVISION DATE: BY:
DATE:
THIS MODULAR BLDG. HAS BEEN ENGINEERED BY A REGISTERED STRUCTURAL ENGINEER AND PREVIOUSLY REVIEWED & APPROVED BY THE DIVISION OF THE STATE ARCHITECT, FIRE & LIFE SAFETY AND ACCESS COMPLIANCE SECTION

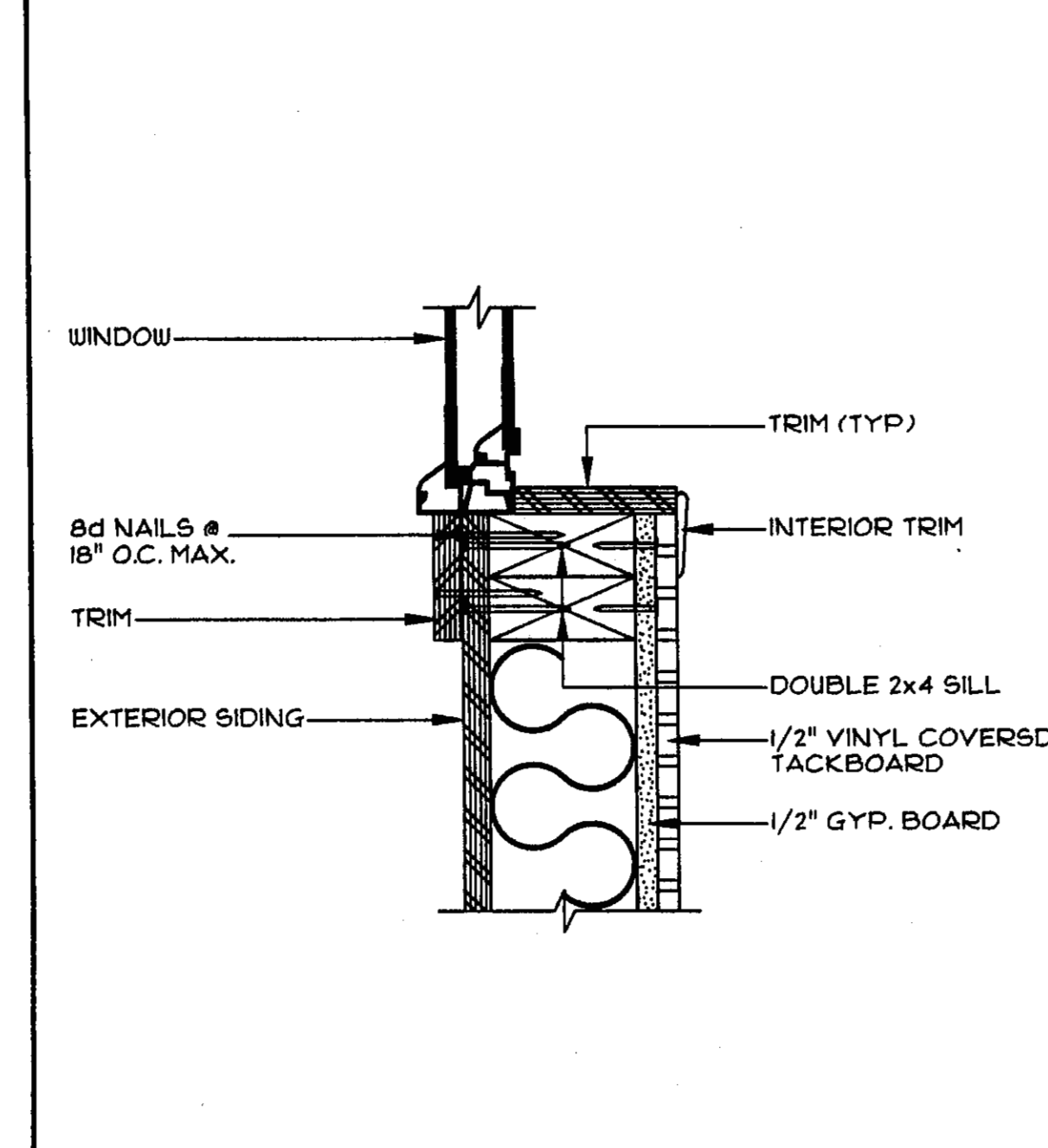
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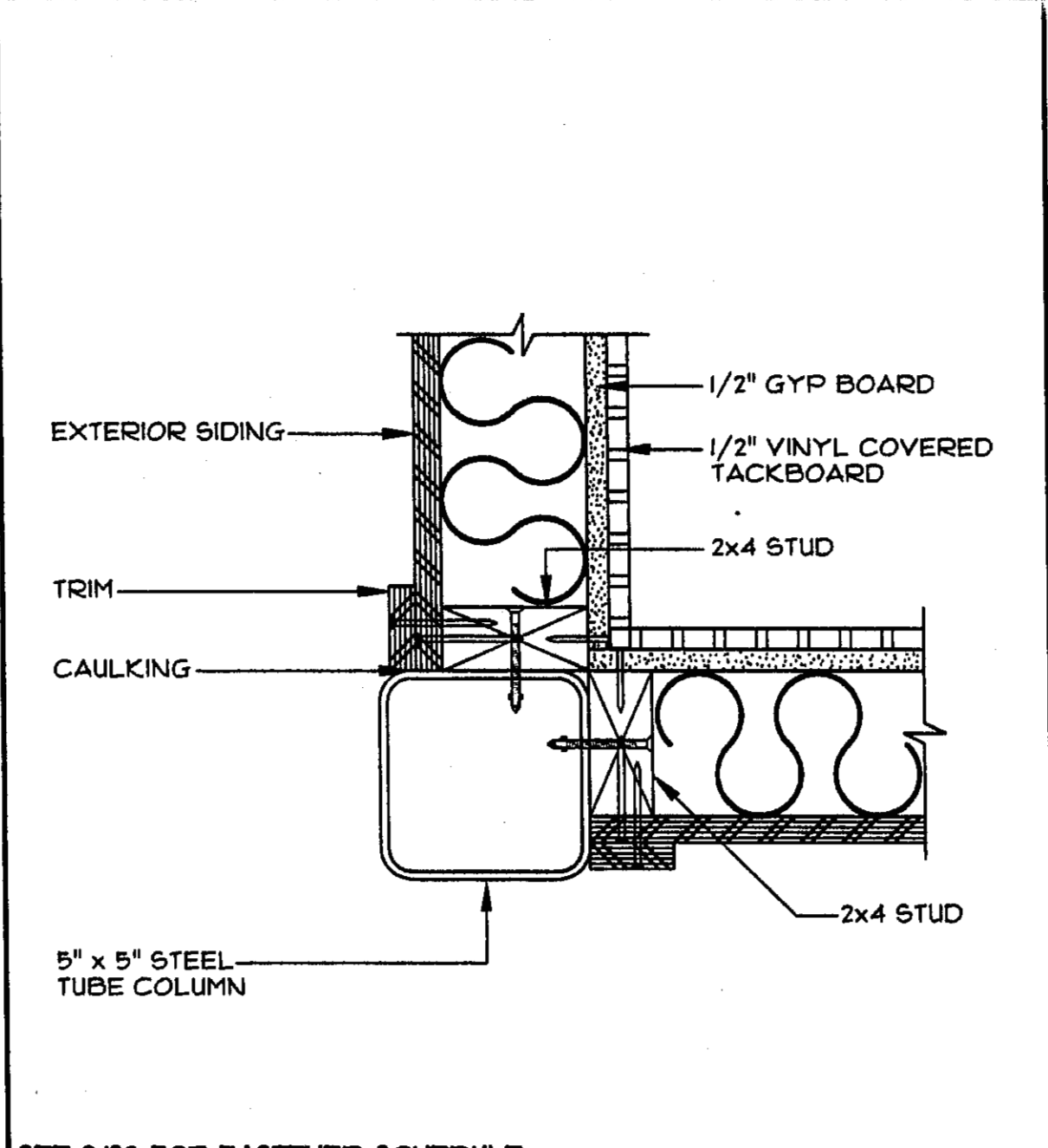
SEE 2/93 FOR FASTENER SCHEDULE
1 COLUMN SECTION AT MOD-LINE
SCALE: 3/4"=1'-0"



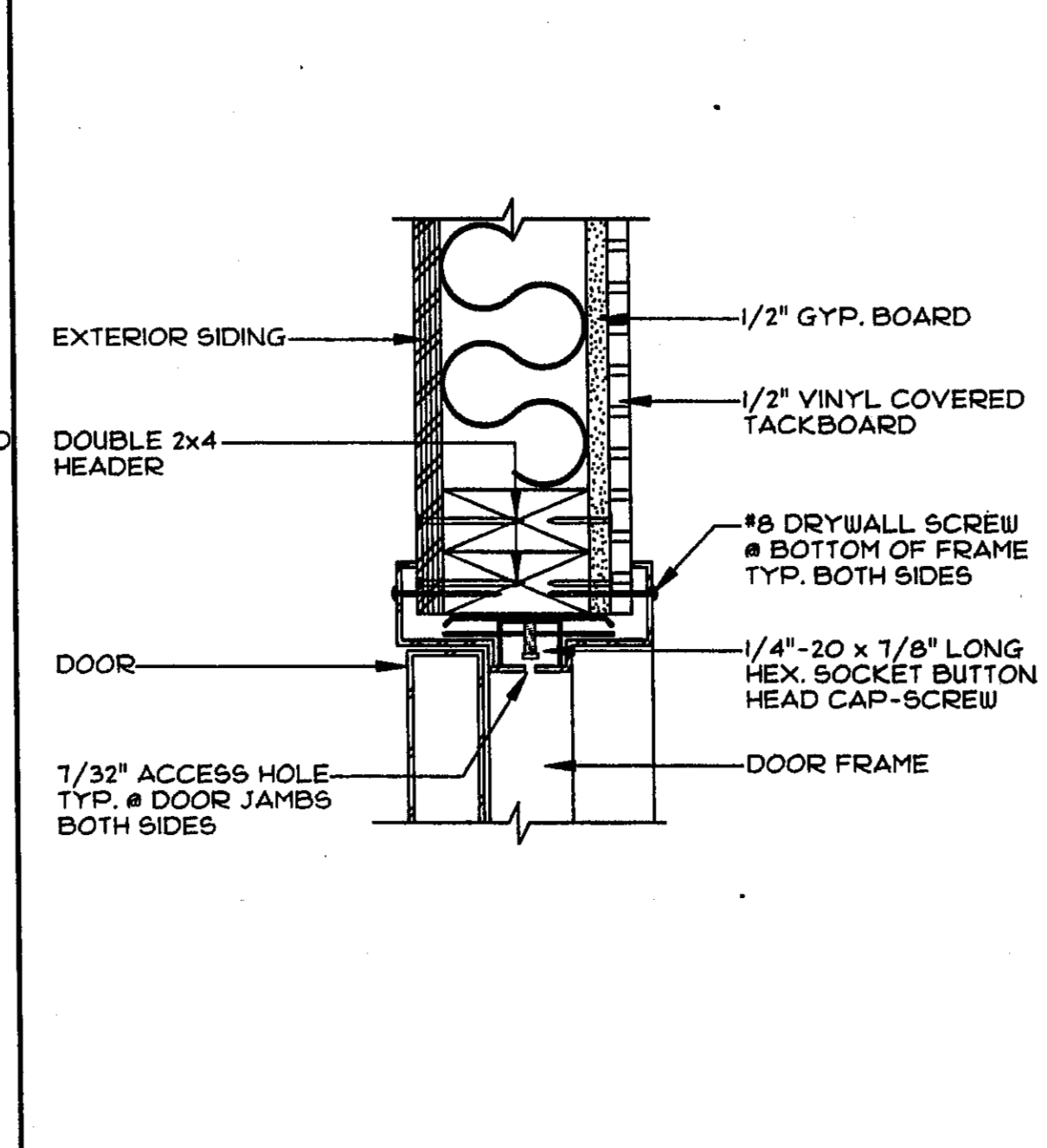
3 WINDOW HEADER (JAMB SIM'L)
SCALE: 3/4"=1'-0"



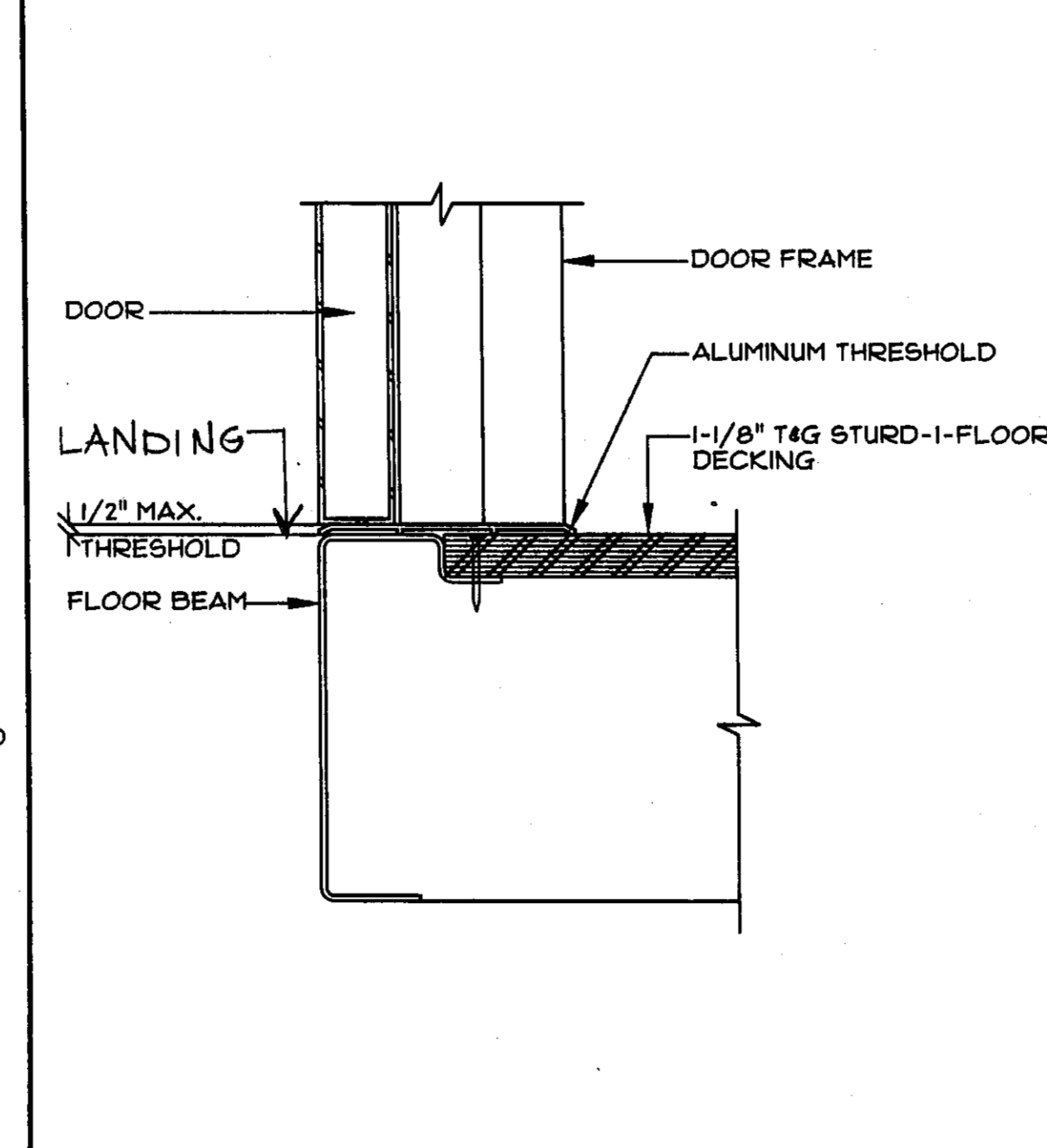
5 WINDOW SILL
SCALE: 3/4"=1'-0"



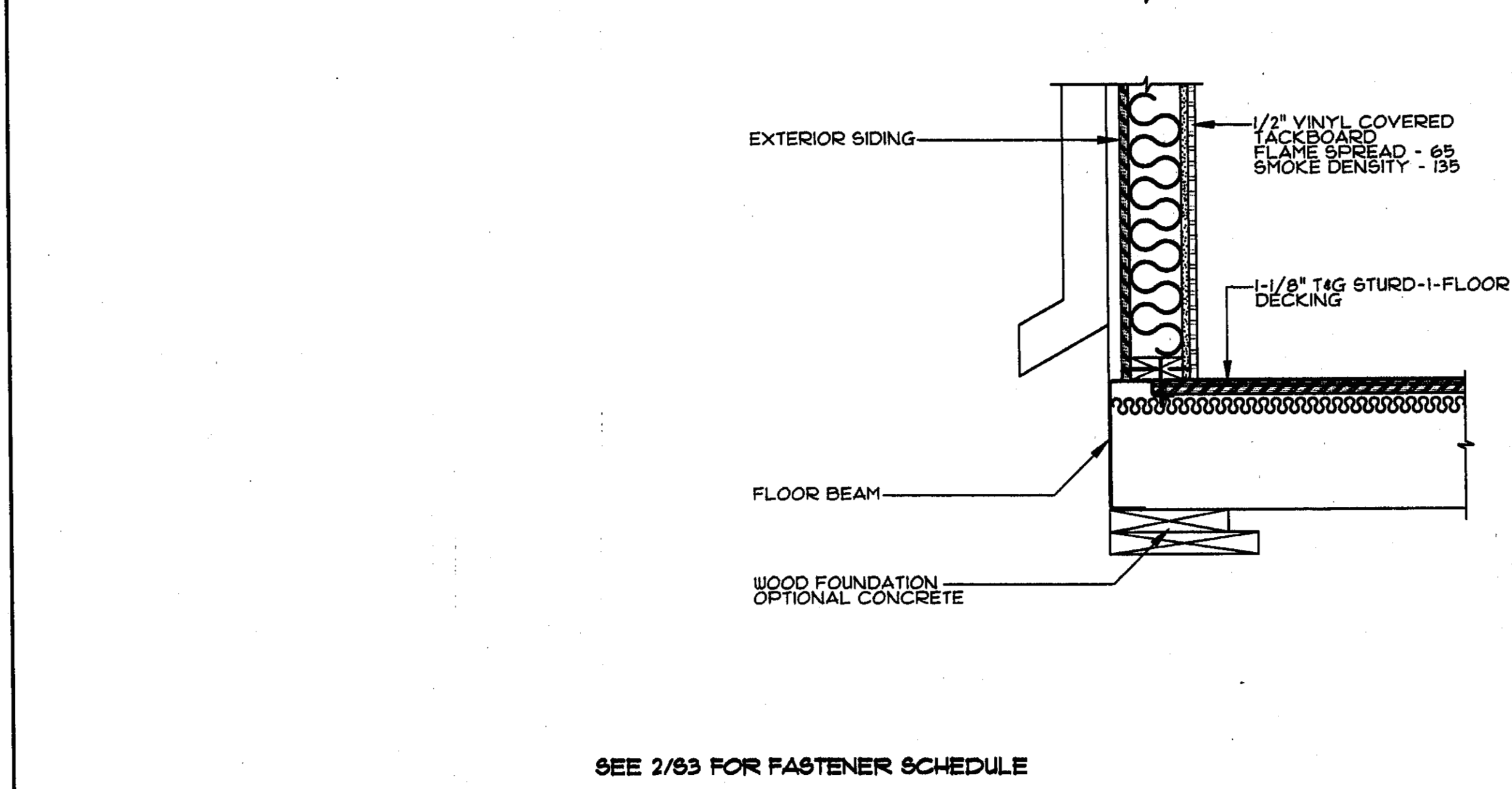
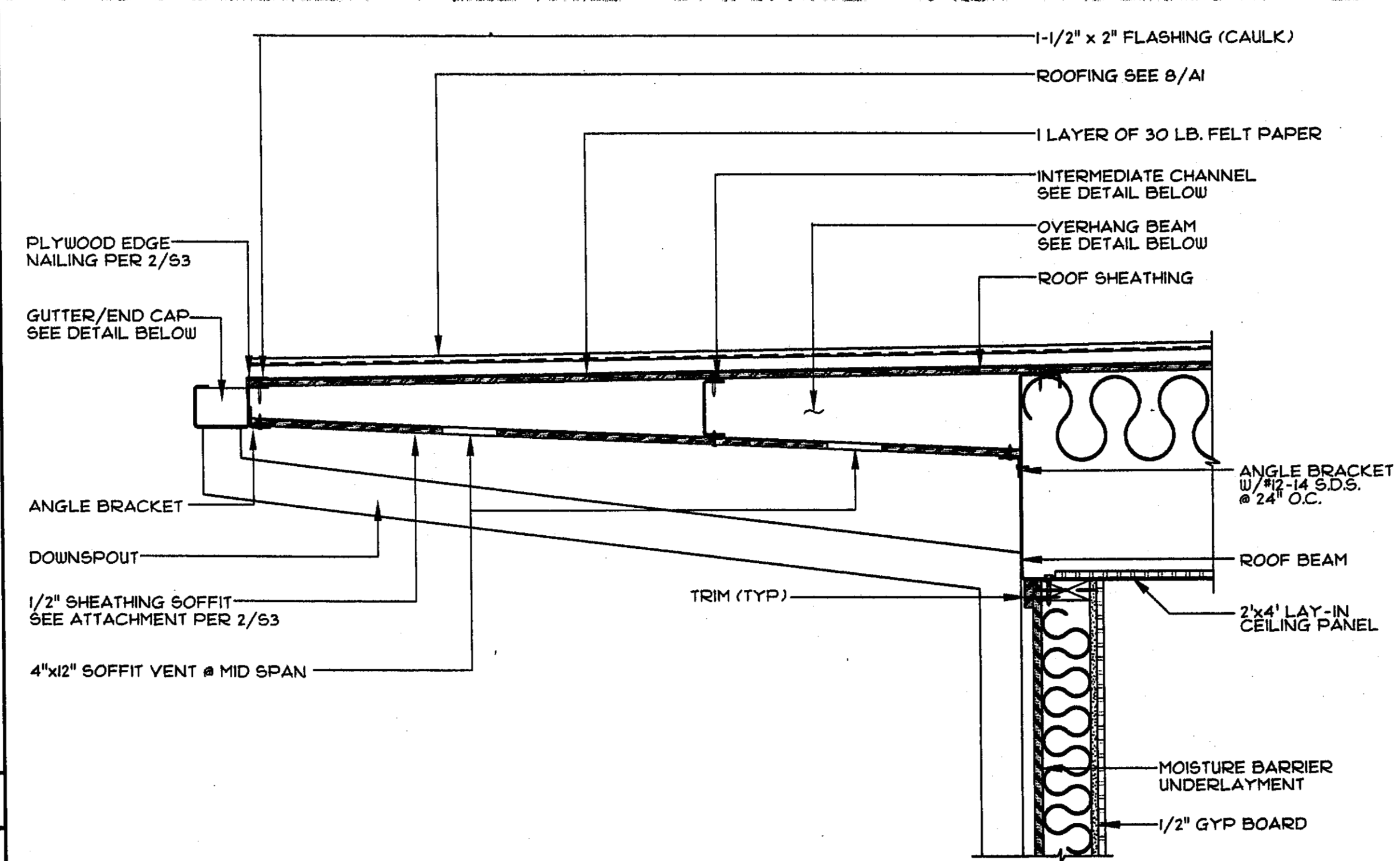
SEE 2/93 FOR FASTENER SCHEDULE
2 COLUMN SECTION @ CORNER
SCALE: 3/4"=1'-0"



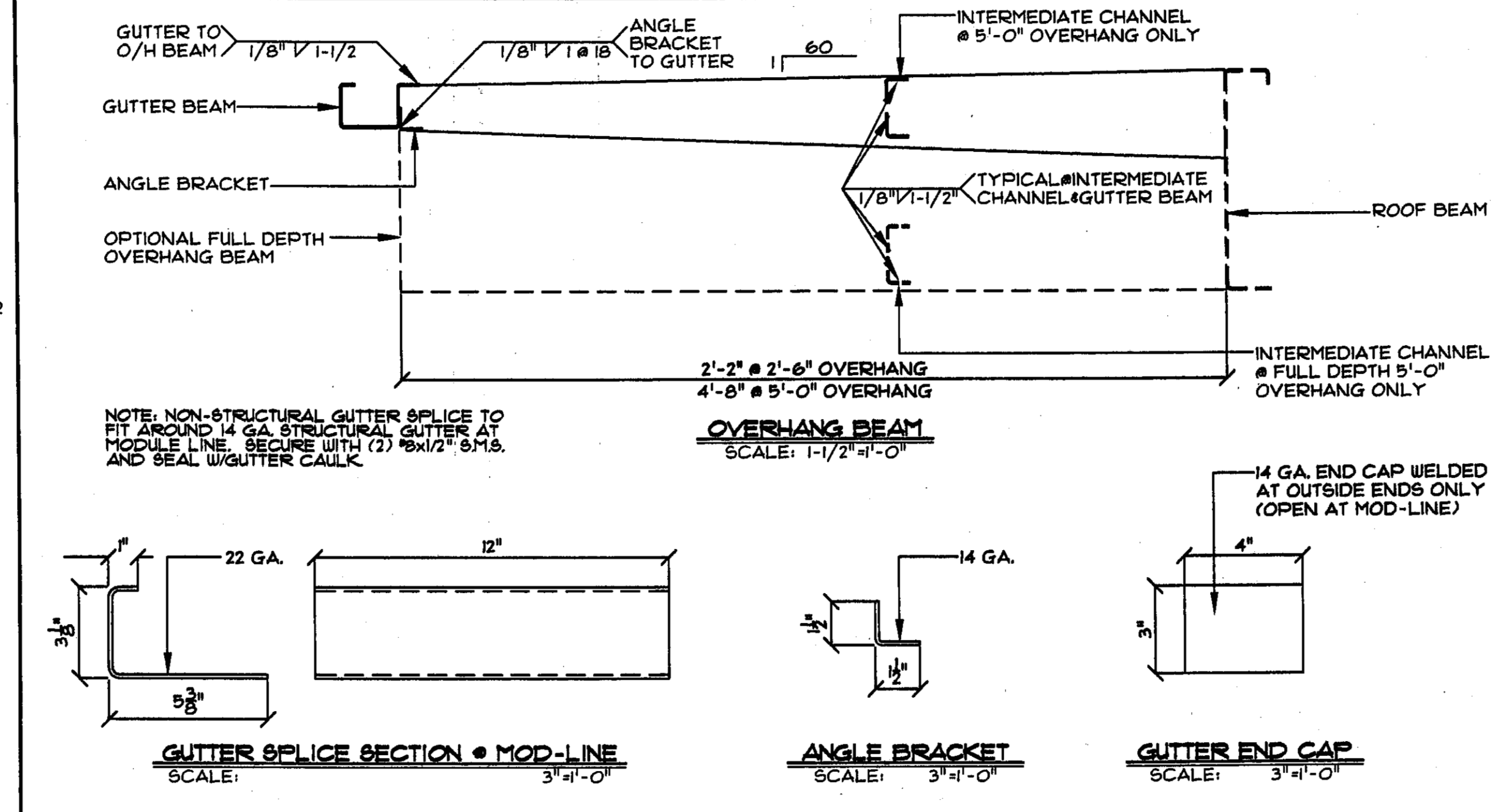
4 DOOR HEAD (JAMB SIM'L)
SCALE: 3/4"=1'-0"



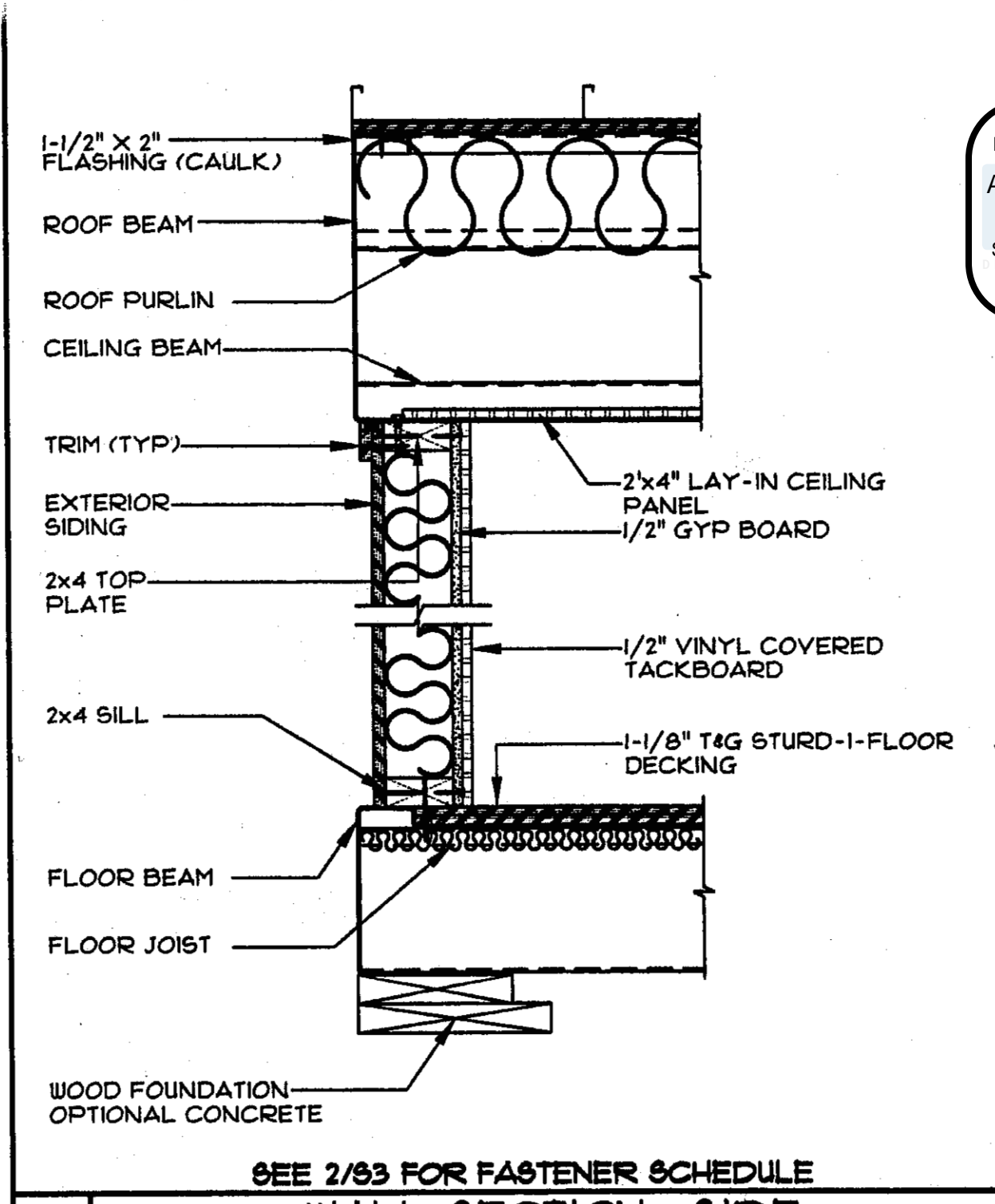
6 DOOR SILL
SCALE: 3/4"=1'-0"



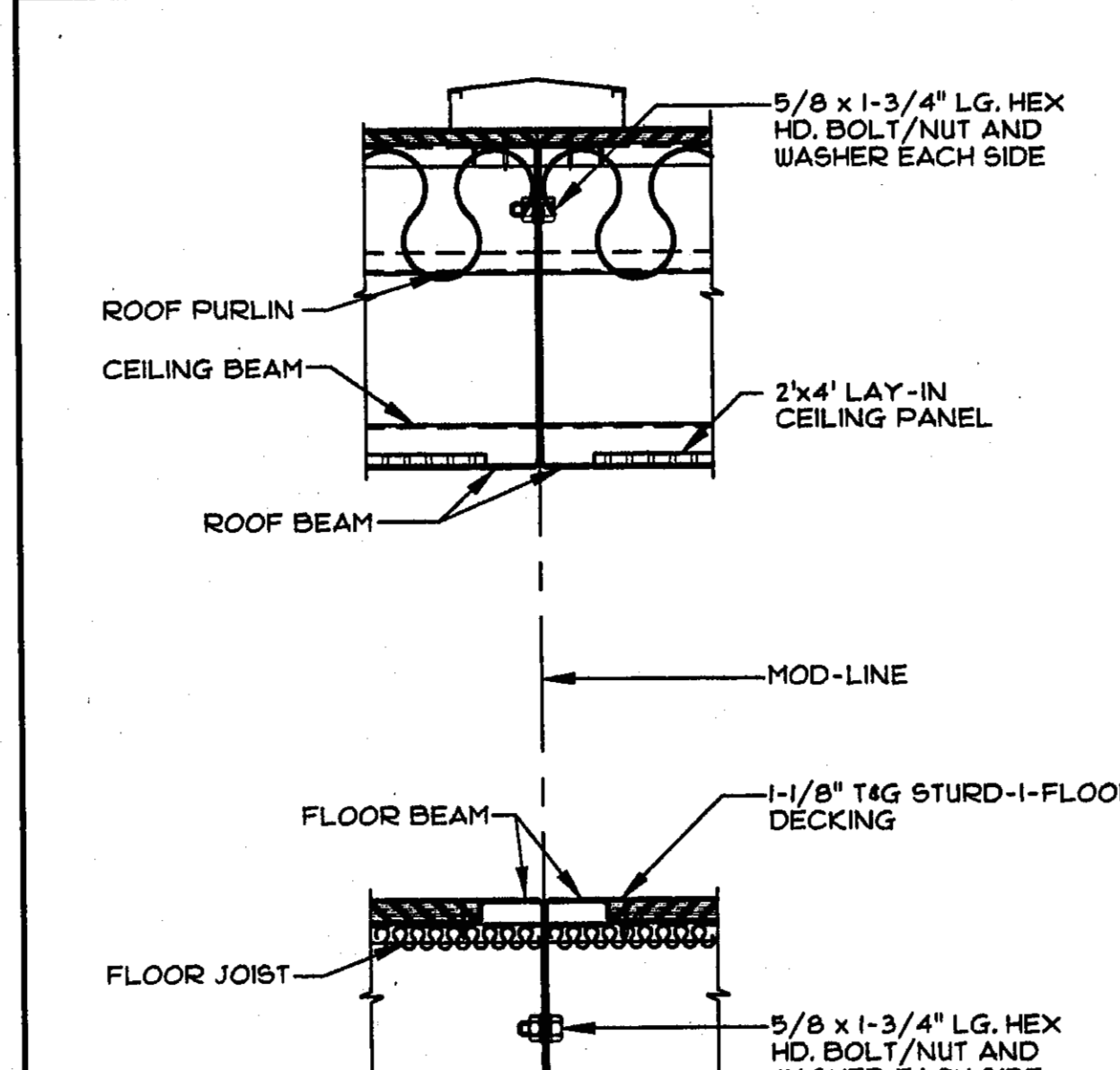
SEE 2/93 FOR FASTENER SCHEDULE
7 WALL SECTION- FRONT AND REAR
SCALE: 1-1/2"=1'-0"



8 OVERHANG SECTION & GUTTER DETAILS
SCALE: AS NOTED



SEE 2/93 FOR FASTENER SCHEDULE
9 WALL SECTION- SIDE
SCALE: 1-1/2"=1'-0"



SEE 2/93 FOR FASTENER SCHEDULE
10 WALL SECTION AT MOD-LINE
SCALE: 1-1/2"=1'-0"

DIVISION OF THE STATE ARCHITECT OFFICE OF REGULATION SERVICES

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
PC-271
DATE 5/10/96

DESIGN CRITERIA
ROOF: DEAD LOAD - 8.0 PSF
ROOF: LIVE LOAD - 20.0 PSF (SNOW)
FLOOR: DEAD LOAD - 8.0 PSF
FLOOR: LIVE LOAD - 50.0 PSF
(OPTIONAL) FLOOR: LIVE LOAD - 70.0 PSF
(OPTIONAL) FLOOR: LIVE LOAD - 125.0 PSF
WALLS: DEAD LOAD - 8.0 PSF
WIND: 80 MPH; EXPOSURE: C
qs=16.4 PSF; Cs=1.06; Cq AS REQ.
SEISMIC: ZONE 4, R=6, C=2.75

THIS MODULAR BLDG. HAS BEEN ENGINEERED BY A REGISTERED STRUCTURAL ENGINEER AND PREVIOUSLY REVIEWED & APPROVED BY THE DIVISION OF THE STATE ARCHITECT, FIRE & LIFE SAFETY AND ACCESS COMPLIANCE SECTION

11 APPROVALS

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-123006 INC.
REVIEWED FOR
SS ☒ FLS ☒ ACS ☒
DATE: 12/20/2024

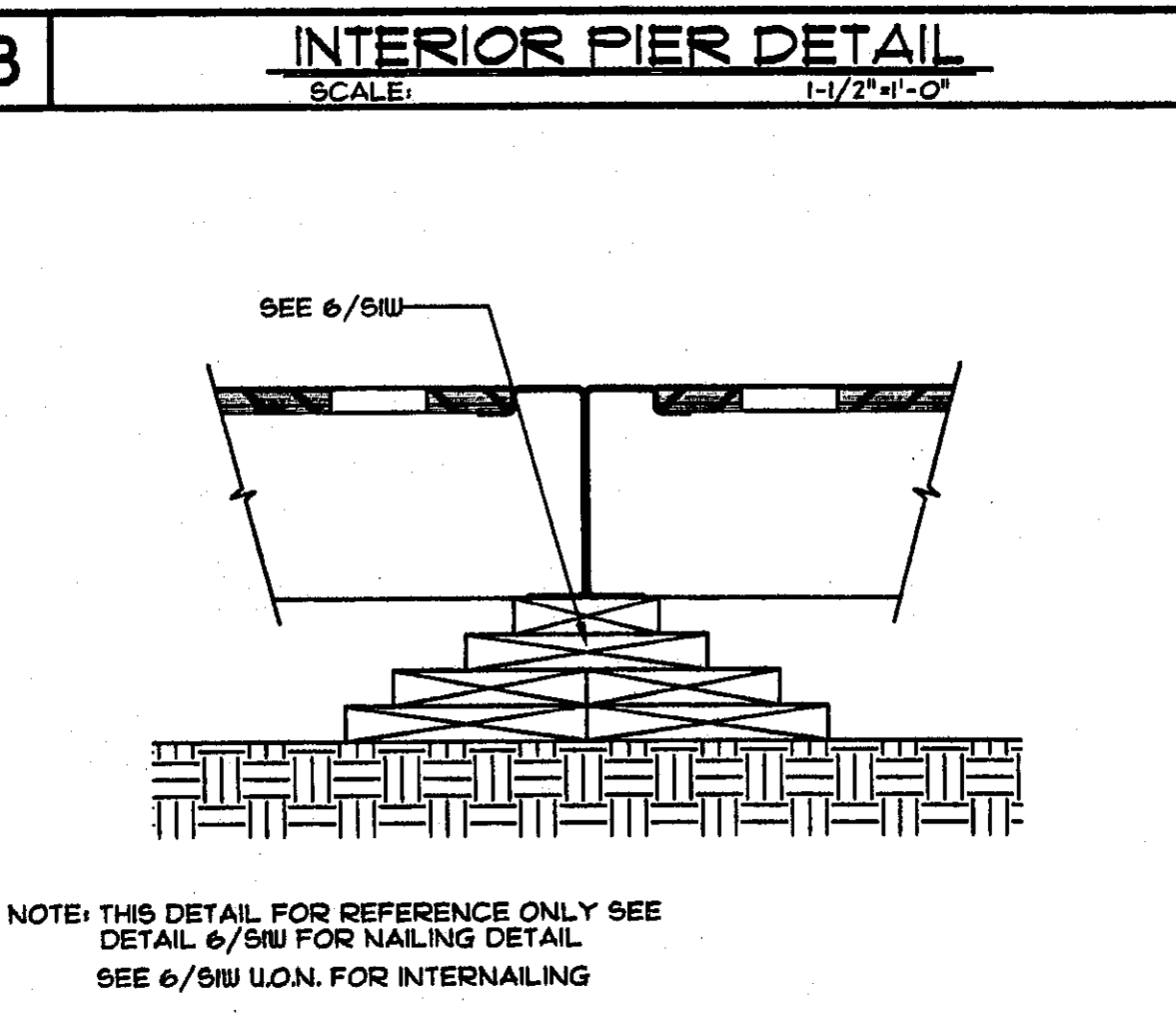
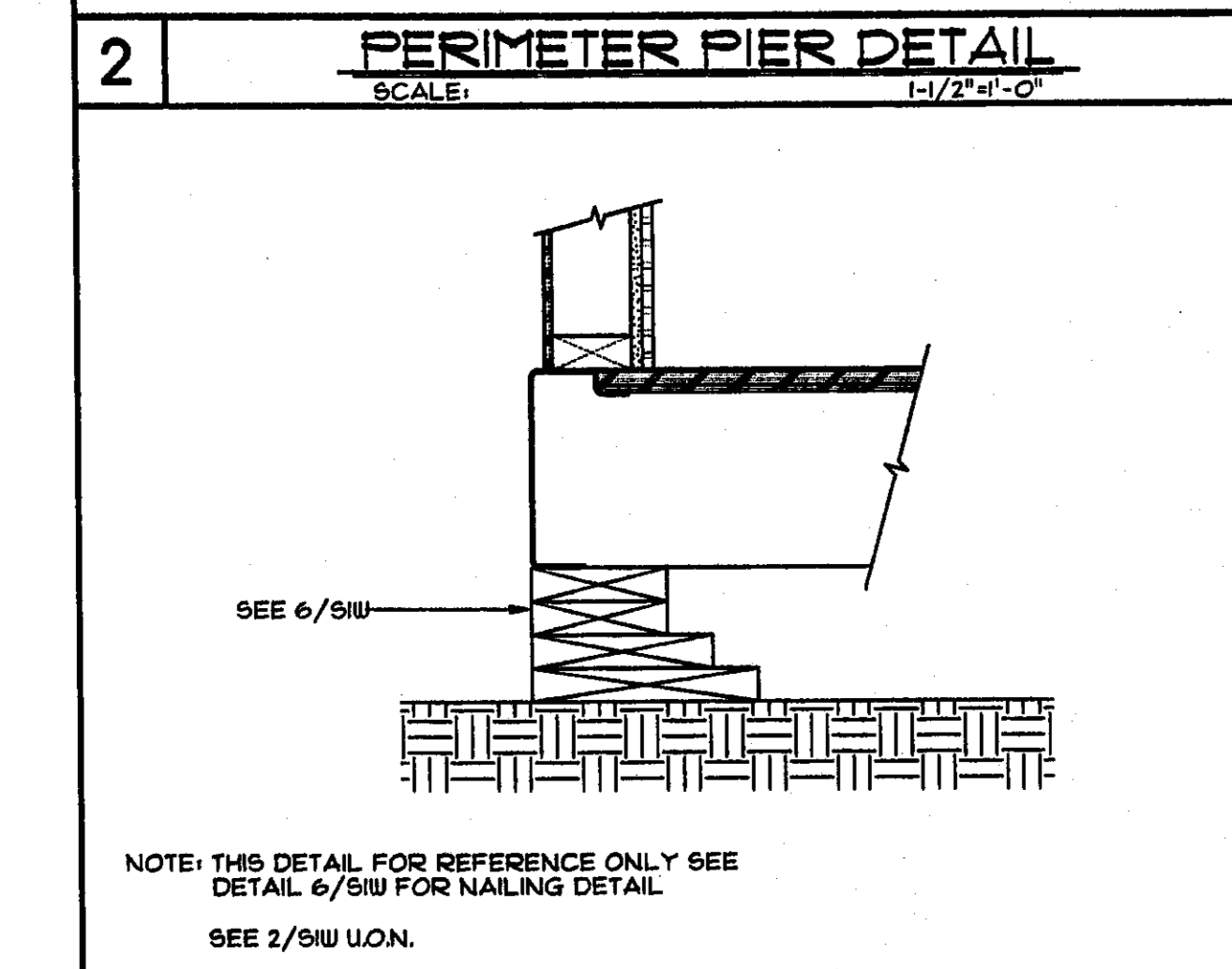
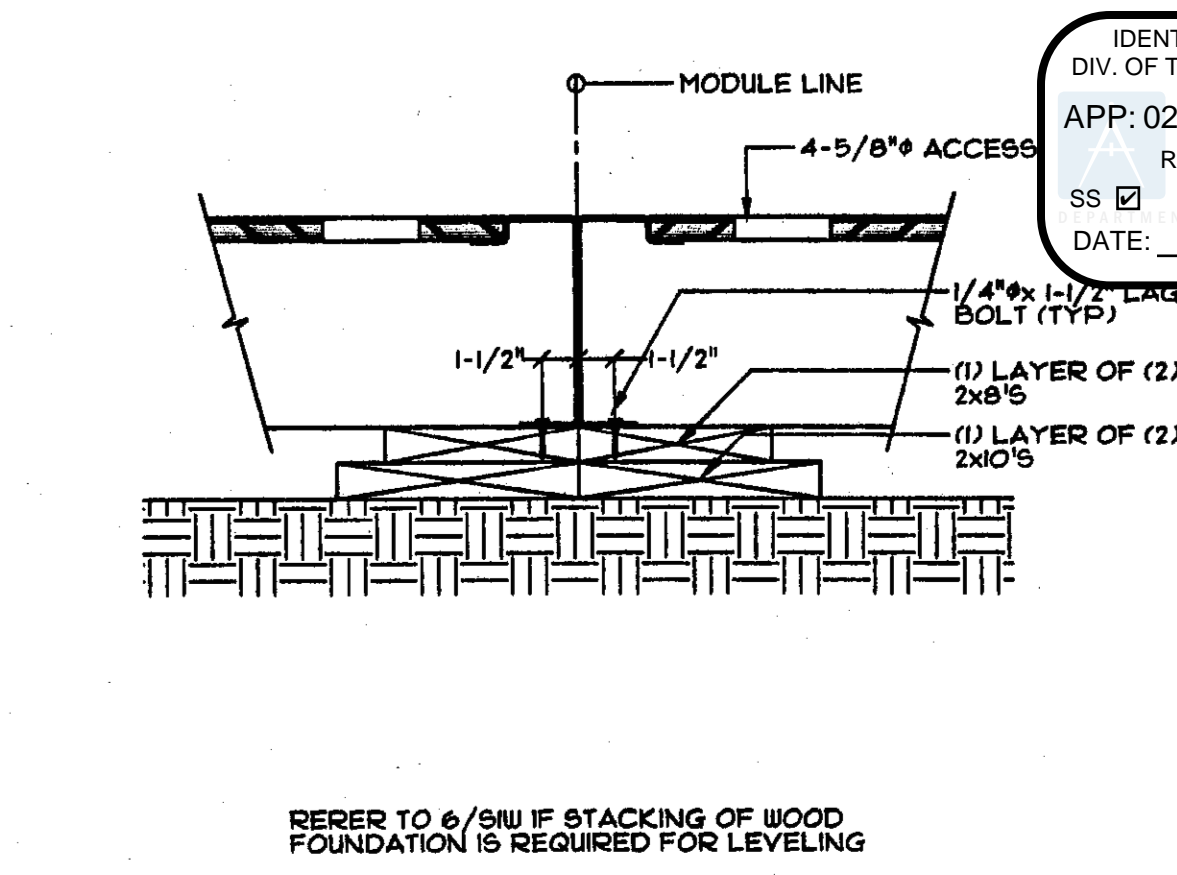
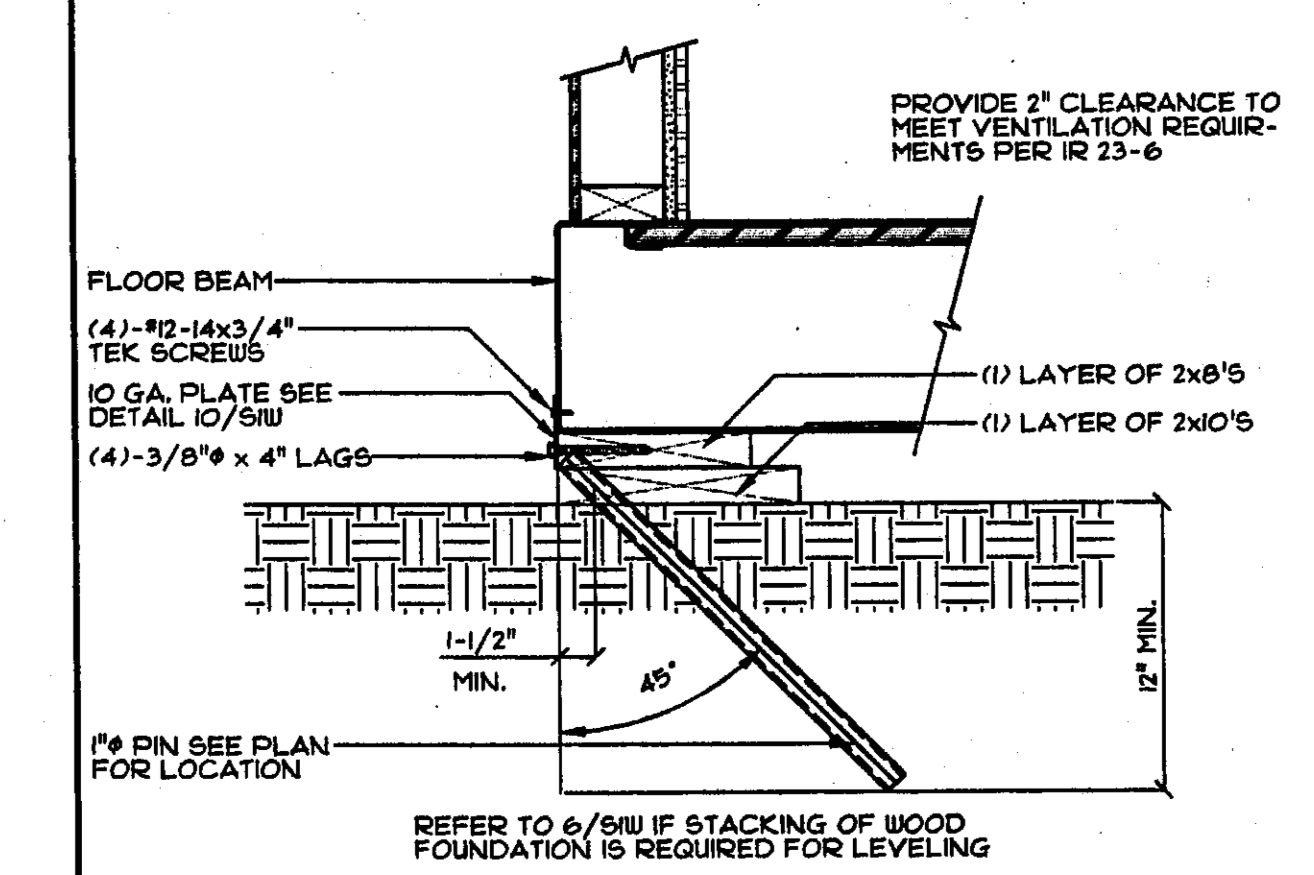
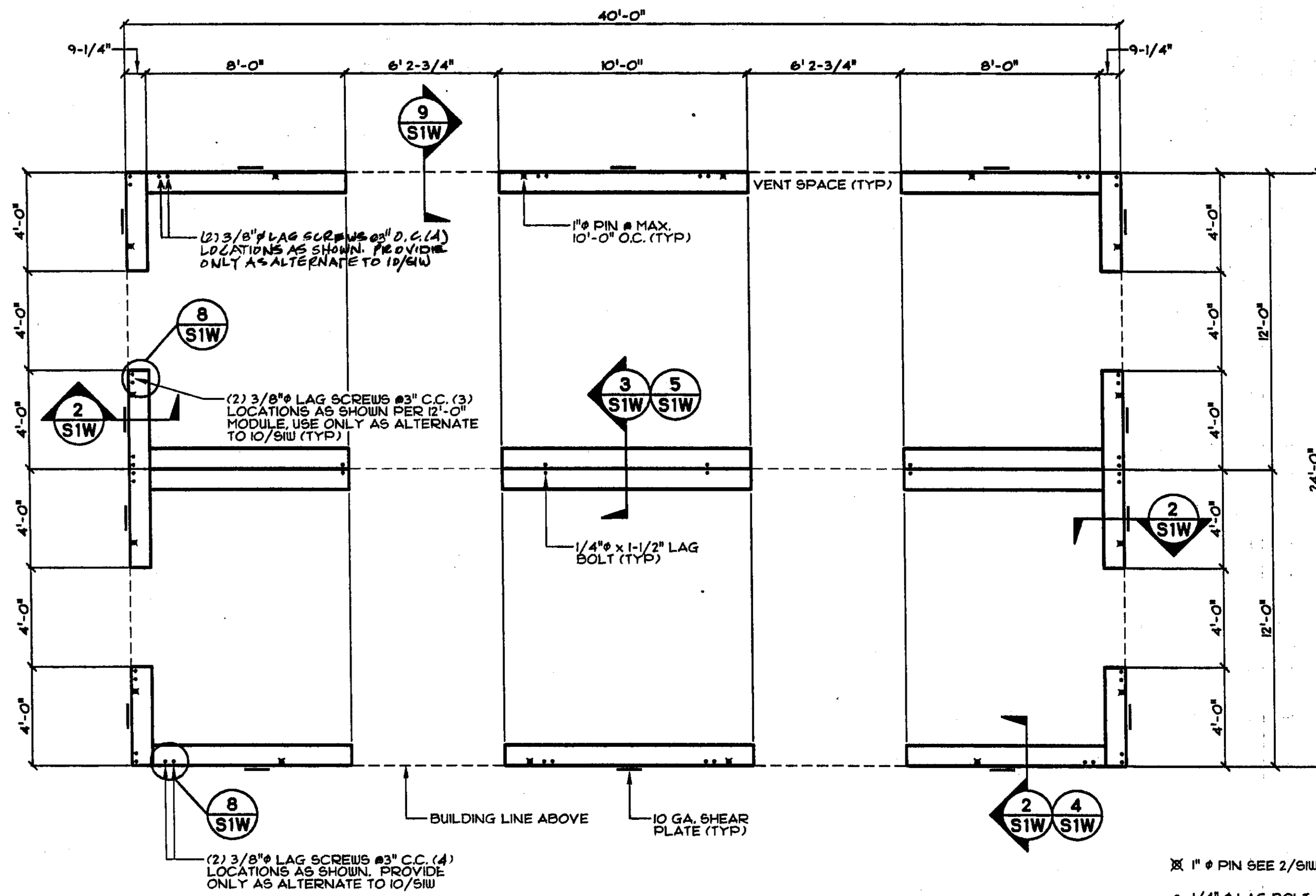
ENVIROPLEX, INC.
4777 E. CARPENTER ROAD STOCKTON, CA. 95215

SECTIONS AND DETAILS

REVISION DATE: BY:

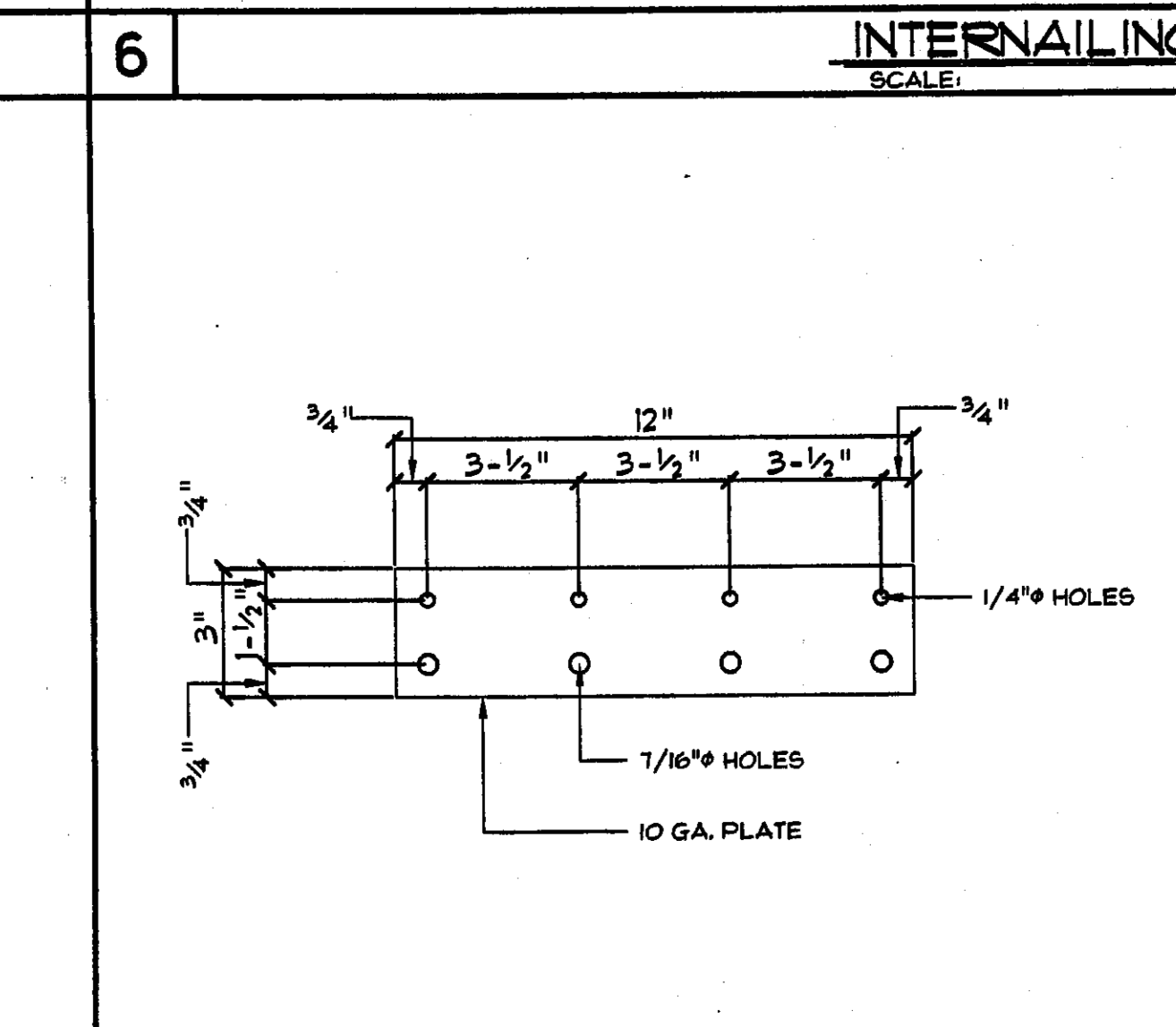
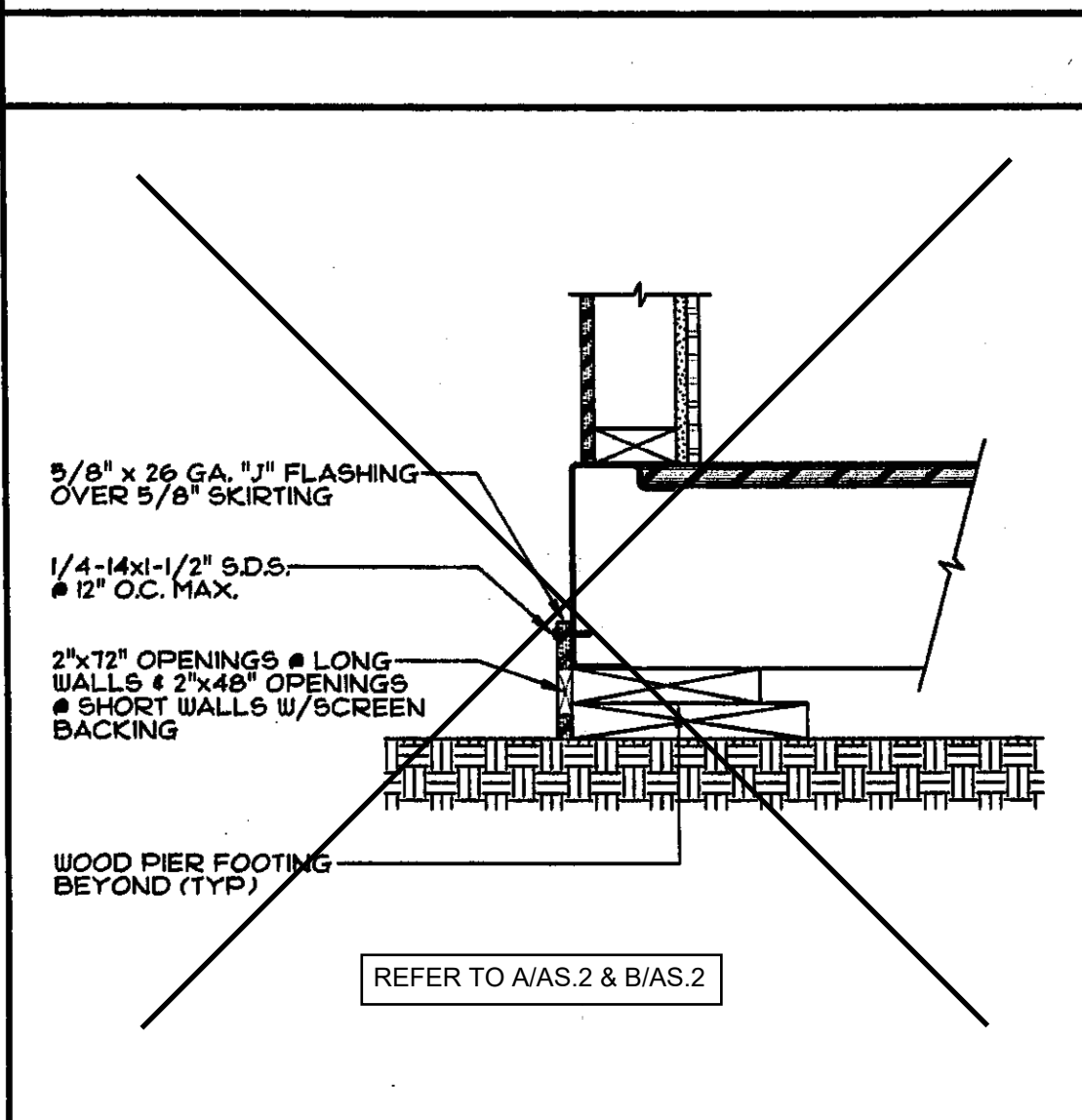
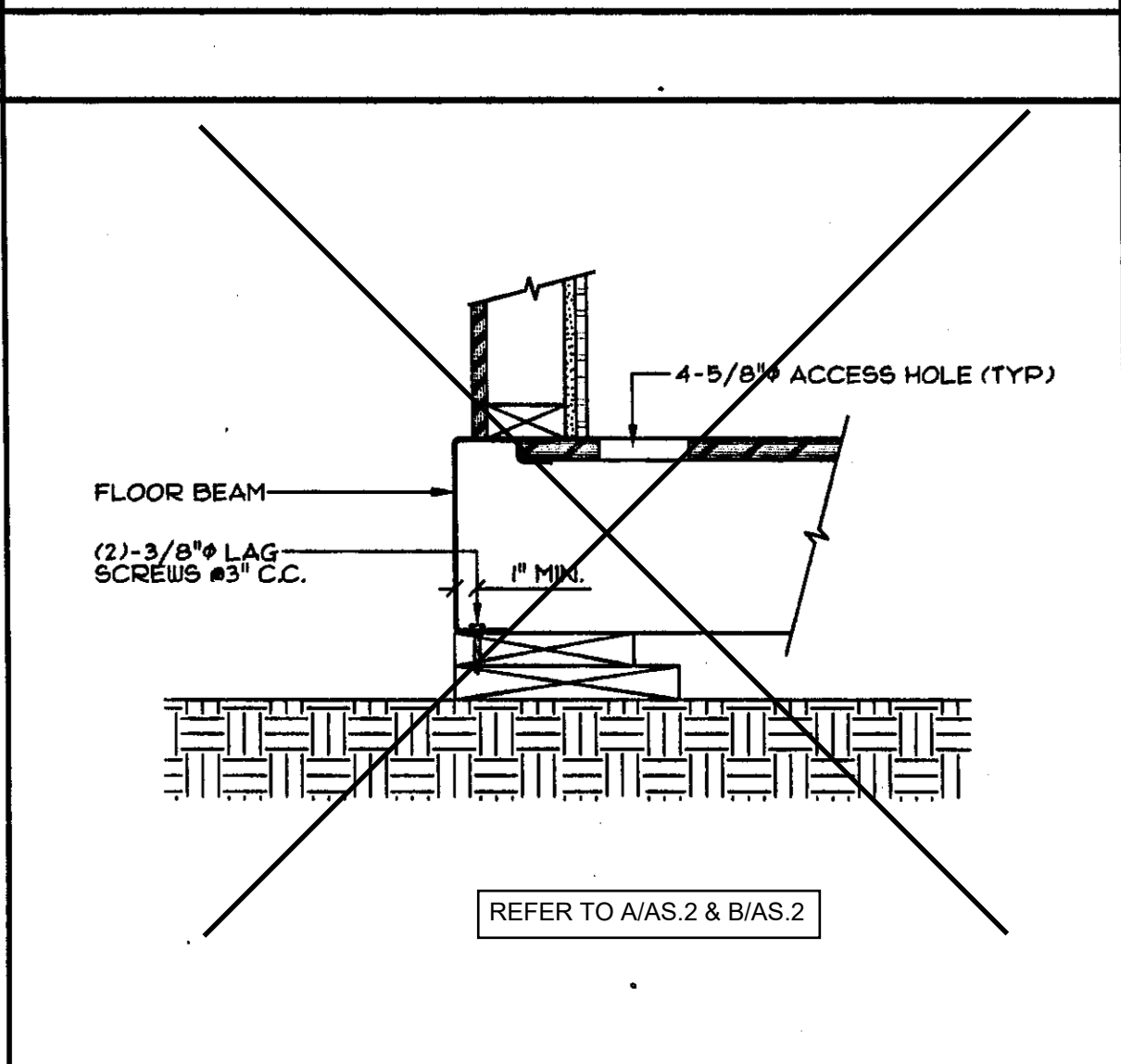
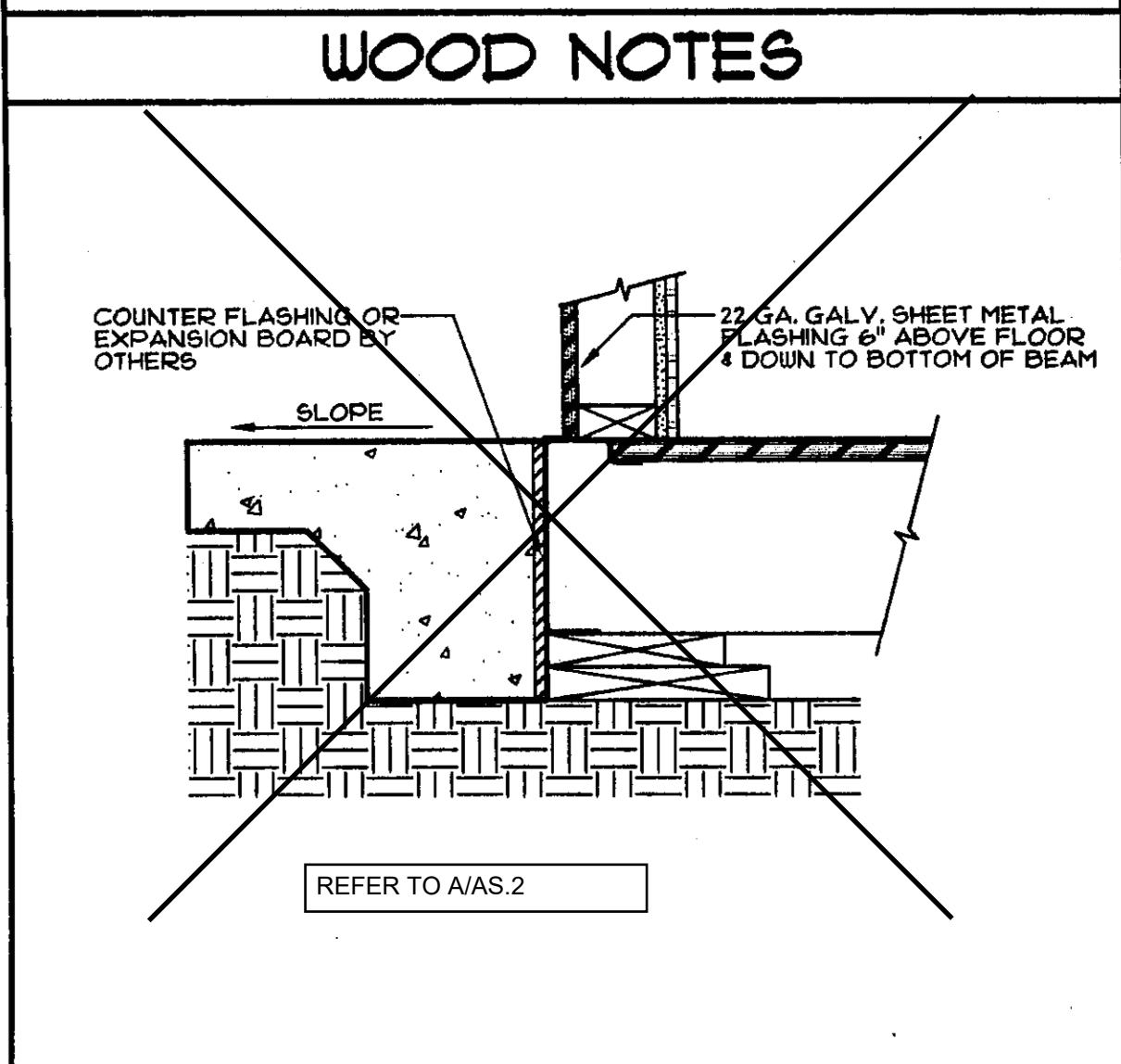
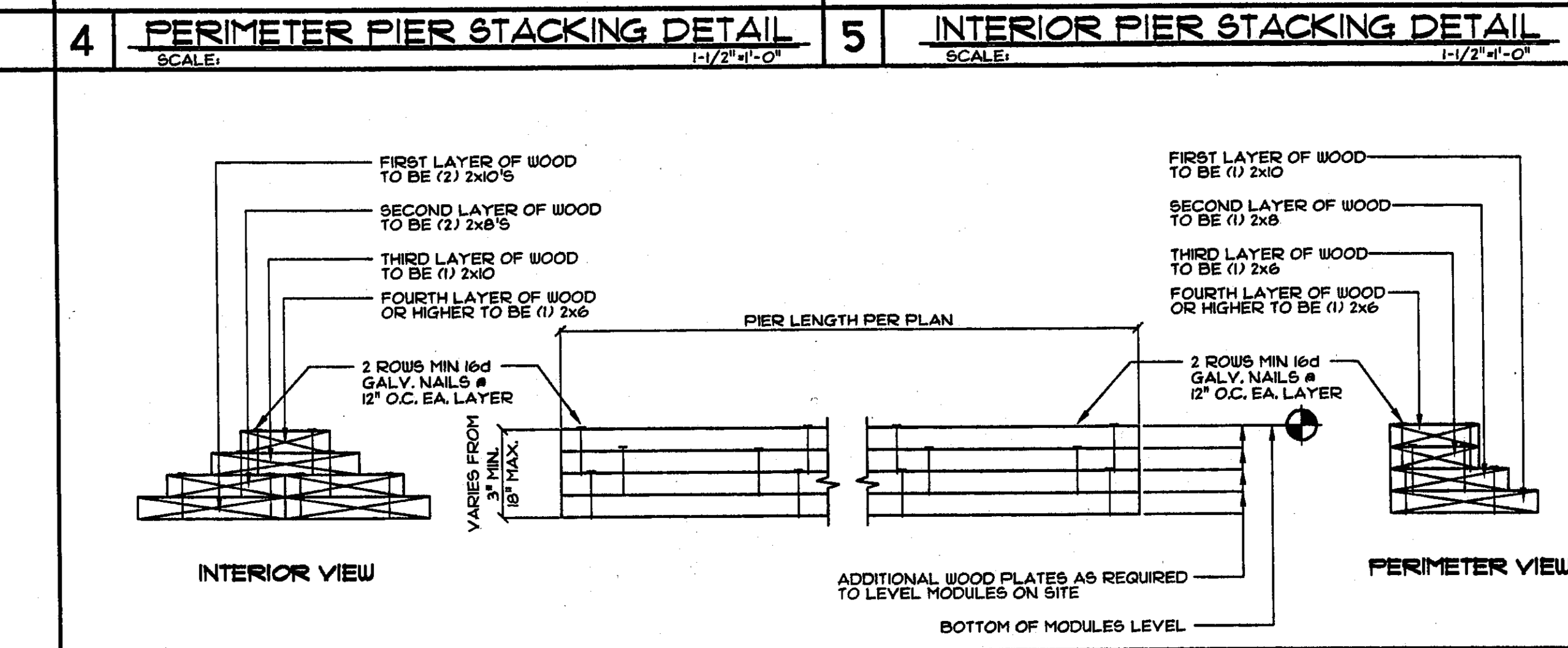
DATE:

A4



24' x 40' WOOD FOUNDATION PLAN
SCALE: 1/4" = 1'-0"

- BOTTOM LAYER OF PIERS SHALL BE PRESSURE TREATED HEM FIR NO. 2 OR BETTER. FOUNDATION GRADE WOOD IN CONTACT WITH SOIL SHALL BE PRESERVATIVE TREATED & SHALL BE STAMPED "FOR GROUND CONTACT". PRESERVATIVE TREATED MATERIAL SHALL BE VERIFIED BY A CERTIFICATE OF TREATMENT STATING, "THE MATERIAL IN THIS UNIT WAS TREATED PER UNIFORM BUILDING CODE, SECTION 2303A1". EACH PIECE PRESERVATIVE TREATED MATERIAL SHALL BE STAMPED WITH THE APPROPRIATE STAMP.
- CORROSION RESISTANT NAILS SHALL BE IN ACCORDANCE WITH SECTION 2325A1 C.B.C.
- SHIM PIERS AS REQUIRED WITH APA RATED PLYWOOD MADE WITH EXTERIOR GLUE. SHIMS SHALL BE CONTINUOUS ACROSS LENGTH OF PIERS AS FIELD CONDITIONS ALLOW. PLYWOOD SHIMS SHALL NOT BE IN DIRECT CONTACT WITH THE SOIL.
- SOIL BEARING PRESSURE IS ASSUMED AT 1000 P.S.F.
- FOUNDATION SHOWN ON (2) LAYERS OF WOOD. ANY ADDITIONAL LAYERS OF WOOD ARE TO BE STACKED AS PER STACKING DETAILS 4/SIW, 5/SIW & 6/SIW.
- VENTILATION TO MEET REQUIREMENTS PER IR 23-6. PROVIDE MIN. 6.4 SQ. FT. OF VENT SPACE. (PROVIDE 2" MIN. CLR.)



WOOD FOUNDATION PLAN FOOTING DETAILS - NOTES

WOOD NOTES

COUNTER FLASHING OR EXPANSION BOARD OR OTHERS

22 GA. GALV. SHEET METAL FLASHING 6" ABOVE FLOOR & DOWN TO BOTTOM OF BEAM

SLOPE

REFER TO A/AS.2

FLOOR BEAM

(2) 3/8" LAG SCREWS #3" C.C.

4-5/8" ACCESS HOLE (TYP.)

1" MIN.

REFER TO A/AS.2 & B/AS.2

5/8" x 26 GA. "J" FLASHING OVER 5/8" SKIRTING

1/4-1 1/2" S.D.S. #12" O.C. MAX.

2"x12" OPENINGS & LONG WALLS & 2"x48" OPENINGS & SHORT WALLS w/SCREEN BACKING

WOOD PIER FOOTING BEYOND (TYP.)

REFER TO A/AS.2 & B/AS.2

INTERNAILING OF WOOD PIERS
SCALE: 1/2" = 1'-0"

DIVISION OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
12 101458
8/31/99

REVISED
IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
PC-271
DATE 4/8/97

DESIGN CRITERIA

ROOF: DEAD LOAD - 8.0 PSF
ROOF: LIVE LOAD - 20.0 PSF (SNOW)

FLOOR: DEAD LOAD - 8.0 PSF
FLOOR: LIVE LOAD - 50.0 PSF

WALLS: DEAD LOAD - 8.0 PSF
WIND: 80 MPH - EXPOSURE: C
q=15.4 PSF; Ce=1.05; Cq AS REQ.
SEISMIC: ZONE 4, Rw=6, C2.75

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7 PERIMETER FLASHING DETAIL SCALE: 1/2" = 1'-0"
8 ALTERNATE PERIMETER DETAIL SCALE: 1/2" = 1'-0"
9 PERIMETER SKIRTING DETAIL SCALE: 1/2" = 1'-0"
10 SHEAR PLATE SCALE: 3/4" = 1'-0"
11 APPROVAL

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-123006 INC:
REVIEWED FOR:
SS ☒ FLS ☒ ACS ☒
DATE: 12/20/2024

PROFESSOR
JOHN H. LAWDER
No. 5310
Exp. 3-31-97
STRUCTURAL
STATE OF CALIFORNIA
1/3/99

ENVIROPLEX, INC.
4777 E. CARPENTER ROAD STOCKTON, CA 95215

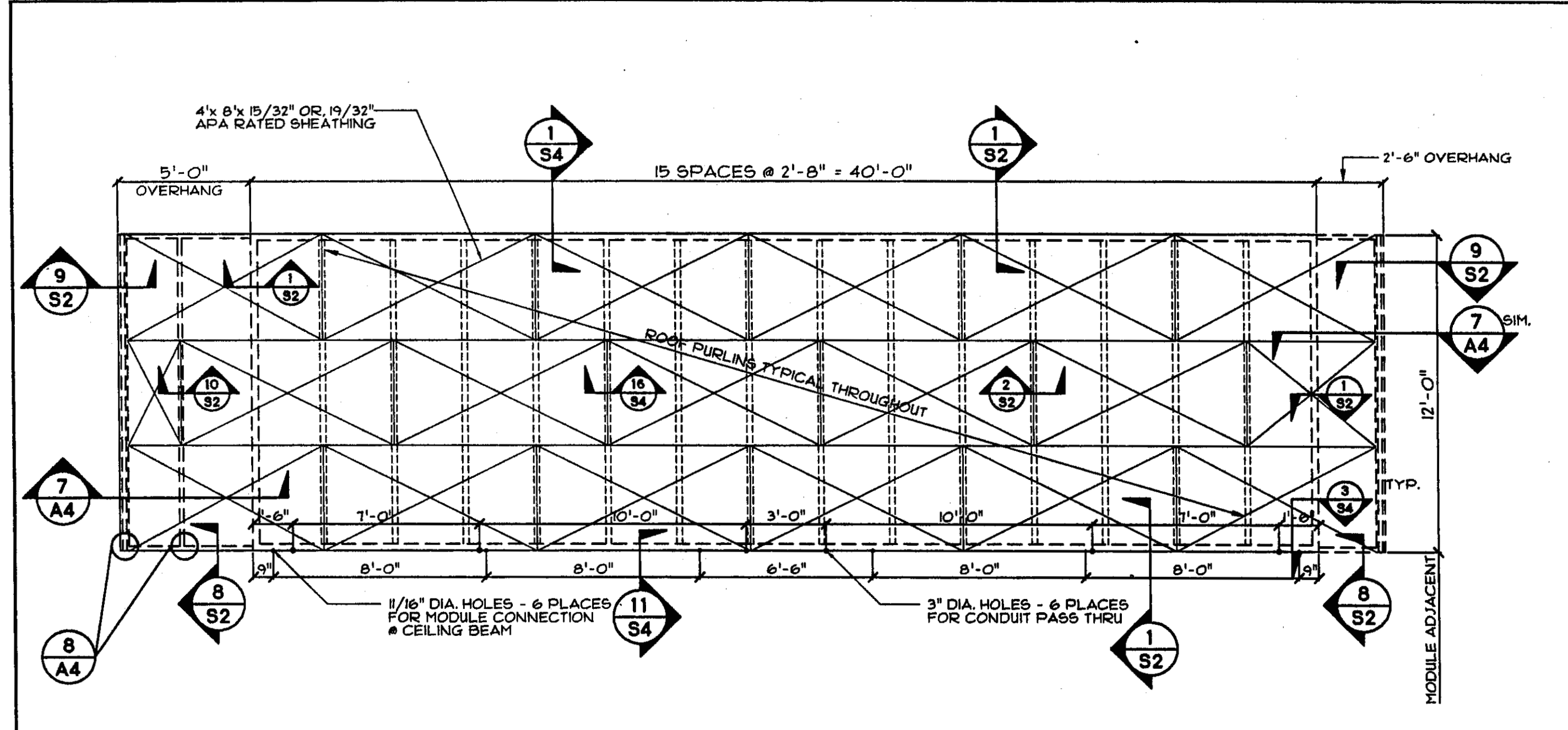
WOOD FOUNDATION PLAN
FOOTING DETAILS - NOTES

REVISION DATE: BY:

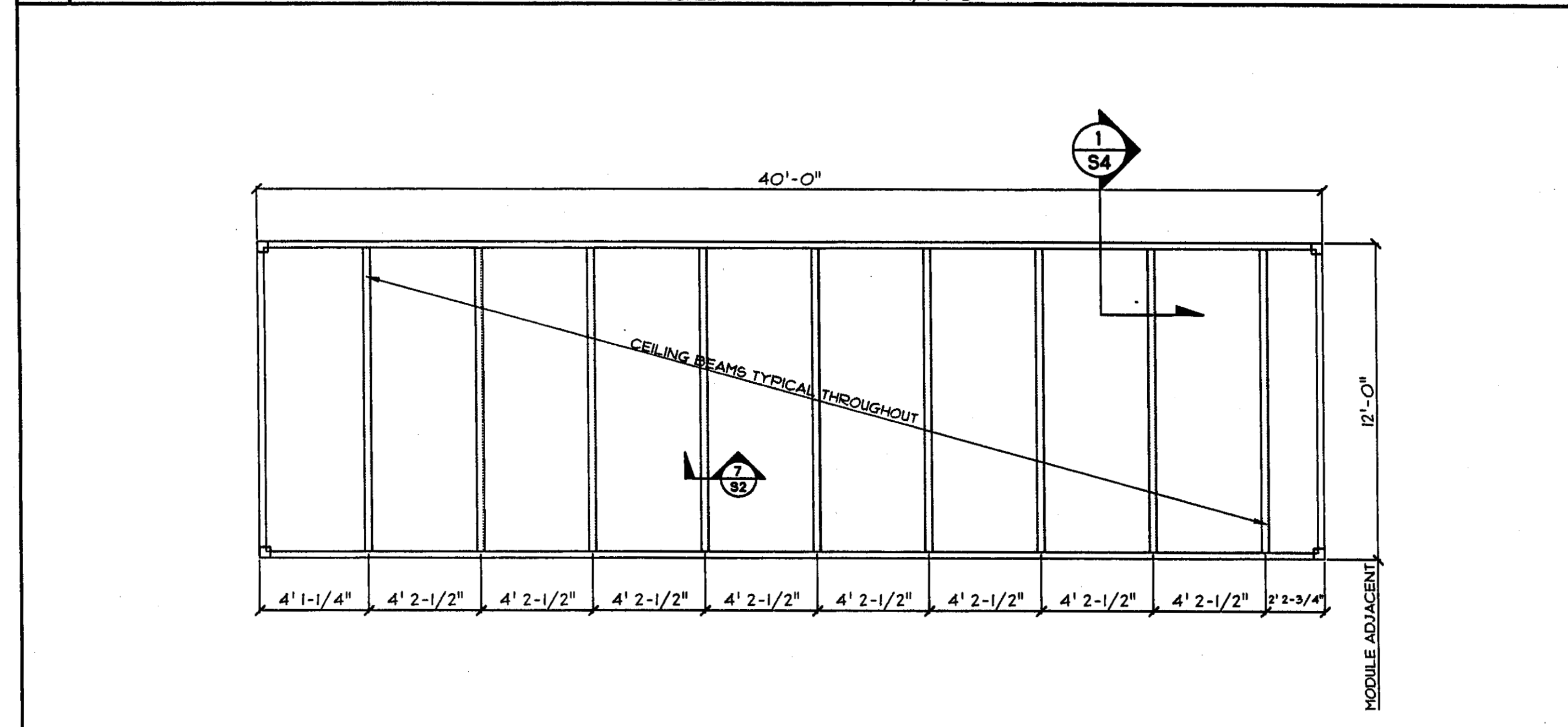
DATE:

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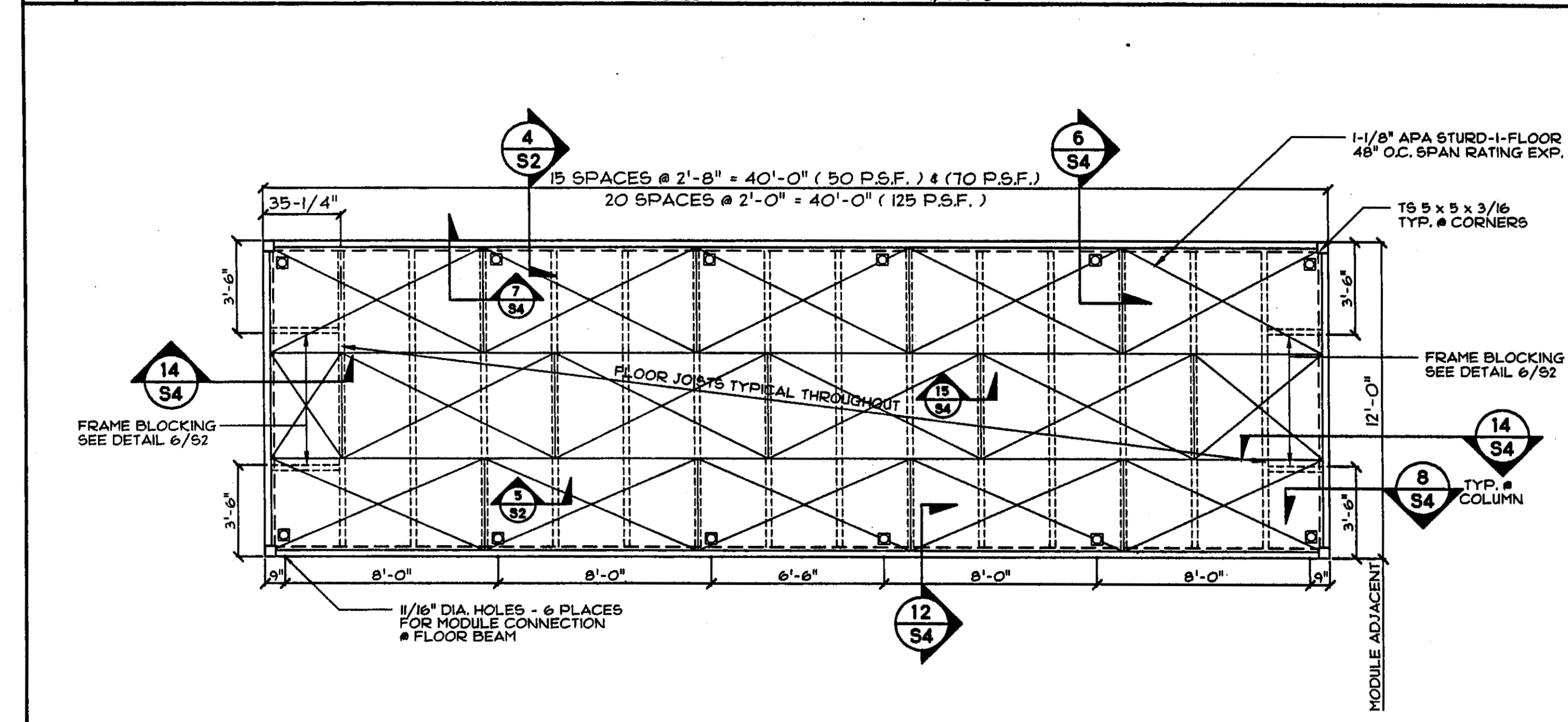
SIW50



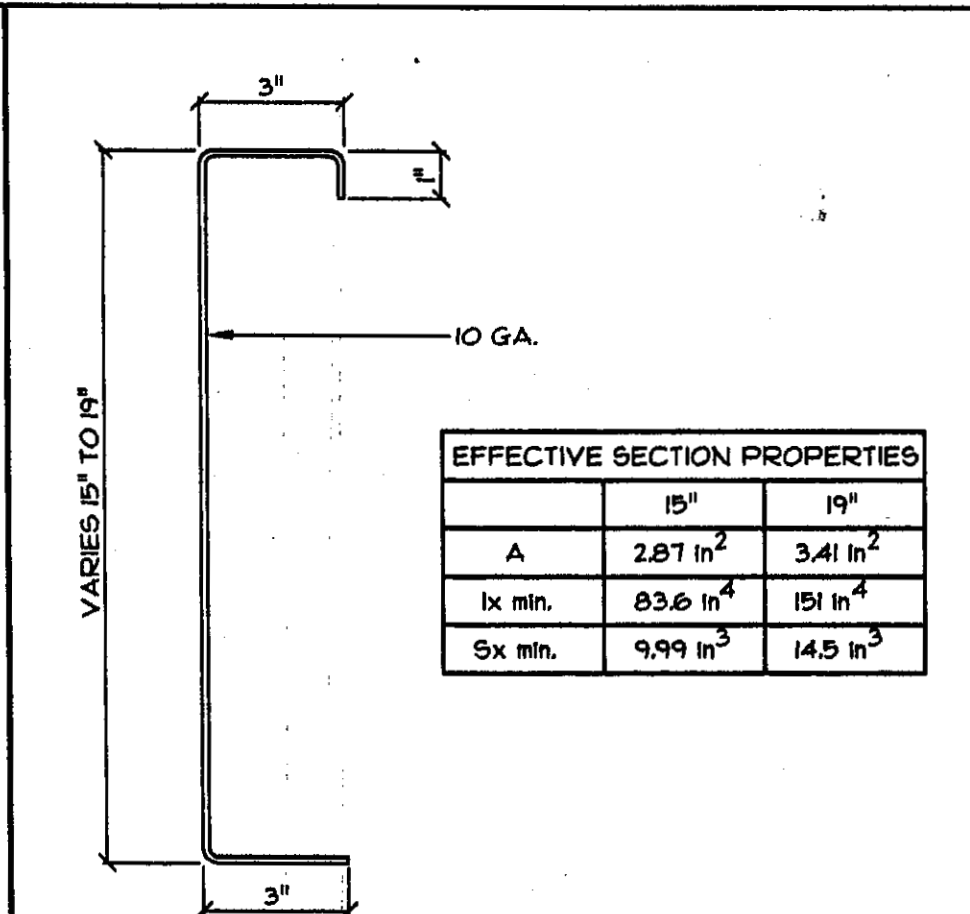
13 ROOF FRAMING PLAN
SCALE: 1/4"=1'-0"



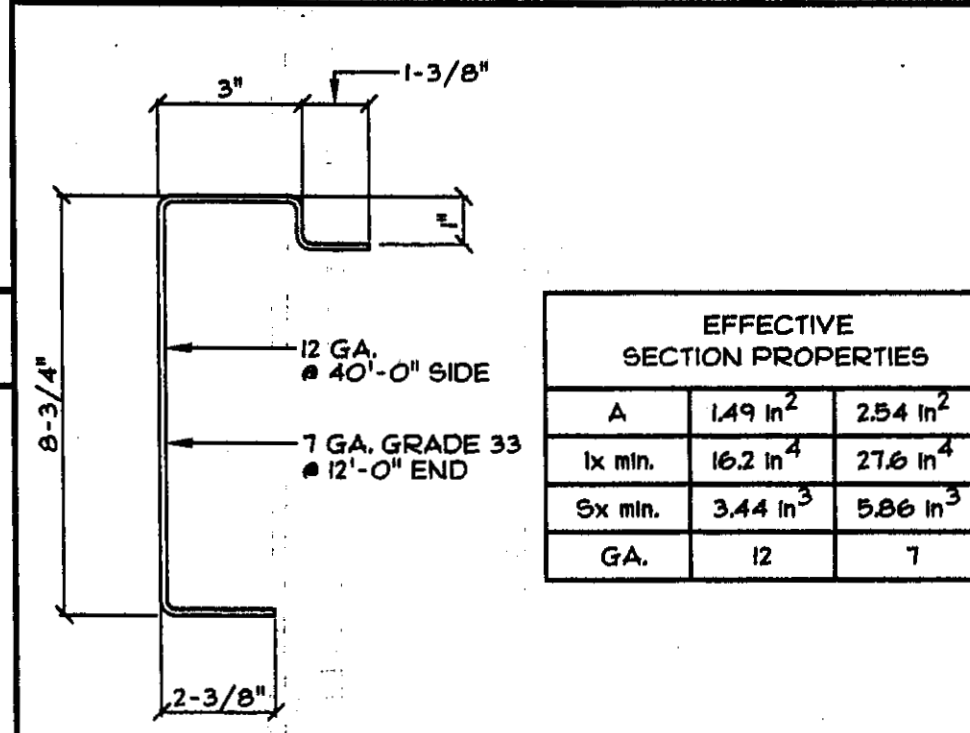
14 CEILING FRAMING PLAN
SCALE: 1/4"=1'-0"



15 FLOOR FRAMING PLAN
SCALE: 1/4"=1'-0"

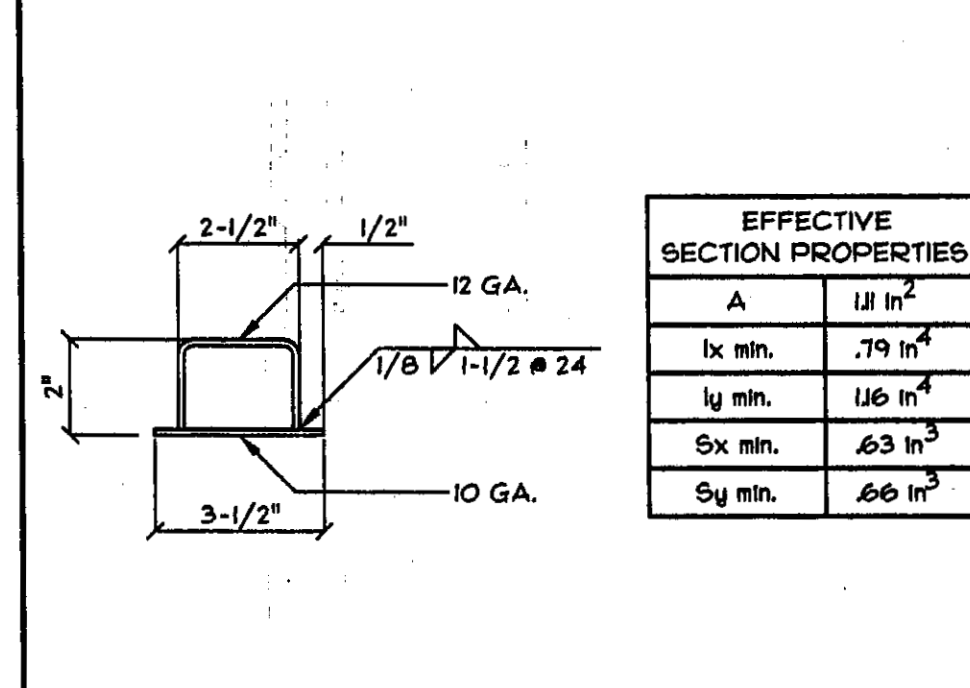


1 ROOF BEAM SECTION
SCALE: 3/4"=1'-0"

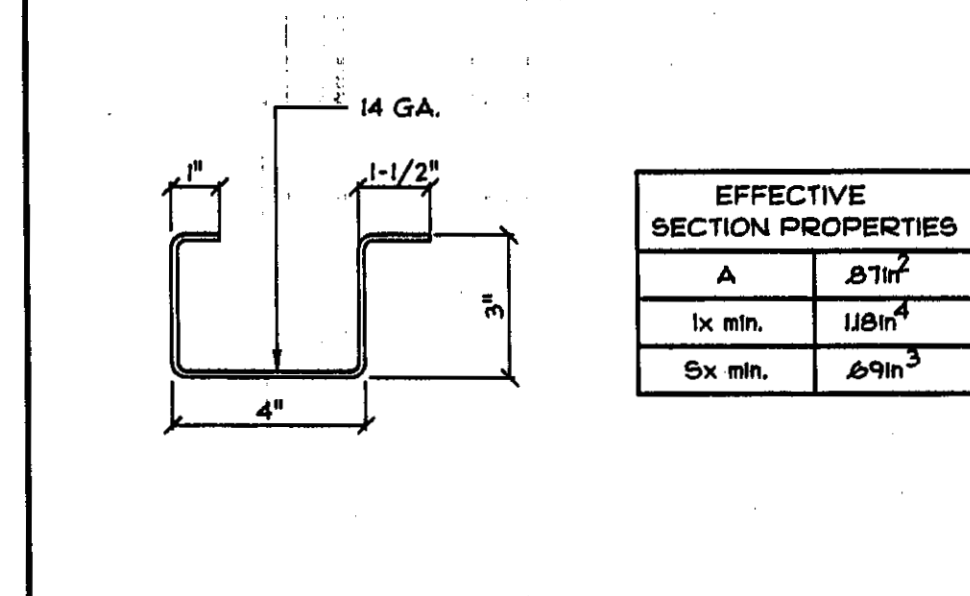


2 ROOF PURLIN SECTION
SCALE: 3/4"=1'-0"

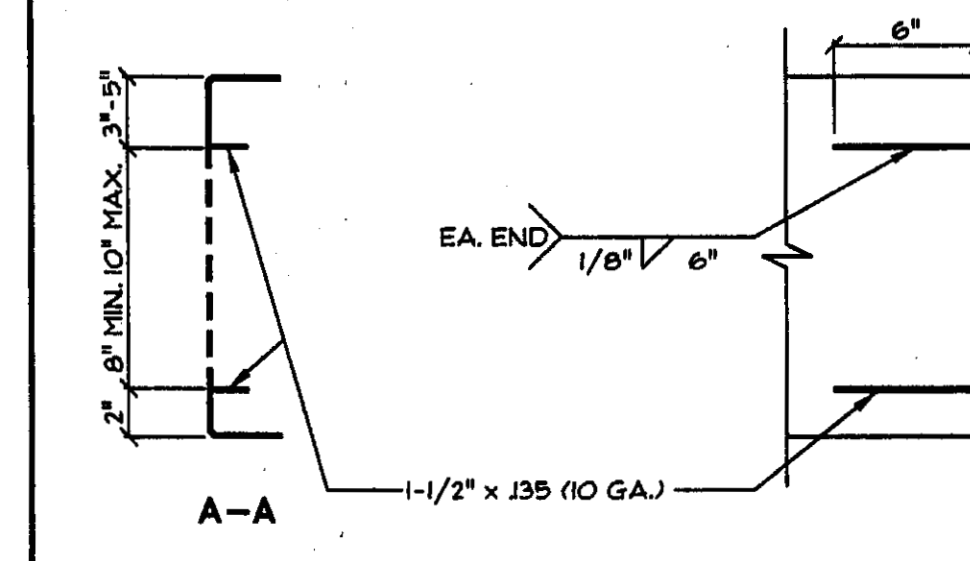
3 ROOF BEAM STIFFENER
SCALE: 3/4"=1'-0"



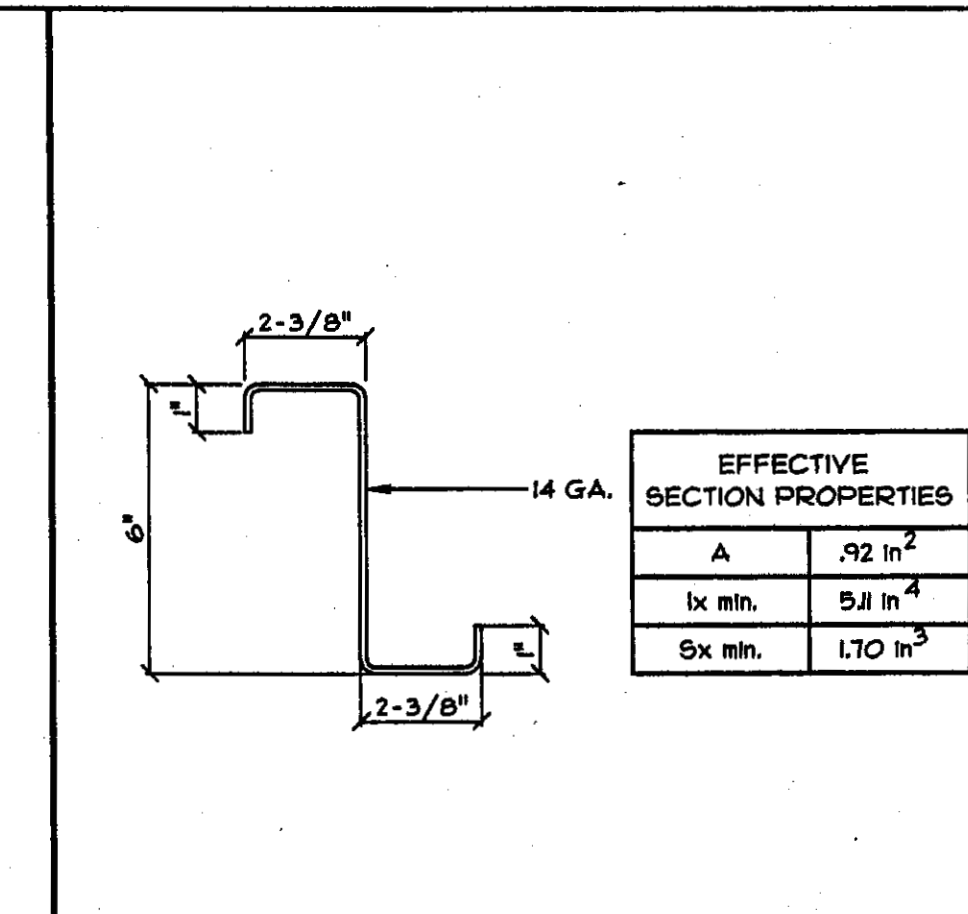
4 FLOOR BEAM SECTION
SCALE: 3/4"=1'-0"



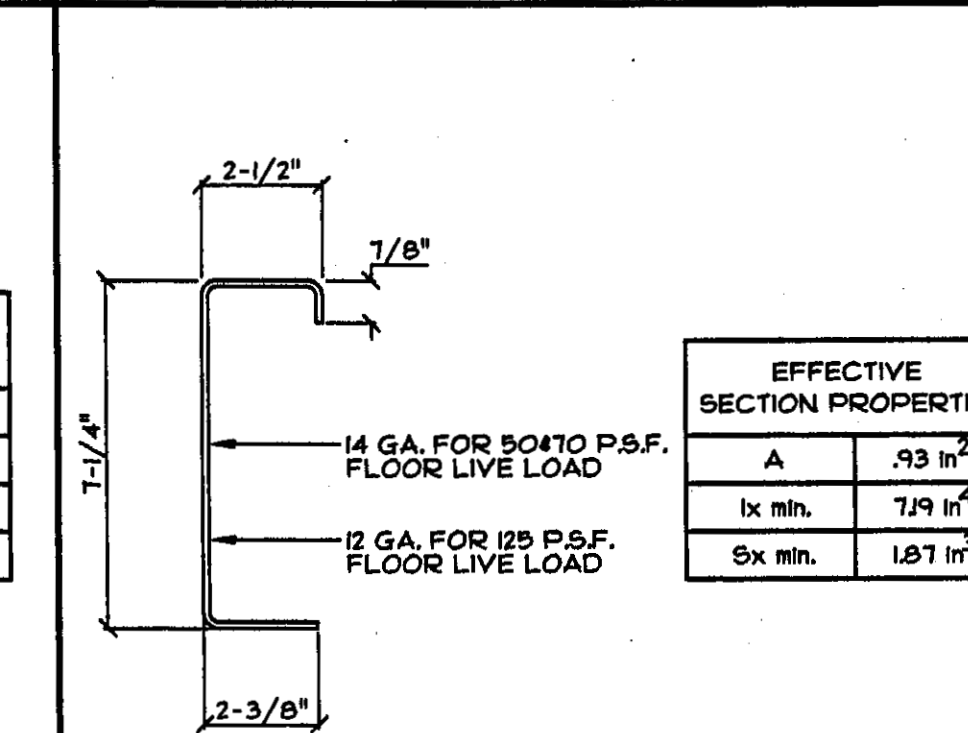
5 FLOOR JOIST SECTION
SCALE: 3/4"=1'-0"



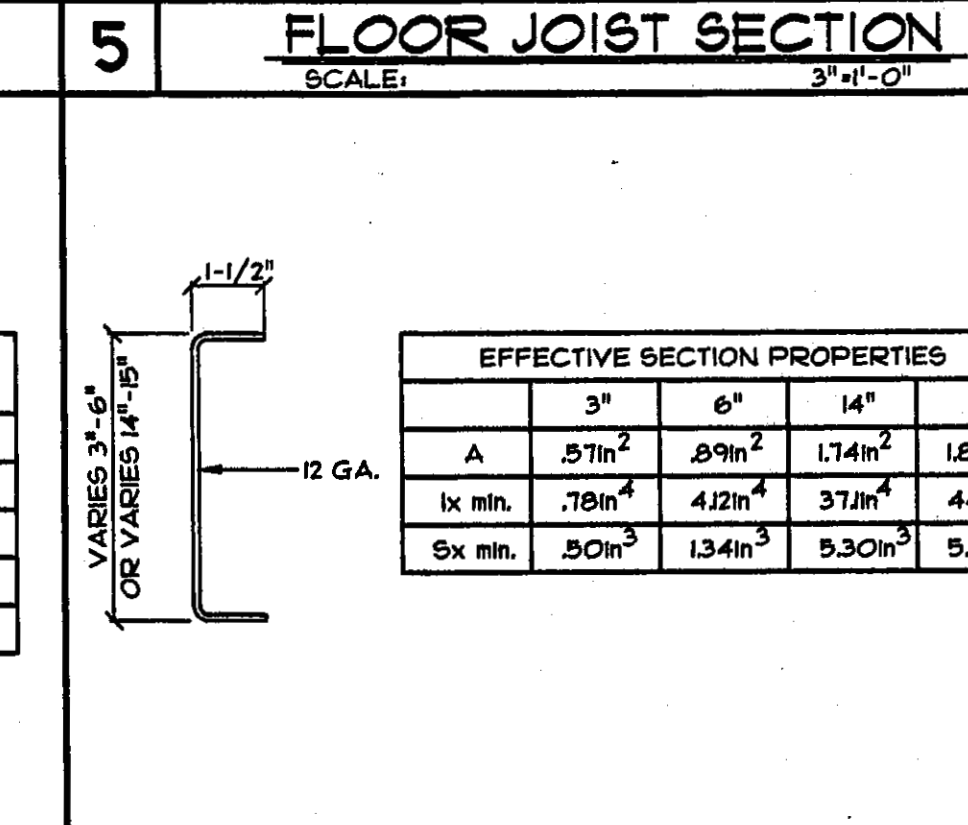
6 CEILING BEAM SECTION
SCALE: 3/4"=1'-0"



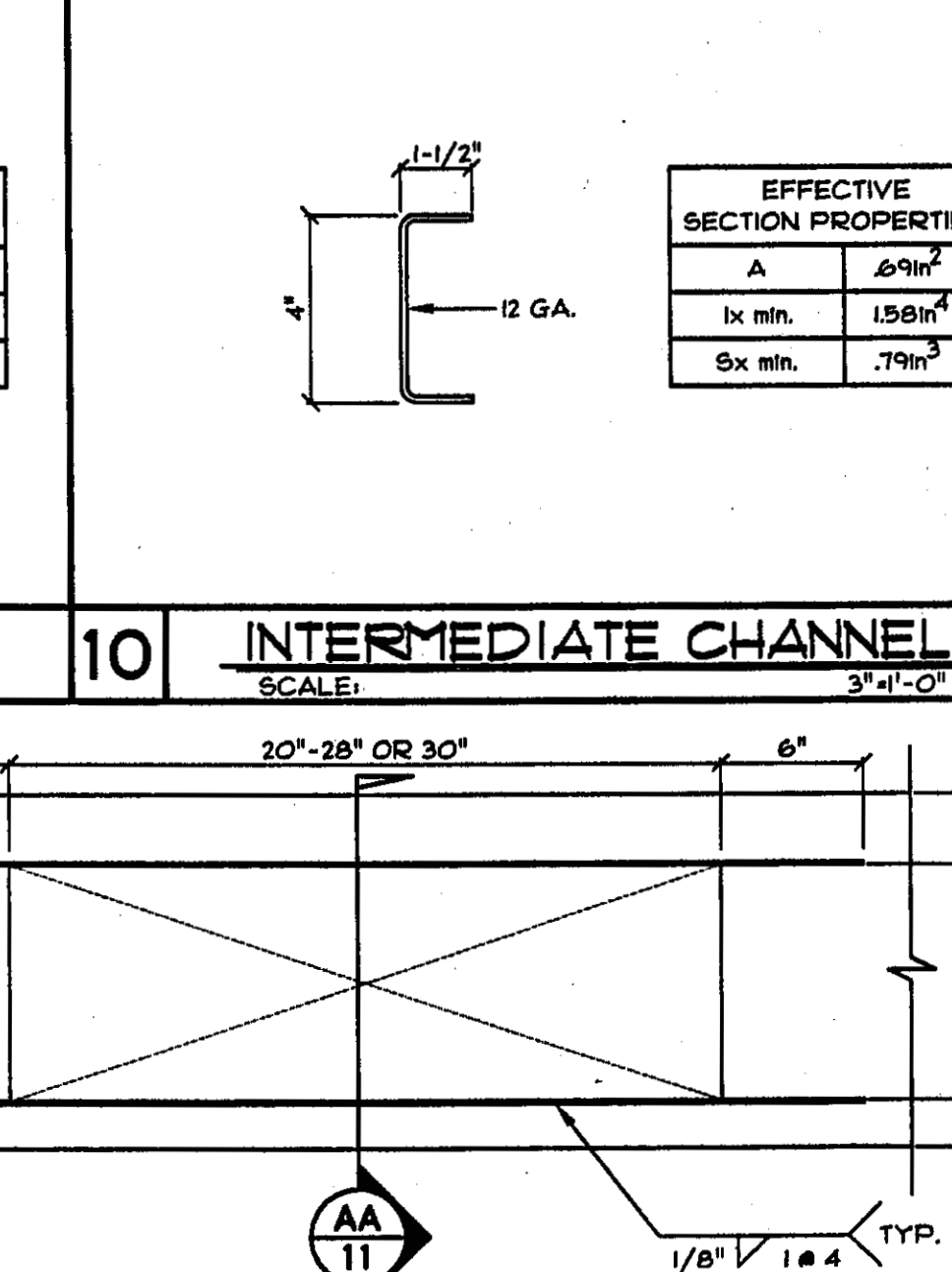
7 OVERHANG BEAM
SCALE: 3/4"=1'-0"



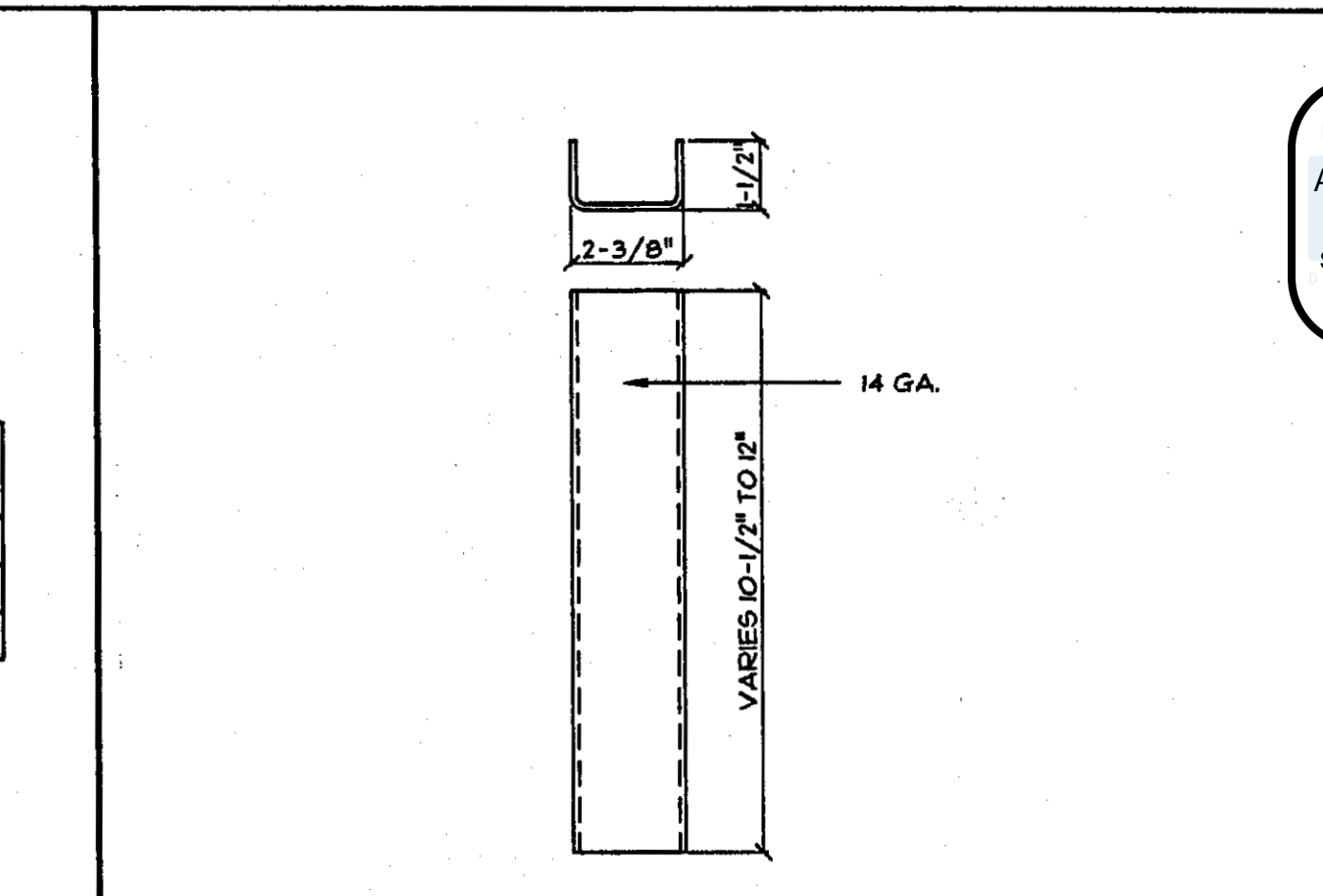
8 GUTTER BEAM SECTION
SCALE: 3/4"=1'-0"



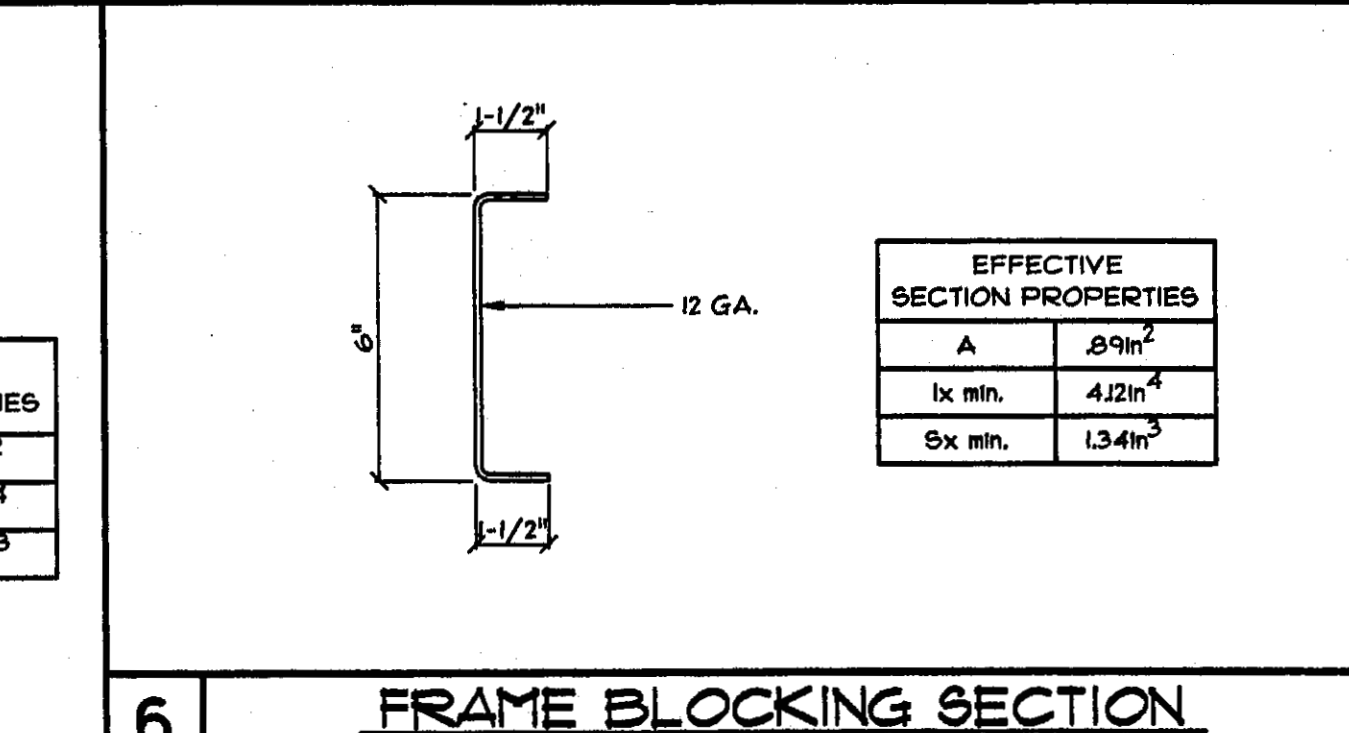
9 INTERMEDIATE CHANNELS
SCALE: 3/4"=1'-0"



10 HVAC HOLE @ ROOF BEAM
SCALE: 1-1/2"=1'-0"



11 FRAME BLOCKING SECTION
SCALE: 3/4"=1'-0"



12 STEEL SPECIFICATION

1. ALL STRUCTURAL STEEL SHALL BE ASTM A570 GRADE 36, UNLESS OTHERWISE NOTED.
2. STRUCTURAL STEEL TUBING SHALL BE ASTM A500 GRADE B F_y=46.
3. ALL MACHINE BOLTS SHALL BE ASTM A307.
4. WELDING SHALL BE DONE PER C.B.C. SECTION 2209A & A105 D II.
5. WELDING INSPECTION TO BE PER C.B.C. SECTION 2212A.5
6. SEE TESTS AND INSPECTIONS REPORT SHEET AO FOR REQUIREMENTS.
7. LIGHT GAGE METAL & FRAMING THICKNESSES

8. MINIMUM STEEL THICKNESS SHALL NOT BE LESS THAN 95% OF THE DESIGN THICKNESS PER C.B.C. SECTION 2230 (A3.4) "DELIVERED MINIMUM THICKNESS"

SHEATHING / PLYWOOD SPECIFICATION
DIVISION OF THE STATE ARCHITECT OFFICE OF REGULATION SERVICES

1. ALL STRUCTURAL PLYWOOD SHALL BE MANUFACTURED TO C.B.C. STANDARD 23-2 (BASED ON PRODUCT STANDARD PS1-83) AND INSPECTED AND GRADE MARKED AT THE MILL BY AN APPROVED QUALITY CONTROL AGENCY SUCH AS APA.
2. ROOF SHEATHING SHALL BE 4'x 8'x 15/32" GRADE MARKED 32/16 SPAN INDEX, EXP. I OR 19/32" GRADE MARKED 40/20 SPAN INDEX, EXP. I.
3. FLOOR SHEATHING SHALL BE 4'x 8'x 1-1/8" T & G APA RATED UNDERLAYMENT GRADE DOUGLAS FIR GROUP I STURD-I-FLOOR, SPAN RATING = 48".
4. WALL SHEATHING SHALL BE 3/8" T-11 APA EXTERIOR TYPE 303 GROUP II, MDO EXTERIOR GROUP II OR OPTIONAL 5/8" T-11 APA EXTERIOR SIDING.
5. SEE 2/63 FOR FASTENER SCHEDULE

DESIGN CRITERIA
ROOF: DEAD LOAD - 8.0 PSF
ROOF: LIVE LOAD - 20.0 PSF (SNOW)
FLOOR: DEAD LOAD - 8.0 PSF
FLOOR: LIVE LOAD - 50.0 PSF
(OPTIONAL) FLOOR: LIVE LOAD - 70.0 PSF
(OPTIONAL) FLOOR: LIVE LOAD - 125.0 PSF
WALLS: DEAD LOAD - 8.0 PSF
WIND: 80 MPH - EXPOSURE: C
qs=15.4 PSF; Cs=1.05; Cq AS REQ.
SEISMIC: ZONE 4, R_w=6, C=2.75

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APPROVALS

IDENTIFICATION STAMP
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PC-271
FLS. SS. 8/10/96
DATE: 8/10/96

REVISION DATE: BY:

IDENTIFICATION STAMP
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APP: 02-123006 INC:
REVIEWED FOR
SS ☒ FLS ☒ ACS ☒
DATE: 12/20/2024

ENVIROPLEX, INC.
4777 E. CARPENTER ROAD STOCKTON, CA 95215

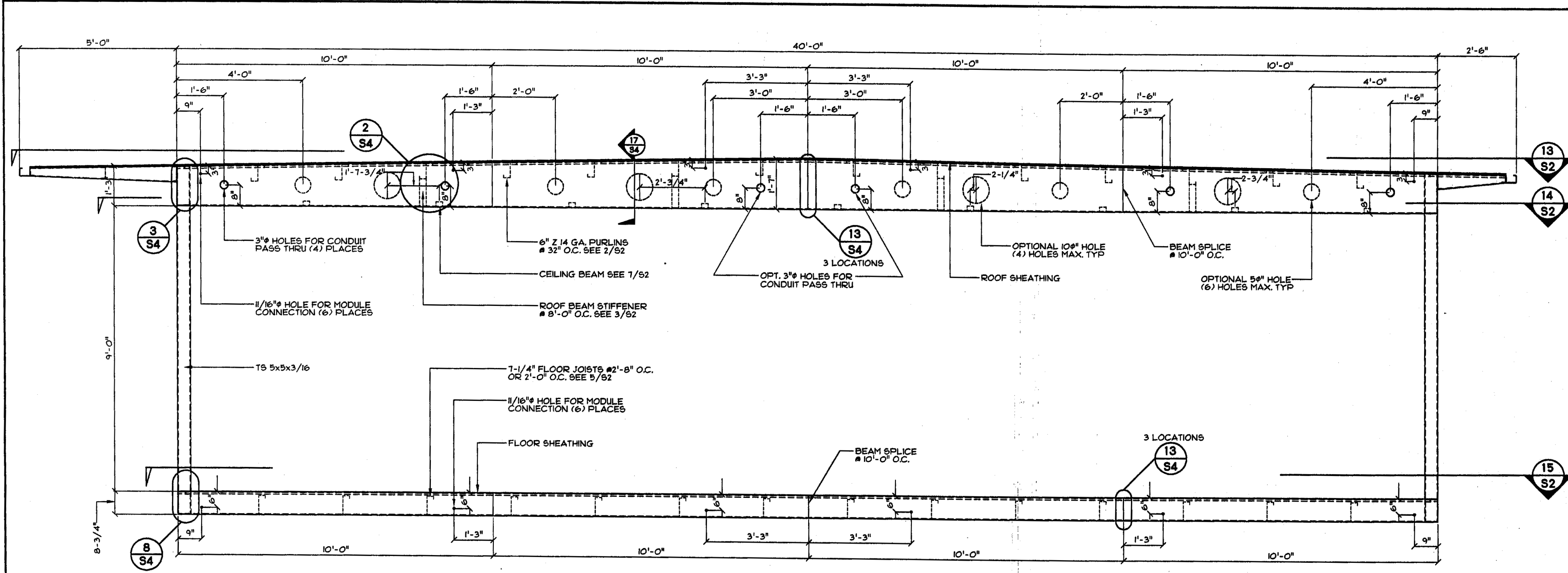
**ROOF-CEILING-FLOOR
FRAMING PLANS
STRUCTURAL STEEL
PROPERTIES - NOTES**

REVISION DATE: BY:

DATE:

THIS MODULAR BLDG. HAS BEEN ENGINEERED BY A REGISTERED STRUCTURAL ENGINEER AND PREVIOUSLY REVIEWED & APPROVED BY THE DIVISION OF THE STATE ARCHITECT, FIRE & LIFE SAFETY AND ACCESS COMPLIANCE SECTION

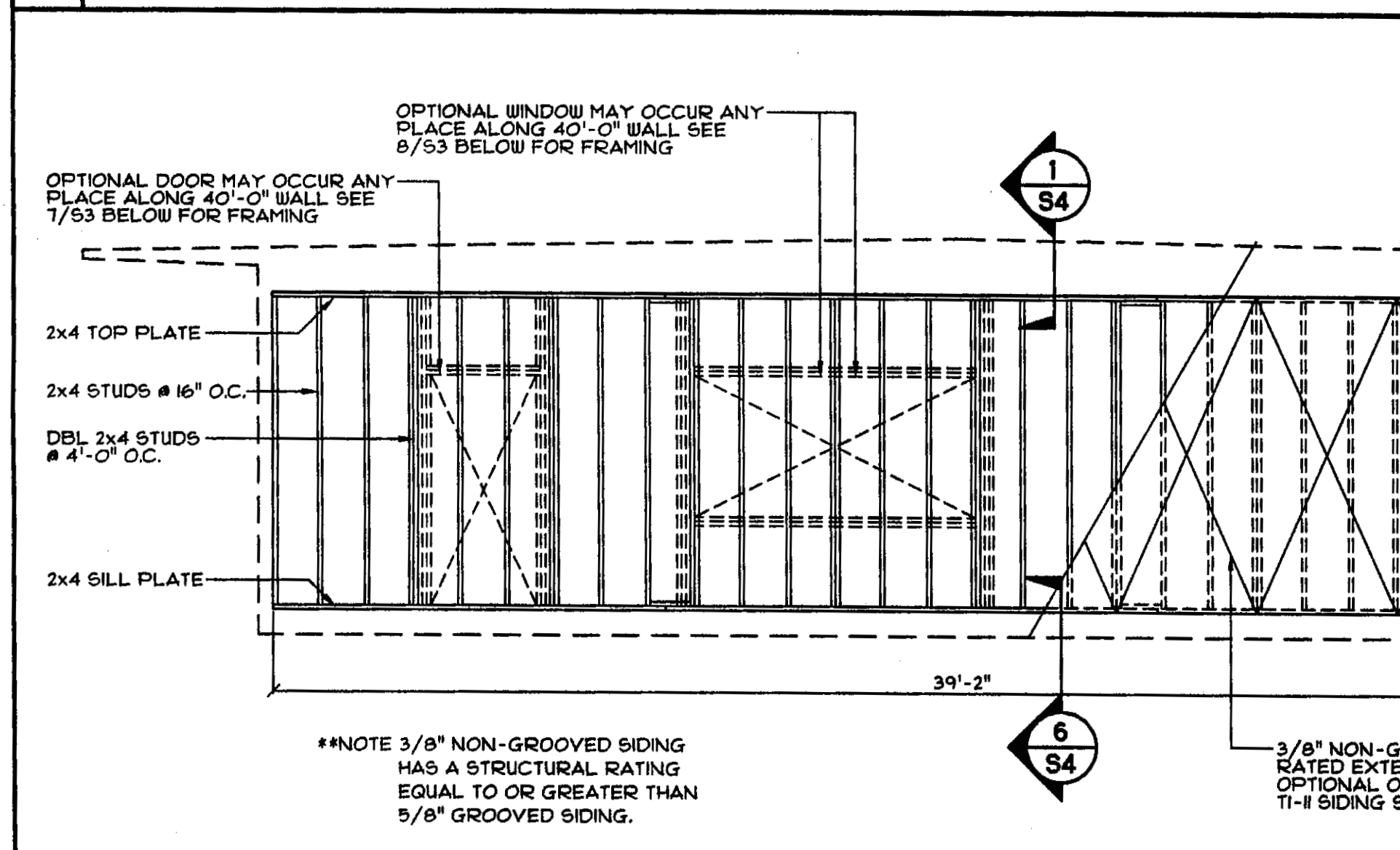
S2



LONGITUDINAL BUILDING ELEVATION

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

1

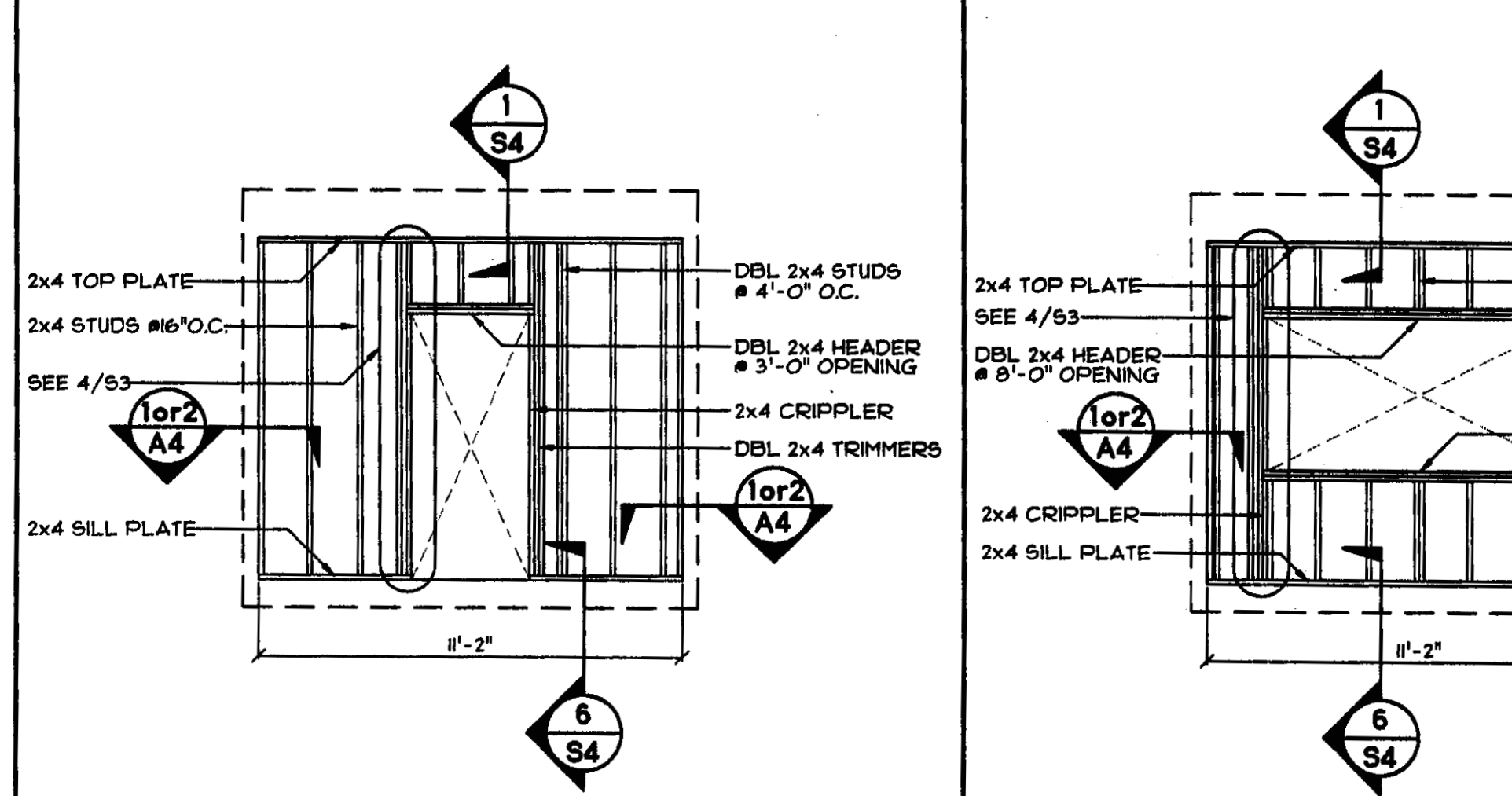


NAILING SCHEDULE

2

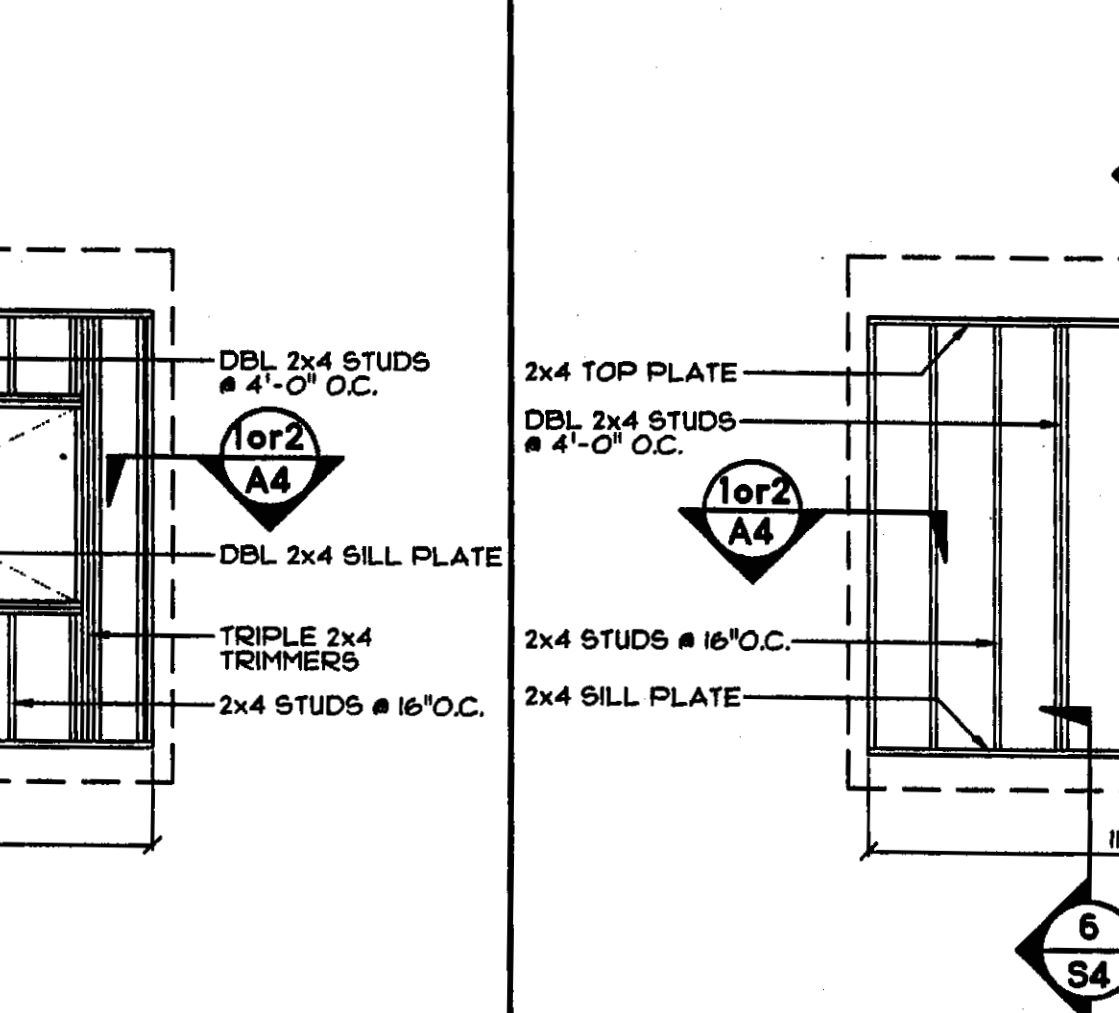
WALL FRAMING ELEVATION @ 40'-0" SIDE

SCALE: 1/4"=1'-0"



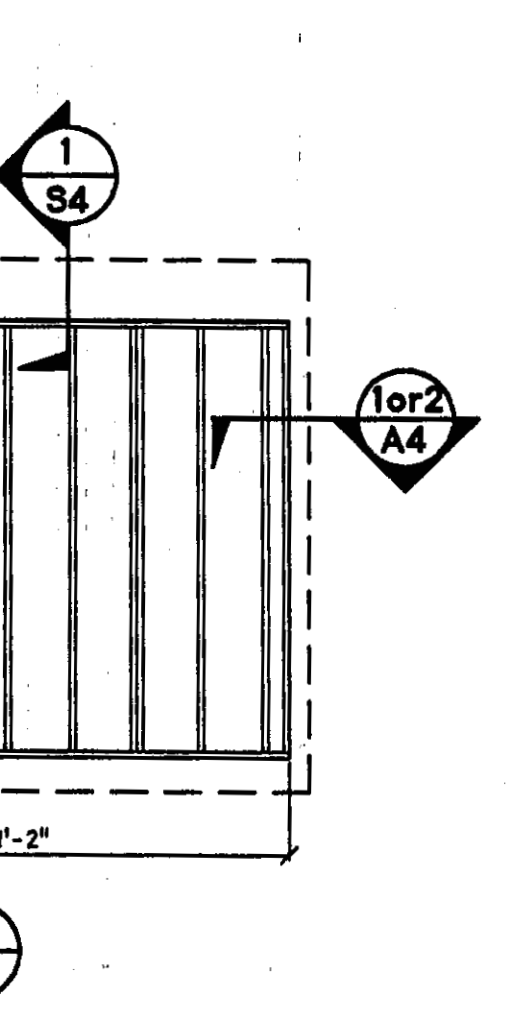
LONGITUDINAL BUILDING SECTION WALL FRAMING ELEVATIONS-END FRAME ELEVATION-NAIL SCHEDULE

SCALE: 1/4"=1'-0"



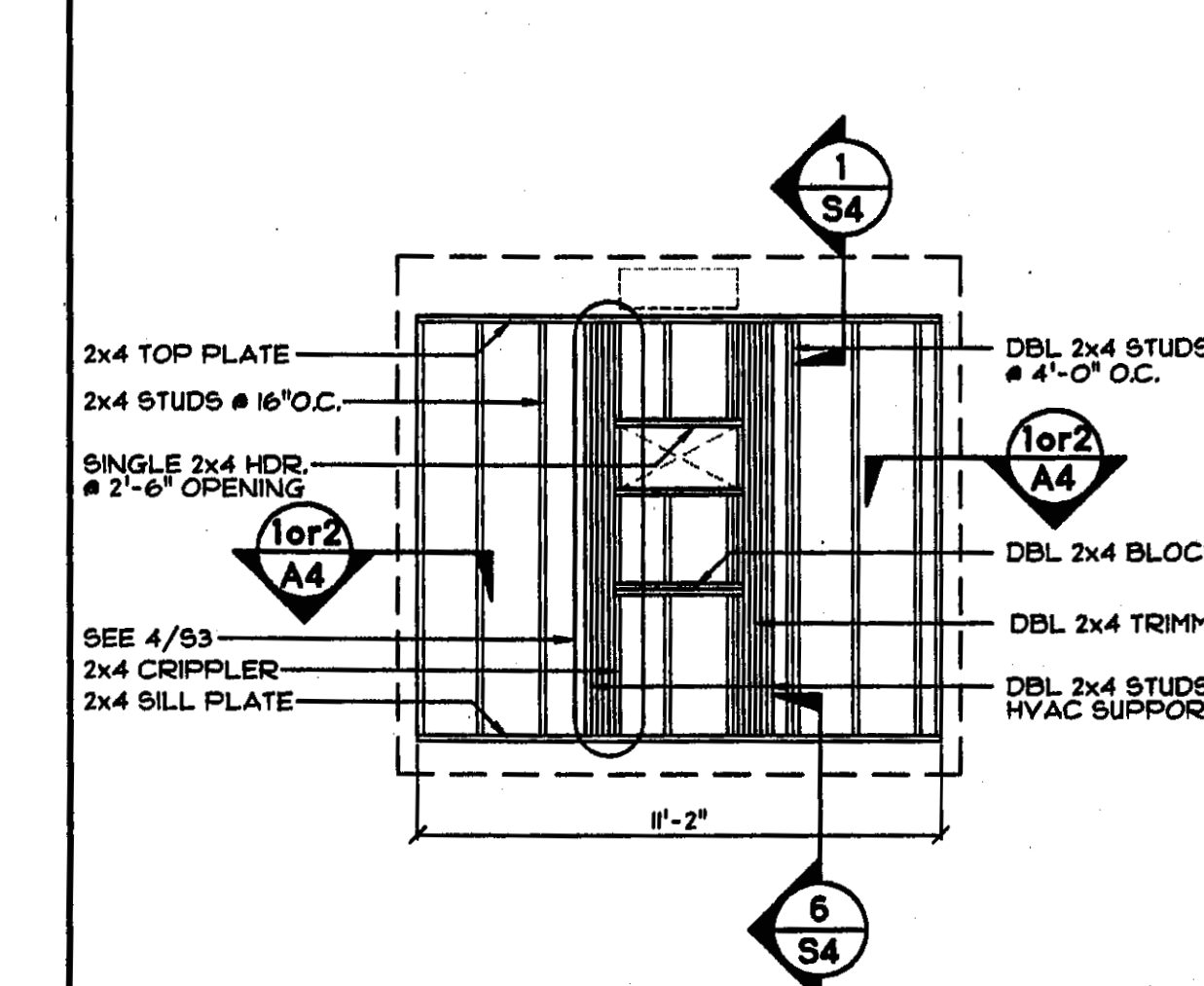
NAILING DETAIL

SCALE: 1"=1'-0"



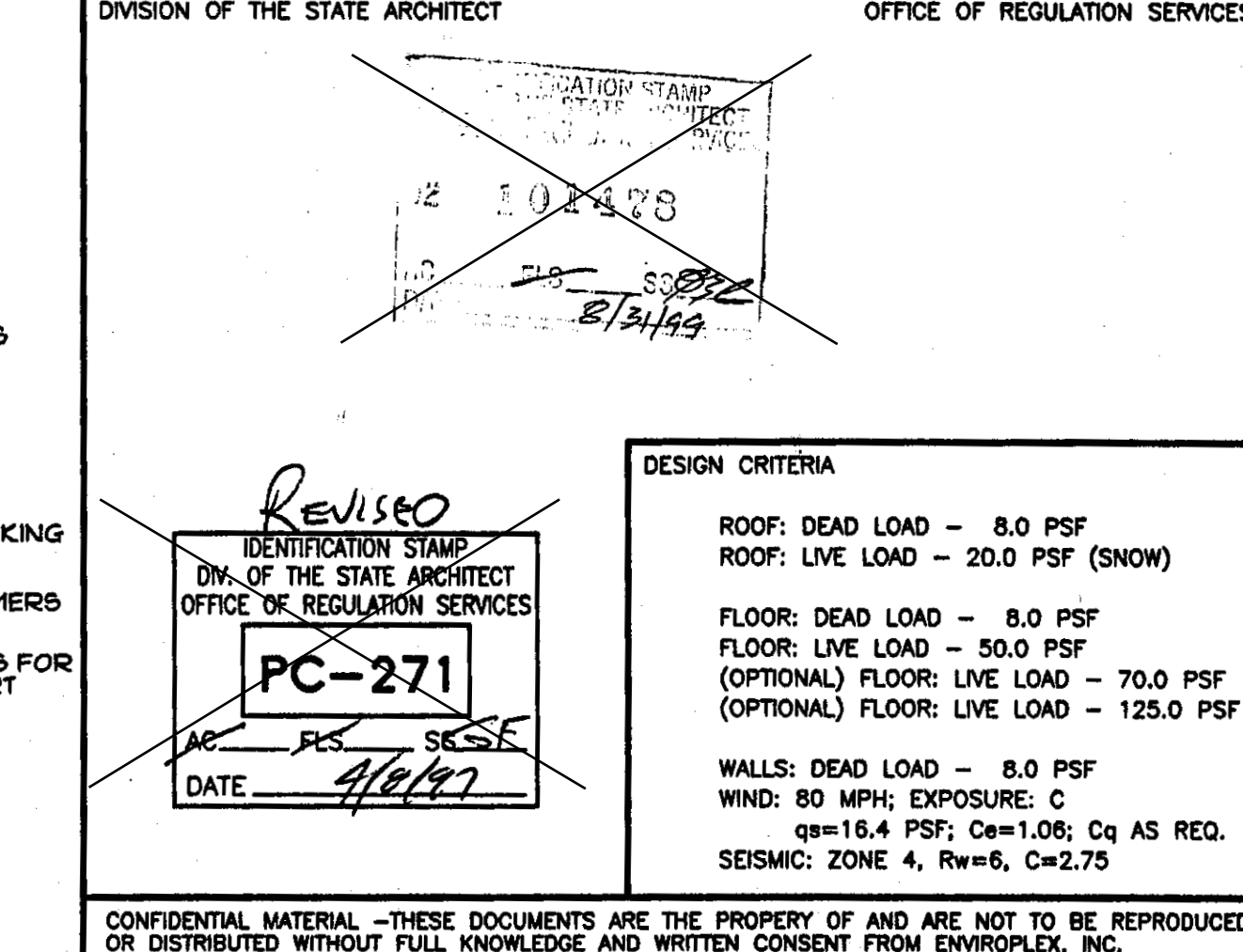
OPTIONAL WINDOW WALL FRAMING

SCALE: 1/4"=1'-0"



END FRAME ELEVATION

SCALE: 1/4"=1'-0"



DOOR WALL FRAMING

SCALE: 1/4"=1'-0"

WINDOW WALL FRAMING

SCALE: 1/4"=1'-0"

WALL FRAMING @ 12'-0" WALL

SCALE: 1/4"=1'-0"

HYAC WALL FRAMING - DUCTED

SCALE: 1/4"=1'-0"

HYAC WALL FRAMING - DUCTED

SCALE: 1/4"=1'-0"

APPROVALS

SCALE: 1/4"=1'-0"

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-123006 INC:
REVIEWED FOR
SS ☒ FLS ☒ ACS ☒
DATE: 12/20/2024

JH SH
621 14TH STREET
(208) 521-1143

ENVIROPLEX, INC.
4777 E. CARPENTER ROAD STOCKTON, CA. 95215

LONGITUDINAL BUILDING SECTION
WALL FRAMING ELEVATIONS-END
FRAME ELEVATION-NAIL SCHEDULE

REVISION DATE: BY:

DATE:

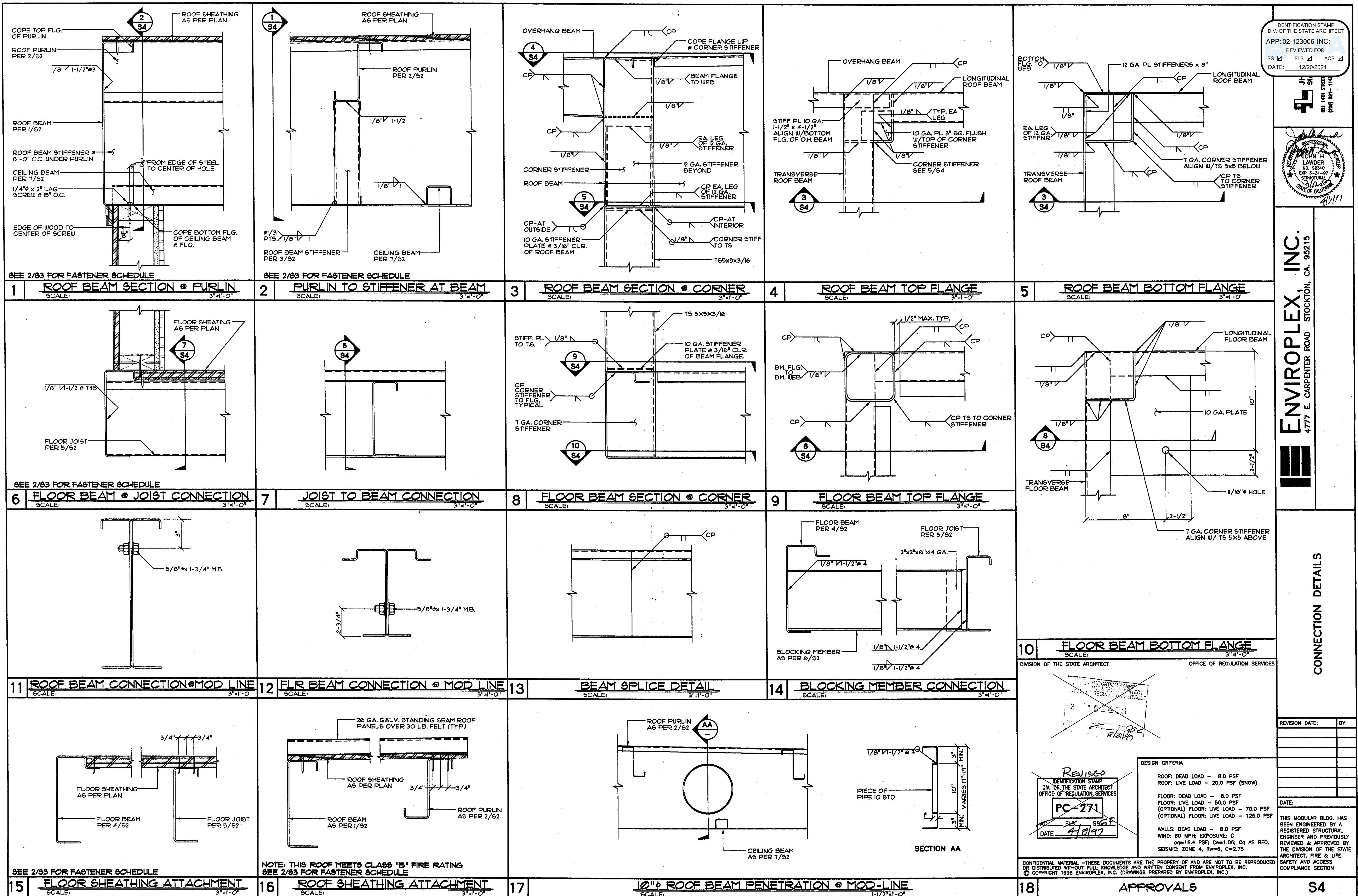
THIS MODULAR BLDG. HAS BEEN ENGINEERED BY A REGISTERED STRUCTURAL ENGINEER AND PREVIOUSLY REVIEWED & APPROVED BY THE DIVISION OF THE STATE ARCHITECT, FIRE & LIFE SAFETY AND ACCESS COMPLIANCE SECTION

DESIGN CRITERIA
ROOF: DEAD LOAD - 8.0 PSF
ROOF: LIVE LOAD - 20.0 PSF (SNOW)
FLOOR: DEAD LOAD - 8.0 PSF
FLOOR: LIVE LOAD - 50.0 PSF
(OPTIONAL) FLOOR: LIVE LOAD - 70.0 PSF
(OPTIONAL) FLOOR: LIVE LOAD - 125.0 PSF
WALLS: DEAD LOAD - 8.0 PSF
WIND: 80 MPH; EXPOSURE: C
qs=16.4 PSF; Ce=1.08; Cq AS REQ.
SEISMIC: ZONE 4, Rw=6, C=2.75

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PC-271
DATE: 4/8/97

93



[illegible]

12 GA. STEEL CHANNELS W/ NON-SLIP FINISH

1-1/2" SQ. x 16 GA. TUBE (TYP) SEE 6/55R

1-1/2" SQ. x 16 GA. TUBE TYP. @ POSTS

1'-0"

2'-10"

12"

1" MAX. SLOPE

C 12" x 2-1/2" x 14 GA.

C 8" x 1-1/2" x 12 GA.

1/8" V TYP.

1/8" V TYP.

8"

1'-0"

3'-3/4"

10 SR5

7 55R

3 55R

ADD (2) 2 x 10 x 2'-0" P.T. H.F. NO. 2 OR BETTER, OR FOUNDATION GRADE REDWOOD NO. 2 OR BETTER @ MID SPAN OF RAMP

TAPERED PERIMETER CHANNEL 8" - 1-1/4" 12 GA. TYP.

ADJUST LEG TO MATCH BUILDING ELEVATION - AS REQ'D 2x10 PLATE TO BE P.T. H.F. NO. 2 OR BETTER, OR FOUNDATION GRADE REDWOOD NO. 2 OR BETTER. NAIL LEG PLATE TO 2x10 W/ (2)-16d GALVANIZED NAILS

SECTION A-A

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

EFFECTIVE SECTION PROPERTIES				
	FLOOR CHANNELS	FLOOR JOIST	PERIMETER BEAM	
	12"	4"	1-1/4"	8"
A (IN ²)	1.51	.35	.69	1.10
I _x MIN (IN ⁴)	1.52	.62	1.58	8.36
S _x MIN (IN ³)	.75	.33	.79	2.12
T (IN)	.105"(12 GA.)	.08"(16 GA.)	.105"(12 GA.)	.105"(12 GA.)

Diagram of a floor channel with dimensions 12" and 2-1/2".

1-1/2"

PERIMETER BEAM

VARIES FROM 1/4" TO 3/4"

9 FLOOR CHANNEL AND PERIMETER BEAM
SCALE: 3" = 1' - 0"

Diagram illustrating the connection of a handrail support bracket to a wall and a post. The bracket is a 6" channel (see 9/55R) mounted to a wall. The handrail support bracket (see 6/55R) is attached to the end of the channel. The bracket is secured to the wall with a 2 x 10 x 2'-0" long P.T. H.F. No. 2 or better or foundation grade redwood No. 2 or better, typ. @ each corner of landing.

C4x14GA CROSS MEMBERS

1-1/2" x 16GA SQ. TUBE

1-7/8" WASHER

1" HEX NUT

1" THREADED ROD

4x6" TGA PLATE

1/8"

1/8"

1/8"

1/8"

(2) 3/16" HOLES

1-1/2" x 1-1/2" x 16 GA. SQUARE TUBE (TYP. SMOOTH SURFACE W/NO SHARP EDGES.

WHEEL CHAIR RAIL 1-1/2" x 1-1/2" x 16 GA. SQUARE TUBE x 4'-4" LONG.

2 S5R

12 GA. END
PLATE TYP

$\frac{1}{8}"$

$\frac{1}{8}"$

3'-2"

2'-10"

$\frac{1}{8}"$

2"

9- $\frac{1}{2}"$

4"

A-A

A-A

10 GA.
BRACKET

$\frac{1}{8}"$

6" CHANNEL
SEE 9/55R

5/16" ϕ HOLE (2 PLACES) FOR
1/4"-20 x 1" LONG HEX WASHER
HEAD SELF DRILLING TEK

1-5/8"

1-3/4"

PLAN A-A

1/2" Ø HOLES @ 8" O.C.
(ONE SIDE ONLY)

DIVISION OF THE STATE ARCHITECT	OFFICE OF REGULATION SERVICES
<div style="text-align: center;"></div>	
DESIGN CRITERIA	
RAMP: DEAD LOAD - 5.0 PSF	
RAMP: LIVE LOAD - 100.0 PSF	

753
14TH STREET
(209) 521-114

REG. ARCH. PROFESSIONAL
JOHN H. LAWDER
No. 52310
EXP. 3-31-97
STRUCTURAL
STATE OF CALIFORNIA

213 122

ENVIROPLEX, INC.
 4777 E. CARPENTER ROAD STOCKTON, CA. 95215

01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 10



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	DATE:	
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ELECTRICAL NOTES & SYMBOL LEGEND

MEP COMPONENT ANCHORAGE NOTES	GENERAL NOTES
<p>1. ALL MECHANICAL, PLUMBING AND ELECTRICAL COMPONENTS SHALL BE ANCHORED AND INSTALLED PER THE DETAILS ON THE DSA APPROVED CONSTRUCTION DOCUMENTS. THE FOLLOWING COMPONENTS SHALL BE ANCHORED OR BRACED TO MEET THE FORCE AND DISPLACEMENT REQUIREMENTS PRESCRIBED IN THE 2022CBC, SECTIONS 1617A.1.16 THROUGH 1617A.1.20 AND ASCE 7-16 CHAPTER 13, 26 AND 30.</p> <p>A. ALL PERMANENT EQUIPMENT AND COMPONENTS.</p> <p>B. TEMPORARY, MOVABLE OR MOBILE EQUIPMENT THAT IS PERMANENTLY ATTACHED (e.g. HARD WIRED) TO THE BUILDING UTILITY SERVICES SUCH AS ELECTRIC, GAS OR WATER. "PERMANENTLY ATTACHED" SHALL INCLUDE ALL ELECTRICAL CONNECTIONS EXCEPT PLUGS FOR 110/120 VOLT RECEPTACLES HAVING A FLEXIBLE CABLE.</p> <p>C. 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.</p> <p>2. THE FOLLOWING MECHANICAL AND ELECTRICAL COMPONENTS SHALL BE POSITIVELY ATTACHED TO THE STRUCTURE BUT NEED NOT DEMONSTRATE DESIGN COMPLIANCE WITH THE REFERENCES NOTED ABOVE. THESE COMPONENTS SHALL HAVE FLEXIBLE CONNECTIONS PROVIDED BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING, AND CONDUIT. FLEXIBLE CONNECTIONS MUST ALLOW MOVEMENT IN BOTH TRANSVERSE AND LONGITUDINAL DIRECTIONS.</p> <p>COMPONENTS WEIGHING 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.</p> <p>COMPONENTS WEIGHING LESS THAN 20 POUNDS, OR IN THE CASE OF DISTRIBUTED SYSTEMS, LESS THAN 5 POUND PER FOOT, WHICH ARE SUSPENDED FROM A ROOF OR FLOOR OR HUNG FROM A WALL.</p> <p>THE ANCHORAGE OF ALL MECHANICAL, ELECTRICAL AND PLUMBING COMPONENTS SHALL BE SUBJECT TO 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.</p>	<p>1. THE CONTRACTOR SHALL VISIT THE SITE INCLUDING ALL AREAS INDICATED ON THE DRAWINGS. HE SHALL THOROUGHLY FAMILIARIZE HIMSELF WITH THE EXISTING CONDITIONS BY SUBMITTING A BID, ACCEPTS THE CONDITIONS UNDER WHICH HE SHALL BE REQUIRED TO PERFORM HIS WORK, AND SHALL COMPLY WITH ALL AUTHORITIES HAVING JURISDICTION, CEC, ALL STATE AND LOCAL CODES AND AMENDMENT.</p> <p>2. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN A COMPLETE SET OF CONTRACT DOCUMENTS AND ADDENDA (DRAWINGS AND SPECIFICATIONS.) HE SHALL CHECK THE CONTRACT DOCUMENTS OF THE OTHER TRADES AND DETERMINE HIS RESPONSIBILITIES. FAILURE TO DO SO SHALL NOT RELEASE THE CONTRACTOR FROM COMPLETING ALL RESPONSIBLE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.</p> <p>3. THE CONTRACTOR SECURE AND PAY FOR ALL PERMITS, FEES, CHARGES, AND INCIDENTAL COSTS NECESSARY FOR EXECUTION AND COMPLETION OF ELECTRICAL WORK, INCLUDING ALL CHARGES BY STATE, COUNTY AND LOCAL GOVERNMENTAL AGENCIES.</p> <p>4. ALL ELECTRICAL WORK REFERENCED HEREIN SHALL BE COORDINATED WITH OTHER TRADES AND SITE CONDITIONS. ANY COSTS TO INSTALL WORK TO ACCOMPLISH SAID COORDINATION WHICH DIFFERS FROM THE WORK AS SHOWN ON THE CONTRACT DOCUMENTS SHALL BE INCURRED BY THE CONTRACTOR. ANY DISCREPANCIES, AMBIGUITIES OR CONFLICTS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT DURING BID TIME FOR CLARIFICATION. ANY SUCH CONFLICTS NOT CLARIFIED PRIOR TO BID SHALL BE SUBJECT TO THE INTERPRETATION OF THE ARCHITECT AT NO ADDITIONAL COST TO THE OWNER.</p> <p>5. PROVIDE TEMPORARY POWER FACILITIES AND CONNECTIONS FOR ALL FEEDERS, BRANCH CIRCUITS, OR SIGNAL AND COMMUNICATIONS SYSTEMS BEING DISCONNECTED TO MAINTAIN SYSTEMS IN OPERATION.</p> <p>6. ALL INTERRUPTION OF ELECTRICAL POWER SHALL BE KEPT TO A MINIMUM. HOWEVER, WHEN AN INTERRUPTION IS NECESSARY, THE SHUTDOWN MUST BE COORDINATED WITH THE OWNER AND ENGINEER 14 DAYS PRIOR TO THE OUTAGE, AND OVERTIME PAY SHALL BE INCLUDED IN THE CONTRACTOR'S BID. WORK IN EXISTING SWITCHBOARDS OR PANEL BOARDS SHALL BE COORDINATED WITH THE OWNER PRIOR TO REMOVING ACCESS PANELS OR DOORS.</p> <p>7. AFTER ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS HAVE BEEN FULLY COMPLETED, REPRESENTATIVES OF THE OWNERS WILL INSPECT THE WORK. THE CONTRACTOR SHALL PROVIDE COMPETENT PERSONNEL TO DEMONSTRATE THE OPERATION OF ANY ITEM OR SYSTEM TO THE FULL SATISFACTION OF EACH REPRESENTATIVE. FINAL ACCEPTANCE OF THE WORK WILL BE MADE BY THE OWNER AFTER RECEIPT OF APPROVAL AND RECOMMENDATION OF ACCEPTANCE FROM EACH REPRESENTATIVE.</p> <p>8. FURNISH A ONE-YEAR WRITTEN GUARANTEE OF MATERIALS AND WORKMANSHIP FROM THE DATE OF PUNCH LIST COMPLETION.</p> <p>9. ALL FINAL CONNECTIONS TO OWNER-FURNISHED EQUIPMENT SHALL BE MADE BY THE CONTRACTOR.</p> <p>10. THE EXACT METHOD AND LOCATION OF CONDUIT PENETRATION AND OPENINGS IN CONCRETE OR MASONRY WALLS, GRADE BEAMS, FLOORS, OR STRUCTURAL STEEL MEMBERS SHALL BE AS DIRECTED BY THE STRUCTURAL ENGINEER. PERFORM CORING, SAW CUTTING, PATCHING, AND REFINISHING OF WALLS AND SURFACES WHEREVER IT IS NECESSARY TO PENETRATE. OPENINGS SHALL BE SEALED IN AN APPROVED METHOD TO MEET THE FIRE RATING OF THE PARTICULAR WALL, FLOOR, OR CEILING. THE EXACT METHOD AND LOCATION OF CONDUIT PENETRATIONS AND OPENINGS IN CONCRETE WALLS OR FLOORS SHALL BE UL APPROVED.</p> <p>11. EQUIPMENT OUTLETS, LIGHTING FIXTURES, CONDUIT, WIRE, AND CONNECTION METHODS IN HVAC AIR PLENUMS SHALL BE APPROVED FOR USE IN PLENUMS AND SHALL CONFORM TO THE CALIFORNIA ELECTRICAL CODE.</p> <p>12. ROUTE EXPOSED CONDUIT AND CONDUIT ABOVE ACCESSIBLE CEILING SPACES PARALLEL AND PERPENDICULAR TO WALLS AND ADJACENT PIPING. ARRANGE CONDUIT TO MAINTAIN HEADROOM AND TO PRESENT A NEAT APPEARANCE.</p> <p>13. CONDUIT SHALL NOT BE INSTALLED IN ANY FLOOR SLAB. CONDUIT SHALL BE INSTALLED CONCEALED IN THE CEILING SPACE, CONCEALED WALLS, OR 24" MINIMUM BELOW SLAB ON GRADE UNLESS NOTED OTHERWISE.</p> <p>14. LOCATE ELECTRICAL EQUIPMENT AND BOXES IN ACCESSIBLE CEILING SPACE OR PROVIDE AN ACCESS PANEL FOR INACCESSIBLE CEILING SYSTEMS. ACCESS DOORS SHALL BE A MINIMUM DIMENSION OF 24" X 24". ACCESS DOOR LOCATIONS SHALL SUIT ACCESSIBILITY AND CONSTRUCTION CONDITIONS. ACCESS DOORS SHALL HAVE A FIRE RATING EQUAL TO THE CEILING ASSEMBLY IN WHICH THEY ARE INSTALLED.</p> <p>15. COORDINATE REQUIRED ACCESS DOORS IN NON-ACCESSIBLE CEILINGS TO SUIT FIELD CONDITIONS. THE EXACT SIZES AND PHYSICAL LOCATIONS SHALL SUIT ACCESSIBILITY AND CONSTRUCTION CONDITIONS. ACCESS DOORS SHALL BE PROVIDED IN OTHER SECTIONS OF THE SPECIFICATIONS. ACCESS DOORS SHALL HAVE A FIRE RATING EQUAL TO THE CEILING ASSEMBLY IN WHICH THEY ARE INSTALLED.</p> <p>16. WHENEVER A DISCREPANCY OF ANY SYSTEM AND/OR EQUIPMENT ARISES ON THE CONTRACT DOCUMENTS OR SPECIFICATIONS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL MATERIAL AND SERVICES REQUIRED BY THE STRICTEST CONDITIONS NOTED ON THE DRAWINGS OR SPECIFICATIONS TO ENSURE COMPLETE AND OPERABLE SYSTEMS AS REQUIRED BY THE OWNER AND ARCHITECT/ENGINEER.</p> <p>17. STRAIGHT FEEDER BRANCH CIRCUIT AND CONDUIT RUNS SHALL BE PROVIDED WITH SUFFICIENT PULL BOXES OR JUNCTION BOXES TO LIMIT THE MAXIMUM LENGTH OF ANY SINGLE CABLE PULL TO 100 FEET. PULL BOXES SHALL BE SIZED PER CODE OR AS INDICATED ON DRAWINGS.</p> <p>18. PANEL SCHEDULES SHALL BE REVISED TO REFLECT FINAL ROOM NAMES AND NUMBERS USING THE OWNER'S ROOM NAMES AND NUMBERS DESIGNATIONS. CONTRACTOR TO PROVIDE FINAL PANEL SCHEDULE TO EOR AT COMPLETION OF PROJECT.</p> <p>19. WHERE OUTLETS OCCUR AT TACKABLE WALL PANELS OR OTHER WALL FINISHES, PROVIDE EXTENSION RINGS AS REQUIRED SO THAT NO SPACE WILL EXIST BETWEEN DEVICE PLATE AND BACKBOX PER CALIFORNIA ELECTRICAL CODE §14.20. SEE ARCHITECTURAL ELEVATIONS FOR WALL FINISHES AND LOCATIONS.</p> <p>20. ALL 120V POWER REQUIRED FOR THE FUNCTIONALITY OF ALL LOW VOLTAGE / TECHNOLOGY SYSTEMS SHALL BE A DEDICATED CIRCUIT AND ON EMERGENCY POWER WHEN AVAILABLE. CABLING CONTRACTOR SHALL COORDINATE ALL 120V POWER REQUIREMENTS AND LOCATIONS WITH ELECTRICAL CONTRACTOR FOR ALL EQUIPMENT.</p> <p>21. ALL AC POWER CABLES ARE TO BE INSTALLED WITH A MINIMUM OF 12 INCHES OF SEPARATION FROM TECHNOLOGY LOW VOLTAGE CABLES, INTERCOM, FIRE ALARM, SECURITY CABLES IN ANY PARALLEL OPEN WIRE RUN.</p> <p>22. CONTRACTOR SHALL PROVIDE AND INSTALL ALL SLEEVES REQUIRED TO INSTALL COMMUNICATION CABLING THROUGH RATED WALLS. ALL TECHNOLOGY SYSTEM CONDUIT SLEEVES SHALL HAVE PROTECTIVE BUSHINGS ON BOTH ENDS, BE DEDICATED FOR TECHNOLOGY SYSTEMS ONLY AND SHALL NOT SHARE WITH OTHER BUILDING TRADES.</p> <p>23. CONTRACTOR SHALL MAINTAIN WALL RATING WITH PROPER FIRE BLOCKING METHODS.</p> <p>24. ALL CONDUCTORS SHALL BE UL LISTED, COPPER #12 MINIMUM SIZE, TYPE THHN/THWN THERMOPLASTIC, 600 VOLT, 75 DEGREES CELSIUS WET AND 90 DEGREES CELSIUS DRY, UNLESS NOTED OTHERWISE.</p> <p>25. ALL CABLING SHALL BE ROUTED IN CONDUIT. SIZE CONDUIT AS REQUIRED TO ROUTE SYSTEMS WITH MAXIMUM 40% CABLE FILL. MINIMUM CONDUIT SIZE SHALL BE 3/4" INTERIOR & 1" EXTERIOR.</p> <p>26. ALL CONDUIT STUB OUTS AND SLEEVES SHALL HAVE PROTECTIVE BUSHINGS TO PREVENT CABLE DAMAGE. BUSHING TO BE INSTALLED PRIOR TO CABLE INSTALLATION. CUTTING BUSHING AND INSTALLING AFTER CABLE IS INSTALLED WILL NOT BE ACCEPTED.</p> <p>27. COORDINATE MOUNTING HEIGHTS AND DETAILS OF ALL OUTLETS (POWER, SIGNAL, ETC.) WITH ARCHITECTURAL CASEWORK DRAWINGS PRIOR TO DIVISION 26 ROUGH-IN. PROVIDE COORDINATION DRAWINGS IN ACCORDANCE WITH DIVISION 26 SPECIFICATIONS WHERE CONFLICTS EXIST. OBTAIN APPROVAL FROM ARCHITECT BEFORE ELECTRICAL ROUGH-IN WHEN CONFLICTS ARISE.</p> <p>28. CIRCUITING:</p> <p>A. BRANCH CIRCUITING IS SCHEMATIC IN NATURE AND IS INTENDED TO INDICATE CIRCUIT LOADING AND CONTROL, NOT METHODS OF INSTALLATION. REFER TO SPECIFICATIONS FOR METHODS OF INSTALLATION AND MATERIALS, INCLUDING WHETHER OR NOT BX IS ALLOWED AND WHETHER "THROUGH-FIXTURE" OR "OCTOPUS (EMT WITH FLEXIBLE WHIPS)" TYPE LIGHTING BRANCH CIRCUITING IS REQUIRED.</p> <p>B. WHERE WIRE SIZE AND CONDUIT SIZE IS NOT INDICATED ON THE DRAWINGS AND/OR PANEL SCHEDULES, REFER TO SPECIFICATIONS FOR MINIMUM SIZE REQUIRED.</p> <p>C. BRANCH CIRCUITS ON THE DRAWINGS ARE GENERALLY NOT SHOWN GROUPED IN SINGLE RACEWAYS. HOWEVER, GROUPING IS ALLOWED UNDER CERTAIN CONDITIONS. REFER TO DIVISION 26 SPECIFICATIONS UNDER SECTION ENTITLED "ELECTRICAL WIRING" FOR REQUIREMENTS.</p> <p>D. THE DRAWINGS GENERALLY INDICATE QUANTITY OF CONDUCTORS ON BRANCH CIRCUIT HOME RUNS ONLY. ELSEWHERE WITHIN CIRCUITS, PROVIDE QUANTITY OF CONDUCTORS AS NEEDED TO ACCOMPLISH CIRCUITING AND SWITCHING REQUIREMENTS SHOWN.</p> <p>29. WHEN REMOVING EXISTING ELECTRICAL WORK WHERE OTHER ITEMS REMAIN ON THE SAME CIRCUIT, THE CONTRACTOR SHALL TAKE WHATEVER STEPS ARE NECESSARY TO MAINTAIN CIRCUIT CONTINUITY.</p> <p>30. ALL ITEMS NOTED TO BE REMOVED ARE TO REMAIN THE PROPERTY OF THE OWNER; HOWEVER, CONTRACTOR SHALL REMOVE FROM JOB SITE ALL MATERIAL NOT RETAINED BY OWNER.</p> <p>31. FIELD VERIFY CONDITION OF, AND MODIFICATIONS AND ADDITIONS TO, ALL EXISTING ELECTRICAL FIXTURES, PANELS, WIRING, ETC.</p> <p>32. CONTRACTOR SHALL FIELD VERIFY EXISTING BRANCH CIRCUIT LOADING WHEN MAKING MODIFICATIONS AND/OR ADDITIONS TO THAT CIRCUIT. IF NEW WORK WOULD OVERLOAD EXISTING CIRCUIT, CONTRACTOR SHALL LOCATE ANOTHER EXISTING CIRCUIT (THE CLOSEST), WHICH WOULD NOT BE OVERLOADED UPON ADDING NEW LOAD, AND SHALL TIE NEW LOAD INTO THAT CIRCUIT.</p> <p>33. CONTRACTOR TO REFER TO ARCHITECTURAL PHASING PLANS AND HAVE A GOOD UNDERSTANDING OF SCOPE OF PROJECT PRIOR TO COMMENCEMENT OF WORK.</p>

ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION
A OR AMP	AMPERES	LV	LOW VOLTAGE
ABV	ABOVE	MAX	MAXIMUM
AFF	ABOVE FINISHED FLOOR	MCA	MINIMUM CIRCUIT AMPS
AFG	ABOVE FINISH GRADE	MCC	MOTOR CONTROL CENTER
AIC	ALFIRE INTERRUPTING CAPACITY	MFR	MANUFACTURER
AL	ALUMINUM	MANH	MANHOLE
AS	DISCONNECT SWITCH SIZE RATING	NIC	MAXIMUM OVERCURRENT PROTECTION
ATS	AUTOMATIC TRANSFER SWITCH	MTD	MOUNTED
AUX	AUXILIARY	MTG	MOUNTING
AWG	AMERICAN WIRE GAUGE	MV	MEDIUM VOLTAGE
B.S.	BARE STRANDED	NAC	NOTIFICATION APPLIANCE CIRCUIT
BKBD	BACKBOARD	NC	NORMALLY CLOSED
BKR	BREAKER	NEC	NATIONAL ELECTRICAL CODE
BLDG	BUILDING	NF	NON-FUSED
C	CONDUIT	NTI	NOT IN CONTRACT
C.O.	CONDUIT ONLY WITH PULL WIRE	NO	NUMBER
CB	CIRCUIT BREAKER	OC	ON CENTER
CKT	CIRCUIT	OD	OUTSIDE DIAMETER
CL	CENTER LINE	PB	PULL BOX
CLG	CELLING	PC	PHOTOCELL
COL	COLUMN	PH OR Ø	PHASE
CU	COPPER	PIV	PISTON INDICATING VALVE
DIS	DISCONNECT	PNL	PANEL
DWG	DISTRIBUTION PANEL	POC	POINT OF CONNECTION
EA	EACH	PR	PRIMARY
ELEC	ELECTRICAL	PVC	POLY-VINYL CHLORIDE
EMH	ELECTRICAL MANHOLE	PWR	POWER
EMT	ELECTRICAL METALLIC TUBING	RECEPTE	RECEPTACLE
EPO	EMERGENCY POWER OFF	REQD	REQUIRED
EQ	EQUIPMENT	RSG	RIGID GALVANIZED STEEL
FA	FIRE ALARM	RFBP	REDUCED PRESSURE BACK FLOW PREVENTER
FACP	FIRE ALARM CONTROL PANEL	SF	SQUARE FEET
FATC	FIRE ALARM TERMINAL CABINET	SP	SPARE
FF	FINISHED FLOOR	SPECS	SPECIFICATIONS
FLA	FULL LOAD AMPS	STD	STANDARD
FIB	FIBER OPTIC	SW	SWITCH
FT	FEET	SWBD	SWITCHBOARD
GFI	GROUND FAULT INTERRUPTER	TB	TERMINAL BLOCK
GFR	GROUND FAULT RELAY	TEL/TELE	TELEPHONE
GND	GROUND	TPS	TWISTED SHIELDED PAIR
HP	HORSEPOWER	TRANSF/XMR	TRANSFORMER
HTR	HEATER	TS	TAMPER SWITCH
HV	HIGH VOLTAGE	TYP	TYPICAL
ISC	SHORT CIRCUIT CURRENT	UG	UNDERGROUND
KCAL	THOUSAND CIRCULAR MILS	UNO	UNLESS NOTED OTHERWISE
KV	KILOVOLT	V	VOLTS
KVA	KILOVOLT-AMPERES	VA	VOLT-AMPERES
KW	KILOWATT	VFD	VARIABLE FREQUENCY DRIVE
LF	LINEAR FEET	W	WATTS
LIS	LOAD INTERRUPTER SWITCH	WP	WEATHERPROOF
LOC	LOCATION	Z	IMPEDANCE
LTG	LIGHTING		

	SHEET OR DETAIL REFERENCE - NUMBER ON TOP INDICATES DETAIL NUMBER - NUMBER ON BOTTOM INDICATES SHEET NUMBER
	MECHANICAL EQUIPMENT CALLOUT SEE MECHANICAL PLANS FOR EXACT LOCATION AND REQUIREMENTS
	KEY NOTE

CIRCUITING	
	ARROW INDICATES HOME RUN. LONGER TICK(S) INDICATE NEUTRAL WIRE(S), SHORTER STRAIGHT TICK(S) INDICATE PHASE WIRE(S), SLANTED SHORTER TICK(S) INDICATE SWITCH LEG(S), DOT(S) INDICATE GROUNDING CONDUCTOR(S), DASHED WIRING (LONG-SHORT-LONG DASHES) INDICATES WIRING BELOW SLAB OR GRADE, DASHED WIRING (SERIES OF SHORT DASHES) INDICATES EXISTING WIRING, SLASH THROUGH ARROW INDICATES PARTIAL CIRCUIT, "D" ON HOME RUN ARROW INDICATES DEDICATED CIRCUIT.
	PROVIDE A SEPARATE NEUTRAL FOR EACH PHASE CONDUCTOR FOR ENTIRE LENGTH OF CIRCUIT FROM PANEL TO OUTLET. COUNT EACH NEUTRAL AS CURRENT-CARRYING AND GROUP A MAXIMUM OF SIX THHN/THWN CONDUCTORS IN A SINGLE RACEWAY. GROUNDING CONDUCTOR IS NOT COUNTED.
<div>LC1-X</div>	LIGHTING CIRCUIT DESIGNATION FOR SPACE, U.N.O.
LC1-X	CIRCUIT DESIGNATION NEXT TO RECEPTACLE DENOTES INDICATES BRANCH CIRCUIT NUMBER. SEE PANEL SCHEDULES FOR INFORMATION.
+42"	A NOTATION INDICATING THE MOUNTING HEIGHT OF A DEVICE AS MEASURED FROM FINISHED FLOOR OR GRADE TO CENTER LINE OF DEVICE





















MOUNTING OVER OBSTRUCTION DETAIL
NOTE: SIDE REACH 1. UNOBSTRUCTED: WHERE A CLEAR FLOOR OR GROUND SPACE ALLOWS A PARALLEL APPROACH TO AN ELEMENT AND THE SIDE REACH IS UNOBSTRUCTED, THE HIGH SIDE REACH SHALL BE 48 INCHES MAX. AND THE LOW SIDE REACH SHALL BE 15 INCHES MIN ABOVE THE FINISH FLOOR OR GROUND. 1.1. EXCEPTION: AN OBSTRUCTION SHALL BE PERMITTED BETWEEN THE CLEAR FLOOR OR GROUND SPACE AND THE ELEMENT WHERE THE DEPTH OF THE OBSTRUCTION IS 10 INCHES MAX. 2. OBSTRUCTED HIGH REACH: WHERE A CLEAR FLOOR OR GROUND SPACE ALLOWS A PARALLEL APPROACH TO AN ELEMENT AND THE HIGH SIDE REACH IS OVER AN OBSTRUCTION, THE HEIGHT OF THE OBSTRUCTION SHALL BE 34 INCHES MAX. AND THE DEPTH OF THE OBSTRUCTION SHALL BE 24 INCHES MAX. THE HIGH SIDE REACH SHALL BE 48 INCHES MAX FOR A REACH DEPTH OF 10 INCHES MAX. WHERE THE REACH DEPTH EXCEEDS 10 INCHES, THE HIGH SIDE REACH SHALL BE 46 INCHES MAX FOR A REACH DEPTH OF 24 INCHES MAX. 3. OPERATION: OPERABLE PARTS SHALL BE OPERABLE WITH ONE HAND AND SHALL NOT REQUIRE TIGHT GRASPING, PINCHING, OR TWISTING OF THE WRIST. THE FORCE REQUIRED TO ACTIVATE OPERABLE PARTS SHALL BE 5 POUNDS MAX.

UNOBSTRUCTED SIDE REACH 2022 CBC 11B-306.1.1	OBSTRUCTED SIDE REACH 2022 CBC 11B-306.1.2

UNOBSTRUCTED FORWARD REACH 2022 CBC 11B-306.2.1	OBSTRUCTED FORWARD REACH 2022 CBC 11B-306.2.2

UNOBSTRUCTED FORWARD REACH 2022 CBC 11B-306.2.1	OBSTRUCTED FORWARD REACH 2022 CBC 11B-306.2.2


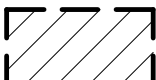
SYMBOLS SHOWN ON LEGEND MAY NOT APPEAR ON DRAWINGS

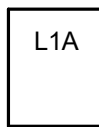
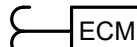


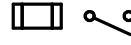





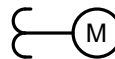








ELECTRICAL DEVICES & EQUIPMENT	
	JUNCTION BOX
	20A MOTOR-RATED TOGGLE SWITCH
	20A-125V DUPLEX RECEPTACLE
	20A-125V GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLE
	20A-125V DUPLEX RECEPTACLE MOUNTED ABOVE COUNTER TOP
	20A-125V CONTROLLED PLUG-LOAD DUPLEX RECEPTACLE
	20A-125V ISOLATED GROUND TYPE DUPLEX RECEPTACLE
	20A-125V DUPLEX TAMPER RESISTANT RECEPTACLE WITH (2) USB CHARGING PORTS
	20A-125V FOURPLEX RECEPTACLE (SAME SYMBOLOGY TYPES AS DUPLEX RECEPTACLE)
	SPECIAL PURPOSE SINGLE POWER RECEPTACLE, RATED AS INDICATED (IF NO RATING INDICATED, RECEPTACLE RATING SHALL MATCH BRANCH CIRCUIT OVERCURRENT PROTECTIVE DEVICE AND SHALL MEET REQUIREMENTS OF EQUIPMENT BEING CONNECTED)
	20A-125V FLUSH FLOOR DUPLEX RECEPTACLE
	20A-125V CEILING MOUNTED DUPLEX RECEPTACLE
	BELL
	EMERGENCY POWER OFF (EPO)
	PUSHBUTTON
	DISCONNECT SWITCH. DISCONNECT SWITCHES SHALL BE 30NF/3 UON, NF = NON-FUSIBLE, NEMA 1 ENCLOSURE. PROVIDE FUSED BUSWAY PLUG WHEN SWITCH IS INDICATED ON BUSWAY.
	TRANSFORMER
	PANELBOARD
	SWITCHBOARD OR DISTRIBUTION PANELBOARD
	PHOTOVOLTAIC SOLAR PANEL











LIGHTING FIXTURES		
EMERGENCY	NORMAL	
		LED 2' x 2' FIXTURE
		LED 2' x 4' FIXTURE
		LED LINEAR FIXTURE (SURFACE/RECESSED/SUSPENDED)
		LED SURFACE MOUNTED FIXTURE
		LED STRIP FIXTURE
		LED DOWNLIGHT (ROUND)
		LED DOWNLIGHT (SQUARE)
		LED INDOOR WALL SCONCE FIXTURE
		LED WALL MOUNTED FIXTURE
		LED OUTDOOR PEDESTRIAN STYLE POST-TOP AREA FIXTURE
		LED OUTDOOR ARM MOUNT AREA FIXTURE
		SPORTS LIGHTING FIXTURE
		LED ACCENT SPOT LIGHT
		EMERGENCY EXIT LIGHT SIGN. REFER TO LIGHTING PLAN FOR NUMBER OF FACES AND DIRECTIONAL ARROWS

REFER TO LIGHT FIXTURE SCHEDULE FOR MANUFACTURER ORDER NUMBERS
LIGHTING CONTROLS
FINISHES SHALL BE SELECTED BY CAMPUS REPRESENTATIVE PRIOR TO ORDERING

	PRIMARY DAYLIGHTING ZONE
	SECONDARY DAYLIGHTING ZONE

	PRIMARY DAYLIGHTING ZONE		SECONDARY DAYLIGHTING ZONE
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SINGLE LINE DIAGRAM			
	PANELBOARD		ELECTRIC CIRCUIT MONITOR
	AUTOMATIC TRANSFER SWITCH		SURGE PROTECTIVE DEVICE
	CIRCUIT BREAKER (FUSED TYPE)		MOTOR
	CIRCUIT BREAKER		TAP
	GROUND FAULT CIRCUIT BREAKER		POINT OF CONNECTION
	METER		CONTINUATION LINE
	TRANSFORMER		GENERATOR
	COMBINATION MOTOR- STARTER		GROUND
	DISCONNECT SWITCH W/COMBINATION MOTOR- STARTER		
	DISCONNECT SWITCH - FUSED		
	DISCONNECT SWITCH		

RENOVATION WORK	
<u>EXISTING WORK SHALL BE SHOWN LIGHT - NEW WORK SHALL BE SHOWN DARK</u>	
(E) 	(E)  EXISTING TO REMAIN
(RR) 	(RR)  EXISTING EQUIPMENT WITH "RR" ADJACENT IS TO BE DISCONNECTED, REMOVED AND RELOCATED TO NEW LOCATION AND RECONNECTED AS REQUIRED.
(R) 	(R)  EXISTING SHALL BE DEMOLISHED AND REMOVED.
(ER) 	(ER)  EQUIPMENT WITH "ER" ADJACENT IS RELOCATED EQUIPMENT SHOWN IN NEW LOCATION.
	  NO TAG INDICATES NEW EQUIPMENT.

ELECTRICAL SHEET INDEX

E01 ES.1 ES.1 EX.1	LEGEND, NOTES, & SHEET INDEX ELECTRICAL SITE PLAN SINGLE LINE DIAGRAM ELECTRICAL DETAILS
<p>IDENTIFICATION STAMP DIV. OF THE STATE ARCHITECT APP: 02-123006 INC: REVIEWED FOR: DATE: 12/20/2024</p> <p>ARCHITECT PBK Architects, Inc. FRESNO 7790 North Palm Avenue Fresno, CA 95711 559-448-8400 P 559-448-8467 F PBK.com</p> <p>MADISON ELEMENTARY SCHOOL - TEMPORARY RELOCATABLE CLASSROOMS</p> <p>109 Stadium Rd, Madera, CA 93637 DSA SUBMITTAL</p> <p>PROFESSIONAL SEAL STATE OF CALIFORNIA JULIEN C. HUNTER E-19819 REGISTERED PROFESSIONAL ENGINEER DATE OF EXPIRATION: 12/31/2025</p> <p>PROJECT NUMBER 230278 DATE 12/10/2024 DSA APPLICATION NO. 02-123006 FILE NO. 20-30 PTN NO. 65243-169 DRAWN BY Author REVISIONS # DESCRIPTION DATE 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355.</p>	

- 1 PROVIDE 24x24" PULLBOX FOR FA/SIGNAL.
- 2 PROVIDE (4) 2" FOR TECH PATHWAY.
- 3 PROVIDE 2"C FOR FA PATHWAY.
- 4 PROVIDE FEEDER PER SINGLE LINE DIAGRAM.
- 5 PROVIDE 24x24" PULLBOX FOR POWER.
- 6 PROVIDE ELECTRICAL AND GROUNDING CONNECTIONS TO PORTABLE LOAD CENTER.
SEE SINGLE LINE SHEET "E5.1" FOR COMPLETE INFORMATION.
- 7 CONNECT FIRE ALARM AND LOW VOLTAGE RACEWAYS TO PORTABLE'S EXISTING CONDUIT CHASES TO ACCESSIBLE CEILING SPACE.
- 8 EXISTING CANOPY LIGHTING FOR PATH OF EGRESS.
- 9 EXISTING WALL PACK LIGHTING FOR PATH OF EGRESS.
- 10 EXISTING POLE LIGHTING FOR PATH OF EGRESS.
- 11 PROVIDE NEW FLOOD LIGHT FIXTURE EXTERIOR LIGHTING CIRCUIT FOR MODULAR BUILDING THAT FLOOD LIGHT IS MOUNTED TO. LITHONIA MODEL#: RSK2FD LP6 40K NPL.

EGRESS LIGHTING HAS BEEN VERIFIED BY DESIGN
PROFESSIONAL TO PROVIDE 1 FT CANDLE LIGHT MIN FROM
BUILDING EXITS TO PUBLIC WAY



ARCHITECT PBK Architects, Inc.

FRESNO
7790 North Palm Avenue
Fresno, CA 93711
559-448-8400 P
559-448-8407 F
PBK.com

109 Stadium Rd. Madera, CA 93637

OSHA SUBMITTAL

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DSA SUBMITTAL

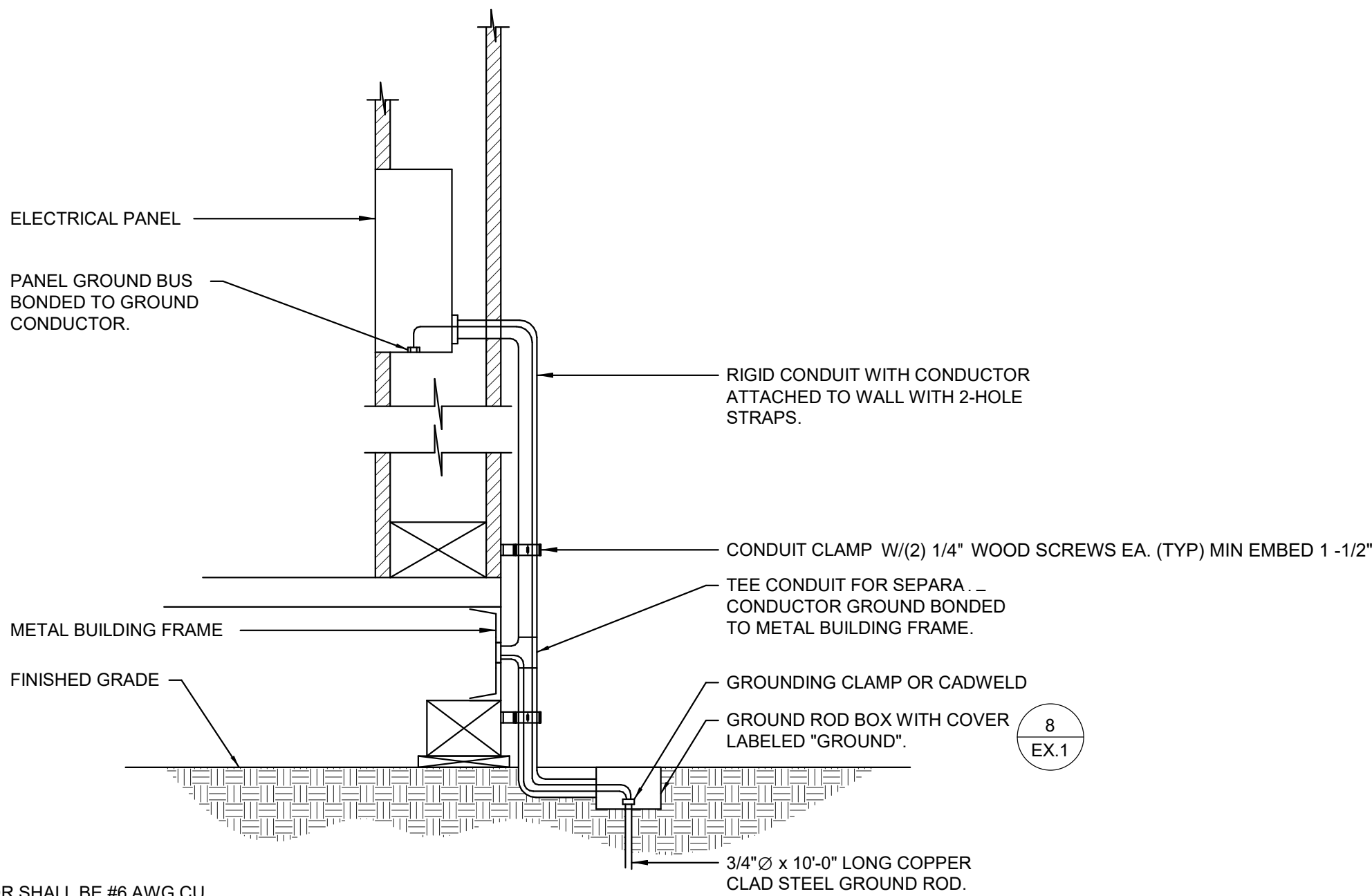
**ELECTRICAL SITE
PLAN**

ES.1

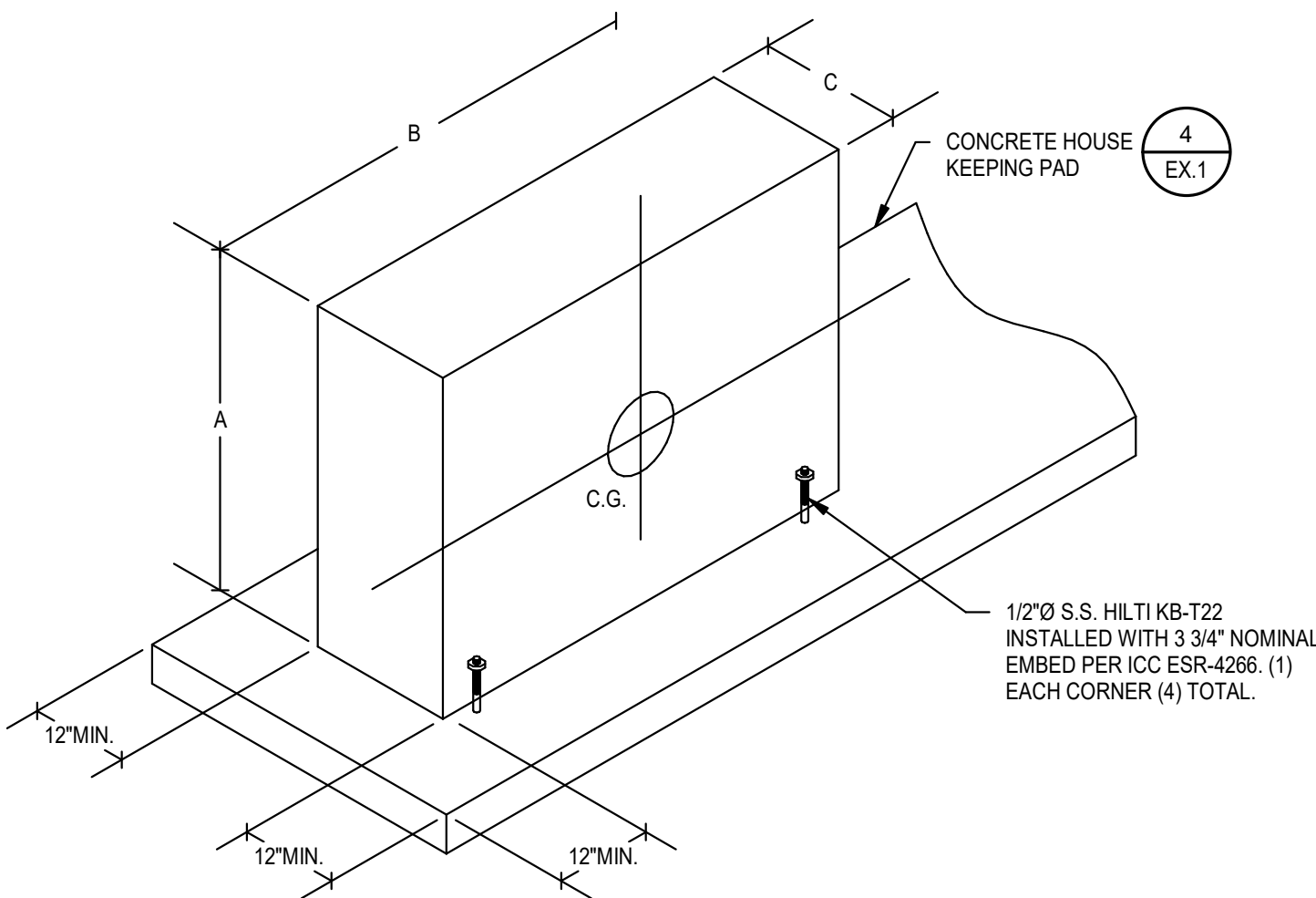
LEGEND:	CONNECTED LOAD BY PHASE	CONNECTED LOAD	REMARKS:
** 6 mA GROUND FAULT CIRCUIT BREAKER		0 VA KVA	
*30 mA GROUND FAULT CIRCUIT BREAKER	A: 0 VA	0 A 3PH AMPS	
# LOCK-ON CIRCUIT BREAKER HANDLE	B: 0 VA	DEMAND LOAD	
ST - SHUNT TRIP	C: 0 VA	0 A 3PH AMPS	

E5.1





- DETAIL NOTES:**
- SIZE OF CONDUCTOR SHALL BE #6 AWG CU.
 - BOND SEPARATE CONDUCTORS FROM GROUND ROD TO ELECTRICAL PANEL AND TO METAL BUILDING FRAME (CEC: 250-81). IN ADDITION TO THE DETAIL SHOWN ABOVE, BOND THE ELECTRICAL GROUND TO METAL WATER PIPE EMBEDDED AT LEAST 10 FT. INTO THE SOIL IF AVAILABLE (CEC: 250-81 & 250-83).
 - ALL MODULES OF METAL FRAME BUILDINGS SHALL BE ELECTRICALLY BONDED TOGETHER (BOLTING ONLY IS NOT ACCEPTABLE BONDINGS).
 - CHECK RESISTANCE TO GROUND. IF RESISTANCE EXCEEDS 25 OHMS, INSTALL ADDITIONAL GROUND RODS WITH CONDUCTORS AS SHOWN, SEPARATED AT LEAST 6'-0\"/>
 - GROUND TEST SHALL BE WITNESSED BY PROJECT INSPECTOR, AND RECORDED FOR OWNER MANUAL.



SYMBOL	A	B	C	WEIGHT	MIN. NO ANCHORS	SIZE OF ANCHORS	MINIMUM EMBEDMENT
TR-TK	43"	31"	24"	675	4	1/2"	3 1/2"

5 TRANSFORMER MOUNTING DETAIL
NOT TO SCALE

1 CONDUIT RISER DETAIL
NOT TO SCALE

9 PORTABLE BUILDING GROUNDING DETAIL
NOT TO SCALE

6 PORTABLE BUILDING POWER CONNECTION DETAIL
NOT TO SCALE

2 TRENCH DETAIL
NOT TO SCALE

7 DELTA-WYE TRANSFORMER SCHEMATIC
NOT TO SCALE

3 UNDERGROUND PULLBOX DETAIL
NOT TO SCALE

8 GROUND WELL ASSEMBLY
NOT TO SCALE

4 CONCRETE HOUSE KEEPING PAD DETAIL
NOT TO SCALE













REVISIONS		
#	DESCRIPTION	DATE

INTERCOM SYSTEMS GENERAL NOTES

- ALL 120V POWER REQUIRED FOR THE FUNCTIONALITY OF EACH SYSTEM SHALL BE A DECODED CIRCUIT AND ON EMERGENCY POWER WHEN AVAILABLE. THE INSTALLING CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND WIRING THEIR OWN 120V POWER REQUIREMENTS FOR ALL REMOTE POWER SUPPLIES. THE INSTALLING CONTRACTORS LICENSED ELECTRICAL SUBCONTRACTOR SHALL COORDINATE ELECTRICAL PANEL LOCATIONS AND WIRING WITH THE PROJECTS ELECTRICAL CONTRACTOR. THE SYSTEMS REQUIREMENTS (TYPICAL), PROJECTS ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL POWER TO MAIN CONTROL PANELS, ALL HEAD END EQUIPMENT. SYSTEM INSTALLERS SHALL BE RESPONSIBLE FOR LOCATION AND CONNECTION OF CONTROL PANEL AND HEAD END POWER WITH THE PROJECTS ELECTRICAL CONTRACTOR.
- THE PROJECTS ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL IN WALL CONDUITS, BELOW GRADE CONDUITS, BELOW SLAB CONDUITS, CONDUITS ACROSS OPEN AREAS BACK BOXES, SLEEVES, AND OTHER RACEWAY REQUIRED FOR DEVICES AND SYSTEMS. THE CONTRACTOR SHALL PROVIDE ALL CONDUIT, SLEEVES, ANY ADDITIONAL CONDUITS, SLEEVES, AND RACEWAY REQUIREMENTS FOR EACH SYSTEM SHALL BE THE RESPONSIBILITY OF EACH SYSTEM INSTALLER.
- ALL EXPOSED SYSTEMS WIRING OR WIRING ROUTING ACROSS NON ACCESSIBLE CEILINGS SHALL BE ROUTED IN CONDUIT. SIZE CONDUIT AS REQUIRED TO ROUTE SYSTEMS WITH 40% CABLE FILL RATIO. MINIMUM CONDUIT SIZE SHALL BE 3/4".
- CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING ALL EXTERIOR WALL PENETRATIONS ARE PROPERLY SEALED TO PREVENT ANY MOISTURE FROM ENTERING BUILDING.
- NO CONDUITS SHALL BE INSTALLED ON THE EXTERIOR OF THE BUILDING. IF EXTERIOR CONDUITS ARE REQUIRED FOR THE PROJECTS ELECTRICAL CONTRACTOR SHALL COORDINATE WITH THE PROJECTS CONSULTANT PRIOR TO ANY ROUGH-IN.
- EACH SYSTEM CONTRACTOR SHALL PROVIDE AND INSTALL PROTECTIVE BUSHINGS ON ALL CONDUIT STUB OUTS AND SLEEVES TO PREVENT CABLE DAMAGE. BUSHING TO BE INSTALLED PRIOR TO CABLE INSTALLATION. CUTTING BUSHING AND INSTALLING AFTER CABLE IS INSTALLED WILL NOT BE EXPECTED.
- ALL CABLE SHALL BE ROUTED DOWN CORRIDORS, PARALLEL AND PERPENDICULAR TO THE BUILDING WALLS AND STRUCTURE. CABLE TO EACH DETAIL SHALL BE LATCH OFF OF A MAIN CONDUIT OR DUCTWORK. CABLE TO EACH DETAIL SHALL BE LATCH OFF OF A MAIN CONDUIT, PIPING, OR DUCTWORK. THE CABLE SUPPORT SYSTEM SHALL BE DIRECTLY CONNECTED TO THE BUILDING'S STEEL JOIST AT LOCATIONS WHERE THE BOTTOM OF THE JOIST IS MORE THAN 12" ABOVE THE CEILING. THE SYSTEM INSTALLER SHALL PROVIDE AND INSTALL THREADED ROD AND ALL REQUIRED MATERIALS TO CONNECT THE THREADED ROD TO THE BUILDING STEEL AND THE CABLE SUPPORT SYSTEM TO THE THREADED ROD. CABLE PATHWAY SHALL NOT BE HIGHER THAN 5" ABOVE THE CEILING AT ANY LOCATIONS.
- THE SYSTEM INSTALLER SHALL PROPERLY SUPPORT ALL INSTALLED SYSTEM CABLEING FROM AN APPROVED CABLE SUPPORT SYSTEM AS DETAILED IN SPECIFICATIONS. NO CABLEING SHALL BE SUPPORTED FROM ANY OTHER TYPE OF SUPPORT. CABLE SUPPORT SHALL BE INSTALLED TO PIPING, OR DUCTWORK. THE CABLE SUPPORT SYSTEM SHALL BE DIRECTLY CONNECTED TO THE BUILDING'S STEEL JOIST AT LOCATIONS WHERE THE BOTTOM OF THE JOIST IS MORE THAN 12" ABOVE THE CEILING. THE SYSTEM INSTALLER SHALL PROVIDE AND INSTALL THREADED ROD AND ALL REQUIRED MATERIALS TO CONNECT THE THREADED ROD TO THE BUILDING STEEL AND THE CABLE SUPPORT SYSTEM TO THE THREADED ROD. CABLE PATHWAY SHALL NOT BE HIGHER THAN 5" ABOVE THE CEILING AT ANY LOCATIONS.
- ALL INTERCOM CABLING FOR CLASSROOMS, OFFICES, CONFERENCE ROOMS, WORK ROOMS, AND LOUNGES SHALL BE HOME RUNS TO HEAD END EQUIPMENT TO ALLOW ZONING TO BE ACCOMPLISHED.
- ALL EXTERIOR AND WALL MOUNTED SPEAKERS SHALL BE MOUNTED AT 10'-0" UNLESS OTHERWISE NOTED.
- EXTERIOR SPEAKERS SHALL NOT BE GROUPED WITH INTERIOR SPEAKERS.
- ALL SPEAKERS SHALL BE CONNECTED TO A STANDARD PUNCH DOWN BLOCK LOCATED NEAR HEAD END EQUIPMENT AND THEN CONNECTED TO HEAD END EQUIPMENT.
- ALL CEILING MOUNTED SPEAKERS SHALL BE INSTALLED UTILIZING A TIE BRIDGE SUPPORT SYSTEM. NO POINT SHOULD BE HIGHER THAN 5" ABOVE THE CEILING MOUNTED SPEAKER BE SUPPORTED BY A CEILING TIE ONLY.
- ALL WALL MOUNTED CALL INITIATING DEVICES SHALL BE INSTALLED AT 42" ABOVE THE FINISHED FLOOR.

INTERCOM/CLOCK SYSTEMS LEGEND

SYMBOL	DESCRIPTION
	SPEAKER, FLUSH MOUNTED IN CEILING, "12" INDICATES HIGH VOLUME IP SPEAKER FOR INTERCOM SYSTEM, CABLEING CONTRACTOR SHALL PROVIDE ONE DROP FROM EACH DROP BOX TO SERVICE LOOP AT DEVICE LOCATION, TERMINATE AND CERTIFY PER SPECIFICATIONS, SUBSCRIPT "L" INDICATES CONNECTION TO LOCAL SOUND SYSTEM, BOGEN PA SYSTEM IP BASED DEVICES
	WALL MOUNTED SPEAKER, BOGEN PA SYSTEM IP BASED DEVICES
	FLUSH MOUNTED EXTERIOR SPEAKER, WEATHER PROOF WALL MOUNTED
	SPEAKER VOLUME CONTROL, FLUSH MOUNTED IN WALL
	MICROPHONE OUTLET, " WHEN REPLACED WITH AN "W" SHALL INDICATE THAT THE OUTLET IS TO BE WALL MOUNTED AT "18" A.F.F. UNLESS NOTED OTHERWISE, " WHEN REPLACED WITH AN "F" SHALL INDICATE THAT THE OUTLET IS TO BE FLOOR MOUNT, " WHEN REPLACED WITH AN "H" SHALL INDICATE THAT THE OUTLET IS TO BE A HANGING MICROPHONE SUSPENDED FROM ABOVE.
	CALL BUTTON FOR COMMUNICATIONS MOUNTED AT 42" A.F.F.
	AUXILIARY INPUT OUTLET, " WHEN REPLACED WITH AN "W" SHALL INDICATE THAT THE OUTLET IS TO BE WALL MOUNTED AT "18" A.F.F. UNLESS NOTED OTHERWISE, " WHEN REPLACED WITH AN "F" SHALL INDICATE THAT THE OUTLET IS TO BE FLOOR MOUNT.
	INTERCOM COMMUNICATIONS CONTROL SYSTEM HANDESET "ACS" INDICATES ADMINISTRATOR CONTROL SYSTEM HANDESET "MCS" INDICATES MASTER CONTROL SYSTEM HANDESET "RCS" INDICATES RESCUE AREA CONTROL SYSTEM HANDESET.
	SINGLE SIDED WALL MOUNTED CLOCK, MOUNTED 8 FEET AFF OR 8 INCHES BELOW CEILING, "H" INDICATES HIGHER BODEN SAVING CLOCKS - CLOCKS TO BE BATTERY POWERED AND COMMUNICATIONS WIRELESSLY.
	DOUBLE SIDED WALL MOUNTED CLOCK, MOUNTED 8 FEET AFF OR 8 INCHES BELOW CEILING WHICH EVER IS HIGHER.










NOTE:

1. EVERY SYMBOL SHOWN ON LEGEND MAY NOT APPEAR ON DRAWINGS. REFER TO GENERAL ELECTRICAL NOTES FOR WALL-MOUNTED DEVICE MOUNTING HEIGHTS.
2. REFERENCE SPECIFICATIONS FOR MATERIALS AND METHODS.
3. COMPLETE INSTALLATION OF ALL PRODUCTS SHALL BE IN COMPLIANCE WITH ALL CODES, INDUSTRY STANDARDS, COMMON PRACTICES AND MANUFACTURERS INSTRUCTIONS.
4. ALL CEILING MOUNTED DEVICES SHALL BE INSTALLED USING TILE BRIDGE SUPPORT OR ANOTHER TYPE OF NON-BUILDING STRUCTURE. NO DEVICES SHALL BE SUPPORTED BY THE CEILING TILE ALONE.

AUDIO & VIDEO GENERAL NOTES

1. ALL 120V POWER REQUIRED FOR THE FUNCTIONALITY OF EACH SYSTEM SHALL BE A DEDEDICATED CIRCUIT AND IN EMERGENCY POWER WHEN AVAILABLE. THE INSTALLING CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING THE 120V POWER REQUIREMENTS FOR ALL REMOTE POWER SUPPLIES. THE INSTALLING CONTRACTOR LICENSED ELECTRICAL SUBCONTRACTOR SHALL COORDINATE ELECTRICAL PANEL LOCATION, LOADS, AND SPACING REQUIREMENTS FOR THE CONTRACTORS SYSTEM REQUIREMENTS. (TYPICAL) THE SYSTEMS ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL POWER MAIN CONTROL PANELS AND ALL HEAD END EQUIPMENT. SYSTEM INSTALLERS SHALL COORDINATE LOCATION AND CONNECTION OF CONTROL PANEL AND HEAD END POWER WITH THE CONTRACTORS ELECTRICAL CONTRACTOR.
2. THE PROJECTS ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL IN WALL CONDUITS, BELOW GRADE CONDUITS, BELOW SLAB CONDUITS, CONDUITS ACROSS OPEN AREAS BACK BOXES, SLEEVES, AND OTHER RACEWAY REQUIRED FOR DEVICES AND PATHWAYS SHOWN ON THE FLOOR PLANS AND DETAIL SHEETS. ANY ADDITIONAL CONDUITS OR RACEWAY REQUIREMENTS FOR EACH SYSTEM SHALL BE THE RESPONSIBILITY OF EACH SYSTEM INSTALLER.
3. ALL EXPOSED SYSTEMS WIRING OR WIRING ROUTING ACROSS NON ACCESSIBLE CEILING SHALL BE ROUTED IN CONDUIT. SIZE CONDUIT AS REQUIRED TO ROUTE SYSTEMS WITH 40% CABLE FILL RATIO. MINIMUM CONDUIT SIZE SHALL BE 3/4".
4. ANY CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING ALL EXTERIOR WALL PENETRATIONS ARE PROPERLY SEALED TO PREVENT ANY MOISTURE FROM ENTERING BUILDING.
5. NO CONDUITS SHALL BE INSTALLED ON THE EXTERIOR OF THE BUILDING. IF EXTERIOR PENETRATIONS ARE REQUIRED, THEY SHALL BE INSTALLED BY THE EXTERIOR CONTRACTOR. THE EXTERIOR CONTRACTOR SHALL COORDINATE WITH THE PROJECTS CONSULTANT PRIOR TO ANY ROUGH-IN.
6. EACH SYSTEM CONTRACTOR SHALL PROVIDE AND INSTALL PROTECTIVE BUSHINGS ON ALL CONDUIT STUB OUTS AND SLEEVES TO PREVENT CABLE DAMAGE. BUSHING TO BE INSTALLED PRIOR TO CABLE INSTALLATION. CUTTING BUSHING AND INSTALLING AFTER CABLE IS INSTALLED WILL NOT BE ACCEPTED.
7. ALL CABLE SHALL BE ROUTED DOWN CORRIDORS, PARALLEL AND PERPENDICULAR TO THE BUILDING WALLS AND STRUCTURE. CABLE TO EACH DEVICE SHALL BRANCH OFF OF A MAIN CONDUIT. CABLE SHALL NOT BE RUN THROUGH CLASSROOMS, OFFICES, STORAGE ROOMS, RESTROOMS OR ANY TYPE OF ROOM OTHER THAN A CORRIDOR WILL NOT BE ACCEPTED. ENTER ALL ROOMS ABOVE THE ASSOCIATED ROOM DOORWAY.
8. THE SYSTEM INSTALLER SHALL PROPERLY SUPPORT ALL INSTALLED SYSTEM CABLEING FROM AN APPROVED CABLE SUPPORT SYSTEM AS DETAILED IN SPECIFICATIONS. NO CABLEING SHALL BE SUPPORTED BY AND TIED DIRECTLY TO BUILDING STEEL, CEILING, FLOOR SUPPORT, CONDUIT, PIPING, OR DUCTWORK. THE CABLE SUPPORT SYSTEM SHALL BE DIRECTLY CONNECTED TO THE BUILDING'S STEEL JOIST. AT LOCATIONS WHERE THE BOTTOM OF THE JOIST IS MORE THAN 12" ABOVE THE CEILING, CABLE SHALL BE SUPPORTED BY A 1/2" DIA. STEEL ROD WITH 1/2" DIA. THREADED ROD AND ALL REQUIRED MATERIALS TO CONNECT THE THREADED ROD TO THE BUILDING STEEL AND THE CABLE SUPPORT SYSTEM TO THE THREADED ROD. CABLE PATHWAY SHALL NOT BE HIGHER THAN 5' ABOVE THE CEILING AT ANY LOCATIONS.
9. ALL EXTERIOR AND LOW VOLTAGE SPEAKERS SHALL BE MOUNTED AT 10'-0" UNLESS OTHERWISE NOTED.
10. EXTERIOR SPEAKERS SHALL BE ON A SEPARATE LOW VOLTAGE CIRCUIT FROM INTERIOR SPEAKERS.
11. ANY CONTRACTOR SHALL COORDINATE ALL MOUNTING LOCATIONS OF ALL AV/ DEVICES TO PROVIDE EVEN AND BALANCED AUDIO COVERAGE OF INTENDED LISTENING AREAS AND UNOBSTRUCTED, SQUARE AND PLUMB VIDEO IMAGE DISPLAYS.
12. ALL LA-Y-IN CEILING MOUNTED SPEAKERS SHALL BE INSTALLED UTILIZING A TILE BRACKET THAT IS LAID IN AT NO POINT TO ADD THE WEIGHT OF A CEILING MOUNTED SPEAKER BE SUPPORTED BY A CEILING TILE ONLY.
13. ANY CONTRACTOR TO COORDINATE WITH ELECTRICAL CONTRACTOR FOR ALL CONDUIT AND BACK BOX REQUIREMENTS.
14. ANY CONTRACTOR TO COORDINATE WITH ALL OTHER TRADES WITH REGARD TO BLOCKING AND PROPER SUPPORT OF ALL AV/ DEVICES.

SECURITY SYSTEMS LEGEND

SYMBOL	DESCRIPTION
	INDICATES THE LOCATION OF AN INTERIOR VIDEO SURVEILLANCE CAMERA. ALL CAMERAS SHALL POE, IP BASED CAMERAS UNLESS NOTED OTHERWISE. CABLING CONTRACTOR SHALL PROVIDE AND INSTALL (1) CATEGORY CABLE TO EACH LOCATION SHOWN.
	INDICATES THE LOCATION OF A WEATHER PROOF (IP66) RATED, EXTERIOR SECURITY CAMERA. ALL CAMERAS SHALL POE, IP BASED CAMERAS UNLESS NOTED OTHERWISE. CABLING CONTRACTOR SHALL PROVIDE AND INSTALL (1) DATA CABLE TO EACH LOCATION SHOWN.
	WALL MOUNTED MOTION DETECTOR. MOUNT AT 12'-0" A.F.F.
	360 DEGREE CEILING MOUNTED MOTION DETECTOR.
	INTRUSION DETECTION SYSTEM ARM/DISARM KEYPAD WITH LOCKING VANDAL RESISTANT COVER.
	INTRUSION DETECTION CONTROL PANELS MOUNTED ON WALL. ELECTRICAL CONTRACTOR TO PROVIDE 120V. POWER TO PANEL. PROVIDE (1) TELEPHONE LINE AND (1) NETWORK CABLE TO PANEL. COORDINATE WITH DISTRICT TECHNOLOGY DEPARTMENT ON ACTIVATING VOICE LINE AND ACQUIRING AN IP ADDRESS.
	ACCESS CONTROL PROXIMITY CARD READER. MOUNT AT 42" A.F.F.
	DOOR RELEASE BUTTON (TO BE CONNECTED TO DOOR INDICATED).
	DOOR CONTACT

NOTE:

1. EVERY SYMBOL SHOWN ON LEGEND MAY NOT APPEAR ON DRAWINGS. REFER TO GENERAL ELECTRICAL NOTES FOR WALL-MOUNTED DEVICE MOUNTING HEIGHTS.
2. REFERENCE SPECIFICATIONS FOR MATERIALS AND METHODS.
3. COMPLETE INSTALLATION OF ALL PRODUCTS SHALL BE IN COMPLIANCE WITH ALL CODES, INDUSTRY STANDARDS, COMMON PRACTICES AND MANUFACTURER'S INSTRUCTIONS.
4. ALL CEILING MOUNTED DEVICES SHALL BE INSTALLED USING TILE BRIDGE SUPPORT OR CEILING TIE FROM THE BUILDING STRUCTURE. NO DEVICES SHALL BE SUPPORTED BY THE SUPPORTED TILE ALONE.

TECHNOLOGY PLAN GENERAL NOTES

1. ALL 120V POWER REQUIRED FOR THE FUNCTIONALITY OF THE TELECOMMUNICATION NETWORK, AND VIDEO EQUIPMENT SHALL BE A DEDICATED CIRCUIT AND IN EMERGENCY POWER AVAILABLE. CONTRACTOR SHALL COORDINATE AND INSTALL ALL 120V POWER REQUIREMENTS AND LOCATIONS AS REQUIRED FOR ALL EQUIPMENT (TYPICAL)
2. CONTRACTOR SHALL COORDINATING WITH PBK TELECOM/VIDEO DEPARTMENT PRIOR TO THE INSTALLATION OF RACKS AND RACK EQUIPMENT. NO RACKS SHALL BE PERMANENTLY INSTALLED WITHOUT WRITTEN APPROVAL OF THE PROPOSED LOCATIONS.
3. THE PROJECTS ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONDUITS, BACK BOXES, AND OTHER RACEWAY REQUIRED FOR DEVICES AND PATHWAYS SHOWN ON TYPICAL POWER PLANS AND DETAIL SHEETS. ANY ADDITIONAL CONDUITS, SLEEVES, AND RACEWAY REQUIREMENTS FOR THE SCS SHALL BE THE RESPONSIBILITY OF THE SCS INSTALLER.
4. THE SELECTED INSTALLING CONTRACTOR MUST BE A CERTIFIED INTEGRATOR/INSTALLER AUTHORIZED BY THE SPECIFIED SYSTEM MANUFACTURER TO INSTALL THE CABLE PLANT AND TELECOMMUNICATIONS PRODUCTS. REFER TO SPECIFICATIONS FOR PRODUCT TYPE AND DESCRIPTION.
5. SYSTEM WIRING AND EQUIPMENT INSTALLATION SHALL BE IN ACCORDANCE WITH ENGINEERING BEST PRACTICES AS ESTABLISHED BY ANSI/EIA/TIA, BICSI, AND THE NEC.
6. ALL WIRING SHALL MEET ALL STATE AND LOCAL ELECTRICAL CODES.
7. ALL TELECOMMUNICATIONS SYSTEMS EQUIPMENT AND MOUNTING LOCATIONS SHALL BE IN COMPLIANCE WITH ADA ACCESSIBILITY STANDARDS.
8. ALL INDUSTRY STANDARD CATEGORY 6A CABLEING PRACTICES MUST BE FOLLOWED FOR ALL DATA CABLEING.
9. ALL DATA CABLES ARE TO BE INSTALLED WITH A MINIMUM OF 12" INCHES OF SEPARATION FROM POWER CABLES, INTERCOM, FIRE ALARM, SECURITY CABLES IN ANY PARALLEL, OPEN WIRE RUN.
10. ALWAYS CROSS OTHER SYSTEM CABLES AT A 90 DEGREE ANGLE.
11. ALL CABLES AND TERMINATION COMPONENTS SHALL BE MACHINE LABELED AT BOTH ENDS. LABEL CABLES PER THE FOLLOWING STANDARDS AND/OR SPECIFICATIONS: FINAL CABLE/OUTLET IDENTIFICATION LABELS SHALL BE COORDINATED WITH THE OWNER AND PBK.
12. CONTRACTOR TO PROVIDE LIGHTNING PROTECTION ON ALL COMMUNICATION CABLE BETWEEN BUILDINGS.
13. ALL EXPOSED CABLEING INSTALLED IN PLENUM SHALL BE PLENUM-RATED. ALL NON PLENUM-RATED CABLEING INSTALLED IN PLENUM SPACES SHALL BE INSTALLED IN CONDUIT.
14. NO TERMINATION OR SPLICES SHALL BE INSTALLED IN OR ABOVE CEILINGS UNLESS NOTED OTHERWISE.
15. TECHNOLOGY CONTRACTOR SHALL PROVIDE AND INSTALL ALL SLEEVES REQUIRED TO INSTALL COMMUNICATION CABLEING THROUGH ALL CMU AND RATED WALLS. ALL TECHNOLOGY SYSTEM CONDUIT SLEEVES SHALL HAVE PROTECTIVE BUSHING ON BOTH ENDS, BE DEDICATED FOR TECHNOLOGY SYSTEMS ONLY AND SHALL NOT SHARE WITH OTHER BUILDING TRADES.
16. CONTRACTOR SHALL MAINTAIN WALL RATING WITH PROPER FIRE BLOCKING METHODS.
17. CONTRACTOR SHALL ROUTE ALL FIBER/OPTIC/DATA AND CATV CABLEING DOWN CORRIDORS AND PERPENDICULAR OR PARALLEL TO BUILDING WALLS ENTER INTO ALL ROOMS ABOVE THE CORRIDORWAY.
18. ALL COMMUNICATION CABLE INSTALLED SHALL ROUTE TO THE CENTER OF THE ROOM IN WHICH IT SERVES AND THEN TO THE OUTLET LOCATION IT IS INTENDED FOR. EACH CABLE SHALL HAVE A 1" SERVICE LOOP AT THE CENTER OF EACH ROOM AND A 3" SERVICE LOOP ABOVE EACH OUTLET LOCATION.
19. THE SYSTEM INSTALLER SHALL PROPERLY SUPPORT ALL INSTALLED SYSTEM CABLEING FROM A PANDUIT JAMBO CABLE SUPPORT SYSTEMS AS DETAILED IN SPECIFICATIONS. NO CABLES SHALL BE ROUTED AND TIED DIRECTLY TO BUILDING STEEL, CEILING GRID SUPPORT, CONDUIT, PIPING, OR DUCTWORK. PANDUIT JAMBO JUMBO SUPPORT SYSTEM SHALL BE DIRECTLY CONNECTED TO THE BUILDING'S STEEL JOIST. IN LOCATION WHERE THE BOTTOM OF THE JOIST IS MORE THAN 12" ABOVE THE CEILING, THE SYSTEM INSTALLER SHALL PROVIDE AND INSTALL THREADED ROD AND ALL REQUIRED MATERIALS TO CONNECT THE THREADED ROD TO THE BUILDING STEEL, AND THE CABLE SUPPORT SYSTEM TO THE THREADED ROD. CABLE PATHWAY SHALL NOT BE HIGHER THAN 6" ABOVE THE CEILING AT ANY LOCATIONS.
20. CONTRACTOR TO PROVIDE AND INSTALL ALL REQUIRED CABLEING AND COMPONENTS TO FURNISH TWO (2) DATA CABLES TO THE FIRE ALARM CONTROL PANEL AND ELEVATOR CONTROL PANEL, ACCESS CONTROL AND INTRUSION DETECTION HEAD END PANELS. CONTRACTOR TO COORDINATE WITH THE SYSTEM INSTALLER FOR EXACT LOCATIONS AND TERMINATION INSTRUCTIONS PRIOR TO INSTALLATION.
21. ALL EXPOSED CABLEING OR CABLEING ROUTING ACROSS NON ACCESSIBLE CEILINGS SHALL BE INSTALLED IN CONDUIT. CONDUIT SHALL BE PROPERLY SIZED TO MAINTAIN THE 40% FILL RATIO.
22. ALL CONDUIT STUB OUTS AND SLEEVES SHALL HAVE PROTECTIVE BUSHINGS TO PREVENT CABLE DAMAGE. BUSHING TO BE INSTALLED PRIOR TO CABLE INSTALLATION. CUTTING CABLES DURING INSTALLING AFTER CABLE IS INSTALLED WILL NOT BE EXCEPTED. CONTRACTOR TO MAINTAIN A 40% MAXIMUM FILL RATIO ON ALL SLEEVES INSTALLED.

SHEET INDEX

TX1	TECH SHEET INDEX, LEGEND & NOTES
TX2.1	TECHNOLOGY PLAN
TX1.1	TECHNOLOGY DETAILS

APPLICABLE CODES





PARTIAL LIST OF APPLICABLE CODES AS OF JANUARY 1, 2022
 2022 CALIFORNIA ADMINISTRATIVE CODE (CAC), PART 1, TITLE 24 CCR
 2022 CALIFORNIA BUILDING CODE (CBC), PART 2, TITLE 24 CCR
 2022 CALIFORNIA ELECTRICAL CODE (CEC), PART 2, TITLE 24 CCR
 2022 CALIFORNIA MECHANICAL CODE (CMC), PART 4, TITLE 24 CCR
 2022 CALIFORNIA PLUMBING CODE (CPC), PART 5, TITLE 24 CCR
 2022 CALIFORNIA ENERGY CODE (CEC), PART 6, TITLE 24 CCR
 2022 CALIFORNIA FIRE CODE (CFC), PART 9, TITLE 24 CCR
 2022 CALIFORNIA EXISTING BUILDING CODE (CEBC), PART 10, TITLE 24 CCR
 2022 CALIFORNIA GREEN BUILDING STANDARDS CODE (CALGREEN), PART 11, TITLE 24 CCR
 2022 CALIFORNIA REFERENCED STANDARDS CODE, PART 12, TITLE 24 CCR
 TITLE 19 CCR, PUBLIC SAFETY, STATE FIRE MARSHAL REGULATIONS

PARTIAL LIST OF APPLICABLE STANDARDS
 NFPA 72 NATIONAL FIRE ALARM AND SIGNALING CODE: (CA AMENDED): 2016 EDITION
 NFPA 720 STANDARD FOR THE INSTALLATION OF CARBON MONOXIDE DETECTION AND WARNING EQUIPMENT:
 2016 EDITION
 NFPA 80 STANDARD FOR FIRE DOORS AND OTHER OPENING PROTECTIVES: 2016 EDITION
 UL 464 AUDIO SIGNALING DEVICES FOR FIRE ALARM AND SIGNALING SYSTEMS, INCLUDING
 ACCESSORIES: 2003 EDITION
 UL 1963 STANDARD FOR HEAT DETECTORS FOR FIRE PROTECTIVE SIGNALING SYSTEMS: 1999 EDITION
 UL 1971 STANDARD FOR SIGNALING DEVICES FOR THE HEARING IMPAIRED: 2002 EDITION (R2010)
 ICC 300 STANDARD FOR BLEACHERS, FOLDING AND TELESCOPING SEATING AND GRANDSTANDS: 2017 EDITION

FOR A COMPLETE LIST OF APPLICABLE NFPA STANDARDS REFER TO 2022 CBC (SFM) CHAPTER 35 AND
 CALIFORNIA FIRE CODE CHAPTER 80.

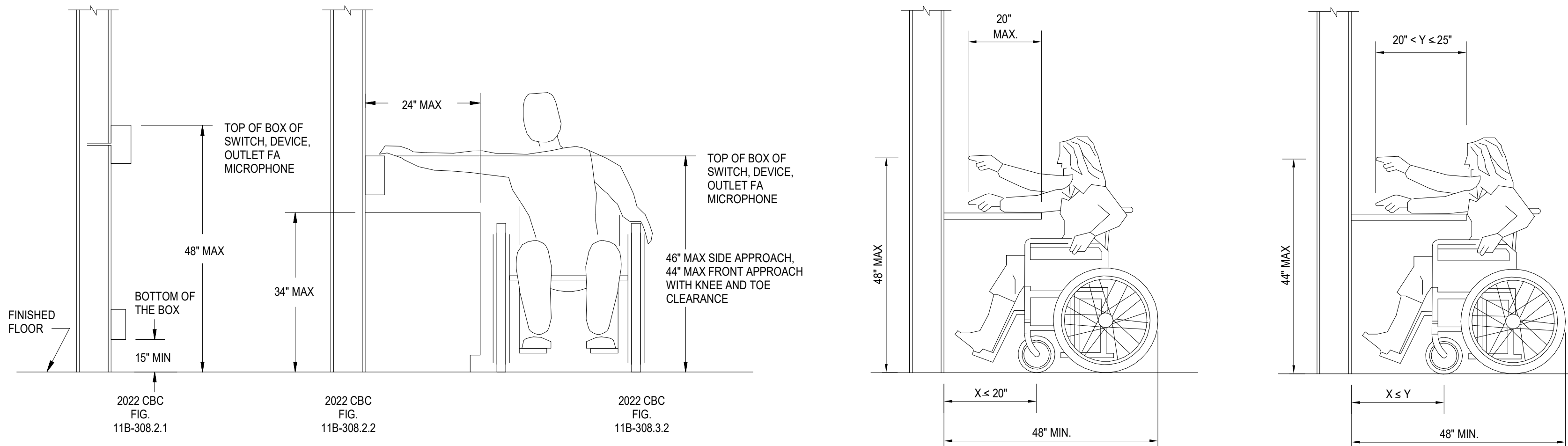
SEE CALIFORNIA BUILDING CODE, CHAPTER 35, FOR STATE OF CALIFORNIA AMENDMENTS TO THE NFPA STANDARDS.

TECHNOLOGY LEGEND

SYMBOL	DESCRIPTION
	INDICATES THE LOCATION OF A NEW TECHNOLOGY OUTLET. CONTRACTOR TO PROVIDE FACEPLATE WITH A MINIMUM OF 4-POR AT EACH LOCATION UNLESS OTHERWISE NOTED. ELECTRICAL CONTRACTOR TO PROVIDE 1/2" DOUBLE GANG BOX WITH A SING GANG REDUCER RING AND A 1" EMT CONDUIT FROM THE BOX TO THE NEAREST ACCESSIBLE CEILING. SOME EXISTING BUILDINGS MAY REQUIRE SURFACING TO RACEWAY. ELECTRICAL CONTRACTOR TO PROVIDE AND INSTALL RACEWAY AS SPECIFIED IN DIVISION 26. SYSTEM INSTALLER TO PROVIDE AND INSTALL A PLASTIC PROTECT BUSHING ON EACH CONDUIT STUB-OUT. TO PREVENT CABLE DAMAGE.
	INDICATES THE LOCATION OF A FLOOR MOUNTED TECHNOLOGY OUTLET. ELECTRICAL CONTRACTOR TO PROVIDE 1/2" DOUBLE GANG FLOOR BOX WITH (1) 1/4" CONDUIT ROUTED FROM THE FLOOR BOX TO THE NEAREST ACCESSIBLE CEILING.
	INDICATES THE LOCATION OF A CEILING MOUNTED OUTLET. CONTRACTOR SHALL MOUNT THIS OUTLET AT 12" ABOVE THE CEILING AND COORDINATE ALL FINAL LOCATIONS WITH OTHER TRADES ON THE PROJECT TO VERIFY THAT THE LOCATION OF THE OUTLET MAINTAINS 12" OF CLEARANCE FROM THE FRONT OF THE FACEPLATE FOR ACCESS. ELECTRICAL CONTRACTOR SHALL ROUTE (1) 1/2" CONDUIT FROM THE BUILDING STRUCTURE TO A SING GANG BACK BOX MOUNTED AT 5' OR LESS ABOVE THE FINISHED CEILING. SECURE CONDUIT AND BACK BOX TO ENSURE MINIMAL SWAY MOVEMENT.
"D#"	DESIGNATES THAT THE ASSOCIATED TECHNOLOGY OUTLET IS INTENDED FOR THE USE OF A NETWORK CONNECTION. THE "#" SHALL BE REPLACED WITH NUMERIC TEXT THAT IDENTIFIES THE TOTAL NUMBER OF DATA CABLES TO BE INSTALLED. CONTRACTOR SHALL TECHNOLOGY OUTLET LOCATION. CONTRACTOR TO PROVIDE AND INSTALL DATA CABLES, AND ALL CONNECTIVITY AS SPECIFIED IN DIVISION 27. ALL PATCHES PROVIDED SHALL BE MINIMUM 12" SQUARE AND SHALL BE APPROPRIATELY SIZED TO ACCOMMODATE THE NUMBER OF CIRCUITS BEING INSTALLED AT THIS TECHNOLOGY OUTLET LOCATION.
"A#"	DESIGNATES THAT THE ASSOCIATED TECHNOLOGY OUTLET IS INTENDED FOR THE USE OF A WIRELESS ACCESS POINT CONNECTION. CONTRACTOR TO PROVIDE AND INSTALL (2) DATA CABLES, AND CONNECTIVITY AS SPECIFIED IN DIVISION 27. (2) 10" PLEN PATCH CABLE FOR EACH LOCATION INSTALLED. PATCH CABLE TO BE INSTALLED AND ROUTED BY OWNER.
"#M#"	INDICATES THE LOCATION OF A VIDEO PROJECTOR # TO BE REPLACED WITH "C" OR "W". "C" INDICATES THAT THE DEVICE IS A CEILING MOUNTED DEVICE. "W" INDICATES IT IS TO BE WALL MOUNTED. CONTRACTOR TO PROVIDE AND INSTALL ONE (1) DATA CABLE, ALL AUDIO/VIDEO CABLES, AUDIO/VIDEO COMPONENTS AND EQUIPMENT AS SPECIFIED IN DIVISION 27.
"LCD"	INDICATES THE LOCATION OF A LED VIDEO DISPLAY. CONTRACTOR TO PROVIDE AND INSTALL ONE (1) DATA CABLE, ALL AUDIO/VIDEO CABLES, AUDIO/VIDEO COMPONENTS AND EQUIPMENT AS SPECIFIED IN DIVISION 27. PROVIDE A HUBBELL 260 BACK BOX WITH A 2 GANG REDUCER RING AND (1) 2" CONDUIT STUBBED OUT ABOVE CEILING.
"AV"	INDICATES THAT THE DESIGNATED TECHNOLOGY OUTLET IS INTEND FOR AN AUDIO/VIDEO (AV) INPUT. CONTRACTOR TO PROVIDE AND INSTALL ONE (1) 1500 BOX WITH TWO (2) 1" CONDUITS ROUTED INTO THE NEAREST ACCESSIBLE CEILING WITHIN THE SAME ROOM. PROVIDE A HUBBELL 260 BACK BOX WITH A 2 GANG REDUCER RING AND (1) 2" CONDUIT STUBBED OUT ABOVE CEILING.
"K"	DESIGNATES THAT THE ASSOCIATED TECHNOLOGY OUTLET IS INTENDED FOR THE USE OF A WALL MOUNTED KRONOS CLOCK. CONTRACTOR TO PROVIDE AND INSTALL (1) DATA CABLE, AND ALL CONNECTIVITY AS SPECIFIED IN DIVISION 27. CONTRACTOR SHALL MOUNT THIS OUTLET AT 42" AFF.
	WIRELESS ACCESS POINT. WALL MOUNT AT 12" AFF. OR CEILING MOUNTED. CONTRACTOR SHALL PROVIDE AND INSTALL OFF PROVIDE ALL REQUIRED DEVICES, FACEPLATES AND (1) DATA CABLE ROUTE TO THE NEAREST MEDIUM.

NOTE:

1. ELECTRICAL NOTES FOR WALL-MOUNTED DEVICE MOUNTING HEIGHTS.
2. REFERENCE SPECIFICATIONS FOR MATERIALS AND METHODS.
3. COMPLETE INSTALLATION OF ALL PRODUCTS SHALL BE IN COMPLIANCE WITH ALL CODES, INDUSTRY STANDARDS, COMMON PRACTICES AND MANUFACTURER'S INSTRUCTIONS.
4. ALL CONDUIT STUB-OUTS SHALL BE EQUIPPED WITH A PLASTIC PROTECTIVE BUSHING TO PREVENT CABLE DAMAGE.



NOTE:

1. THIS DETAIL APPLIES TO MOUNTING OF ANY MECHANICAL AND ELECTRICAL DEVICE WHICH CONTAINS AN OPERABLE PART THAT IS ADJUSTABLE BY THE OCCUPANT. THIS DOES NOT APPLY TO SENSORS OR CONTROLS THAT ARE ONLY ADJUSTABLE THROUGH THE BUILDING AUTOMATION SYSTEM (IE TEMPERATURE AND HUMIDITY SENSORS).
2. FOR 24" REACH TO CONTROLS, OUTLETS OR SWITCHES ON THE WALL AT THE ACCESSIBLE WORK SURFACE WITH KNEETOE SPACE, AN ADDITIONAL 7" MUST BE ADDED TO THE KNEE SPACE.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-123006 INC:
REVIEWED FOR
SS ☒ FLS ☒ ACS ☒
DATE: 12/20/2024



ARCHITECT PBK Architects, Inc.
FRESNO
7790 North Palm Avenue
Fresno, CA 93711
559-448-8400 P
559-448-8467 F
PBK.com

**MADISON ELEMENTARY SCHOOL - TEMPORARY
RELOCATABLE CLASSROOMS**

109 Stadium Rd, Madera, CA 93637



PROFESSIONAL SEAL



PROJECT NUMBER

230278

DATE
12/10/2024

OSHA APPLICATION NO.
02-123006

FILE NO.
20-30

PTN NO.
65243-169

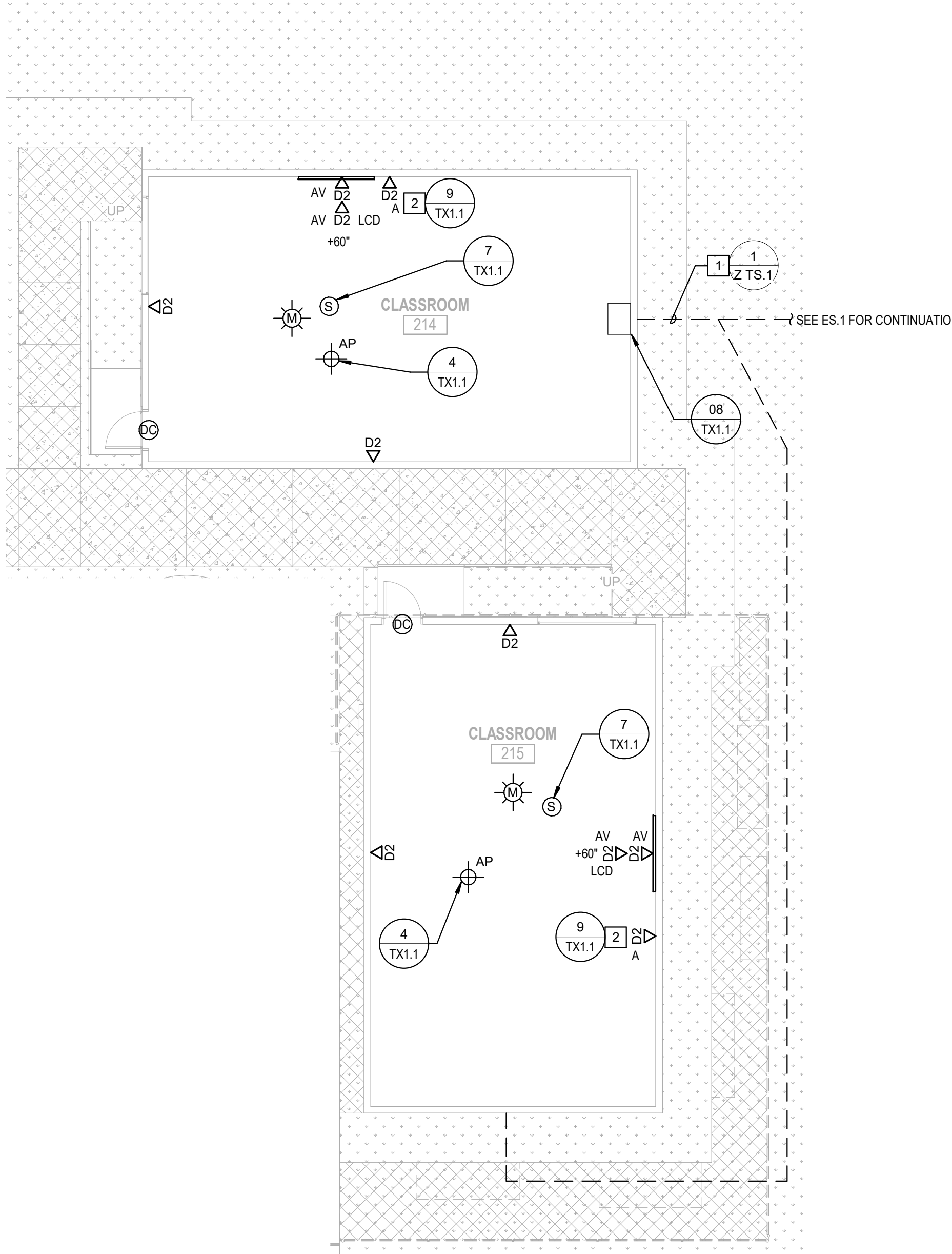
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REVISIONS

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TECH. SHEET INDEX, LEGEND & NOTES

T0.1



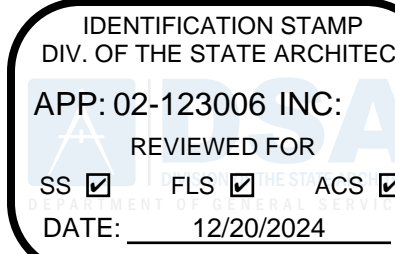
1 TECHNOLOGY PLAN

GENERAL NOTES

1. UNLESS NOTED OTHERWISE DATA OUTLETS ON THIS SHEET SHALL BE SERVED FROM IDENTIFICATION 110.
2. REFER TO SHEET T0.1 FOR TECHNOLOGY PLAN GENERAL NOTES AND TECHNOLOGY SYMBOL LIST.
3. REFER TO SPECIFICATIONS FOR GENERAL TECHNOLOGY EQUIPMENT INFORMATION.

KEY NOTES

- 1** PROVIDE THE FOLLOWING CONDUITS FOR CABLES AS LISTED BELOW:
- (1) 2" C. DATA/TELEPHONE
 - (1) 2" C. PA, CLOCK & SECURITY CABLES.
 - (1) 2" C. SPARE
 - (1) 2" C. FIBER OPTIC CABLE.
- 2** PROVIDE AUDIO OUT ASSISTIVE LISTENING DEVICE IN SINGLE GANG BOX, MOUNTED 18" AFF. ROUTE CABLE THROUGH ADJACENT BOX KNOCKOUTS. REFER TO DETAIL 09/1TX1 FOR MORE DETAILS.



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FRESNO
7790 North Palm Avenue
Fresno, CA 93711
559-448-8400 P
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PBK.com

MADISON ELEMENTARY SCHOOL - TEMPORARY
RELOCATING CLASSROOMS

09 Stadium Rd, Madera, CA 93637



PROFESSIONAL SEA



PROJECT NUMBER
230278

DATE _____

DSA APPLICATION

FILE NO

PTN NO.

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REVISIONS

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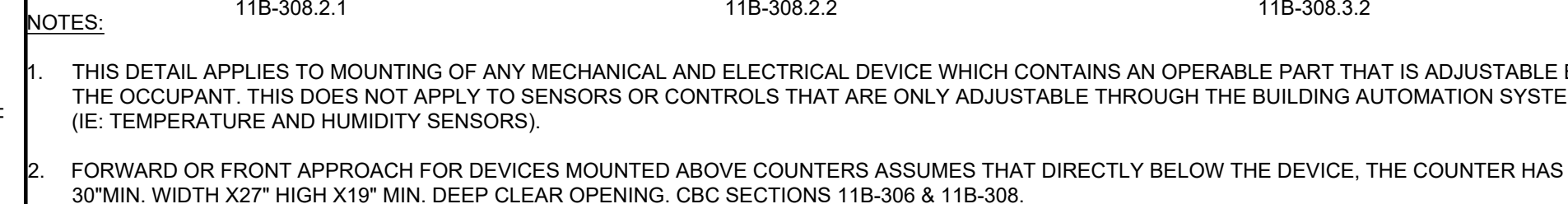
DSA SUBMITTAL

TECHNOLOGY PLAN

T2.1

FIRE ALARM GENERAL NOTES

FIRE ALARM SYSTEM OUTPUTS



NOTES:

1. WALL-MOUNTED APPLIANCES SHALL BE MOUNTED SUCH THAT THE ENTIRE LENS IS NOT LESS THAN 80 IN. (2.03m) AND NOT GREATER THAN 96 IN. (2.44m) ABOVE THE FINISHED FLOOR OR AT THE MOUNTING HEIGHT SPECIFIED USING THE PERFORMANCE-BASED ALTERNATIVE OF NFPA 72, CHAPTER 18.5.5.
2. WHERE LOW CEILING HEIGHTS DO NOT PERMIT ALL MOUNTING AT A MINIMUM OF 80 IN. (2.03m), WALL MOUNTED VISUAL NOTIFICATION APPLIANCES SHALL BE MOUNTED WITHIN 6 IN. (150mm) OF THE CEILING. (NFPA 72, CHAPTER 18.5.5.2)

NOTES:

1. DEVICE ADDRESSING VARIES DEPENDING ON THE MANUFACTURER. FIRE ALARM CONTRACTOR TO PROGRAM DEVICES ACCORDING TO THE MANUFACTURER'S OPERATION MANUAL.
2. CORRECT DEVICE ADDRESSING TO BE REFLECTED ON AS-BUILT RECORD DRAWINGS.

NOTES:

1. LEGEND AND SYMBOLS REFLECT SCOPE OF WORK ONLY.

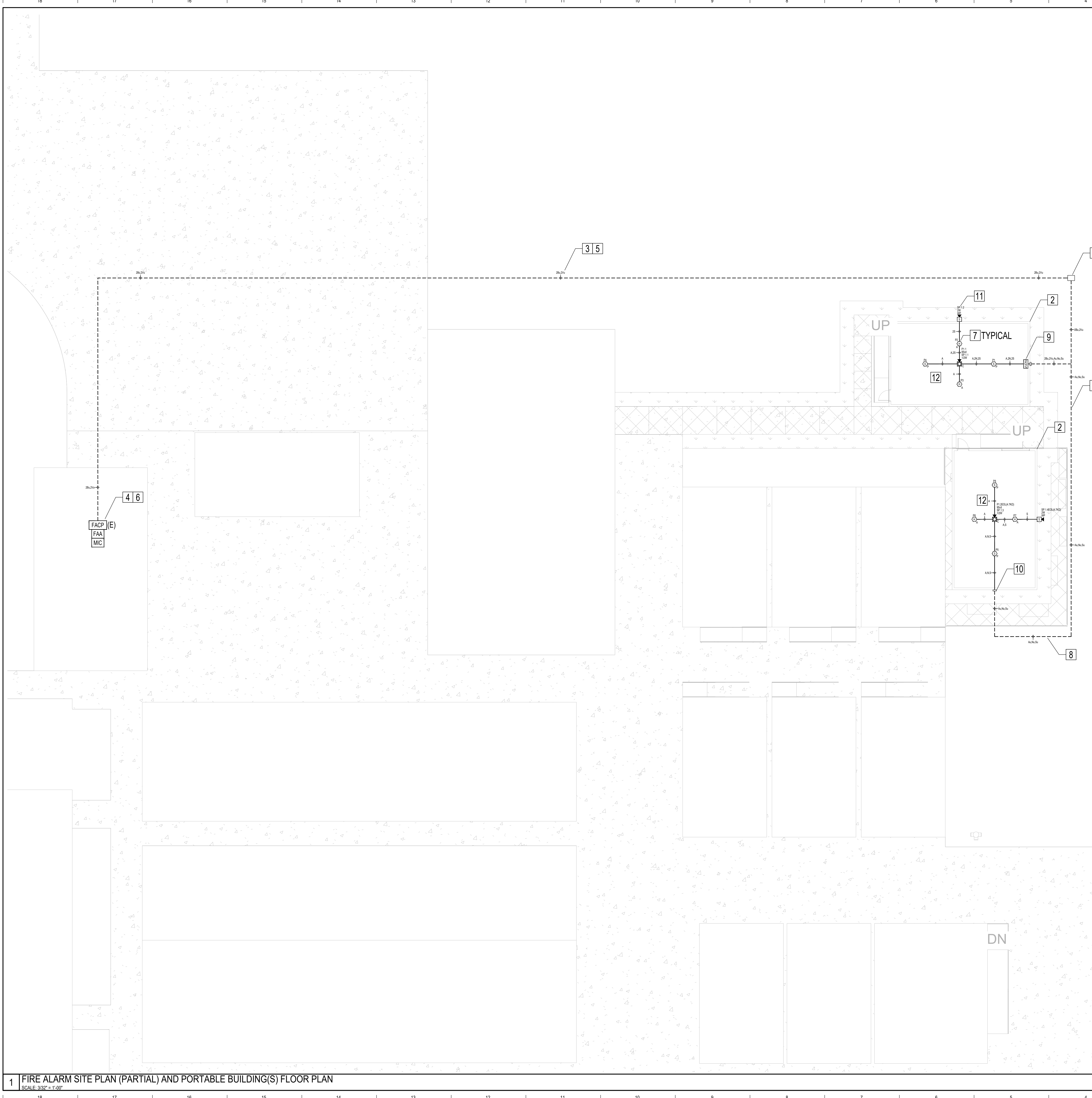
NOTES:

1. ALL FIRE ALARM WIRING SHALL BE CLASS "B", STYLE "Y" UNLESS OTHERWISE NOTED.

<u>SHEET #</u>	<u>SHEET DESCRIPTION</u>
FA0.0	FIRE ALARM LEGEND, NOTES & INDEX
FA1.0	FIRE ALARM SITE PLAN
FA1.1	FIRE ALARM FLOOR PLAN - FIRST FLOOR
FA1.2	FIRE ALARM FLOOR PLAN - SECOND FLOOR
FA2.0	FIRE ALARM RISER DIAGRAM
FA3.0	FIRE ALARM DETAILS AND CALCULATIONS

[illegible]



EAO 0



1	PROVIDE NEW 24"x24" PULL BOX. REFERENCE SHEET ES.1 OF ELECTRICAL SHEETS.
2	SCOPE OF WORK BUILDING(S).
3	PROVIDE 2" MINIMUM CONDUIT FOR FIRE ALARM SYSTEM PATHWAY.
4	LOCATION OF EXISTING GAMEWELL E3 SERIES FIRE ALARM CONTROL PANEL. INSTALL EMERGENCY VOICE/ALARM COMMUNICATION SYSTEM MICROPHONE IN THIS LOCATION. INSTALL ALL REQUIRED AUDIO EXPANSION CARDS IN EXISTING FACP ENCLOSURE. FIELD VERIFY PRIOR TO ROUGH IN.
5	INSTALL/ROUTE TWO (2) 1/2" Cu CABLE AND TWO (2) 3/4" Cu CABLE FROM EXISTING FACP LOCATION TO SCOPE OF WORK BLDGS.
6	INSTALL NEW E3-LOC REMOTE OPERATOR CONSOLE WITH LCD SCREEN AND PAGING MICROPHONE FOR USER OPERATION AND CONTROL. COORDINATE WITH CAMPUS REPRESENTATIVE FOR EXACT LOCATION AND FIELD VERIFY PRIOR TO ROUGH IN.
7	INSTALL HEAT DETECTION IN ABOVE CEILING SPACES.
8	CONTINUE FIRE ALARM CIRCUITS FROM BUILDING TO BUILDING AS NOTED.
9	INSTALL NEW FIRE ALARM CONTROL PANEL WITH AMPLIFIER IN THIS LOCATION.
10	NEW DP1 PATHWAY BOX. REFER TO ELECTRICAL SHEETS FOR DETAILS.
11	INSTALL EXTERIOR NOTIFICATION APPLIANCE IN ACCORDANCE WITH CFC §907.5.2.4.
12	ALL FIRE ALARM WIRING MAY BE OPEN RUN INSTALLED IN ACCORDANCE WITH GENERAL NOTE 18, CEC AND NFPA 70.

RATED WALL LEGEND



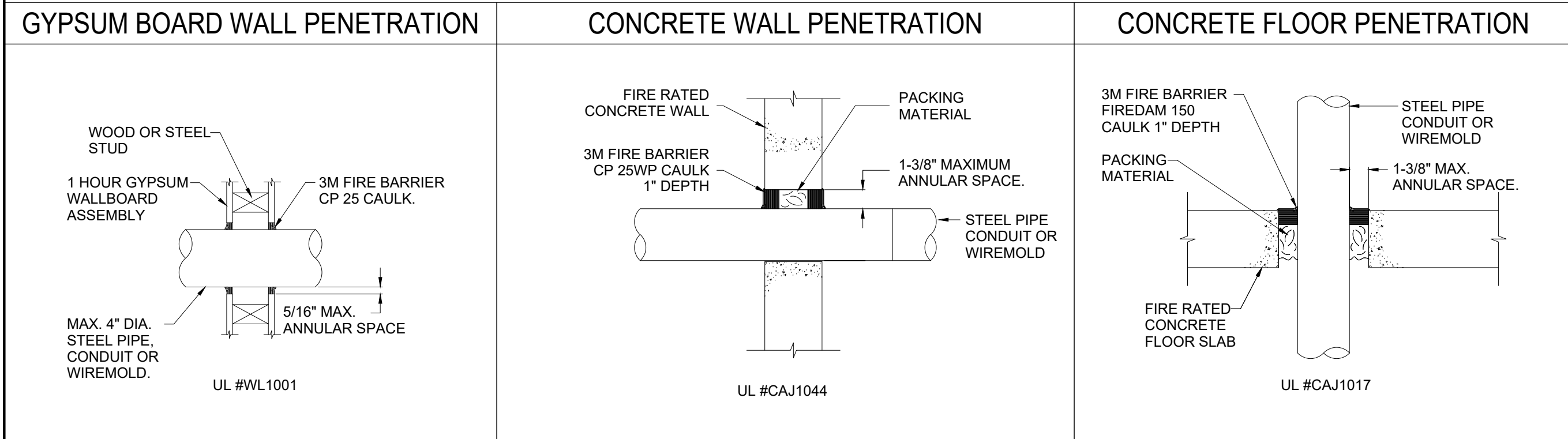
<p>ARCHITECT</p> <p>FRESNO 7790 North Palm Avenue Fresno, CA 93711 559-448-8600 P 559-448-8467 F PBK.com</p>	<p>PBK Architects, Inc.</p>
<p>M/E/P Engineering & Technology</p>	
 <p>CITY OF 895 W. Ashlan Ave. Suite 101 Chico, CA 95012 953-223-9600 p LEAFengrivers.com</p>	
<h1 style="margin: 0;">MADISON ELEMENTARY SCHOOL - TEMPORARY RELOCATABLE CLASSROOMS</h1> <p style="font-size: 2em; margin-top: 20px;">103 Stadium Rd., Madera, CA 95637</p> <hr style="width: 50%; margin-left: auto; margin-right: 0;"/> <p style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-top: 20px;">DSA SUBMITTAL</p>	
	

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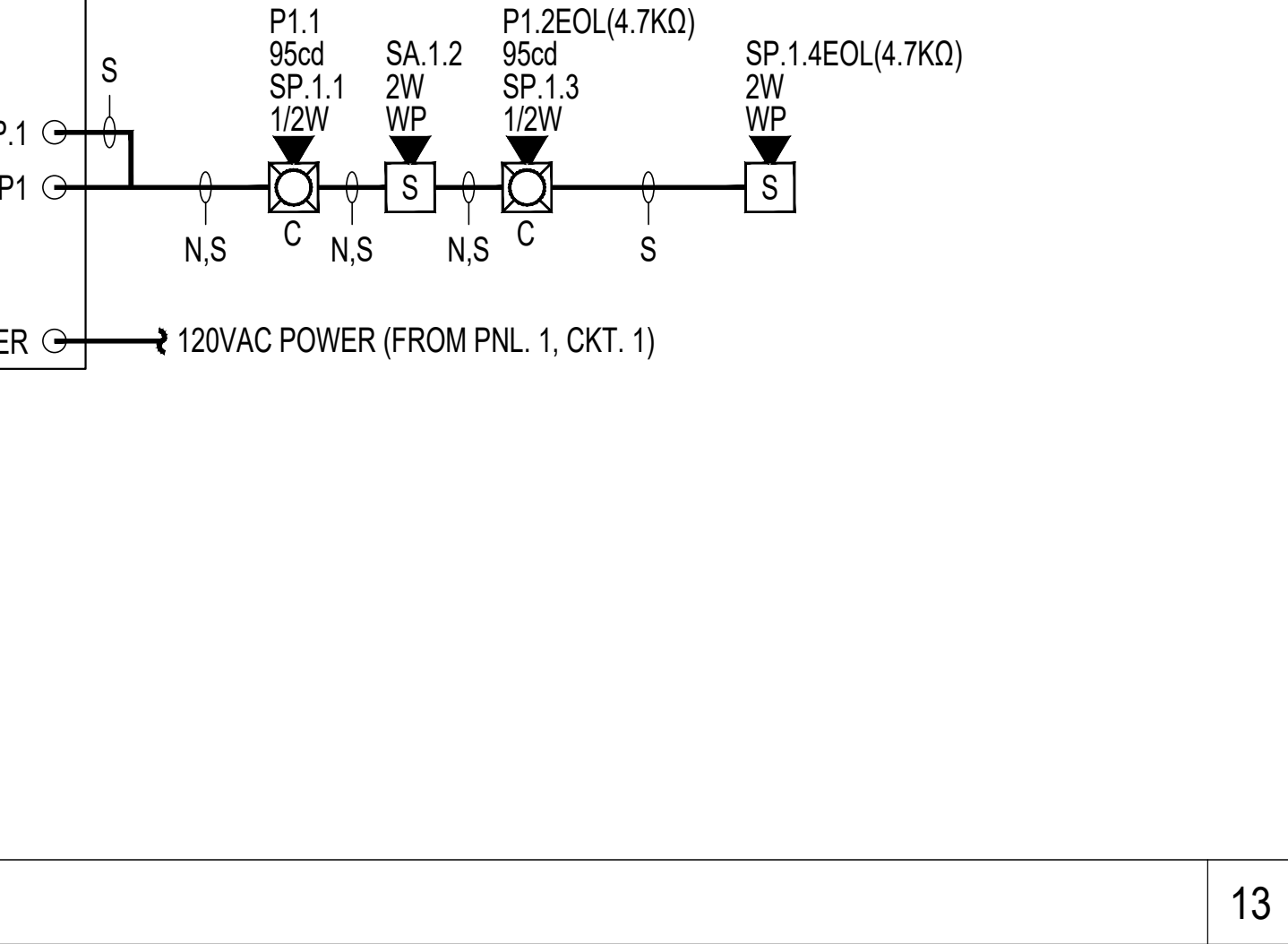
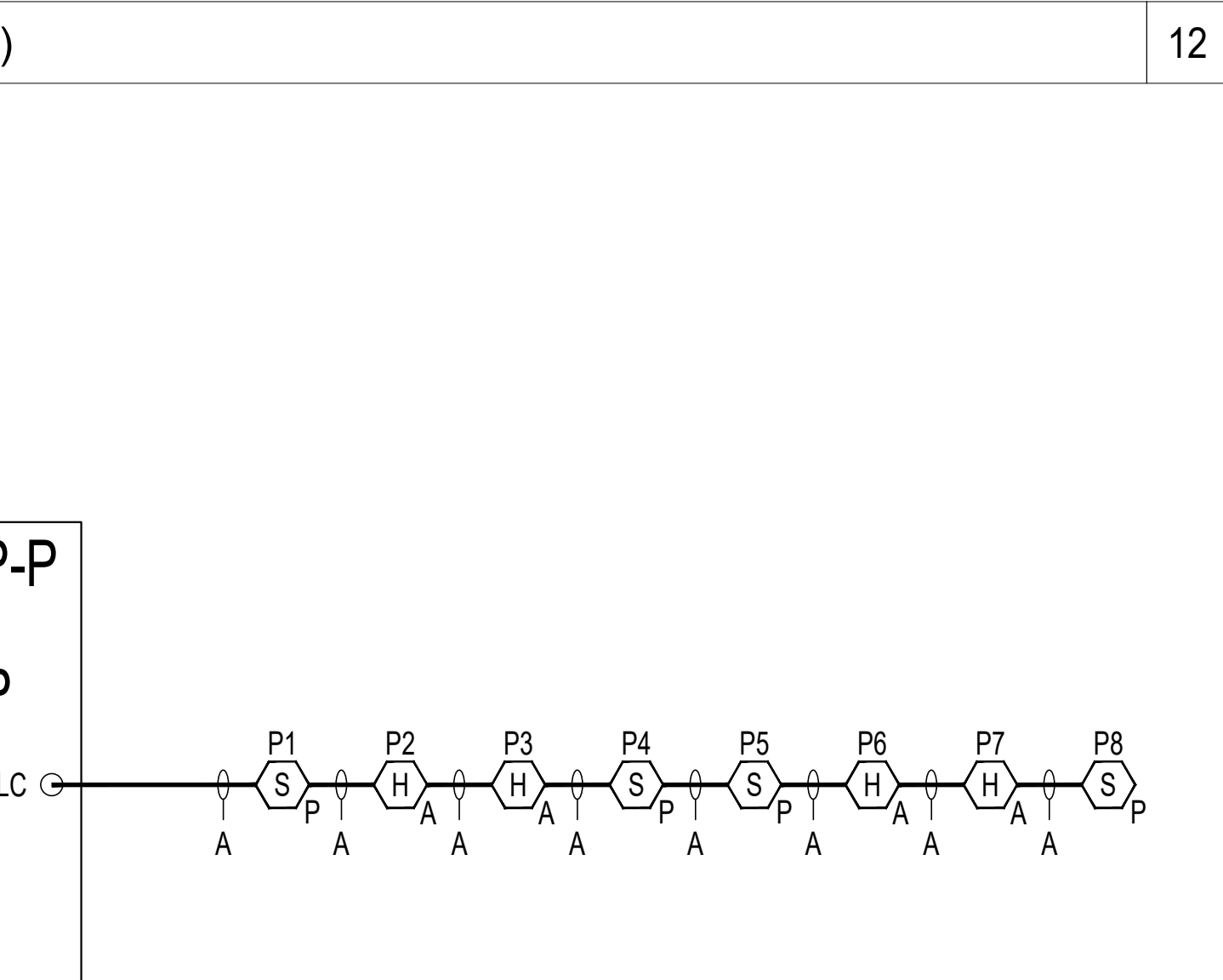
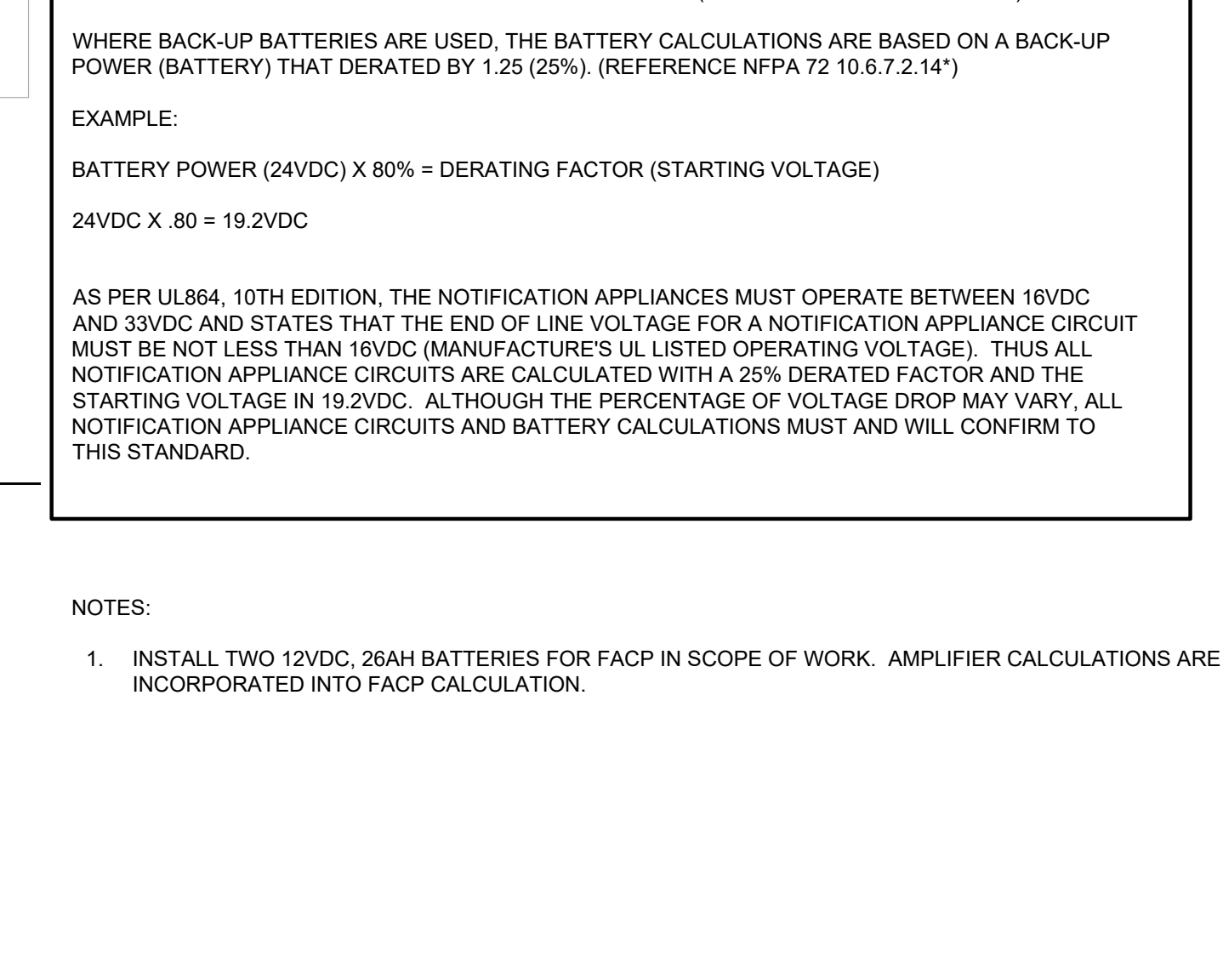
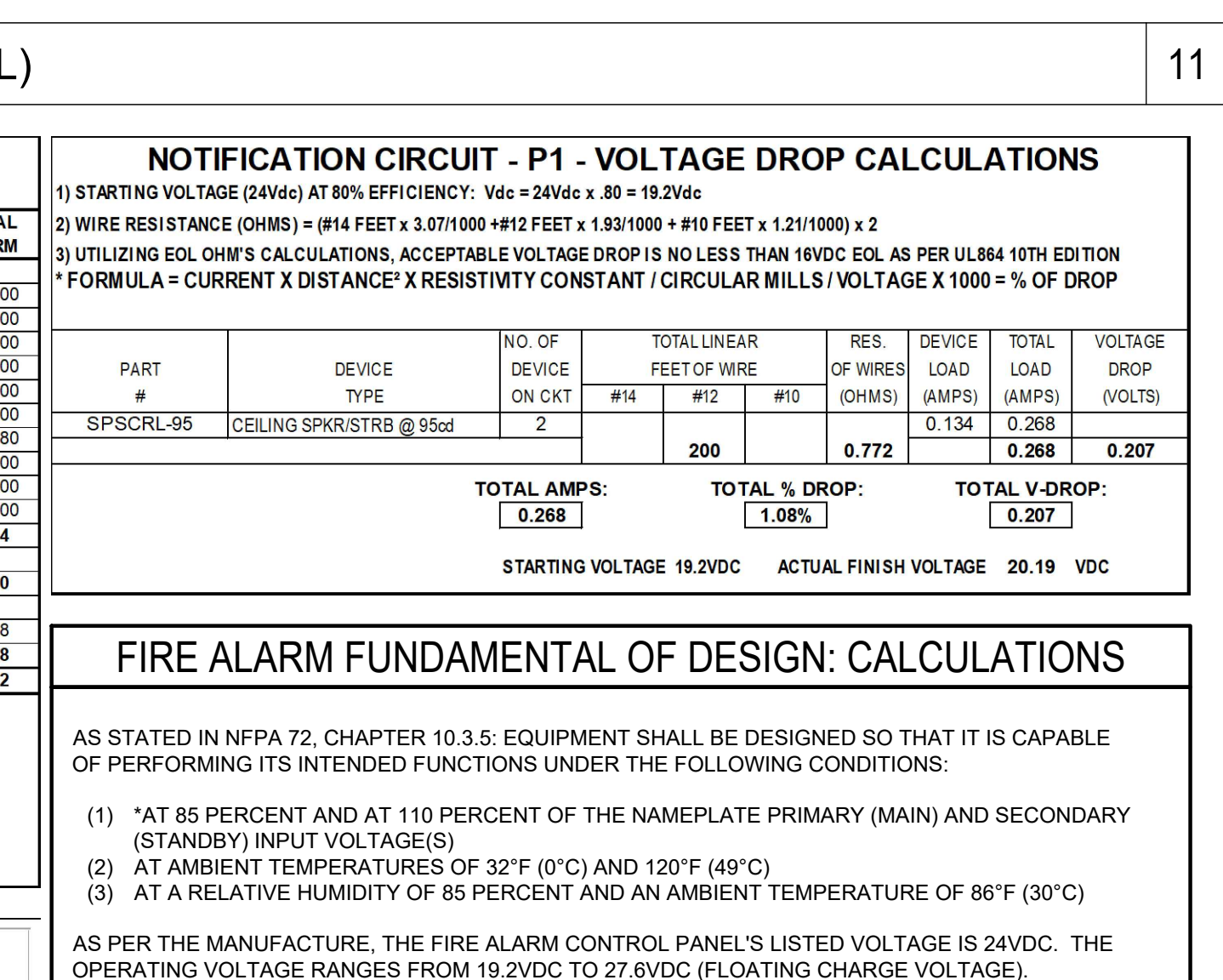
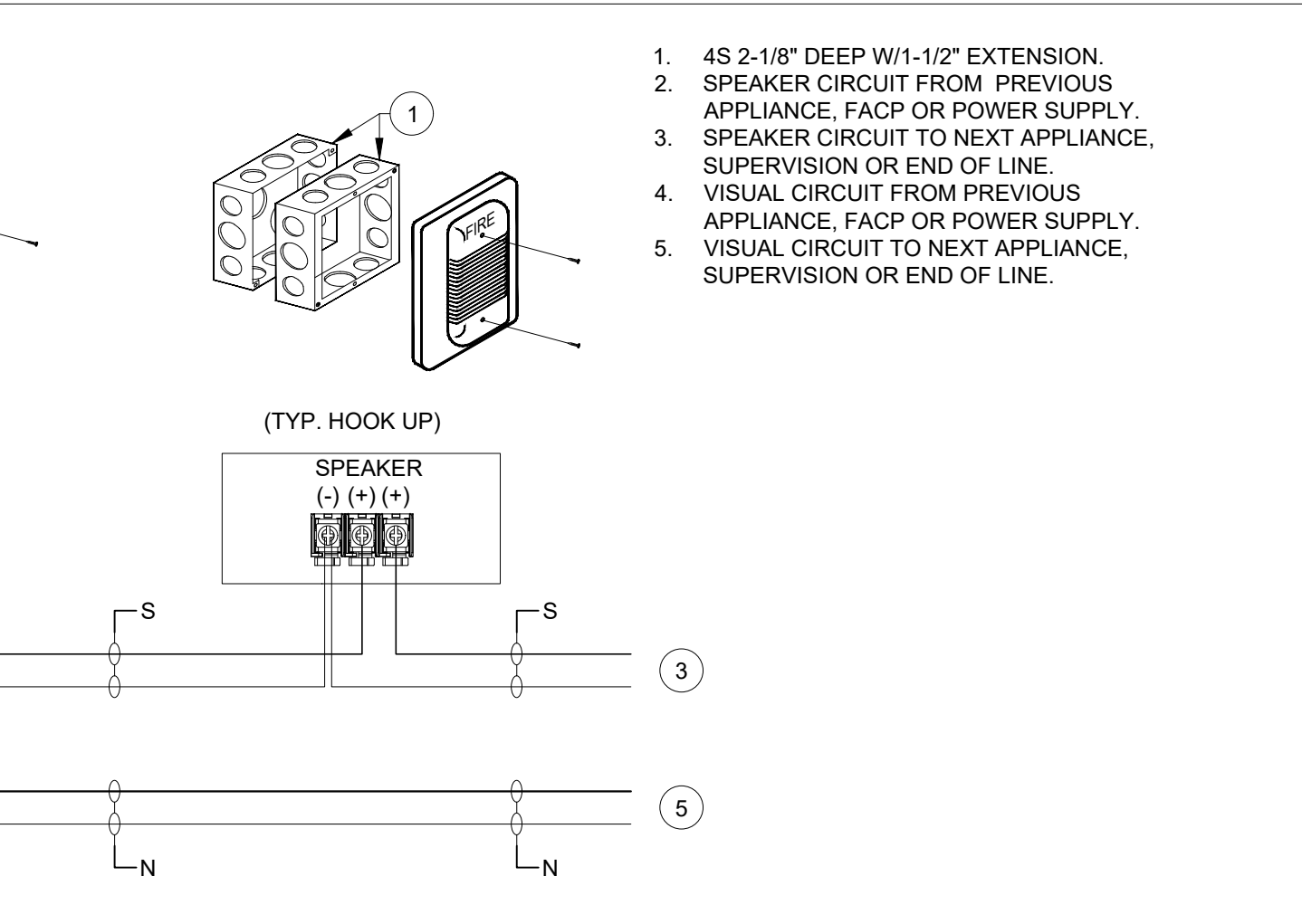
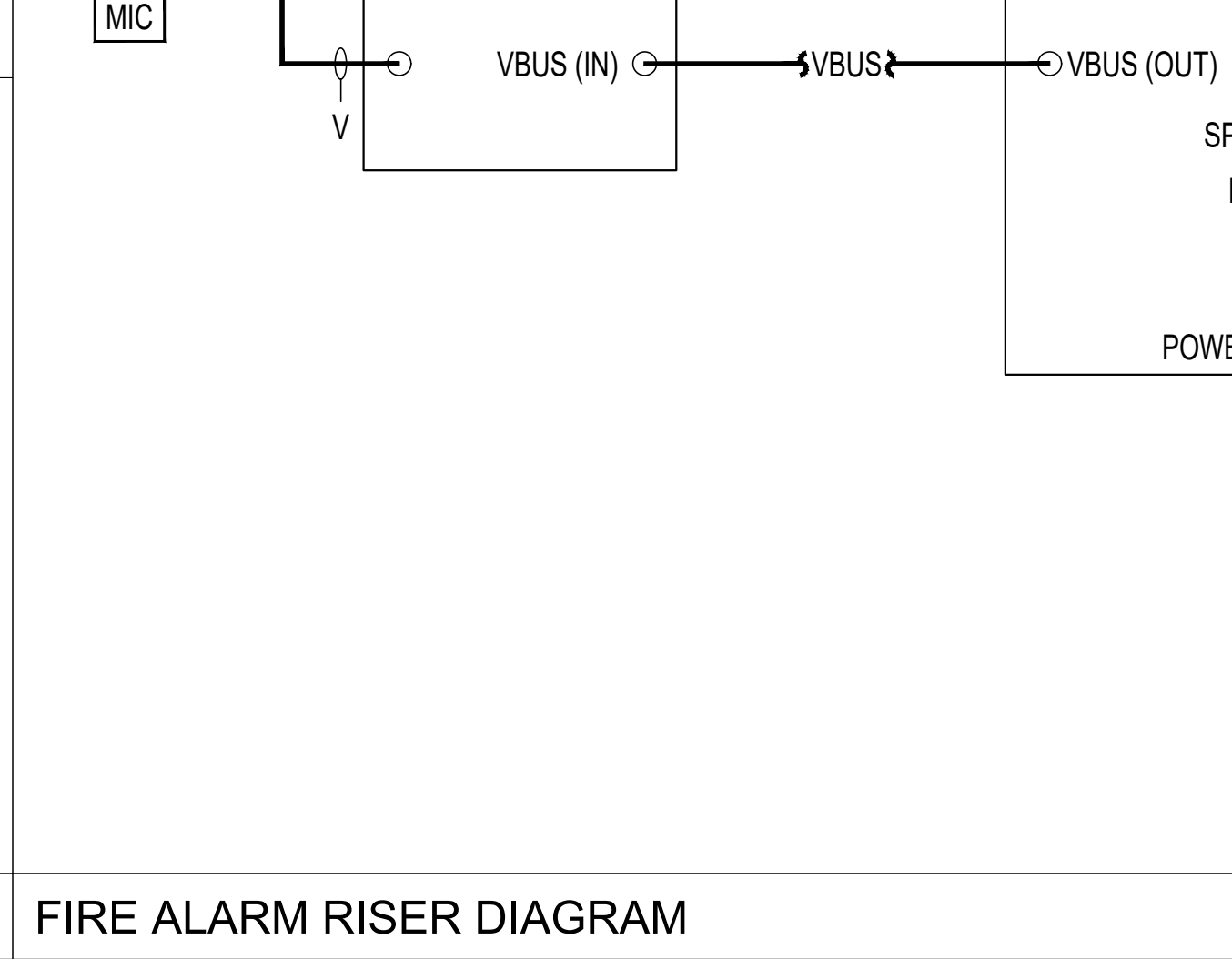
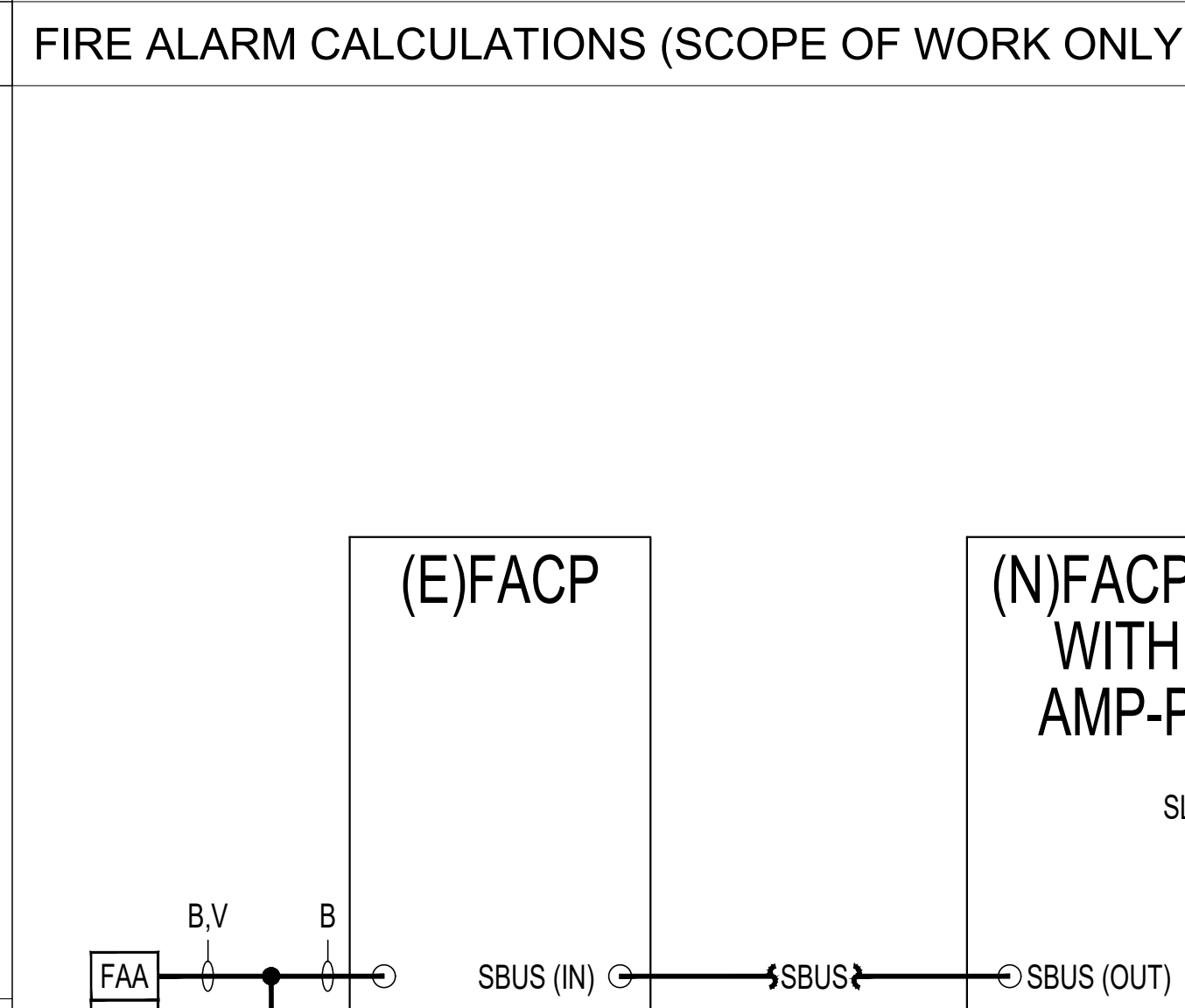
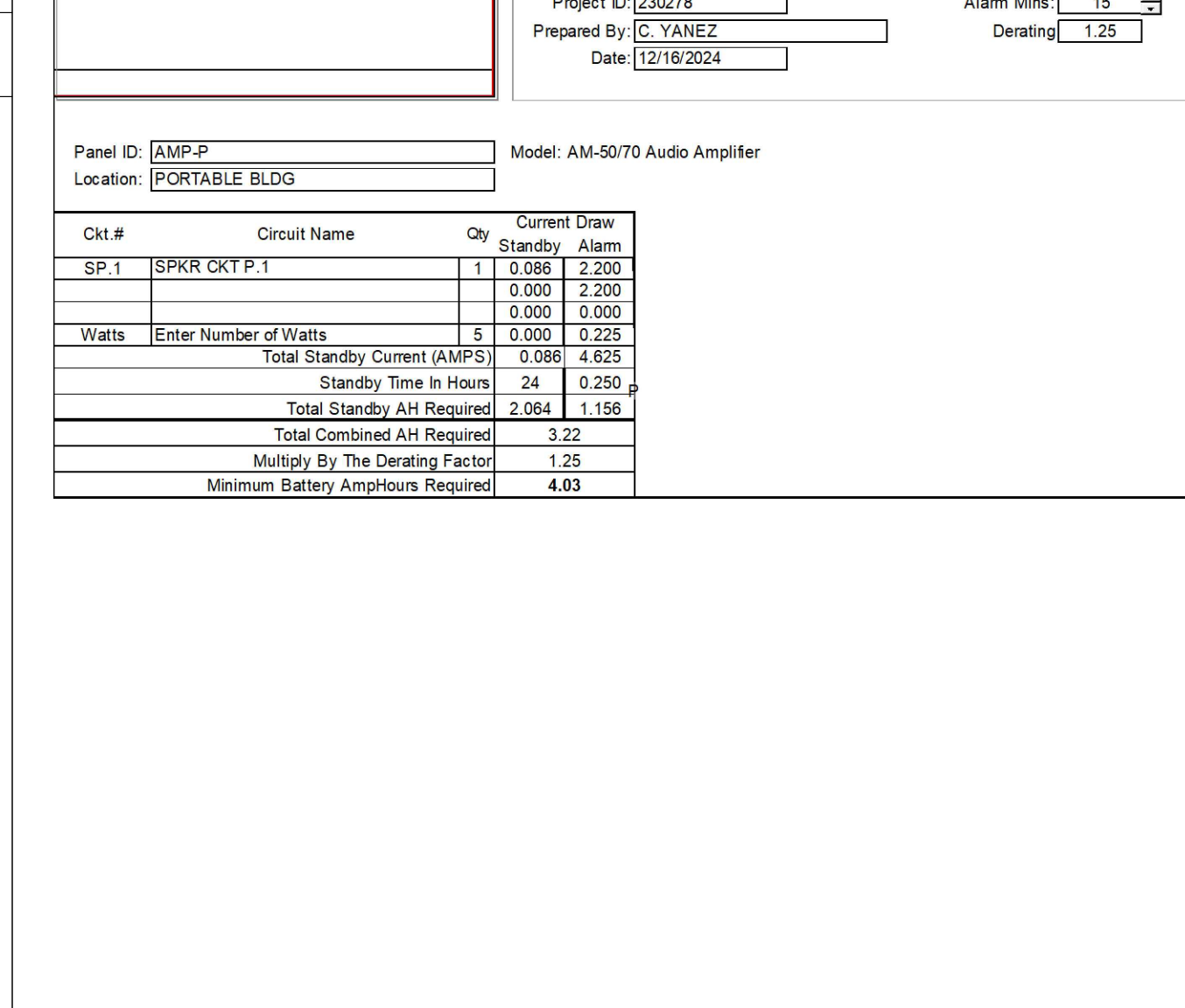
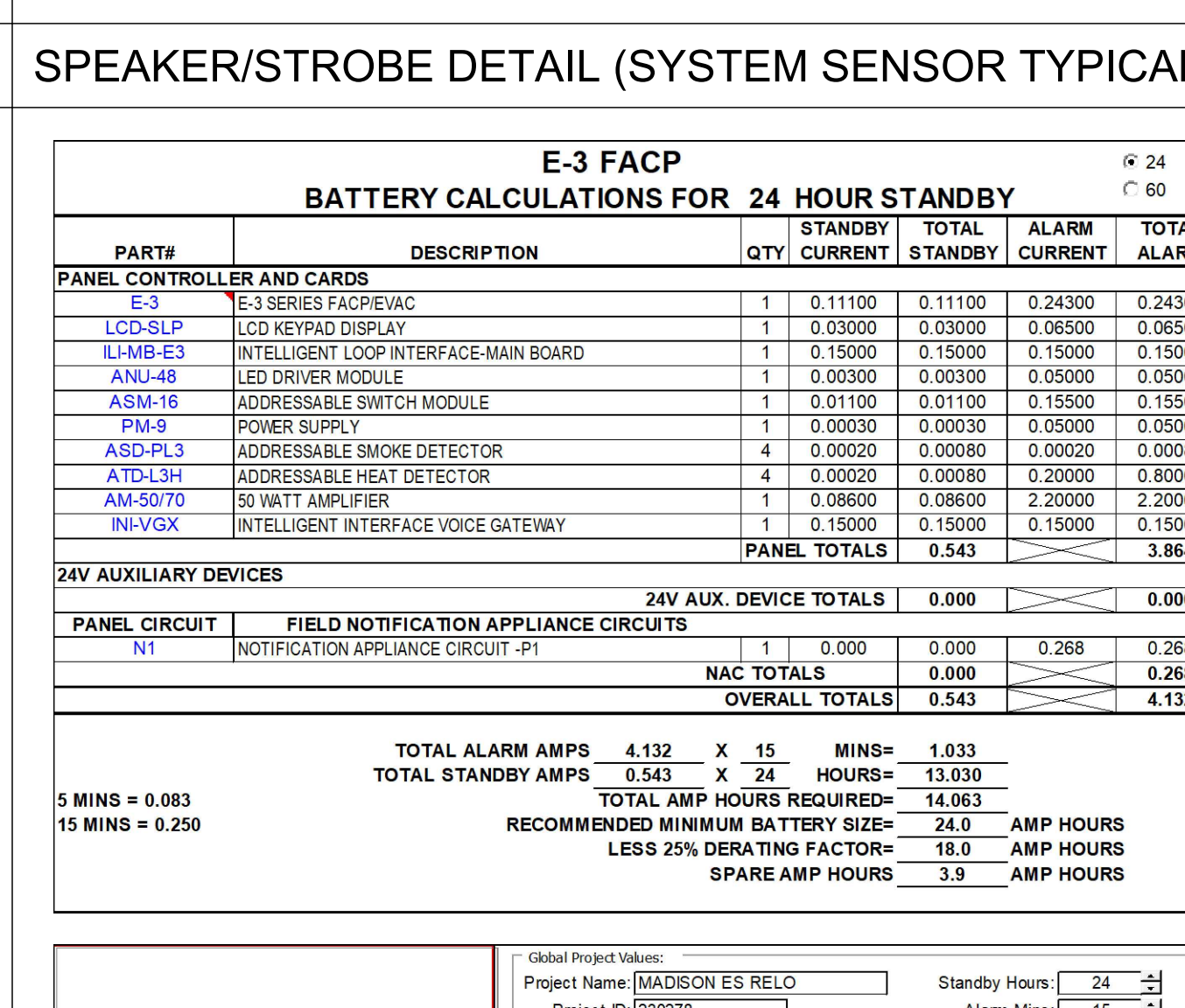
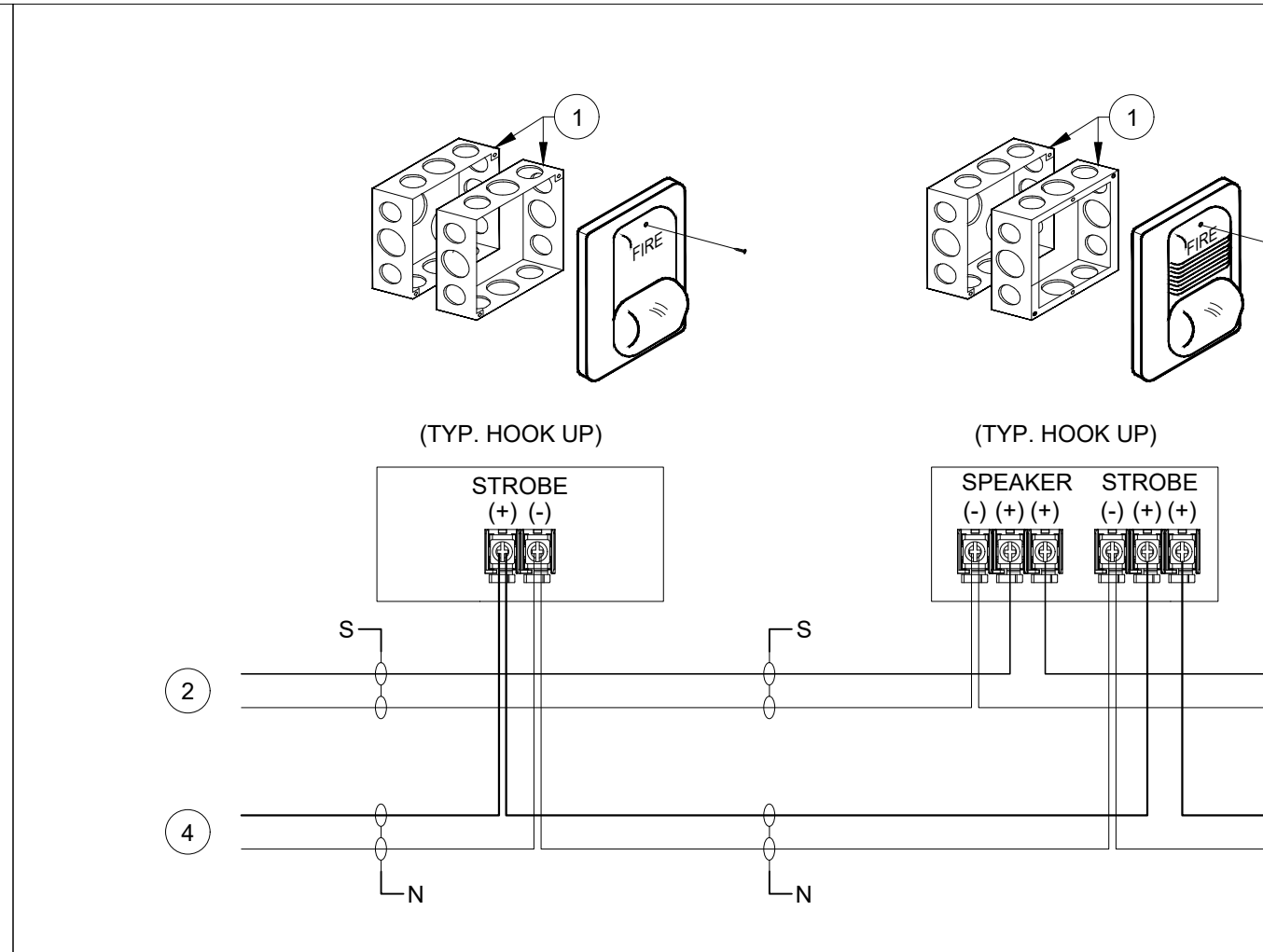
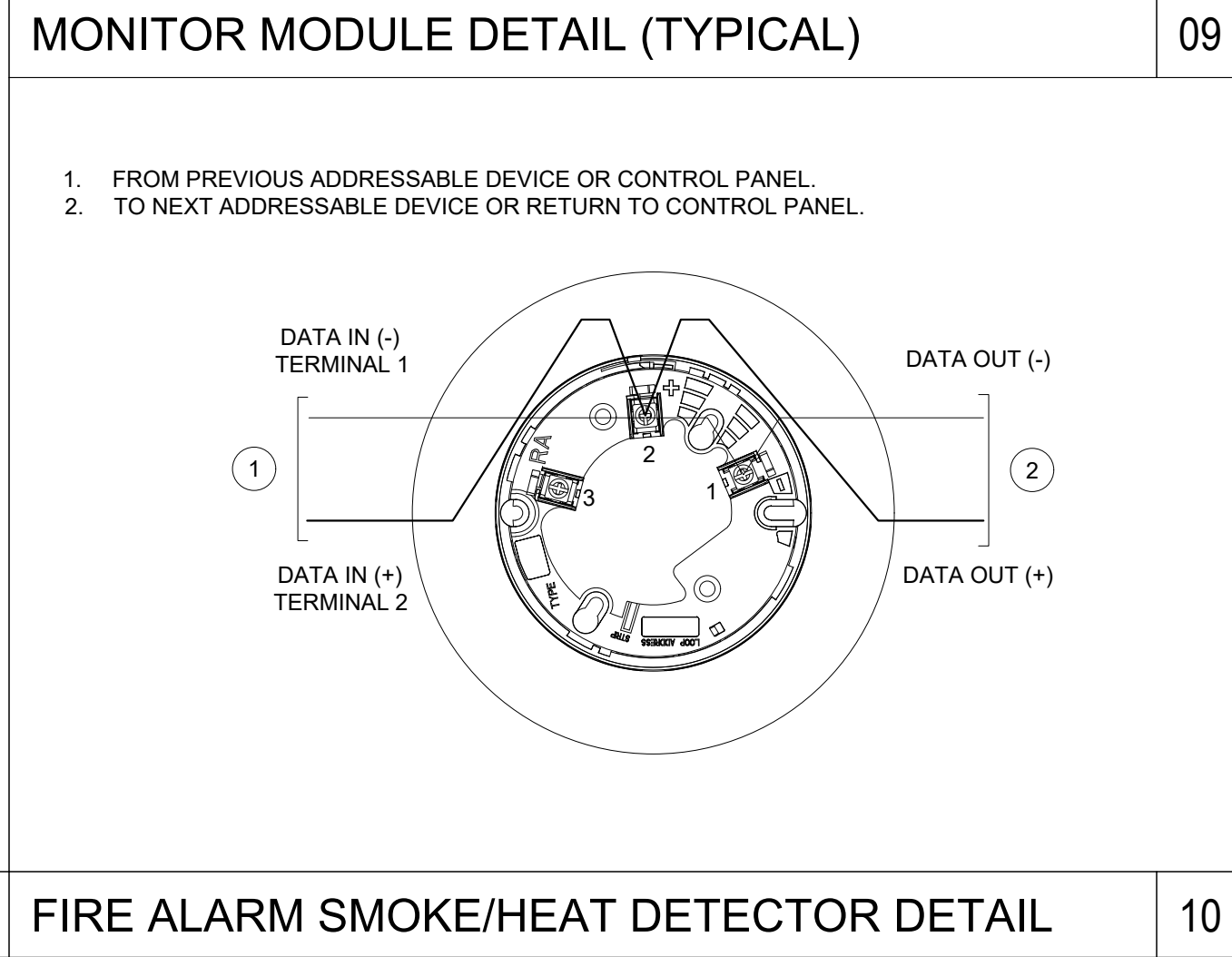
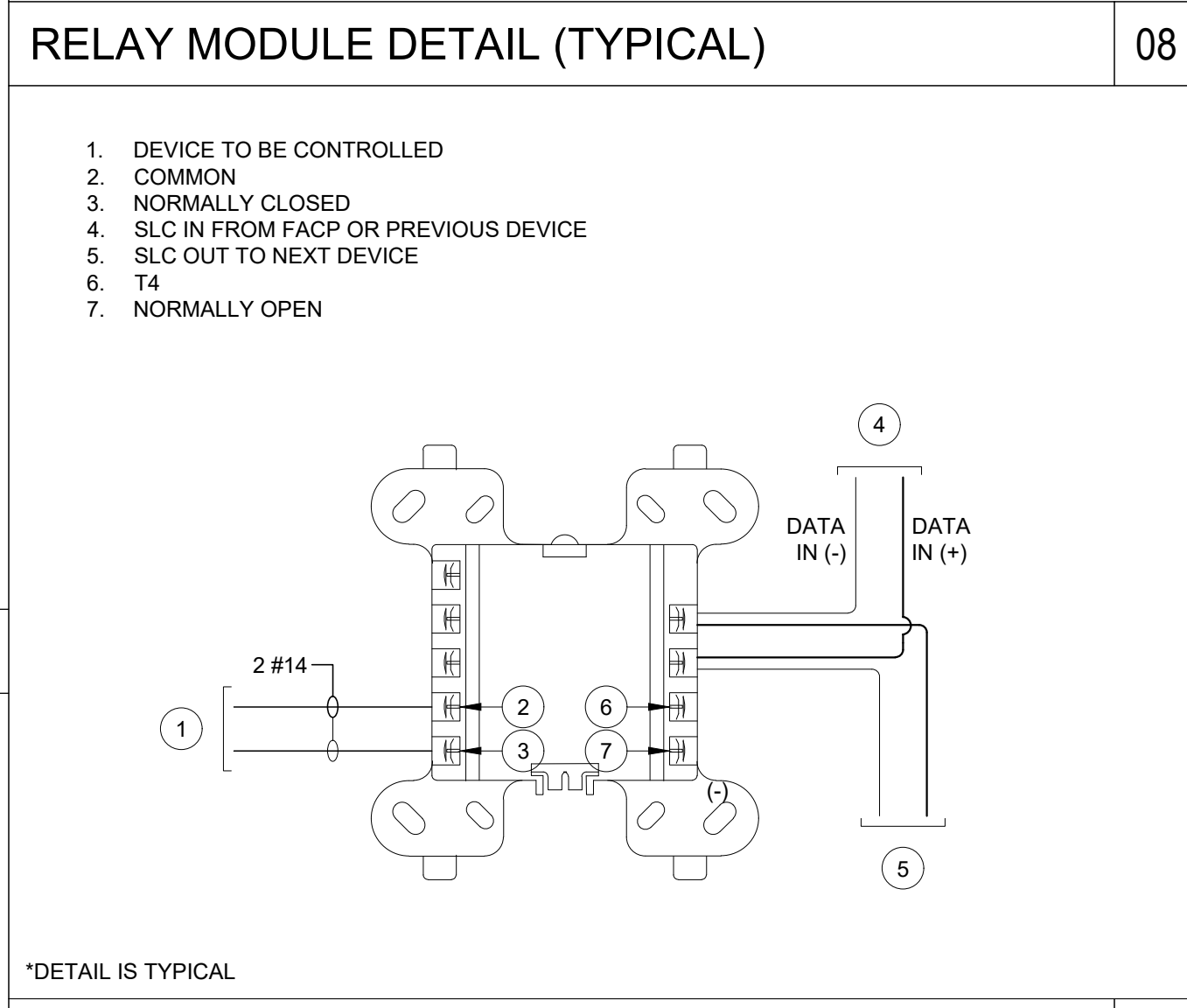
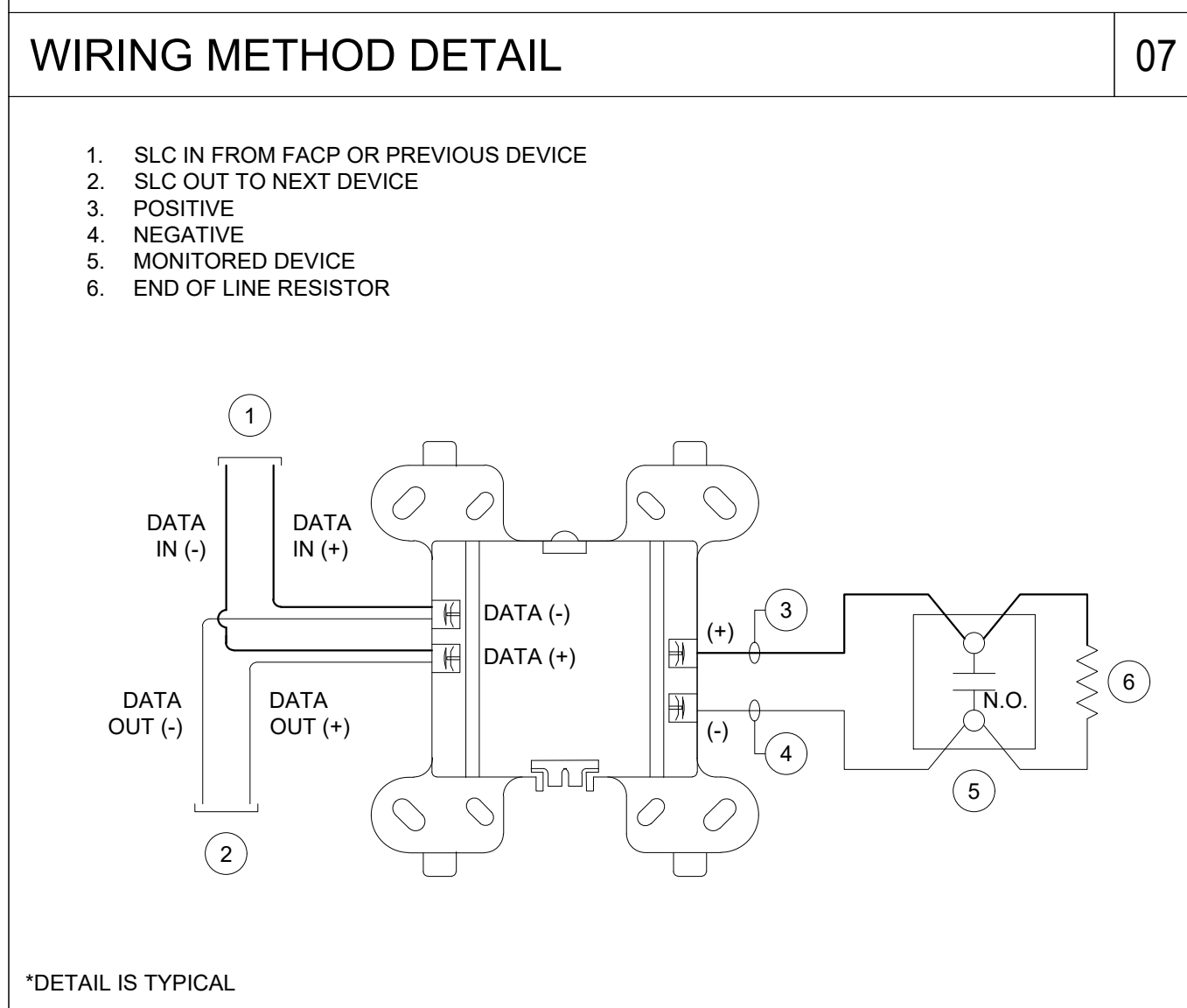
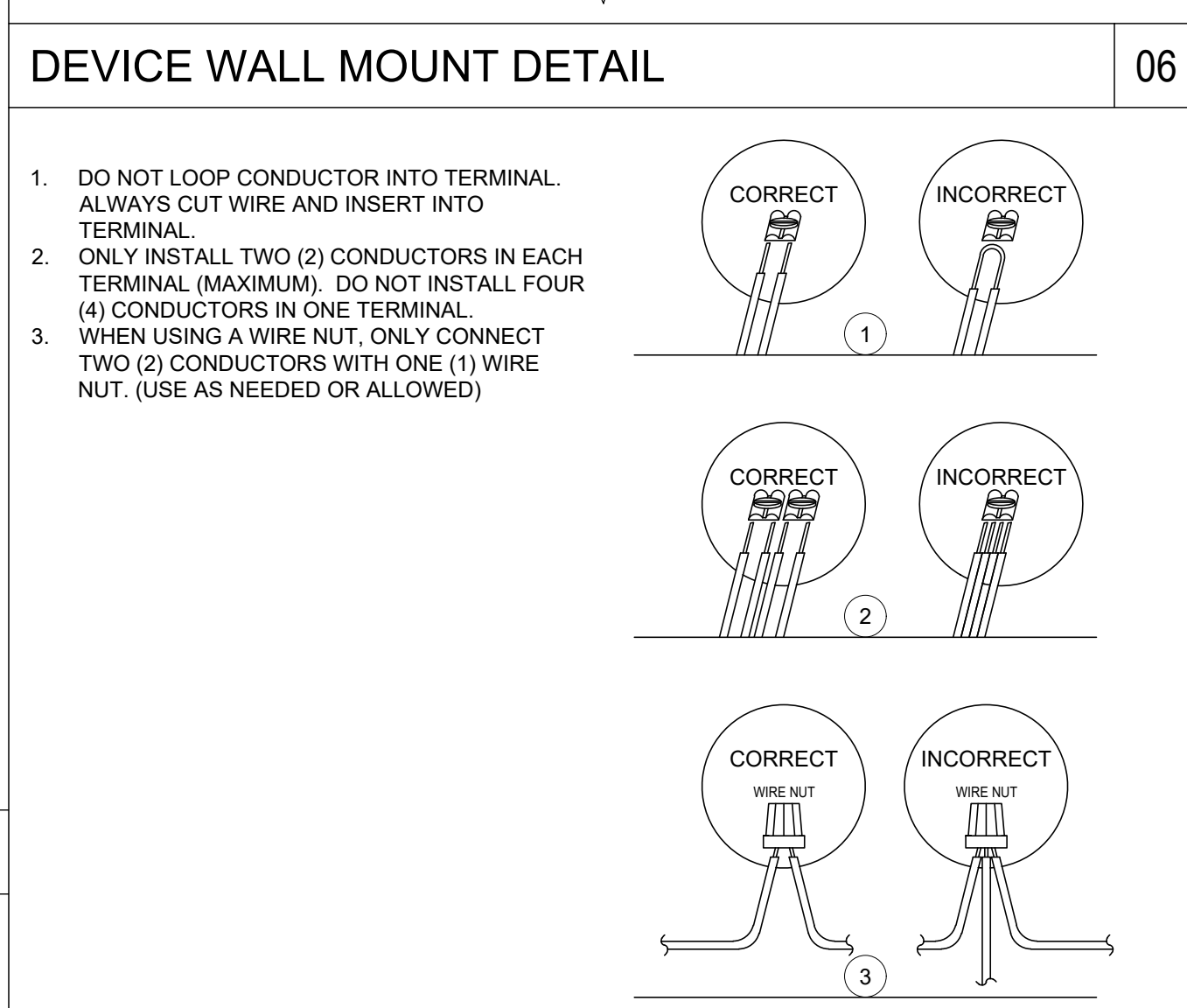
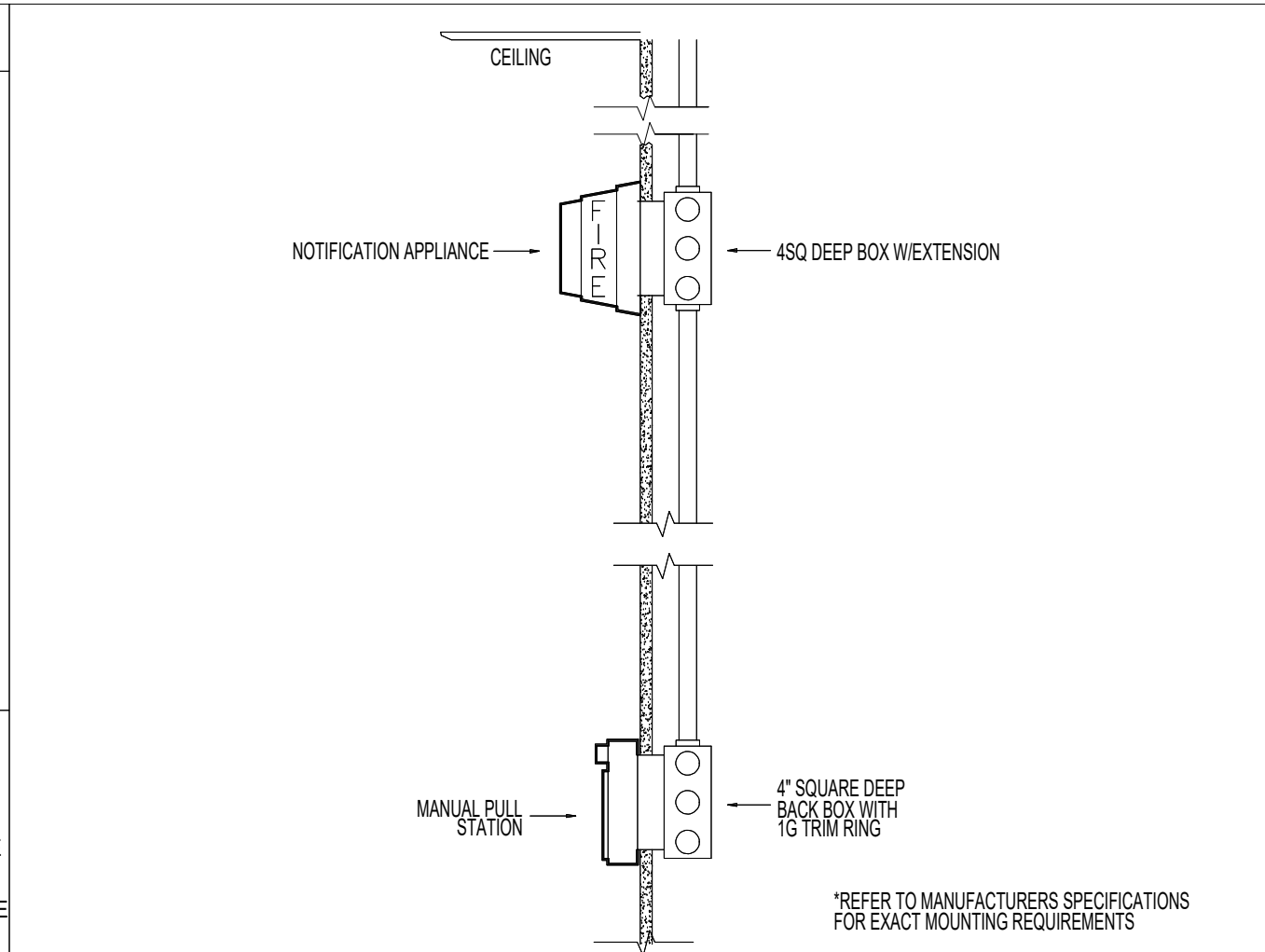
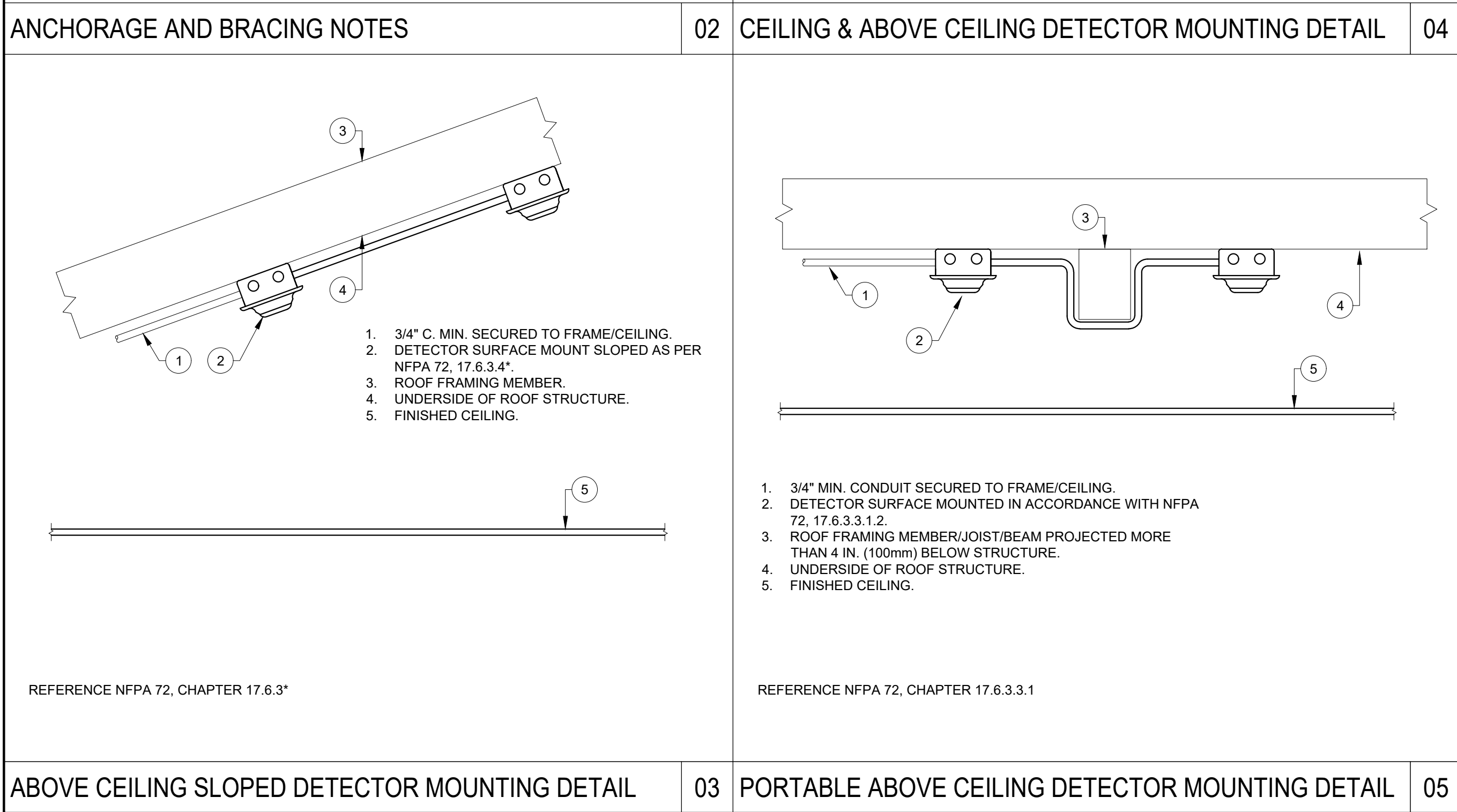
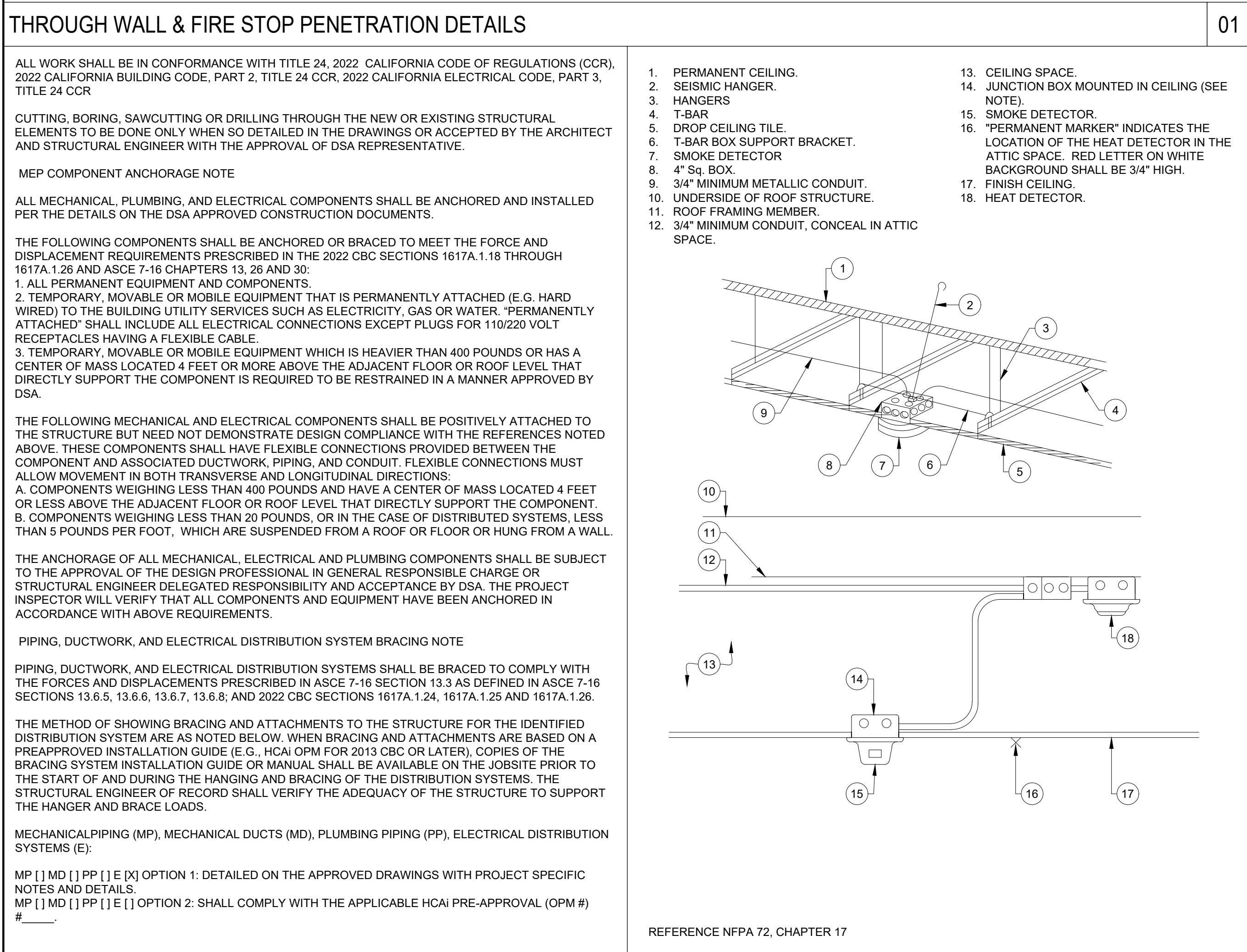
FIRE ALARM PARTIAL SITE PLAN AND PORTABLE BUILDING FLOOR PLANS

FA1.0

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ITEM 1	ITEM 2	ITEM 3																																																
<p>WALL ASSEMBLY - THE 1, 2, 3 OR 4 HOUR FIRE RATED GYPSUM WALL BOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER DESCRIBED IN THE INDIVIDUAL U300 OR U400 SERIES WALL PARTITION DESIGN IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:</p> <p>A. STUDS - WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS (MAX. 2 HR. RATED ASSEMBLIES) OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOMINAL 2" X 4" LUMBER SPACED IN 18" ON CENTER WITH NOMINAL 2" X 4" LUMBER AND PLATES AND CROSS BRACES. STEEL STUDS TO BE MINIMUM 3-8/8" WIDE BY 1-3/8" DEEP CHANNELS SPACED MAXIMUM 24" ON CENTER.</p> <p>B. WALLBOARD/GYPSUM - NOMINAL 3/8" THICK, 4" WIDE SQUARE OR TAPERED EDGES. THE GYPSUM WALLBOARDS RYPS, THICKNESS, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE SPECIFIED IN THE INDIVIDUAL U300 OR U400 DESIGN IN THE UL FIRE RESISTANCE DIRECTORY.</p> <p>MAXIMUM DIAMETER OF OPENINGS IS 13-1/2".</p> <p>SYSTEM NUMBER: WL1001 (FORMERLY SYSTEM NUMBER 147) F RATINGS: 1, 2, 3 AND 4 HOUR (SEE ITEMS 2 AND 3) T RATINGS: 0, 1, 2, 3 AND 4 HOUR (SEE ITEM 3) L RATING AT AMBIENT: LESS THAN 1 CFM/SQ FT (SEE ITEM 3)</p>	<p>PIPE OR CONDUIT - NOMINAL 1/2" IN DIAMETER (OR SMALLER) SCHEDULE 10 (OR HEAVIER), STEEL PIPE NOMINAL 6" IN DIAMETER (OR SMALLER), STEEL CONDUIT NOMINAL 4" IN DIAMETER (OR SMALLER), STEEL ELECTRICAL METALLIC TUBING OR TYPE L (OR HEAVIER), COPPER TUBING NOMINAL 1" IN DIAMETER (OR SMALLER), FLEXIBLE STEEL CONDUIT. WHEN COPPER PIPE OR FLEXIBLE STEEL CONDUIT IS USED, MAXIMUM F RATING OF FIRESTOP SYSTEM (ITEM CONSTRUCTED USING STEEL CHANNEL STUDS). A MAXIMUM OF ONE (1) PIPE OR CONDUIT IS PERMITTED IN THE FIRESTOP SYSTEM. PIPE OR CONDUIT TO BE INSTALLED NEAR CENTER OF STUD CAVITY WIDTH AND TO BE RIDGIDLY SUPPORTED IN BOTH SIDES OF WALL ASSEMBLY.</p> <table><tr><th>MAX PIPE OR CONDUIT DIA. (INCHES)</th><th>ANNULAR SPACE (INCHES)</th><th>F RATING (HOURS)</th><th>T RATING (HOURS)</th></tr><tr><td>1</td><td>0 TO 3/16</td><td>1 OR 2</td><td>0 + 1 OR 2</td></tr><tr><td>1</td><td>1/4 TO 1/2</td><td>3 OR 4</td><td>3 OR 4</td></tr><tr><td>4</td><td>0 TO 1/4</td><td>0</td><td>0</td></tr><tr><td>6</td><td>1/4 TO 1/2</td><td>3 OR 4</td><td>0</td></tr><tr><td>12</td><td>3/16 TO 3/8</td><td>1 OR 2</td><td>0</td></tr></table> <p>*WHEN COPPER PIPE IS USED, T RATING IS 0 NOMINAL MINNESOTA MINING & MFG. CO. - TYPES CP-23 SIL, CP-25 N/8, CP-25 WS, CP-25 WS + (NOTE: L RATINGS APPLY WHEN THE TYPE CP-25WS+CAULK IS USED)</p>	MAX PIPE OR CONDUIT DIA. (INCHES)	ANNULAR SPACE (INCHES)	F RATING (HOURS)	T RATING (HOURS)	1	0 TO 3/16	1 OR 2	0 + 1 OR 2	1	1/4 TO 1/2	3 OR 4	3 OR 4	4	0 TO 1/4	0	0	6	1/4 TO 1/2	3 OR 4	0	12	3/16 TO 3/8	1 OR 2	0	<p>FILL, VOID OR CAVITY MATERIAL, CAULK - CAULK FILL MATERIAL INSTALLED TO COMPLETELY FILL ANNULAR SPACE BETWEEN PIPE OR CONDUIT AND GYPSUM WALLBOARD AND WITH A MINIMUM OF 3" IN DIAMETER BOARD OF CAULK APPLIED TO PERIMETER OF PIPE OR CONDUIT AT ITS EGRESS FROM THE WALL. CAULK INSTALLED SYMMETRICALLY ON BOTH SIDES OF WALL ASSEMBLY. THE HOURLY F RATING OF THE FIRESTOP SYSTEM IS DEPENDENT UPON THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED, AS SHOWN IN THE FOLLOWING TABLE. IN THE HOURLY T RATING OF THE FIRESTOP SYSTEM IS DEPENDENT UPON THE TYPE OR SIZE OF THE PIPE OR CONDUIT AND THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED AS TABULATED BELOW:</p> <table><tr><th>MAX PIPE OR CONDUIT DIA. (INCHES)</th><th>ANNULAR SPACE (INCHES)</th><th>F RATING (HOURS)</th><th>T RATING (HOURS)</th></tr><tr><td>1</td><td>0 TO 3/16</td><td>1 OR 2</td><td>0 + 1 OR 2</td></tr><tr><td>1</td><td>1/4 TO 1/2</td><td>3 OR 4</td><td>3 OR 4</td></tr><tr><td>4</td><td>0 TO 1/4</td><td>0</td><td>0</td></tr><tr><td>6</td><td>1/4 TO 1/2</td><td>3 OR 4</td><td>0</td></tr><tr><td>12</td><td>3/16 TO 3/8</td><td>1 OR 2</td><td>0</td></tr></table> <p>*WHEN COPPER PIPE IS USED, T RATING IS 0 NOMINAL MINNESOTA MINING & MFG. CO. - TYPES CP-23 SIL, CP-25 N/8, CP-25 WS, CP-25 WS + (NOTE: L RATINGS APPLY WHEN THE TYPE CP-25WS+CAULK IS USED)</p>	MAX PIPE OR CONDUIT DIA. (INCHES)	ANNULAR SPACE (INCHES)	F RATING (HOURS)	T RATING (HOURS)	1	0 TO 3/16	1 OR 2	0 + 1 OR 2	1	1/4 TO 1/2	3 OR 4	3 OR 4	4	0 TO 1/4	0	0	6	1/4 TO 1/2	3 OR 4	0	12	3/16 TO 3/8	1 OR 2	0
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FRESNO
7790 North Palm Avenue
Fresno, CA 93711
559-448-8400 P
559-448-8467 F
PBK.com

MEP Engineering Technology
LEAF ENGINEER
CLUES
895 W. Ashby Ave. Suite 101
Clovis, CA 93612
559.223.9800 p
LEAFmep.com

MADISON ELEMENTARY SCHOOL - TEMPORARY
RELOCATABLE CLASSROOMS
109 Stadium Rd, Madera, CA 93637
DSA SUBMITTAL

TOGETHER WE BUILD
THE FUTURE

PROFESSIONAL SEAL
REGISTERED PROFESSIONAL ENGINEER
STEVEN E. MUSLER
E-19817
Exp. 3-31-26
ELECTRICAL
STATE OF CALIFORNIA

PROJECT NUMBER
230278
DATE
12/10/2024
DSA APPLICATION NO.
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65243-169
DRAWN BY

REVISIONS
DESCRIPTION DATE

DSA SUBMITTAL
FIRE ALARM DETAILS,
CALCULATIONS AND
RISER DIAGRAM

FA2.0



Project Manual

For

James Madison Elementary School Temporary Relocatable Classrooms

109 Stadium Rd, Madera, CA 93637

VOLUME 1 and 2

Bidding and Contract Requirements
And
Specifications

for the

Madera Unified School District
1205 S. Madera Ave.
Madera, CA 93637

Date:12/10/2024

PBK Project No.: 230278
DSA Application No.: 02-123006

Package

Project Manual

for:

James Madison Elementary School New Classroom Building

for the

Madera Unified School District

Date: 03/05/2024

PBK Project No.: 230278

DSA Application No.: 02-123006

Package

Consultants:

Architect:

PBK

7790 N. Palm Avenue

Fresno, California 93711

Phone: 559-448-8467



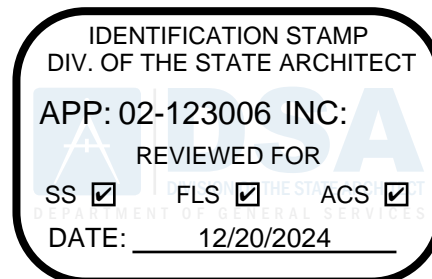
Electrical:

Leaf Engineers

895 W Ashlan Avenue, Suite 101

Clovis, Ca 93612

P.: 559-348-2130





Project Manual Cover Sheet and Seal Page.

DOCUMENT 00 01 10 TABLE OF CONTENTS

VOLUME 1 DISTRICT DOCUMENTS

DIVISION 0 BIDDING AND CONTRACT REQUIREMENTS

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00 01 10	Table of Contents

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01 25 13	Product Substitution Procedures
01 26 00	Contract Modification Procedures
01 29 00	Payment Procedures
01 31 00	Project Management and Coordination
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01 45 23	Testing and Inspecting Services
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DIVISION 3 CONCRETE

03 10 00	Concrete Forming and Accessories
03 20 00	Concrete Reinforcing
03 30 00	Cast-in-Place Concrete

DIVISION 6 WOOD, PLASTICS, AND COMPOSITES

06 10 00	Rough Carpentry
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DIVISION 26 ELECTRICAL

26 05 00 Common Work Results for Electrical
26 05 19 Low-Voltage Electrical Power Conductors And Cables
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DIVISION 28 ELECTRONIC SAFETY AND SECURITY

28 30 00 Fire Alarm System with Integral Emergency Voice-Alarm
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END OF SECTION 00 01 10

SECTION 01 10 00 SUMMARY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements including but not limited to:
 - 1. Work covered by Contract Documents.
 - 2. Work by Owner.
 - 3. Work under separate contracts.
 - 4. Owner furnished products.
 - 5. Access to site.
 - 6. Coordination with occupants.
 - 7. Work restrictions.
 - 8. Specification and Drawing conventions.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents.

1.4 WORK BY OWNER AND UNDER SEPARATE CONTRACTS

- A. The Owner reserves the right to let separate contract for work outside of the scope of this Contract. Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying Work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.
- B. Owner Furnished Products (OFCI):
 - 1. The Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner furnished products and making building services connections when applicable:
 - a. Owner Furnished Products: Refer to drawings.

1.5 ACCESS TO SITE

- A. Use of Site:
 - 1. Limit use of Project site to Work in areas and areas within the Contract limits indicated. Do not disturb portions of site beyond areas in which the Work is indicated:
 - a. Limits: The Drawings indicate the limits of the construction operations.
 - b. Driveways, Walkways, and Entrances:
 - 1) Keep driveways, parking areas, student drop off and pick up points, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, the students, and emergency vehicles at all times. Do not use these areas for parking or storage of materials:
 - a) Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b) Schedule deliveries to minimize space and time requirements for

storage of materials and equipment onsite.

- B. Condition of Existing Building: Maintain portions of existing building affected by construction operations in weathertight condition throughout construction period. Repair damage caused by construction operations.
- C. COVID-19 Conditions: Contractors must conform, and ensure that all subcontractors and other Project personnel, including but not limited to; workers and site visitors, conform to all regulations, limitations, and requirements as put forth and recommended by Associated General Contractors of California (AGC), State of California Guidance on Outbreak of 2019 Novel Coronavirus (2019-nCoV) in Wuhan, China, and local Health Department agencies.

1.6 COORDINATION WITH OCCUPANTS

- A. Owner Limited Occupancy of Completed Areas of Construction:
 - 1. Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work:
 - a. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
 - b. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
 - c. Before limited Owner occupancy, ensure mechanical and electrical systems are fully operational, and required tests and inspections and start up procedures are successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
 - d. Upon occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.7 WORK RESTRICTIONS

- A. Work Restrictions: Comply with restrictions on construction operations. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. Regulatory Requirements:
 - 1. All codes, laws, ordinances, rules, regulations, orders and other legal requirements of City, County, State, Federal and other public authorities which bear on performances of Work shall be applicable to Project. Latest editions shall be applicable unless specified otherwise.
 - 2. Other State Agencies:
 - a) SJVAPCD: San Joaquin Valley Air Pollution Control District
 - 1) District Rule 9510
- C. On Site Work Hours: Limit Work in the existing building to normal working hours, Monday through Friday, unless otherwise indicated. Coordinate with Owner when it is necessary to extend working hours or Work on weekends.
- D. Existing Utility Interruptions:
 - 1. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and after providing temporary utility services according to requirements indicated:
 - a. Notify Owner not less than two (2) weeks in advance of proposed utility

- interruptions.
- b. Obtain Owner's written permission before proceeding with utility interruptions.
- E. Noise, Vibration, and Odors:
 - 1. Coordinate operations that result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner:
 - a. Notify Owner not less than two (2) weeks in advance of proposed disruptive operations.
 - b. Obtain Owner's written permission before proceeding with disruptive operations.
- F. Controlled Substances, Firearms, and Explosive Devices: Use of tobacco products, controlled substances, firearms, and explosive devices on the site is not permitted.
- G. Employee Identification: Provide identification tags for Contractor personnel working on site. Require personnel to use identification tags at all times.
- H. Employee Screening:
 - 1. Comply with Owner's requirements for drug and background screening of Contractor personnel working on site:
 - a. Maintain list of approved screened personnel with Owner's representative.

1.8 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content:
 - 1. The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - a. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - b. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Drawing Coordination:
 - 1. Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 - a. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 - b. Abbreviations: Materials and products are identified by abbreviations.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 CONSTRUCTION SCHEDULE

- A. The Owner has a critical need for the Work to begin upon Notice to Proceed and shall be Substantially Complete by the date specified on the Project Schedule.

END OF SECTION 01 10 00

SECTION 01 25 00 SUBSTITUTION PROCEDURES AND FORM

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for substitutions.

1.3 DEFINITIONS

- A. Products: Items purchased for incorporation in the Work, regardless if specifically purchased for the Project or taken from Contractor's previously purchased stock. The term *product* is inclusive for material, equipment, assembly, system, and other terms of similar intent.
- B. Substitutions:
 - 1. Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor:
 - a. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - b. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 SUBMITTALS

- A. Substitution Requests:
 - 1. Submit three (3) copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles:
 - a. Substitution Request Form: Use facsimile of form provided in Project manual.
 - b. Documentation:
 - 1) Show compliance with requirements for substitutions and the following, as applicable:
 - a) Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b) Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, which are necessary to accommodate proposed substitution.
 - c) Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d) Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e) Samples, where applicable or requested.

- f) Certificates and qualification data, where applicable or requested.
 - g) List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - h) Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i) Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - j) Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k) Cost information, including a proposal of change, if any, in the Contract Sum.
 - l) Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m) Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
2. Architect's Action:
- a. If necessary, Architect will request additional information or documentation for evaluation within seven (7) days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later:
 - 1) Forms of acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - 2) Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.
- B. Coordination: Revise or adjust affected Work as necessary to integrate Work of the approved substitutions.

PART 2 PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions: Substitutions are considered as changes to the Drawings and shall be submitted to DSA.
- B. Substitutions for Cause:
 - 1. Submit requests for substitution immediately on discovery of need for change, but not later than 30 days prior to time required for preparation and review of related submittals:
 - a. Conditions:
 - 1) Architect will consider Contractor's request for substitution when the following

conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

- a) Requested substitution is consistent with the Contract Documents and will produce indicated results.
- b) Substitution request is fully documented and properly submitted.
- c) Requested substitution will not adversely affect Contractor's Construction Schedule.
- d) Requested substitution has received necessary approvals of authorities having jurisdiction.
- e) Requested substitution is compatible with other portions of the Work.
- f) Requested substitution has been coordinated with other portions of the Work.
- g) Requested substitution provides specified warranty.
- h) If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

C. Substitutions for Convenience:

1. Architect will consider requests for substitution if received prior to the Award of the Contract. Requests received after that time may be considered or rejected at discretion of Architect:

a. Conditions:

- 1) Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a) Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b) Requested substitution does not require extensive revisions to the Contract Documents.
 - c) Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d) Substitution request is fully documented and properly submitted.
 - e) Requested substitution will not adversely affect Contractor's Construction Schedule.
 - f) Requested substitution has received necessary approvals of authorities having jurisdiction.
 - g) Requested substitution is compatible with other portions of the Work.
 - h) Requested substitution has been coordinated with other portions of the Work.
 - i) Requested substitution provides specified warranty.
 - j) If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 EXECUTION (NOT USED)

REQUEST FOR SUBSTITUTION

Contract Award Date:

To:

Substitution Requested By:

Project Name and Number:

We submit for consideration the following product in lieu of the specified item for the above Project:

Drawing No.	Specification Section	Paragraph	Specified Item
<hr/>	<hr/>	<hr/>	<hr/>

Proposed Substitution:

Request is made during ____ bidding ____ construction period.

Submit in accordance with Section 01 33 00: Submittal Procedures.

1. Technical data, cost, and time information relating to changes to Construction Documents required by proposed substitution.
2. Detailed comparison of proposed substitution and specified product including but not limited to warranty, significant variations, qualifications of manufacturers, and maintenance.
3. Complete technical data, detailed shop drawings, samples, installation procedures, warranty, and substantiating data marked to indicate equivalent quality and performance to that specified. Manufacturer sell sheets are not acceptable submittals.

Cause for Request:

Cost saving realized by Owner:

Does substitution affect adjacent Work, Construction Documents, cost, schedule, quality, and related submittals?

Yes ____ No ____ On separate sheet, explain affects to the Work, documents, schedule, and submittals.

Contractor is responsible for associated costs and additional time of the proposed substitution including costs incurred by the Architect for evaluation of substitution and changes to the documents. Describe costs for changes to design, including engineering and detailing costs caused by the requested substitution.

Warranty: Is the warranty for the requested substitution the same or different? Yes ____ No ____

Explain Differences:

Contractor Certification:

In making a request for substitution, Contractor certifies that:

1. The proposed substitution has been thoroughly researched and evaluated and determined as equivalent or superior to specified product or material, will fit into space provided, and is compatible with adjacent materials.
2. It will provide the same or better warranty for the proposed substitution at no additional cost to the Owner.
3. Cost data is complete and includes related costs under the Contract. Claims for additional costs related to the proposed substitution that may subsequently become apparent are waived.
4. It will assume the responsibility for delays and costs caused by the proposed substitution, if approved, are accepted by Contractor unless delays are and costs are specifically mentioned and approved in writing by the Owner and the Architect.
5. It will assume the liability for the performance of the substitution and its performance.
6. The installation of the proposed substitution is coordinated with the Work and with changes required for the Work.
7. It will reimburse the Owner and Architect for evaluation and redesign services associated with the substitution request and, when required, by approval by governing authorities.

Submitted by:

Signature of Contractor

Title

Firm

Telephone

Date

Signature shall be by the individual authorized to legally bind Contractor to the above terms. Failure to provide legally binding signature will result in retraction of approval.

FOR USE BY ARCHITECT:

____ Accepted
____ Not Accepted

____ Accepted as Noted
____ Received Too Late

FOR USE BY OWNER:

____ Accepted ____ Not Accepted

By: _____

By: _____

Date: _____

By: _____

Remarks: _____

Remarks: _____

END OF SECTION 01 25 00

SECTION 01 25 13 PRODUCT SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Specified product compliance, and product quality assurance.
 - 2. Specific administrative and procedural requirements for handling requests for substitutions made prior to award of Contract.
 - 3. Requirements for product delivery, storage, and handling.
- B. Related Requirements:
 - 1. Instructions to Offerors:
 - a. Product options and procedures for submittal of requests for substitutions during the Proposal period.

1.3 DEFINITIONS

- A. Definitions used in this Section are not intended to negate the meaning of other terms used in the Contract Documents, including such terms as “specialties,” “systems,” “structure,” “finishes,” “accessories,” “furnishings,” “special construction,” and similar terms. Such terms are self-explanatory and have recognized meanings in the construction industry:
 - 1. Equipment: Product with operational parts, regardless of whether motorized or manually operated, and in particular, a product that requires service connections such as wiring or piping.
 - 2. Materials: Products that must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, or installed to form units of work.
 - 3. Products:
 - a. Items purchased for incorporation in the Work, regardless of whether they were specifically purchased for the Project or taken from Contractor’s previously purchased stock. The term “product” as used herein includes the terms “material”, “equipment”, “system”, and other terms of similar intent:
 - 1) Named products: Identified by the use of the manufacturer’s name for a product, including such items as a make or model designation as recorded in published product literature of the latest issue as of the date of the Contract Documents.
 - 2) Specified products: Same as Named Products.

1.4 QUALITY ASSURANCE

- A. Source Limitations:
 - 1. To the fullest extent possible, provide products of the same generic kind from a single source for each unit of work:
 - a. When it is discovered that specific products are available only from sources that do not or cannot produce an adequate quantity to complete Project requirements in a timely manner, consult with the Architect/Engineer for a determination of what product quantities are most important before proceeding. The Architect/Engineer will designate those qualities, such as visual, structural, durability, or compatibility

that are most important. When the Architect/Engineer's determination has been made, select products from those sources that produce products that possess the most important qualities to the fullest extent possible.

- B. Compatibility of Options:
 - 1. Compatibility of products is a basic requirement of product selection. When Contractor is given the option of selecting between two (2) or more products for use on the Project, the product selected must be compatible with other products previously selected, even if the products previously selected were also Contractor options. The complete compatibility between the various choices available to Contractor is not assured by the various requirements of the Contract Documents but must be provided by Contractor.
- C. Or Equal:
 - 1. Where the phrase "or equal," "or equivalent," "or Architects approved equal," or similar phrasing occurs in the Proposal Documents, do not assume that materials, equipment, or methods of construction will be approved by the Architect unless the item has been specifically approved for this Work by the Architect.
 - 2. The decision of the Architect shall be final.
- D. Where a proposed substitution involves the work of more than one (1) contractor, each contractor involved shall cooperate and coordinate the work with all other contractors involved, so as to provide uniformity and consistency and to assure the compatibility of products.
- E. Foreign Product Limitations:
 - 1. "Foreign products" as distinguished from "domestic products" are defined as products that are either manufactured substantially (50 percent or more of value) outside of the United States and its possessions, or produced or supplied by entities known to be substantially owned (more than 50 percent) by persons who are not citizens of, nor living within the United States and its possessions.
 - 2. Except under one (1) of the following conditions, select and provide domestic, not foreign, products for inclusion in the Work:
 - a. There is no domestic product available that complies with the requirements of the Contract Documents.
 - b. Available domestic products that comply with the requirements of the Contract Documents are available only at prices or other procurement terms that are substantially higher (25 percent or more) than for available foreign products that comply with the requirements of the Contract Documents.
 - c. At the discretion of Architect or Owner.
 - 3. Final determination and acceptance will be the responsibility of Architect.

1.5 SUBSTITUTIONS OF PRODUCTS

- A. The products described in the Proposal Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution. The materials and equipment named in, and the procedures covered by these Specifications have been selected as a standard because of quality, particular suitability, or record of satisfactory performance. It is not intended to preclude the use of equal or better materials or equipment, provided that same meets the requirements of the particular Project and is approved in an Addendum as a substitution prior to the submission of proposals.
- B. No substitution will be considered prior to receipt of proposals unless written request for approval has been received by the Architect at least seven (7) days prior to the date for receipt of proposals. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute

- including Drawings, cuts, performance and test data, and any other information necessary for an evaluation. The Architect's decision of approval or disapproval of a proposed substitution shall be final.
- C. If the Architect approves any proposed substitution prior to receipt of proposals, such approval will be set forth in an Addendum. Offerors shall not rely upon approvals made in any other manner.
- D. The Architect and Owner reserve the right to disapprove the use of any manufacturer who in their judgment is unsuitable for use on the Project and that decision will be final.
- E. The following are not considered as substitutions:
1. Revisions to the Contract Documents, when requested by Owner, Architect, or any of their consultants are considered as changes, not substitutions.
 2. Specified Contractor options on products and construction methods included in Contract Documents are choices made available to Contractor and are not subject to the requirements specified in this Section for substitutions.
 3. Except as otherwise provided in the Contract Documents, Contractor's determination of and compliance with governing authorities does not constitute substitutions, nor does it constitute a basis for change orders.
- F. The following may be considered as a reason for a request for substitution:
1. The request is directly related to an "or approved equal" clause or similar language in the Contract Documents.
 2. The specified product or method of construction cannot be provided within the Contract Time in accordance with the paragraph below concerning availability of specified items.
 3. The specified product or method of construction cannot receive necessary approval by a governing authority, but the requested substitution can be approved.
 4. A substantial advantage is offered to Owner, in terms of cost, time, energy conservation, or other consideration of merit, after deducting offsetting responsibilities Owner may be required to bear. These additional responsibilities may include such considerations as additional compensation to Architect/Engineer for redesign and evaluation services, the increased cost of other work by Owner or separate contractors, and similar considerations.
 5. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, but Contractor certifies that the substitution will overcome the incompatibility.
 6. The specified product or method of construction cannot be coordinated with other materials, but Contractor certifies that the proposed substitution can be coordinated with them.
 7. The specified product or method of construction cannot provide a warranty required by the Contract Documents, but Contractor certifies that the proposed substitution provides the required warranty.
- G. Availability of Specified Items:
1. Verify prior to submittal of Proposal that all specified items will be available in time for installation during orderly and timely progress of the Work:
 - a. In the event specified items will not be so available, notify the Architect prior to receipt of Proposals. Submit Request for Substitutions in accordance with this Section.
 - b. The request will not be considered if the product or method cannot be provided as a result of Contractor's failure to pursue the Work promptly or coordinate activities properly.
 2. Costs of delays because of non-availability of specified items, when such delays could have been avoided by Contractor, will be back-charged as necessary and shall not be borne by Owner.

- H. A request constitutes a representation that Offeror:
 - 1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
 - 2. Will provide same warranty for substitution as for specified product, except when inability to provide specified warranty is reason for request for substitution as described above.
 - 3. Will coordinate installation and make changes to other work that may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
 - 5. Will reimburse Owner and pay for all costs, including Architect/Engineer's redesign and evaluation costs resulting from the use of the proposed substitution, or for review or redesign of services associated with re-approval by authorities having jurisdiction.
- I. No substitutions will be considered after the Award of Contract.

1.6 SUBSTITUTION REQUEST SUBMITTAL

- A. Requests for Substitutions:
 - 1. Submit three (3) copies of each request for substitution. In each request, identify the product or fabrication or installation method to be replaced by the substitution. Include related Specifications Section and Drawing numbers, and complete documentation showing compliance with the requirements for substitutions. Include, as appropriate, with each request, the following information:
 - a. Product data, drawings, and descriptions of products, fabrication, and installation procedures.
 - b. Samples, where applicable or requested.
 - c. A detailed comparison of the significant qualities of the proposed substitution with those of the Work originally specified. Significant qualities may include elements such as size, weight, durability, performance, and visual effect, where applicable.
 - d. Coordination information, including a list of changes or modifications needed by other parts of the Work and to construction performed by Owner and separate contractors that will become necessary to accommodate the proposed substitution.
 - e. A statement indicating the effect the substitution will have on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
 - f. Cost information, including a proposal of the net change, if any, in the Contract Sum.
 - g. Certification by Contractor to the effect that, in Contractor's opinion, after thorough evaluation, the proposed substitution will result in work that in every significant respect is equal to, or better than, the Work required by the Contract Documents, and that it will perform adequately in the application indicated. Include Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.
 - h. A statement indicating that Contractor will reimburse Owner and pay for all costs, including Architect/Engineer's re-design and evaluation costs resulting from the use of the proposed substitution.
- B. Work-Related Submittals: Contractor's submittal of, and Architect/Engineer's acceptance of, shop drawings, product data, or samples related to work not complying with the Contract Documents, does not constitute an acceptance or valid request for a substitution, nor approval thereof.

1.7 DELIVERY, STORAGE, AND HANDLING

A. General:

1. Deliver, store, and handle products in accordance with manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft. Control to prevent overcrowding of construction spaces or overloading of structure. In particular, coordinate delivery and installation to ensure minimum holding or storage times for items known or recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other sources of loss:
 - a. Deliver products to the site in the manufacturer's sealed containers or other packaging system, complete with labels intact, and instructions for handling, storage, unpacking, installing, cleaning, and protecting.
 - b. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation or potential degradation of product.
 - c. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
 - d. Store products at the site or in a bonded and insured off-site storage facility or warehouse in a manner that will facilitate inspection and measurement of quantity or counting of units. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.
 - e. Store heavy materials away from the Project structure or in a manner that will not endanger the supporting construction.

PART 2 PRODUCTS

2.1 GENERAL PRODUCT COMPLIANCE

A. General:

1. Requirements for individual products are indicated in the Contract Documents; compliance with these requirements is in itself a Contract requirement. These requirements may be specified in any one (1) of several different specifying methods, or in any combination of these methods. These methods include the following:
 - a. Proprietary.
 - b. Descriptive.
 - c. Performance.
 - d. Compliance with Reference Standards.
2. Compliance with codes, compliance with graphic details, allowances, and similar provisions of the Contract Documents also have a bearing on the selection process.

B. Procedures for Selecting Products:

1. Contractor's options in selecting products are limited by requirements of the Contract Documents and governing regulations. They are not controlled by industry traditions or procedures experienced by Contractor on previous construction projects. Required procedures include, but are not limited to, the following for the various indicated methods of specifying:
 - a. Proprietary and semi-proprietary Specification requirements:
 - 1) Single product name: Where only a single product or manufacturer is named, provide the product indicated, unless the Specification indicates the possible consideration of other products. Advise Architect/Engineer before proceeding, when it is discovered that the named product is not a reasonable or feasible solution.
 - 2) Two (2) or more product names: Where two (2) or more products or manufacturers are named, provide one (1) of the products named, at Contractor's option. Exclude products that do not comply with Specification requirements. Do not provide or offer to provide an unnamed product, unless the Specification indicates the possible consideration of other products.

Advise Architect/Engineer before proceeding where none of the named products comply with Specification requirements or are not feasible for use. Where products or manufacturers are specified by name, accompanied by the term "or approved equal" or similar language, comply with this Section regarding substitutions to obtain approval from Architect/Engineer for the use of an unnamed product.

- b. Nonproprietary Specification requirements: Where the Specifications name products or manufacturers that are available and may be incorporated in the Work, but do not restrict Contractor to the use of these products only, Contractor may, at his option, use any available product that complies with the Contract requirements.
 - c. Descriptive Specification requirements: Where the Specifications describe a product or assembly generically, in detail, listing the exact characteristics required, but without use of a brand name, provide products or assemblies that provide the characteristics indicated and otherwise comply with Contract requirements.
 - d. Performance Specification requirements: Where the Specifications require compliance with indicated performance requirements, provide products that comply with the specific performance requirements indicated, and that are recommended by the manufacturer for the application indicated. The manufacturer's recommendations may be contained in published product literature, or by the manufacturer's individual certification of performance. General overall performance of a product is implied where the product is specified for specific performances.
 - e. Compliance with standards, codes, and regulations: Where the Specifications require only compliance with an imposed standard, code, or regulation, Contractor has the option of selecting a product that complies with Specification requirements, including standards, codes, and regulations.
 - f. Visual matching: Where matching an established sample is required, the final judgement of whether a product proposed by Contractor matches the sample satisfactorily will be determined by Architect. Where there is no product available within the specified product category that matches the sample satisfactorily and also complies with other specified requirements, comply with the provisions of this Section regarding substitutions and other Contract Documents for change orders for the selection of a matching product in another product category, or for noncompliance with specified requirements.
 - g. Visual selection: Except as otherwise indicated, where specified product requirements include the phrase "...as selected from the manufacturer's standard colors, patterns, textures..." or similar phrases, Contractor has the option of selecting the product and manufacturer, provided the selection complies with other specified requirements. Architect is subsequently responsible for selecting the color, pattern, and texture from the product line selected by Contractor.
 - h. Allowances: Refer to individual Sections of the Specifications for an indication of product selections that are controlled by established allowances, and for the procedures required for processing such selections.
- C. Producer's Statement of Applicability: Where individual Specification Sections indicate products that require a "Statement of Applicability" from the manufacturer or other producer, submit a written certified statement from the producer stating that the producer has reviewed the proposed application of the product on the Project. This statement shall affirm that the producer agrees with, or does not object to, Architect/Engineer's Specification, and that Contractor's selection of the product on the Project is suitable and proper.

2.2 SUBSTITUTIONS

- A. Condition: Contractor's request for substitution will be received and considered when extensive revisions to Contract Documents are not required, when the proposed changes are in keeping with the general intent of the Contract Documents, when the request is timely, fully documented and properly submitted, and when one (1) or more of the above

conditions are satisfied, all as judged and determined by Architect/Engineer; otherwise, the requests will be returned without action except to record noncompliance with these requirements.

PART 3 EXECUTION

3.1 INSTALLATION OF PRODUCTS

- A. General: Except as otherwise indicated in individual Sections of these Specifications, comply with the manufacturer's instructions and recommendations for installation of the products in the applications indicated.
- B. Anchor each product securely in place, accurately located, and aligned with other work.
- C. Clean exposed surfaces and protect surfaces as necessary to ensure freedom from damage and deterioration at time of acceptance.
- D. Products and assemblies shall be installed complete, in-place, watertight, and structurally sound.

3.2 INSTALLATION OF APPROVED SUBSTITUTIONS

- A. Coordinate all approved substitutions with adjacent work.
- B. Comply with the manufacturer's and/or supplier's instructions and recommendations for installation of the products in the applications indicated.
- C. Provide all items required by manufacturer and/or supplier regarding installation, i.e. supplemental supports, anchors, fasteners, painting, etc., whether or not indicated or specified.

END OF SECTION 01 25 13

SECTION 01 26 00 CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Section:
 - 1. Section 01 25 00: Substitution Procedures and Form.
- C. Minor Changes in the Work:
 - 1. Architect will issue supplemental instructions / Bulletins authorizing changes in the Work.

1.3 PROPOSAL REQUESTS

- A. Owner Initiated Proposal Requests / Bulletins:
 - 1. Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications:
 - a. Work Change Proposal Requests / Bulletins issued by Architect are not instructions either to stop Work in progress or to execute the proposed change.
 - b. Within time specified in Proposal Request / Bulletins after receipt of Proposal Request / Bulletins, submit quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change:
 - 1) Include list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - 2) Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - 3) Include costs of labor and supervision directly attributable to the change.
 - 4) Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- B. Contractor Initiated Proposals:
 - 1. If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect:
 - a. Include statement outlining reasons for the change and the effect of the change on the Work. Provide complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - b. Include list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - c. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

- d. Include costs of labor and supervision directly attributable to the change.
- e. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- f. Comply with requirements in Section 01 25 00: Substitution Procedures and Form if the proposed change requires substitution of one product or system for product or system specified.
- g. Proposal Request Form: As approved by Architect and Owner and similar to that of AIA Document G709.

1.4 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner, Contractor, Architect on a form as approved by Architect and Owner and similar to that of AIA Document G701.

1.5 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive:
 - 1. Architect may issue a Construction Change Directive on on a form as approved by Architect and Owner and similar to that of AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order:
 - a. Construction Change Directive contains a complete description of change in the Work and designates the method to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of Work required by the Construction Change Directive. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 29 00 PAYMENT PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.3 DEFINITIONS

- A. Pencil Copy: A copy submitted prior to a final/official.
- B. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination:
 - 1. Coordinate preparation of the schedule of values with preparation of Contractor's Construction Schedule:
 - a. Coordinate line items in the schedule of values with administrative forms and schedules, including the following:
 - 1) Application for Payment forms with continuation sheets.
 - 2) Updated submittal schedule.
 - 3) Items required to be indicated as separate activities in updated Contractor's Construction Schedule.
 - b. Submit the schedule of values to Architect at earliest possible date, but no later than seven (7) days before the date scheduled for submittal of initial Applications for Payment. Contractor's standard form or electronic media printout will be considered but must be approved by Owner.
- B. Format and Content:
 - 1. Use Project manual table of contents as a guide to establish line items for the schedule of values. Provide at least one (1) line item for each Specification Section:
 - a. Identification:
 - 1) Include the following Project identification on the schedule of values:
 - a) Project name and location.
 - b) Name of Architect.
 - c) Architect's Project number.
 - d) Contractor's name and address.
 - e) Date of submittal.
 - 2. Arrange schedule of values consistent with format of AIA Documents G702/G703.
 - 3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of Subcontractor.

- d. Name of manufacturer or fabricator.
- e. Name of supplier.
- f. Change Orders (numbers) that affect value.
- g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent (.01%), adjusted to total 100 percent:
 - 1) Labor.
 - 2) Materials.
 - 3) Equipment rentals.
 - 4) General Conditions:
 - a) Supervisor.
 - b) Submittals.
 - c) Closeout.
 - d) Field Engineering.
 - e) Daily Clean-up.
 - f) Final Clean-up.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed:
 - a. Differentiate between items stored on site and items stored off site. Include evidence of insurance.
6. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line item value of unit cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
7. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item:
 - a. Temporary facilities and other major cost items that are not direct cost of actual Work in place may be shown either as separate line items in the schedule of values or distributed as general overhead expense.
8. Schedule updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATION FOR PAYMENT

- A. Submit preliminary (pencil) copy of proposed values to Architect and Owner for review by the 20th of the month. Allow four (4) days for comments. Schedule review of the pencil copy during bi-monthly site visits.
- B. Once preliminary (pencil) approved, submit four (4) notarized originals of each application on AIA Form G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet for G702 or other similar form approved by Owner.
- C. Content and Format: Utilize schedule of values for listing items in Application for Payment.
- D. Submit updated construction or recovery schedule with each Application for Payment.
- E. Payment Period: Submit at intervals stipulated in Owner/Contractor Agreement. Include Supplementary Conditions of the Contract.
- F. Only materials stored on the Project site shall be paid for unless the materials are stored in a bonded warehouse agreed upon by Owner. Periodic review of stored item will be required by the inspector of record.
- G. Substantiating Data:

1. When Architect/Engineer requires substantiating information, submit data justifying dollar amounts in question. Items that may be requested by Architect or Owner to substantiate costs include, but are not limited to the following:
 - a. Current Record Documents as specified in Section 01 77 00: Closeout Procedures.
 - b. Labor time sheets, purchase orders, or similar documentation.
 - c. Affidavits attesting to products stored off-site.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 31 00 PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - a. General coordination procedures.
 - b. Coordination drawings.
 - c. Pre-installation meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Contractor shall make a reasonable attempt to interpret the Contract Documents before asking the Architect for assistance in interpretation. Requests for Information (RFI) will not be allowed from Sub-Contractors. The Contractor is to evaluate the Sub-Contractor's request and respond if the Contractor deems necessary the RFI will be forwarded to the Architect for a evaluation and response. The Contractor shall arrange the necessary meeting in the field with appropriate Architect's field representative(s) to obtain clarification as needed on items that may need interpretation, clarification and respond appropriately.

1.3 SUBMITTALS

- A. Subcontract List:
 - 1. Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - a. Name, address, and telephone number of entity performing subcontract or supplying products.
 - b. Number and title of related Specification Section(s) covered by subcontract.
 - c. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names:
 - 1. Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and the duties and responsibilities; list address, telephone numbers (home, office, and cellular), and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project:
 - a. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.4 COORDINATION PROCEDURES

- A. Coordinate construction operations to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations that depend on each other for proper

installation, connection, and operation:

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include items as required notices, reports, and list of attendees at meetings:
1. Prepare similar memoranda for Owner and separate contractors if coordination of the Work is required.
- C. Administrative Procedures:
1. Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Administrative activities include, but are not limited to, the following:
 - a. Preparation of Contractor's Construction Schedule.
 - b. Preparation of the schedule of values.
 - c. Installation and removal of temporary facilities and controls.
 - d. Delivery and processing of submittals.
 - e. Progress meetings.
 - f. Pre-installation conferences.
 - g. Project closeout activities.
 - h. Startup and adjustment of systems.
 - i. Coordinating inspections and other jurisdictional requirements.
 - j. Coordinate OFCI equipment.
 - k. Action items and issue logs.
- D. Conservation:
1. Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste:
 - a. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to the Specifications Sections for disposition of salvaged materials that are designated as Owner's property.

1.5 COORDINATION DRAWINGS

- A. Coordination Drawings, General:
1. Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on shop drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity:
 - a. Content:
 - 1) Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a) Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b) Coordinate the addition of trade specific information to the coordination drawings by multiple contractors in sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.

- c) Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
- d) Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
- e) Show location and size of access doors required for access to concealed dampers, valves, and other controls.
- f) Indicate required installation sequences.
- g) Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization:

1. Floor plans and reflected ceiling plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan Drawings with section drawings where required to adequately represent the Work.
2. Plenum space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures, ductwork, piping, and other components.
3. Mechanical rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire-alarm, and electrical equipment.
4. Structural penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab edge and embedded items: Indicate slab edge locations and sizes, and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and plumbing work - Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts, and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
7. Electrical work - Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire alarm locations.
 - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
 - e. Floor boxes.
8. Fire protection system - Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, sprinkler heads, and inspector test locations.
9. IDF/MDF rooms: Communications and low voltage (security, data, phone, etc.) audio.
10. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
11. Coordination drawing prints: Prepare coordination drawing prints according to

requirements in Section 01 33 00: Submittal Procedures.

- C. Coordination Digital Data Files:
 - 1. Prepare coordination digital data files according to the following requirements:
 - a. File preparation format: Same digital data software program, version, and operating system as original Drawings.
 - b. File submittal format: Submit or post coordination drawing files using same format as file preparation.
 - c. BIM file incorporation:
 - 1) Develop and incorporate coordination drawing files into Building Information Model established for Project:
 - a) Perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.
 - d. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files:
 - 1) Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - 2) Digital data software program: Drawings are available in Revit.
 - 3) Contractor shall execute a data licensing agreement in the form of AIA Document C106.

1.6 PROJECT MEETINGS

- A. Schedule and conduct meetings and conferences at Project site unless otherwise indicated:
 - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 - 2. Agenda: Architect to prepare the meeting agenda and distribute the agenda to all invited attendees.
 - 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
 - 4. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.
 - 5. Issue logs: Documentation element of software project management and contains a list of ongoing and closed issues of the Project.
- B. Kick-off and Preconstruction Conference:
 - 1. Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect:
 - a. Conduct the conference to review responsibilities and personnel assignments.
 - b. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.
 - c. Agenda: Discuss items of significance that affect progress.
 - d. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
 - e. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.

C. Pre-Installation Conferences:

1. Conduct a pre-installation trade conference at site before each construction activity that requires coordination with other construction trades:
 - a. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Engineer of Record of scheduled meeting dates.
 - b. Agenda: Contractor to review progress of other construction activities and preparations for the particular activity under consideration.
 - c. Contractor to record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 - d. Reporting: Contractor to distribute minutes of the meeting to each party present and to other parties requiring information.
 - e. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
 - f. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.

D. Project Closeout Conference:

1. Schedule and conduct a Project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion:
 - a. Conduct the conference to review requirements and responsibilities related to Substantial Completion.
 - b. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with the Project and authorized to conclude matters relating to the Work.
 - c. Agenda: Discuss items of significance that could affect or delay Project closeout.
 - d. Minutes: Entity conducting meeting will record and distribute meeting minutes.
 - e. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.

E. Progress Meetings:

1. Conduct progress meetings at weekly intervals:
 - a. Coordinate dates of meetings with preparation of payment requests.
 - b. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with the Project and authorized to conclude matters relating to the Work.
 - c. Agenda:
 - 1) Review and correct or approve minutes of previous progress meeting.
Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of the Project:
 - a) Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - d. Minutes:

- 1) Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information:
 - a) Schedule updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
 - b) Six (6) week look-ahead schedules. This may be altered to three (3) week look-ahead as part of an action item when Architect/District request:
 - i. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.
- F. Coordination Meetings:
1. Conduct coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences:
 - a. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with the Project and authorized to conclude matters relating to the Work.
 - b. Agenda:
 - 1) Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of the Project:
 - a) Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b) Schedule updating: Revise combined Contractor's Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c) Review present and future needs of each contractor present.
 - c. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.
 - d. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.

PART 2 PRODUCTS (NOT USED)
PART 3 EXECUTION (NOT USED)

END OF SECTION 01 31 00

SECTION 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Startup construction schedule.
 - 2. Contractor's Construction Schedule.
 - 3. Construction schedule updating reports.
 - 4. Daily construction reports.
 - 5. Material location reports.
 - 6. Site condition reports.
 - 7. Special reports.

1.3 DEFINITIONS

- A. Activity:
 - 1. A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources:
 - a. Critical activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - b. Predecessor activity: An activity that precedes another activity in the network.
 - c. Successor activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of the project.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Float:
 - 1. The measure of leeway in starting and completing an activity:
 - a. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 - b. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - c. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

- F. Look-ahead Schedule: Schedule indicating activities scheduled to occur or commence prior to submittal of next schedule update.
- G. Milestones: Measurable, observable, and serve as progress markers (flags) but, by definition, are independent of time (have zero durations); therefore, no Work or consumption of resources is associated with them.
- H. Recovery Schedule: Submittal of a revised CPM schedule and a written plan.
- I. Resource Loading: The allocation of manpower and equipment necessary for completion of an activity as scheduled.

1.4 SUBMITTALS

- A. Submittal Format:
 - 1. Submit required submittals in the following format:
 - a. Working electronic copy of schedule file, where indicated.
 - b. PDF electronic file.
- B. Startup Diagram: Of size necessary to display entire network for entire construction period. Show logic relationship ties for all activities.
- C. Contractor's Construction Schedule:
 - 1. Initial schedule, of size required to display entire schedule for entire construction period:
 - a. Submit a working electronic copy of schedule labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
- D. CPM Reports:
 - 1. Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days:
 - a. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
 - b. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
 - c. Total Float Report: List of all activities sorted in ascending order of total float.
 - d. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work until most recent Application for Payment.
- E. Construction Schedule Updating Reports: Submit with Applications for Payment.
- F. Daily Construction Reports: Submit at monthly intervals.
- G. Material Location Reports: Submit at monthly intervals.
- H. Site Condition Reports: Submit at time of discovery of differing conditions.
- I. Special Reports: Submit at time of unusual event.

1.5 QUALITY ASSURANCE

- A. Pre-Scheduling Conference:
 - 1. Conduct conference at site. Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:
 - a. Review software limitations and content and format for reports.
 - b. Verify availability of qualified personnel needed to develop and update schedule.
 - c. Discuss constraints, including phasing, Work stages, area separations, interim milestones, and partial Owner occupancy.
 - d. Review delivery dates for Owner furnished products.
 - e. Review schedule for work of Owner's separate contracts, if any.
 - f. Review submittal requirements and procedures.
 - g. Review time required for review of submittals and resubmittals.
 - h. Review requirements for tests and inspections by independent testing and inspecting agencies.
 - i. Review time required for Project closeout and Owner startup procedures.
 - j. Review and finalize list of construction activities to be included in schedule.
 - k. Review procedures for updating schedule.
- B. Coordination:
 - 1. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports:
 - a. Secure time commitments for performing critical elements of the Work from entities involved.
 - b. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Time is of the essence to Owner. Commence Work immediately upon issuance of the Notice to Proceed. There is a critical need for the Work to be substantially complete within the time frame identified in the Agreement.
- B. Time Frame:
 - 1. Extend schedule from date established for commencement of the Work to date of Substantial Completion and date of final completion:
 - a. Contract completion date shall not be changed by submission of schedule that shows an early completion date, unless specifically authorized by Change Order.
- C. Activities:
 - 1. Treat each separate area or story as a separate numbered activity for each main element of the Work. Comply with the following:
 - a. Activity duration: Define activities in terms of number of days anticipated.
 - b. Procurement activities: Include procurement process activities for long lead items and major items requiring a cycle of more than 60 days as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - c. Submittal review time: Include review and resubmittal times indicated in Section 01 33 00: Submittal Procedures in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.

- d. Startup and testing time: Include number of days anticipated for startup and testing.
 - e. Substantial Completion: Indicate completion of all conditions as in advance of date established for Substantial Completion and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 - f. Punch list and final completion: Include a maximum of 30 days for completion of punch list items and final completion.
 - g. Inspections required by Authorities Having Jurisdiction (AHJ).
- D. Constraints:
- 1. Include constraints and Work restrictions indicated in the Contract Documents and show how the sequence of the Work is affected:
 - a. Work restrictions:
 - 1) Show the effect of the following items on the schedule:
 - a) Coordination with existing construction.
 - b) Limitations of continued occupancies.
 - c) Uninterruptible services.
 - d) Partial occupancy before Substantial Completion.
 - e) Use of premises restrictions.
 - f) Provisions for future construction.
 - g) Seasonal variations.
 - h) Environmental control.
 - i) Rain days as specified.
 - b. Work stages:
 - 1) Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a) Submittals.
 - b) Mockups.
 - c) Fabrication.
 - d) Installation.
 - e) Tests and inspections.
 - f) Adjusting.
 - g) Curing.
- E. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
- F. Six (6) Week Look-Ahead Schedule:
- 1. Prepare schedule indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
 - a. Unresolved issues.
 - b. Unanswered Requests for Information.
 - c. Rejected or unreturned submittals.
 - d. Notations on returned submittals.
 - e. Pending modifications affecting the Work and Contract Time.
 - f. Inspections by AHJ.
 - g. Trade pre-installation conference.
- G. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

- H. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
- I. Contract Modifications: For each proposed Contract modification and concurrent with its submission, prepare a time impact analysis to demonstrate the effect of the proposed change on the overall Project schedule.
- J. Schedule Updating:
 - 1. Concurrent with making revisions to the schedule, prepare tabulated reports showing the following:
 - a. Identification of activities that have changed.
 - b. Changes in early and late start dates.
 - c. Changes in early and late finish dates.
 - d. Changes in activity durations in workdays.
 - e. Changes in the critical path.
 - f. Changes in total float or slack time.
 - g. Changes in Contract Time.

3.2 REPORTS

- A. Daily Construction Reports:
 - 1. Prepare a daily construction report recording information concerning events at the site and submit each month to Architect:
 - a. List of subcontractors at the Project site.
 - b. List of separate contractors at the Project site.
 - c. Approximate count of personnel at the Project site.
 - d. Rental equipment at the Project site.
 - e. Material deliveries.
 - f. High and low temperatures and general weather conditions, including presence of rain or snow.
 - g. Accidents.
 - h. Meetings and significant decisions.
 - i. Unusual events (see special reports).
 - j. Stoppages, delays, shortages, and losses.
 - k. Meter readings and similar recordings.
 - l. Emergency procedures.
 - m. Orders and requests of AHJ.
 - n. Change Orders received and implemented.
 - o. Construction Change Directives received and implemented.
 - p. Services connected and disconnected.
 - q. Equipment or system tests and startups.
 - r. Partial completions and occupancies.
 - s. Substantial Completions authorized.
- B. Material Location Reports:
 - 1. At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from the Project site. Indicate the following categories for stored materials:
 - a. Material stored prior to previous report and remaining in storage.
 - b. Material stored prior to previous report and since removed from storage and installed.
 - c. Material stored following previous report and remaining in storage.

- C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report and contact Architect's field representative. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents to Architect's field representative.
- D. Special Reports:
 - 1. Submit special reports directly to Owner within 24 hours of an occurrence. Distribute copies of report to parties affected by the occurrence:
 - a. Reporting unusual events: When an event of an unusual and significant nature occurs at site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, and response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner and Architect in advance when these events are known or predictable.

3.3 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating:
 - 1. At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule with a pencil copy of pay application:
 - a. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 - b. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 - c. As the Work progresses, indicate final completion percentage for each activity.
- B. Distribution:
 - 1. Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and interested parties identified by Contractor with a need-to-know schedule responsibility:
 - a. Post copies in Project meeting rooms and temporary field offices.
 - b. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION

SECTION 01 33 00 SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Requirements for the submittal schedule and administrative and procedural requirements for submitting shop drawings, product data, samples, and other submittals.
- B. Related Section:
 - 1. Section 01 25 00: Substitution Procedures and Form.

1.3 DEFINITIONS

- A. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- B. Portable Document Format (PDF): An open standard file format used for representing documents in a device and display resolution independent fixed layout document format.
- C. Submittals: Written and graphic information and physical samples that require Architect's responsive action or are for information and do not require Architect's action.

1.4 SUBMITTALS

- A. Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections:
 - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's Construction Schedule.
 - 2. Initial submittal: Submit concurrently with construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - 3. Final submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files:
 - 1. Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals:

- a. Upon request, Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing shop drawings and Project record drawings:
 - 1) Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - 2) Digital drawing software program: The Contract Drawings are available in Revit.
 - 3) Contractor shall execute a data licensing agreement in a form as approved by the Architect similar to that of AIA Document C106, Digital Data Licensing Agreement.
 - 4) The following digital data files will be furnished for each appropriate discipline:
 - a) Floor plans.
 - b) Reflected ceiling plans.
- B. Coordination:
 1. Coordinate preparation and processing of submittals with performance of construction activities:
 - a. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - b. Submit submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - c. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - d. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination:
 - 1) Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time:
 1. Allow time for submittal review, including time for resubmittals. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals:
 - a. Initial review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 - b. Intermediate review: If intermediate submittal is necessary, process in same manner as initial submittal.
 - c. Resubmittal review: Allow 15 days for review of each resubmittal.
 - d. Sequential review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
 - e. Concurrent consultant review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
- D. Electronic Submittals:
 1. Identify and incorporate information in each electronic submittal file:
 - a. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with bookmarked and hyperlinks enabling navigation to each item.
 - b. Name file with submittal number or other unique identifier, including revision

identifier:

- 1) File name shall use Project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., SLOHSM-06 10 00.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., SLOHSM-06 10 00.01.A).
- c. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
- d. Transmittal form for electronic submittals:
 - 1) Use software generated form from electronic project management software acceptable to Owner, containing the following information:
 - a) Project name.
 - b) Date.
 - c) Name and address of Architect.
 - d) Name of Construction Manager.
 - e) Name of Contractor.
 - f) Name of firm or entity that prepared submittal.
 - g) Names of Subcontractor, manufacturer, and supplier.
 - h) Category and type of submittal.
 - i) Submittal purpose and description.
 - j) Specification Section number and title.
 - k) Specification paragraph number or Drawing designation and generic name for each of multiple items.
 - l) Drawing number and detail references, as appropriate.
 - m) Location(s) where product is to be installed, as appropriate.
 - n) Related physical samples submitted directly.
 - o) Indication of full or partial submittal.
 - p) Transmittal number, numbered consecutively.
 - q) Submittal and transmittal distribution record.
 - r) Other necessary identification.
 - s) Remarks.
- e. Metadata:
 - 1) Include the following information as keywords in the electronic submittal file metadata:
 - a) Project name.
 - b) Number and title of appropriate Specification Section.
 - c) Manufacturer name.
 - d) Product name.
- E. Options: Identify options requiring selection by Architect.
- F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- G. Resubmittals:
 1. Make resubmittals in same form and number of copies as initial submittal:
 - a. Note date and content of previous submittal.
 - b. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - c. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for

- performance of construction activities. Show distribution on transmittal forms.
- I. Use for Construction: Retain complete copies of submittals on the Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. Submittal Procedure Requirements:
 1. Prepare and submit submittals required by individual Specification Sections:
 - a. Submit electronic submittals via email as PDF electronic files:
 - 1) Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - b. Submittals: Submit three (3) paper copies of each submittal unless otherwise indicated. Architect will return two (2) copies.
 - c. Certificates and certifications submittals:
 - 1) Provide statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity:
 - a) Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
 - b) Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data:
 1. Collect information into a single submittal for each element of construction and type of product or equipment:
 - a. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as shop drawings, not as product data.
 - b. Mark each copy of each submittal to show which products and options are applicable.
 - c. Include the following information, as applicable:
 - 1) Manufacturer's catalog cuts.
 - 2) Manufacturer's product specifications.
 - 3) Standard color charts.
 - 4) Statement of compliance with specified referenced standards.
 - 5) Testing by recognized testing agency.
 - 6) Application of testing agency labels and seals.
 - 7) Notation of coordination requirements.
 - 8) Availability and delivery time information.
 - d. For equipment, include the following in addition to the above, as applicable:
 - 1) Wiring diagrams showing factory installed wiring.
 - 2) Printed performance curves.
 - 3) Operational range diagrams.
 - 4) Clearances required to other construction, if not indicated on accompanying shop drawings.
 - e. Submit product data before or concurrent with samples.
 - f. Submit product data in PDF electronic file.
- C. Shop Drawings:
 1. Prepare Project specific information, drawn accurately to scale. Do not base shop drawings on reproductions of the Contract Documents or standard printed data:
 - a. Preparation:
 - 1) Fully illustrate requirements in the Contract Documents. Include the following

information, as applicable:

- a) Identification of products.
 - b) Schedules.
 - c) Compliance with specified standards.
 - d) Notation of coordination requirements.
 - e) Notation of dimensions established by field measurement.
 - f) Relationship and attachment to adjoining construction clearly indicated.
 - g) Seal and signature of professional Engineer if specified.
- b. Sheet size: Except for templates, patterns, and similar full-size drawings, submit shop drawings on sheets size indicated in Specification Section.
 - c. Submit shop drawings in PDF electronic file.

D. Samples:

1. Submit samples for review of kind, color, pattern, and texture for a check of characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed:
 - a. Transmit samples that contain multiple related components, such as accessories, together in one submittal package.
 - b. Identification:
 - 1) Attach label on unexposed side of samples that includes the following:
 - a) Generic description of sample.
 - b) Product name and name of manufacturer.
 - c) Sample source.
 - d) Number and title of applicable Specification Section.
 - e) Specification paragraph number and generic name of each item.
 - c. For projects where electronic submittals are required, provide corresponding electronic submittal of sample transmittal, digital image file illustrating sample characteristics, and identification information for record:
 - 1) Disposition: Maintain sets of approved samples at the Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - 2) Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such samples must be in an undamaged condition at time of use.
 - 3) Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 - d. Submit full size units or samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following:
 - 1) Partial sections of manufactured or fabricated components.
 - 2) Small cuts or containers of materials.
 - 3) Complete units of repetitively used materials.
 - 4) Swatches showing color, texture, and pattern.
 - 5) Color range sets.
 - 6) Components used for independent testing and inspection:
 - a) Number of samples - Submit three (3) sets of samples. Architect will retain two (2) sample sets; remainder will be returned:
 - i. Submit a single sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - ii. If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a sample, submit at least three (3) sets of paired units that show approximate limits of variations.

- E. Product Schedule:
 - 1. As required in individual Specification Section, prepare a written summary indicating types of products required for the Work and their intended locations. Include the following information in tabular form:
 - a. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 - b. Manufacturer, product name, and model number if applicable.
 - c. Number and name of room or space.
 - d. Location within room or space.
 - e. Submit product schedule in PDF electronic file.
- F. Coordination Drawing Submittals: Comply with requirements specified in Section 01 31 00: Project Management and Coordination.
- G. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 29 00: Payment Procedures.
- H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 45 23: Testing and Inspecting Services.
- I. Closeout Submittals required for Substantial Completion: Comply with requirements specified in Section 01 77 00: Closeout Procedures.
- J. Maintenance Data: Comply with requirements specified in Section 01 78 23: Operation and Maintenance Data.
- K. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- L. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- M. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that the installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- N. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- O. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- P. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- Q. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- R. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on

evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

- S. Research Reports:
 - 1. Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with the building code in effect for the Project. Include the following information:
 - a. Name of evaluation organization.
 - b. Date of evaluation.
 - c. Time period when report is in effect.
 - d. Product and manufacturers' names.
 - e. Description of product.
 - f. Test procedures and results.
 - g. Limitations of use.
- T. Pre-Construction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product for compliance with performance requirements in the Contract Documents.
- U. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- V. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location for compliance with requirements in the Contract Documents.
- W. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED DESIGN SERVICES

- A. Performance and Design Criteria:
 - 1. Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated:
 - a. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated Design Services Certification:
 - 1. In addition to shop drawings, product data, and required submittals, submit digitally signed PDF electronic file and three (3) paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional:
 - a. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

- A. Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
 - 1. Reviewed: Indicates the Architect has reviewed the submittal and takes no exceptions as submitted.
 - 2. Furnish as Corrected: Submittal is approved, provided modifications noted are properly incorporated. Resubmission is not usually necessary.
 - 3. Revised and Resubmit: Modifications are required prior to approval. Work cannot proceed until the submittal is revised and resubmitted for further review.
 - 4. Rejected: Work covered by the submittal is not complete or does not conform the contract documents and cannot proceed. A new submittal needs to be made according to the notations and resubmitted for approval prior to fabrication or construction.
- B. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- C. Incomplete submittals are not permitted, will be considered nonresponsive, and will be returned for resubmittal without review.
- D. Submittals not required by the Contract Documents will be returned by Architect without action.

END OF SECTION

SECTION 01 35 46 INDOOR AIR QUALITY PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Construction procedures to promote adequate indoor air quality after construction.
 - 2. Testing indoor air quality after completion of construction.
- B. Related Sections:
 - 1. Section 01 60 00: Product Requirements.
 - 2. Section 23 05 93: Testing, Adjusting, and Balancing for HVAC.
 - 3. Division 23 Sections.
- C. Reference Standards:
 - 1. ASHRAE Std 52.2 – Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.
 - 2. ASHRAE Std 62.1 – Ventilation For Acceptable Indoor Air Quality.
 - 3. ASHRAE Std 129 – Measuring Air-Change Effectiveness.
 - 4. ASTM E779 – Standard Test Method for Determining Air Leakage Rate by Fan Pressurization.
 - 5. SMACNA (OCC) – IAQ Guideline for Occupied Buildings Under Construction.
- D. Project Goals:
 - 1. Dust and airborne particulates:
 - a. Prevent deposition of dust and other particulates in HVAC ducts and equipment:
 - 1) Establish condition of existing ducts and equipment prior to start of alterations.
 - 2) Contractor shall bear the cost of cleaning required due to failure to protect ducts and equipment from construction dust.
 - 2. Airborne contaminants:
 - a. Procedures and products have been specified to minimize indoor air pollutants:
 - 1) Furnish products meeting the Specifications.
 - 2) Avoid construction practices that could result in contamination of installed products leading to indoor air pollution.
- E. Verification: HVAC system has been designed to achieve the minimum requirements for ventilation specified in ASHRAE 62.1, with verification provided by MEP Engineer of Record.

1.3 DEFINITIONS

- A. Adsorptive Materials: Gypsum board, acoustical ceiling tile and panels, carpet and carpet tile, fabrics fibrous insulation, and other similar products.
- B. Contaminants: Gases, vapors, regulated pollutants, airborne mold and mildew, and the like, as specified.

- C. Particulates: Dust, dirt, and other airborne solid matter.
- D. Wet Work: Concrete, plaster, coatings, and other products that emit water vapor or volatile organic compounds during installation, drying, or curing.

1.4 SUBMITTALS

- A. See Section 01 33 00: Submittal Procedures.
- B. Submittals provided by Owner and/or the Commissioning Agent: To be reviewed by Contractor and submitted to Architect for processing.
- C. Indoor Air Quality Management Plan:
 - 1. Describe in detail measures to be taken to promote adequate indoor air quality upon completion; use SMACNA IAQ Guidelines for Occupied Buildings Under Construction as a guide (submit prior to pre-construction meeting):
 - a. Submit not less than 60 days before enclosure of building.
 - b. Identify potential sources of odor and dust.
 - c. Identify construction activities likely to produce odor or dust.
 - d. Identify areas of Project potentially affected, especially occupied areas.
 - e. Evaluate potential problems by severity and describe methods of control.
 - f. Describe construction ventilation to be provided, including type and duration of ventilation, use of permanent HVAC systems, types of filters, and schedule for replacement of filters.
 - g. Describe cleaning and dust control procedures.
 - h. Describe measures to be taken for protection of absorptive materials.
 - i. Outline requirement for filtration for air handling equipment used during construction to use media with a minimum of MERV 8 at each return grill if permanently installed air handlers are used during construction.
- D. Interior Finishes Installation Schedule: Identify each interior finish that either generates odors, moisture, or vapors, or is susceptible to adsorption of odors and vapors, and indicate air handling zone, sequence of application, and curing times.
- E. Duct and Terminal Unit Inspection Report.
- F. Air Contaminant Test Plan:
 - 1. Identify:
 - a. Testing agency qualifications.
 - b. Locations and scheduling of air sampling.
 - c. Test procedures, in detail.
 - d. Test instruments and apparatus.
 - e. Sampling methods.
- G. Air Contaminant Test Reports:
 - 1. Show:
 - a. Location where each sample was taken, and time.
 - b. Test values for each air sample; average the values of each set of three (3).
 - c. HVAC operating conditions.
 - d. Certification of test equipment calibration.
 - e. Other conditions or discrepancies that might have influenced results.
- H. Ventilation Effectiveness Test Plan:
 - 1. Identify:
 - a. Testing agency qualifications.

- b. Description of test spaces, including locations or air sampling.
 - c. Test procedures, in detail; state whether tracer gas decay or step-up will be used.
 - d. Test instruments and apparatus; identify tracer gas to be used.
 - e. Sampling methods.
- I. Ventilation Effectiveness Test Reports:
- 1. Include preliminary tests of instruments, apparatus, and test spaces.
 - 2. Calculation of ventilation effectiveness, E.
 - 3. Location where each sample was taken, and time.
 - 4. Test values for each air sample.
 - 5. HVAC operating conditions.
 - 6. Other information specified in ASHRAE 129.
 - 7. Other conditions or discrepancies that might have influenced results.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Low VOC Materials: See other Sections for specific requirements for materials with low VOC content.
- B. Auxiliary Air Filters: MERV of 8, minimum, when tested in accordance with ASHRAE 52.2.

PART 3 EXECUTION

3.1 CONSTRUCTION PROCEDURES

- A. Prevent the absorption of moisture and humidity by adsorptive materials:
 - 1. Sequence the delivery of such materials so that they are not present in the building until wet work is completed and dry.
 - 2. Deliver and store such materials in fully sealed moisture-impermeable packaging.
 - 3. Provide sufficient ventilation for drying within reasonable time frame.
- B. Begin construction ventilation when building is substantially enclosed.
- C. If extremely dusty or dirty, work must be conducted inside the building:
 - 1. Shut down HVAC systems for the duration.
 - 2. Remove dust and dirt completely before restarting systems.
- D. HVAC equipment and supply air ductwork may be used for ventilation during construction:
 - 1. Operate HVAC system on 100 percent outside air, with 1.5 air changes per hour, minimum.
 - 2. Ensure that air filters are correctly installed prior to starting use:
 - a. Replace filters when they lose efficiency (for corridor HVAC only).
 - 3. Do not use return air ductwork for ventilation.
 - 4. Seal return air inlets or otherwise positively isolate return air system to prevent recirculation of air:
 - a. Provide alternate return air pathways (for corridor HVAC only).
- E. Do not store construction materials or waste in mechanical or electrical rooms.
- F. Prior to use of return air ductwork without intake filters, clean up and remove dust and debris generated by construction activities:
 - 1. Inspect duct intakes, return air grilles, and terminal units for dust.

2. Clean plenum spaces, including top sides of lay-in ceilings, outsides of ducts, tops of pipes, and conduit.
 3. Clean tops of doors and frames.
 4. Clean mechanical and electrical rooms, including tops of pipes, ducts, and conduit, equipment, and supports.
 5. Clean return plenums of air handling units.
 6. Remove intake filters last after cleaning is complete.
- G. Do not perform dusty or dirty work after starting use of return air ducts without intake filters.
- H. Use other relevant recommendations of SMACNA IAQ Guideline for Occupied Buildings Under Construction for avoiding unnecessary contamination due to construction procedures.

END OF SECTION

SECTION 01 40 00 QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated and paid by the District (or refer to Section 01 45 23: Testing and Inspecting Services). These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements:
 - 1. Specific quality assurance and quality control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality assurance and quality control procedures that facilitate compliance with Contract Document requirements.
 - 3. Requirements for Contractor to provide quality assurance and quality control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions.
 - 4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

- A. Experienced: When used with an entity or individual, experienced means having successfully completed a minimum of five (5) years' documented experience with projects similar in nature, size, and extent; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality Control Testing: Tests and inspections performed onsite for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector:
 - 1. Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform particular construction operations, including installation, erection, application, and similar operations:
 - a. Use of trade specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- D. Mockups:
 - 1. Full size physical assemblies that are constructed onsite. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will

be judged:

- a. Laboratory mockups: Full size physical assemblies constructed at testing facility to verify performance characteristics.
 - b. Integrated exterior mockups: Mockups of exterior envelope erected separately from the building but on the Project site, consisting of multiple products, assemblies, and subassemblies.
 - c. Room mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.
- E. Pre-Construction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- F. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- G. Quality Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- H. Quality Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include Contract enforcement activities performed by Architect.
- I. Source Quality Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- J. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two (2) or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 SUBMITTALS

- A. Shop Drawings:
1. Submit Plans, Sections, and elevations, indicating materials and size of mockup construction:
 - a. Indicate manufacturer and model number of individual components.
 - b. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

- B. Contractor's Statement of Responsibility:
 - 1. When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
 - a. Seismic force resisting system, designated seismic system, or component listed in the designated seismic system quality assurance plan prepared by Architect.
 - b. Main wind force resisting system or wind resisting component listed in the wind force resisting system quality assurance plan prepared by Architect.
- C. Schedule of Tests and Inspections:
 - 1. Prepare in tabular form and include the following:
 - a. Specification Section number and title.
 - b. Entity responsible for performing tests and inspections.
 - c. Description of test and inspection.
 - d. Identification of applicable standards.
 - e. Identification of test and inspection methods.
 - f. Number of tests and inspections required.
 - g. Time schedule or time span for tests and inspections.
 - h. Requirements for obtaining samples.
 - i. Unique characteristics of each quality control service.

1.6 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports:
 - 1. Prepare and submit certified written reports specified. Include the following:
 - a. Date of issue.
 - b. Project title and number.
 - c. Name, address, and telephone number of testing agency.
 - d. Dates and locations of samples and tests or inspections.
 - e. Names of individuals making tests and inspections.
 - f. Description of the Work and test and inspection method.
 - g. Identification of product and Specification Section.
 - h. Complete test or inspection data.
 - i. Test and inspection results and an interpretation of test results.
 - j. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - k. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - l. Name and signature of laboratory inspector.
 - m. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports:
 - 1. Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
 - a. Name, address, and telephone number of technical representative making report.
 - b. Statement on condition of substrates and their acceptability for installation of product.
 - c. Statement that products at site comply with requirements.
 - d. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - e. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - f. Statement whether conditions, products, and installation will affect warranty.
 - g. Other required items indicated in individual Specification Sections.
- C. Factory Authorized Service Representative's Reports:

1. Prepare written information documenting manufacturer's factory authorized service representative's tests and inspections specified in other Sections. Include the following:
 - a. Name, address, and telephone number of factory authorized service representative making report.
 - b. Statement that equipment complies with requirements.
 - c. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - d. Statement whether conditions, products, and installation will affect warranty.
 - e. Other required items indicated in individual Specification Sections.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.
- E. Trade Pre-Installation Conferences: Meeting minutes to be Contractor provided.

1.7 QUALITY ASSURANCE

- A. Qualifications establish the minimum qualification levels required; refer to individual Specification Sections for additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated and sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated and with record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State of California and is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated.
- F. Specialists:
 1. Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated:
 - a. Requirements of authorities having jurisdiction supersede requirements for specialists.
- G. Testing Agency Qualifications:
 1. A NRTL, a NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, documented according to ASTM E329; with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities:
 - a. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - b. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

- H. Manufacturer's Technical Representative Qualifications: An authorized representative of the manufacturer who is trained and approved by the manufacturer to observe and inspect installation of the manufacturer's products.
- I. Factory Authorized Service Representative Qualifications: An authorized representative of the manufacturer who is trained and approved by the manufacturer to inspect installation of the manufacturer's products.
- J. Pre-Construction Testing:
 - 1. Where testing agency is indicated to perform pre-construction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - a. Contractor responsibilities include the following:
 - 1) Provide test specimens representative of proposed products and construction.
 - 2) Submit specimens with sufficient time for testing and analyzing results to prevent delaying the Work.
 - 3) Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - 4) Build site assembled test assemblies and mockups using installers who will perform same tasks for the Project.
 - 5) Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - 6) When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on the Project.
 - 2. Testing agency responsibilities: Submit certified written report of each test, inspection, and similar quality assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
- K. Mockups:
 - 1. Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - a. Build mockups in location and of size indicated, or if not indicated, as directed by Architect.
 - b. Notify Architect a minimum of seven (7) days in advance of dates and times when mockups will be constructed.
 - c. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction.
 - d. Demonstrate the proposed range of aesthetic effects and workmanship.
 - e. Obtain Architect's approval of mockups before starting Work, fabrication, or construction. Allow seven (7) days for initial review and each re-review of each mockup.
 - f. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - g. Demolish and remove mockups when directed unless otherwise indicated.
- L. Integrated Exterior Mockups: Mockup of the exterior envelope erected separately from the building but on the Project site, consisting of multiple products, assemblies, and subassemblies. Mockup, if not specifically shown on the Drawings, shall be minimum eight feet by eight feet (8'x8'). Mockup shall include all major façade elements and at least one (1) window a minimum of two feet by two feet (2'x2') in size. Prior to constructing mockup, verify requirements with Architect. Pre-installation conferences for trades involved in integrated exterior mockup shall be held after mockup is completed.

- M. Laboratory Mockups: Comply with requirements of pre-construction testing and those specified in individual Specification Sections.
- N. Trade Pre-Installation Conferences: Meeting minutes to be Contractor provided.

1.8 QUALITY CONTROL

- A. Owner Responsibilities:
 - 1. Where quality control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform the services:
 - a. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - b. Costs for retesting and re-inspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities:
 - 1. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality control activities required to verify that the Work complies with requirements, whether specified or not:
 - a. Unless otherwise indicated, provide quality control services specified and those required by authorities having jurisdiction. Perform quality control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - b. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform the quality control services. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 - c. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 - d. Where quality control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality control service.
 - e. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 - f. Submit additional copies of each written report directly to authorities having jurisdiction when they so direct.
 - g. Provide documentation for construction safety as required by CBC Chapter 33 and CFC Chapter 33. Show representation for construction safeguards through the life of the Project.
- C. Manufacturer's Field Services: Where indicated, engage a factory authorized service representative to inspect field assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00: Submittal Procedures.
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in pre-installation conferences, examination of substrates and conditions, verification of materials, observation of installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Retesting/Re-Inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. Testing Agency Responsibilities:

1. Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections:
 - a. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - b. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 - c. Conduct and interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from requirements.
 - d. Submit a certified written report, in duplicate, of each test, inspection, and similar quality control service through Contractor.
 - e. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 - f. Do not perform any duties of Contractor.
- G. Associated Services:
 1. Cooperate with agencies performing required tests, inspections, and similar quality control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - a. Access to the Work.
 - b. Incidental labor and facilities necessary to facilitate tests and inspections.
 - c. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - d. Facilities for storage and field curing of test samples.
 - e. Delivery of samples to testing agencies.
 - f. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - g. Security and protection for samples and for testing and inspecting equipment at the Project site.
- H. Coordination:
 1. Coordinate sequence of activities to accommodate required quality assurance and quality control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting:
 - a. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections:
 1. Prepare a schedule of tests, inspections, and similar quality control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's Construction Schedule. Update as the Work progresses:
 - a. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.9 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections:
 1. Owner will engage a qualified testing agency or special inspector to conduct special tests and inspections, as required by authorities having jurisdiction, as the responsibility of Owner, and as indicated in individual Specification Sections:
 - a. Verifying that manufacturer maintains detailed fabrication and quality control procedures, and reviews the completeness and adequacy of those procedures to perform the Work.
 - b. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 - c. Submitting a certified written report of each test, inspection, and similar quality

control service to Architect with copy to Contractor and to authorities having jurisdiction.

- d. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
- e. Interpreting tests and inspections and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
- f. Retesting and re-inspecting corrected Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log:
 - 1. Prepare a record of tests and inspections. Include the following:
 - a. Date test or inspection was conducted.
 - b. Description of the Work tested or inspected.
 - c. Date test or inspection results were transmitted to Architect.
 - d. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes:
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 29: Cutting and Patching.
- B. Protect construction exposed by or for quality control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality control services.

END OF SECTION

SECTION 01 42 00 REFERENCES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. General: This Section specifies procedural and administrative requirements for compliance with governing regulations and codes and standards imposed upon the Work. These requirements include the obtaining of permits, licenses, inspections, releases, and similar statements, as well as payments, associated with regulations, codes, and standards.
- B. Governing Regulations:
 - 1. Refer to General and Supplementary Conditions for requirements related to compliance with governing regulations:
 - a. The Division of the State Architect (DSA), State of California provides design and construction oversight for this Project and as such is subject to the rules and regulations.

1.3 DEFINITIONS

- A. Approved: When used to convey Architect's action on Contractor's submittals, applications, and requests, approved is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- B. Basic Contract: Definitions are included in the Conditions of the Contract.
- C. Directed: A command or instruction by Architect. Other terms including requested, authorized, selected, required, and permitted have the same meaning as directed.
- D. Furnish: Supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- E. Indicated: Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including shown, noted, scheduled, and specified have the same meaning as indicated.
- F. Install: Operations at the Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- G. Project Site: Space available for performing construction activities. The extent of the Project site is shown on Drawings and may or may not be identical with the description of the land on which the Project is to be built.
- H. Provide: Furnish and install, complete and ready for the intended use.
- I. Regulations: Includes laws, statutes, ordinances, and lawful orders issued by governing authorities, as well as those rules, conventions, and agreements within the construction industry that effectively control the performance of the Work regardless of whether they are

- lawfully imposed by a governing authority or not.
- J. Testing Agencies: An independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere, to report on and, if required, to interpret results of those inspections or tests.

1.4 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference. Individual Specification Sections indicate which codes and standards Contractor must keep available at the Project site for reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Conflicting Requirements: Where compliance with two (2) or more standards is specified, and where these standards establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced, unless the Contract Documents specifically indicate a less stringent requirement. Refer requirements that are different, but apparently equal, and uncertainties as to which quality level is more stringent to Architect/Engineer for a decision before proceeding.
- D. Minimum Quantities or Quality Levels: In every instance the quantity or quality level shown or specified is intended to be the minimum for the Work to be provided or performed. Unless otherwise indicated, the actual Work may either comply exactly, within specified tolerances, with the minimum quantity or quality specified, or may exceed that minimum within reasonable limits. In complying with these requirements, the indicated numeric values are either minimum or maximum values, as noted, or as appropriate for context of the requirements. Refer instances of uncertainty to Architect/Engineer for decision before proceeding.

1.5 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations - Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the trade association, standards-producing organization, authorities having jurisdiction, or other entity applicable to the context of the text provision:
1. AABC - Associated Air Balance Council; www.aabc.com.
 2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
 3. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
 4. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
 5. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
 6. ACI - American Concrete Institute (formerly ACI International); www.concrete.org.
 7. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
 8. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
 9. AGA - American Gas Association; www.aga.org.
 10. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
 11. AI - Asphalt Institute; www.asphaltinstitute.org.
 12. AIA - American Institute of Architects (The); www.aia.org.
 13. AISC - American Institute of Steel Construction; www.aisc.org.
 14. AISI - American Iron and Steel Institute; www.steel.org.

15. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
16. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
17. ANSI - American National Standards Institute; www.ansi.org.
18. APA - The Engineered Wood Association; www.apawood.org.
19. APA - Architectural Precast Association; www.archprecast.org.
20. API - American Petroleum Institute; www.api.org.
21. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
22. ASCE - American Society of Civil Engineers; www.asce.org.
23. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
24. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
25. ASME - ASME International (American Society of Mechanical Engineers); www.asme.org.
26. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
27. ASSP - American Society of Safety Professionals (The); www.assp.org.
28. ASTM - ASTM International (American Society for Testing and Materials International); www.astm.org.
29. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
30. AWI - Architectural Woodwork Institute; www.awinet.org.
31. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
32. AWWPA - American Wood Protection Association (formerly American Wood-Preservers' Association); www.awpa.com.
33. AWS - American Welding Society; www.aws.org.
34. AWWA - American Water Works Association; www.awwa.org.
35. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
36. BIA - Brick Industry Association (The); www.gobrick.com.
37. BICSI - BICSI, Inc.; www.bicsi.org.
38. BIFMA - BIFMA International (Business and Institutional Furniture Manufacturer's Association); www.bifma.com.
39. BOCA - BOCA (Building Officials and Code Administrators International Inc.); (See ICC).
40. CEA - Consumer Electronics Association; www.ce.org.
41. CFFA - Chemical Fabrics & Film Association, Inc.; www.chemicalfabricsandfilm.com.
42. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
43. CGA - Compressed Gas Association; www.cganet.com.
44. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
45. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
46. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
47. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
48. CPA - Composite Panel Association; www.pbmdf.com.
49. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
50. CRRC - Cool Roof Rating Council; www.coolroofs.org.
51. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
52. CSA - Canadian Standards Association; www.csa.ca.
53. CSA - CSA International (formerly IAS - International Approval Services); www.csa-international.org.
54. CSI - Construction Specifications Institute (The); www.csinet.org.
55. CTI - Cooling Technology Institute (formerly Cooling Tower Institute); www.cti.org.
56. CWC - Composite Wood Council; (See CPA).
57. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
58. DHI - Door and Hardware Institute; www.dhi.org.
59. DSA - Division of the State Architect, State of California.

60. ECA - Electronic Components Association; www.ec-central.org.
61. ECAMA - Electronic Components Assemblies & Materials Association; (See ECA).
62. EIA - Electronic Industries Alliance; (See TIA).
63. EIMA - EIFS Industry Members Association; www.eima.com.
64. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
65. ESD - ESD Association (Electrostatic Discharge Association); www.esda.org.
66. ESTA - Entertainment Services and Technology Association; (See PLASA).
67. EVO - Efficiency Valuation Organization; www.evo-world.org.
68. FM Approvals - FM Approvals LLC; www.fmglobal.com.
69. FM Global - FM Global (formerly FMG - FM Global); www.fmglobal.com.
70. FSC - Forest Stewardship Council U.S.; www.fscus.org.
71. GA - Gypsum Association; www.gypsum.org.
72. GANA - Glass Association of North America; www.glasswebsite.com.
73. GS - Green Seal; www.greenseal.org.
74. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
75. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
76. HPW - H.P. White Laboratory, Inc.; www.hpwhite.com.
77. ICBO - International Conference of Building Officials; (See ICC).
78. ICC - International Code Council; www.iccsafe.org.
79. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
80. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
81. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
82. IEC - International Electrotechnical Commission; www.iec.ch.
83. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
84. IES - Illuminating Engineering Society (formerly Illuminating Engineering Society of North America); www.ies.org.
85. IESNA - Illuminating Engineering Society of North America; (See IES).
86. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
87. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
88. IGSHPA - International Ground Source Heat Pump Association;
www.igshpa.okstate.edu.
89. Intertek - Intertek Group (formerly ETL SEMCO; Intertek Testing Service NA);
www.intertek.com.
90. ISA - International Society of Automation (The) (formerly Instrumentation, Systems,
and Automation Society); www.isa.org.
91. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
92. ISFA - International Surface Fabricators Association (formerly International Solid
Surface Fabricators Association); www.isfanow.org.
93. ISO - International Organization for Standardization; www.iso.org.
94. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
95. ITU - International Telecommunication Union; www.itu.int/home.
96. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
97. LMA - Laminating Materials Association; (See CPA).
98. LPI - Lightning Protection Institute; www.lightning.org.
99. MBMA - Metal Building Manufacturers Association; www.mbma.com.
100. MCA - Metal Construction Association; www.metalconstruction.org.
101. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
102. MHIA - Material Handling Industry of America; www.mhia.org.
103. MIA - Marble Institute of America; www.marble-institute.com.
104. MMPA - Moulding & Millwork Producers Association (formerly Wood Moulding &
Millwork Producers Association); www.wmmpa.com.
105. MPI - Master Painters Institute; www.paintinfo.com.
106. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry
Inc.; www.mss-hq.org.
107. NAAMM - National Association of Architectural Metal Manufacturers;
www.naamm.org.

108. NACE - NACE International (National Association of Corrosion Engineers International); www.nace.org.
109. NADCA - National Air Duct Cleaners Association; www.nadca.com.
110. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
111. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
112. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
113. NCMA - National Concrete Masonry Association; www.ncma.org.
114. NEBB - National Environmental Balancing Bureau; www.nebb.org.
115. NECA - National Electrical Contractors Association; www.necanet.org.
116. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
117. NEMA - National Electrical Manufacturers Association; www.nema.org.
118. NETA - InterNational Electrical Testing Association; www.netaworld.org.
119. NFHS - National Federation of State High School Associations; www.nfhs.org.
120. NFPA - NFPA (National Fire Protection Association); www.nfpa.org.
121. NFPA - NFPA International; (See NFPA).
122. NFRC - National Fenestration Rating Council; www.nfrc.org.
123. NHLA - National Hardwood Lumber Association; www.nhla.com.
124. NLGA - National Lumber Grades Authority; www.nlga.org.
125. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
126. NRCA - National Roofing Contractors Association; www.nrca.net.
127. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
128. NSF - NSF International (National Sanitation Foundation International); www.nsf.org.
129. NSPE - National Society of Professional Engineers; www.nspe.org.
130. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
131. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
132. NWFA - National Wood Flooring Association; www.nwfa.org.
133. PDI - Plumbing & Drainage Institute; www.pdionline.org.
134. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
135. RFCI - Resilient Floor Covering Institute; www.rfci.com.
136. RIS - Redwood Inspection Service; www.redwoodinspection.com.
137. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
138. SDI - Steel Deck Institute; www.sdi.org.
139. SDI - Steel Door Institute; www.steeldoor.org.
140. SEFA - Scientific Equipment and Furniture Association; www.sefalabs.com.
141. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
142. SIA - Security Industry Association; www.siaonline.org.
143. SJI - Steel Joist Institute; www.steeljoist.org.
144. SMA - Screen Manufacturers Association; www.smainfo.org.
145. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
146. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
147. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
148. SPIB - Southern Pine Inspection Bureau; www.spib.org.
149. SPRI - Single Ply Roofing Industry; www.spri.org.
150. SRCC - Solar Rating and Certification Corporation; www.solar-rating.org.
151. SSINA - Specialty Steel Industry of North America; www.ssina.com.
152. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
153. STI - Steel Tank Institute; www.steeltank.com.
154. SWI - Steel Window Institute; www.steelwindows.com.
155. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
156. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
157. TCNA - Tile Council of North America, Inc. (formerly Tile Council of America); www.tileusa.com.

158. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
 159. TIA - Telecommunications Industry Association (formerly TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
 160. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
 161. TMS - The Masonry Society; www.masonrysociety.org.
 162. TPI - Truss Plate Institute; www.tpinst.org.
 163. TPI - Turfgrass Producers International; www.turfgrasssod.org.
 164. TRI - Tile Roofing Institute; www.tilerroofing.org.
 165. UBC - Uniform Building Code; (See ICC).
 166. UL - Underwriters Laboratories Inc.; www.ul.com.
 167. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
 168. USAV - USA Volleyball; www.usavolleyball.org.
 169. USGBC - U.S. Green Building Council; www.usgbc.org.
 170. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
 171. WASTEC - Waste Equipment Technology Association; www.wastec.org.
 172. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
 173. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
 174. WDMA - Window & Door Manufacturers Association; www.wdma.com.
 175. WI - Woodwork Institute (formerly WIC - Woodwork Institute of California); www.wicnet.org.
 176. WMMPA - Wood Moulding & Millwork Producers Association; (See MMPA).
 177. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
 178. WPA - Western Wood Products Association; www.wwpa.org.
- B. Standards and Regulations - Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations:
1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
 2. FED-STD - Federal Standard; (See FS).
 3. USAB - United States Access Board; www.access-board.gov.
 4. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).
- C. Code Agencies - Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the Agency:
1. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
 2. ICC - International Code Council; www.iccsafe.org.
 3. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.
- D. State Government Agencies - Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents:
1. CBHF - State of California; Department of Consumer Affairs; Bureau of Electronic Appliance and Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
 2. CCR - California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
 3. CDHS - California Department of Health Services; (See CDPH).
 4. CDPH - California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
 5. CPUC - California Public Utilities Commission; www.cpuc.ca.gov.
 6. CBC – California Building Code (2019 Edition).

7. CEC – California Electrical Code (2019 Edition).
8. CMC – California Mechanical Code (2019 Edition).
9. CFC – California Fire Code (2019 Edition).

1.6 SUBMITTALS

- A. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 45 23 TESTING AND INSPECTING SERVICES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements and qualifications including but not limited to:
 - 1. Professional testing and laboratory services.
 - 2. Accessories necessary for the completion of testing and laboratory services.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements:
 - 1. Specific quality assurance and quality control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality assurance and quality control procedures that facilitate compliance with Contract Document requirements.
 - 3. Requirements for Contractor to provide quality assurance and quality control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions.
 - 4. Specific test and inspection requirements are not specified in this Section.
- C. A DSA approved Qualified Independent Testing Laboratory and/or Geotechnical Engineering Service Selected and Paid by Owner:
 - 1. Owner will pay for the initial laboratory services of materials that comply with the requirements of the Contract Documents. Contractor shall bear the burden of testing and retesting of materials that do not comply with the requirements of the Contract Documents.
- D. Inspecting agency shall perform inspections and tests in accordance with the rules and regulations of the building code, local authorities, specifications of ASTM, and the Contract Documents.
- E. Materials and workmanship found not in compliance with required standards or performance obligations shall be removed and replaced. Replacement and subsequent testing shall be at Contractor's expense.
- F. Where terms "Inspector" and "Laboratory" are used, it is meant and in reference to an officially designated and accredited inspector of the testing laboratory or geotechnical service engaged by Owner.
- G. Laboratory inspections shall not relieve Contractor or fabricator of his responsibility to furnish materials and workmanship in accordance with the Contract Documents.
- H. Contractor or fabricator shall cooperate with the testing laboratory in matters pertaining to the Work.

- I. Contractor to address deficiency and failed reports.

1.3 SUBMITTALS

- A. Schedule of Tests and Inspections:
 - 1. Prepare a schedule of tests, inspections, and similar quality control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's Construction Schedule. Update as the Work progresses:
 - a. Prepare in tabular form and include the following:
 - 1) Specification Section number and title.
 - 2) Entity responsible for performing test and inspection.
 - 3) Description of test and inspection.
 - 4) Identification of applicable standards.
 - 5) Identification of test and inspection methods.
 - 6) Number of tests and inspections required.
 - 7) Time schedule or time span for tests and inspections.
 - 8) Requirements for obtaining samples.
 - 9) Unique characteristics of each quality control service.
- B. Test and Inspection Reports:
 - 1. Prepare and submit certified written reports specified. Include the following:
 - a. Date of issue.
 - b. Project title and number.
 - c. Name, address, and telephone number of testing agency.
 - d. Dates and locations of samples and tests or inspections.
 - e. Names of individuals making tests and inspections.
 - f. Description of the Work and test and inspection method.
 - g. Identification of product and Specification Section.
 - h. Complete test or inspection data.
 - i. Test and inspection results and an interpretation of test results.
 - j. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - k. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - l. Name and signature of laboratory inspector.
 - m. Recommendations on retesting and re-inspecting.
- C. Submit copies of reports of each inspection and test:
 - 1. Owner, program or project manager, Architect, and each engineer or outside consultants regarding their particular phase of the Project: One (1) copy each.
 - 2. Construction Manager (CM) and Contractor: Two (2) copies each.
- D. In addition to furnishing a written report, notify the CM and Contractor verbally of uncorrected conditions or failures to comply with requirements of the Contract Documents, and immediately fax and email corresponding report to Architect and the engineer.
- E. At completion of each trade or branch of Work requiring inspecting and testing, submit a final certificate attesting to satisfactory completion of Work.
- F. Report full compliance with requirements of the Contract Documents.
- G. Submit copies of test results sealed by a registered engineer to municipal authorities having jurisdiction, as required.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications:
 - 1. The 2022 California Administrative Code (Title 24, Part 1) describes the general administrative requirements for the Project under the jurisdiction of the Division of the State Architect (DSA). These provisions require that a structural test for construction projects under DSA jurisdiction be performed by testing laboratories acceptable to DSA. DSA administers the Laboratory Evaluation and Acceptance Program to evaluate laboratories for structural testing and special inspection services. A NRTL, a NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, documented according to ASTM E329 and ASTM E534, and with additional qualifications specified in individual Sections:
 - a. NRTL: A Nationally Recognized Testing Laboratory according to 29 CFR 1910.7.
 - b. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
 - c. Laboratory Evaluation and Acceptance program to evaluate laboratories acceptable to DSA.
 - d. Testing agencies shall be insured against errors and omissions by a professional liability insurance policy having a minimum limit of liability of \$500,000.00.
- B. Inspection and testing services for the testing agency shall be under the direction of a California Registered Engineer, charged with engineering managerial responsibility, and having a minimum of five (5) years' engineering experience in inspection and testing of construction materials.
- C. Concrete Inspectors: Inspecting personnel monitoring concrete work shall be ACI certified inspectors.
- D. Structural Steel:
 - 1. Primary inspectors performing structural steel inspection shall be currently certified AWS Certified Welding Inspectors (CWI), in accordance with the provisions of AWS QCI, *Standard and Guide for Qualification and Certification of Welding Inspectors*:
 - a. Inspector may be supported by assistant inspectors who perform specific inspection functions under the direct supervision of the primary inspector. Assistant inspectors shall be currently certified AWS Certified Associate Welding Inspectors (CAWI). Work of assistant inspectors shall be monitored daily by the inspector.
- E. Testing Equipment: Equipment shall be calibrated at intervals not exceeding 12 months by devices of accuracy traceable to the National Bureau of Standards.
- F. Referenced Standards: Latest adopted edition of standards referenced apply to the Work. In the event of conflict between the Contract Documents and referenced standards, the Contract Documents shall govern. In case of conflict between Contract Documents and the California Building Code, the more stringent shall govern.
- G. Owner Responsibilities:
 - 1. Where quality control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform the services:
 - a. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - b. Costs for retesting and re-inspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- H. Contractor Responsibilities:
 - 1. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality control activities required to verify that the Work complies

with requirements, whether specified or not:

- a. Refer to individual Specification Sections for specific requirements.
- b. Unless otherwise indicated, provide quality control services specified and those required by authorities having jurisdiction. Perform quality control services required of Contractor by authorities having jurisdiction, whether specified or not.
- c. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform the quality control services. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
- d. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
- e. Where quality control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality control service.
- f. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
- g. Submit additional copies of each written report directly to authorities having jurisdiction when they so direct.
- h. Associated responsibilities and services - Cooperate with agencies performing required tests, inspections, and similar quality control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel:
 - 1) Provide the following:
 - a) Provide access to the Work.
 - b) Deliver of samples to testing laboratory, without cost to Owner, in adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - c) Advise laboratory and Architect sufficiently in advance of construction operations to allow laboratory to complete required inspections or tests and to assign personnel for field inspection and testing as specified.
 - d) Provide facilities for storage and curing of concrete test samples on site for the first 24 hours and for subsequent field curing required by ASTM C31.
 - e) Incidental labor, facilities, and equipment necessary to assist laboratory personnel in obtaining and handling samples at the site.
 - f) Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - g) Provide concrete mix designs in accordance with ACI 301 made by an independent testing laboratory or qualified concrete supplier. Where mix designs by an independent testing laboratory are required, select and pay for laboratory.
 - h) Obtain required inspections or approvals of the building official. Inspection requests and notifications required by building code are responsibility of Contractor.
 - i) Provide current welder certificates for each welder employed.
 - j) Provide fabrication and erection inspection and testing of welds in accordance with AWS D1.1, Chapter 6.
 - k) Use prequalification of welding procedures in executing the Work.
 - l) Security and protection for samples and for testing and inspecting equipment at the Project site.
 - i. Retesting/re-inspecting: Regardless of payment responsibility of the original tests or inspections, provide quality control services, including retesting and re-inspecting, for construction that replaced Work failing to comply with the Contract Documents, code requirements, or what is required from DSA.

I. Testing Agency Responsibilities:

1. Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections:

TESTING AND INSPECTING SERVICES

- a. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - b. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 - c. Conduct and interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from requirements.
 - d. Submit a certified written report, in duplicate, of each test, inspection, and similar quality control service through Contractor.
 - e. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 - f. Do not perform any duties of Contractor.
- J. Authority and Duties of Laboratory Personnel:
1. A representative of the testing laboratory, who has reviewed and is familiar with the Project and Specifications, shall participate in pre-construction conferences. The representative shall coordinate material testing and inspection requirements with Contractor and its subcontractors consistent with the planned construction schedule. The laboratory representative shall attend conferences required or requested to address quality control issues.
 2. Laboratory personnel shall inspect and test materials, assemblies, specimens, and Work performed, including design mixes, methods and techniques, and report the progress to Architect.
 3. If material or Work fails to meet requirements of the Contract Documents, the laboratory inspector shall notify the CM, Architect, engineers, supplier, or Subcontractor providing or preparing the materials or Work being tested of such failure.
 4. Laboratory personnel shall not perform the work of Contractor or act as foremen or superintendents. Work will be inspected as it progresses, but failure to detect defective Work or materials shall not prevent later rejection when a defect is discovered.
 5. Laboratory personnel are not authorized to revoke, alter, relax, enlarge, or release the requirements of the Contract Documents or approve or accept portions of Work, except where approval is specifically specified in the Specifications.
 6. Comply with building code requirements for special inspections.
- K. Testing Laboratory Guidelines and Procedures:
1. Technicians scheduled to perform specific testing services must be qualified to review and perform other services that overlap, i.e. earthwork, foundation inspections, rebar inspection, and concrete when scheduled concurrently at the site.
 2. Technician time for services performed will be reimbursed at a regular time rate. Compensation at the overtime rate will be considered for hours over eight (8) hours spent at the site on a single day, field testing services performed on a Saturday or Sunday, and field services performed on a recognized holiday.
 3. There shall be a three (3) hour minimum for each scheduled testing service. Vehicle charges will be included on a \$25.00 per trip basis.
 4. Cylinder pick up will be controlled by the technician performing test on a scheduled pick up day. If there are no testing services scheduled, the cylinder pick up fee is \$40.00 on week days and \$50.00 on weekends and holidays with no technician or vehicle charge.
 5. Contractor shall bear the responsibility of scheduling the testing services. Contractor and the testing laboratory shall assume full responsibility to coordinate the testing services. Cancellations or failed test shall be reimbursable to the Owner by the responsible party for the cancellations or failure of a test or service.
- L. Coordination:
1. Coordinate sequence of activities to accommodate required quality assurance and quality control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting:

- a. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log:
 1. Prepare a record of tests and inspections. Include the following:
 - a. Date test or inspection was conducted.
 - b. Description of the Work tested or inspected.
 - c. Date test or inspection results were transmitted to Architect.
 - d. Identification of testing agency or special inspector conducting test or inspection.
 - e. Deficiency log.
- B. Maintain log at site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 TESTING AND INSPECTION SERVICES

- A. Testing services shall include, but not be limited to those specified below or which are necessary or required during course of construction to ascertain Specification compliance and which may be deemed necessary by Architect, the engineer, or Owner to ensure the quality of the Work.
- B. Owner reserves the right to add to or delete any or all inspection and testing specified, excluding testing required by the applicable building codes.
- C. If conflicts arise between Drawings and Specifications, notify Architect immediately. The most stringent requirements shall dictate procedure.

3.3 TESTING OF EARTHWORK

- A. Testing Services (as specified or required):
 1. References (as applicable for tests required):
 - a. American Society for Testing and Materials (ASTM):
 - 1) D698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft³ (600 kN-m/m³).
 - 2) D2922 - Standard Test Method for Density of Soil and Soil-Aggregate In Place By Nuclear Methods (Shallow Depth).
 - 3) D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 - b. American Association of State Highway and Transportation Officials (AASHTO):
 - 1) T89 - Determining the Liquid Limit of Soils.
 - 2) T90 - Determining the Plastic Limit and Plasticity Index of Soils.
 - 3) T99 - Moisture-Density Relations of Soils Using a 2.5 kg (5.5 lb) Rammer and a 305-mm (12-in) Drop.
 - 4) T238 - Density of Soil and Soil Aggregates In Place By Nuclear Methods (Shallow Depth).
 2. Perform sieve analysis to develop grain size distribution curves for materials to be used for subgrade, fill under slab on grade, and backfills.
 3. Establish the moisture density relation of soils to be used as fill using the method best suited to the type of fill material.

4. Determine moisture content of all fill materials before placement and advise Contractor when it is or is not suitable to achieve required compaction.
5. Determine Liquid Limit in accordance with ASTM D4318 or AASHTO T89, Plastic Limit in accordance with ASTM D4318, and Plasticity Index in accordance with ASTM D4318 of all fill material,
6. Perform one (1) in place density test for each 2,500 square feet (280 square yards) of existing subgrade material.
7. Perform Moisture-Density curve in accordance with ASTM D698 or AASHTO T99 for one type of fill material. If the original choice of material does not meet the Specifications, Contractor shall pay for additional testing.
8. Perform in place density tests of each lift of compacted fill at locations adequate to evaluate the degree of compaction of all fill areas. Conduct one test for each 2,500 square feet (280 square yards) of each lift of compacted fill.
9. Perform testing at a frequency of one (1) in-place density and moisture test for each 75 lineal feet or less of utility trench, with a minimum of three (3) tests per lift

B. Reports:

1. Submit reports with the following information:
 - a. Type and condition of soil at footing bottoms.
 - b. Level of water table in the excavated areas.
 - c. Grain size distribution of fill materials (average of three [3] tests).
 - d. Moisture density test results.
 - e. In place density test results with moisture content and relative density of each layer of compacted fill. Include with in place density test results, a plan showing location of each test.
 - f. Notify Architect by telephone within one (1) hour of the discovery of the following conditions and follow up telephone notification with written report:
 - 1) Materials used or degree of soil compaction not meeting specified requirements.
 - 2) Frost and freeze protection requirements for excavation bottoms not being complied with.
 - 3) Water in excavations not being removed prior to Work being performed in excavation.

3.4 INSPECTION OF PIPED SITE UTILITIES

- A. Laboratory representative shall observe and report on the following:
1. Proper alignment and grade of trenches.
 2. Pipe bedding and supports.
 3. Pipe, joints, jointing material, and thrust blocks prior to installation of pipe.
 4. Installation of pipe and joints.
 5. Testing of piped utilities performed by Contractor.

3.5 PAVING

- A. Testing Services:
1. Perform field tests for moisture density properties:
 - a. Provide field testing of the subgrade as specified.
 - b. Paving sub-base: Provide one (1) field test for every 5,000 square feet of area of crushed limestone or caliche sub-base.
 - c. Lime treated subgrade: Provide one (1) field test for every 5,000 square feet of area of lime treated subgrade for content of lime and subgrade compaction.
 - d. Cement soil stabilization: Provide one (1) field test for every 5,000 square feet of area of cement stabilized subgrade for content of cement and subgrade compaction.

3.6 PIER DRILLING OPERATION

- A. A representative of a qualified geotechnical laboratory shall provide services specified.
- B. Laboratory representative shall make continuous inspections to determine that proper bearing stratum is obtained and utilized for bearing and that shafts are properly clean and dry before placing concrete.
- C. Laboratory shall furnish complete pier log showing the diameter, top and bottom elevations of each pier, casing required or not required, actual penetration into bearing stratum, elevation of top of bearing stratum, volume of concrete used, and deviations from specified tolerances.
- D. Laboratory representative shall make continuous inspections of drilled pier construction to check the following:
 - 1. Verify soundness of bearing stratum and desired penetration.
 - 2. Verify pier dimensions and reinforcing used.
 - 3. Monitor condition of hole and removal of water and loose material from bottom.
 - 4. Monitor placement of concrete and use of tremie or pumps.
 - 5. Monitor the extraction of casing, if used.
- E. Request probe holes when deemed necessary to confirm safe bearing capacity.

3.7 CONCRETE REINFORCING STEEL AND EMBEDDED METAL ASSEMBLIES

- A. Inspect concrete reinforcing steel prior to placing concrete for compliance with Contract Documents and approved shop drawings. Noncompliance with Contract Documents and approved shop drawings shall be immediately brought to the attention of Contractor for correction and, if left uncorrected, reported to Architect.
- B. Laboratory representative shall observe and report on the following:
 - 1. Number and size of bars.
 - 2. Bending and lengths of bars.
 - 3. Splicing.
 - 4. Clearance to forms, including chair heights.
 - 5. Clearance to sides and bottom of trench if soil formed.
 - 6. Clearance between bars or spacing.
 - 7. Rust, form oil, and other contamination.
 - 8. Grade of steel.
 - 9. Securing, tying, and chairing of bars.
 - 10. Excessive congestion of reinforcing steel.
 - 11. Installation of anchor bolts and placement of concrete around such bolts.
 - 12. Fabrication and installation of embedded metal assemblies, including visual inspection of all welds.
 - 13. Visually inspect studs and deformed bar anchors on embedded assemblies for compliance with Contract Documents. Check number, spacing, and weld quality. If, after welding, visual inspection reveals that a sound weld or a full 360-degree fillet has not been obtained for a particular stud or bar, such stud or bar shall be struck with a hammer and bent 15 degrees off perpendicular and then bent back into position. Anchors failing this test shall be replaced.
- C. Provide a qualified, experienced inspector to inspect reinforcing steel. Inspector shall have a minimum of three (3) years of experience inspecting reinforcing steel in projects of similar size.

3.8 CONCRETE INSPECTION AND TESTING

- A. Receive and evaluate proposed concrete mix designs submitted by Contractor. If mix designs comply with Drawings and Specifications, the laboratory shall submit a letter to the Architect certifying compliance. Mix designs not complying with Drawings and Specifications shall be returned by the laboratory as being unacceptable. Check the proposed mixes for proportions, water cement ratio, and slump in accordance with ACI 613 and 318.
- B. Comply with ACI 311 *Guide For Concrete Inspection* and ACI *Manual of Concrete Inspection*.
- C. Sample and test concrete placed at the site in accordance with ASTM C172. Each sample shall be obtained from a different batch of concrete on a random basis.
- D. Test concrete:
 - 1. Mold and cure five (5) specimens from each sample:
 - a. For each 50 cubic yards or fraction thereof of structural building concrete.
 - b. For each 100 cubic yards or fraction thereof of nonstructural concrete and site Work paving and sidewalks.
 - c. Laboratory cure two (2) cylinders in accordance with ASTM C192.
 - d. Field cure remaining cylinders in accordance with ASTM C31.
 - 2. Two (2) specimens shall be tested at seven (7) days for information, two (2) shall be tested at 28 days for acceptance.
 - 3. Store one (1) cylinder for testing at 56 days in the event the 28-day strength tests do not meet strength requirements.
- E. Deviations from the requirements of ASTM specifications shall be recorded in the test report. Test concrete specimens in accordance with ASTM C39.
- F. Specimens for pumped concrete shall be taken at the discharge end of pumping equipment.
- G. Supervise curing and protection provided for test specimens in field and transportation from the field to laboratory. Test cylinders shall be stored in the field for 24 hours and then carefully transported to laboratory and cured in accordance with ASTM C31.
- H. Make one (1) strength test (four [4] cylinders) of each mix design of concrete placed in any one (1) day.
- I. Make one (1) slump test for each set of cylinders following procedural requirements of ASTM C143 and ASTM C172. Make additional slump tests whenever consistency of concrete appears to vary. Slump tests corresponding to samples from which strength tests are made shall be reported with strength test results. Other slump tests need not be reported.
- J. Determine total air content of air entrained normal weight concrete sample for each strength test in accordance with ASTM C231.
- K. Determine air content and unit weight of lightweight concrete sample for each strength test in accordance with ASTM C173 and ASTM C567.
- L. Determine temperature of concrete sample for each strength test.
- M. Inspect each batch of concrete and monitor addition of mixing water to assure uniform consistency from truck to truck. Check mixing form mixers before mix begins to set and within time limits set forth in ASTM C94:
 - 1. Monitor addition of water and high range water reducer to concrete at job site and

length of time concrete is allowed to remain in truck during placement.

- N. Testing agency shall furnish and maintain a competent inspector at the mixing plant at the start of each day's mixing. Inspector shall examine concrete materials for compliance with Specifications and approved mix design, weighing and measuring devices, proportioning and mixing of materials, water and cement content of each batch, general operation of the plant, and transportation of concrete to jobsite. Inspector shall verify that the amount of free surface moisture contained in fine and course aggregate has been properly accounted for in the concrete mixing to achieve required consistency and water cement ratio.
- O. Testing laboratory shall monitor addition of water to concrete at the jobsite and the length of time concrete is allowed to remain in the truck before placement. Inspector shall compare mixture with criteria on the approved mix design and report any significant deviation to Architect, Contractor, and concrete supplier. Do not permit addition of water that will exceed maximum water/cement ratio for the mix as given on the approved mix design.
- P. Observe placing of concrete except nonstructural slabs on grade and site Work. Observe and report on placing method, consolidation, cold joints, length of drop, and displacement of reinforcement. Report deficiencies to Contractor immediately for corrective action. Inspections may be reduced to a periodic basis when all procedures have been deemed satisfactory by the laboratory.
- Q. Test reports shall include but not be limited to the following information:
 - 1. Date of concrete placement.
 - 2. Concrete mix identification number or proportion of ingredients.
 - 3. Truck ticket number.
 - 4. Time test was made.
 - 5. Time of batching.
 - 6. Location of each placement.
 - 7. Slump, unit weight, water content (microwave test), and air content of concrete sampled.
 - 8. Date and results of strength test.
- R. Report promptly to Architect all details of reasons for rejection of any and all quantities of concrete. Give all information concerning locations of the concrete pours, quantities, date of pours, and other pertinent facts concerning concrete represented by the specimens.
- S. Testing laboratory shall certify each delivery ticket indicating class of concrete delivered (or placed), amount of water added and time at which cement and aggregate were dispensed into the truck, and time at which concrete was discharged from the truck.
- T. Evaluation and Acceptance:
 - 1. If measured slump or air content of air entrained concrete falls outside specified limits, a check test shall be made immediately on another portion of the same sample. In the event of a second failure, concrete shall be considered to have failed to meet the requirements of the Specifications, and shall not be used in the structure.
 - 2. Strength level of concrete will be considered satisfactory if the averages of sets of three (3) consecutive strength test results are equal to, or exceed, specified strength and no individual test result (average of two [2] cylinders) is below specified strength by more than 500 psi.
 - 3. Completed concrete work will be accepted when requirements of ACI 301 Chapter 18 *Specifications for Structural Concrete for Buildings* have been met.
- U. Concrete Test Reports:
 - 1. Reports shall be made and distributed immediately after respective tests or inspections are made:

- a. Where reports indicate deviations from Contract Documents, they shall also include a determination of the probable cause of deviation and where applicable, a recommendation for corrective action.
- V. Furnish a statistical analysis for each class of concrete placed on the Project in accordance with ACI 214 and ACI 318. Information shall be updated and distributed once a month as directed by the Architect. Information shall include, but not be limited to, the following:
1. Strength tests at seven (7) days.
 2. Strength tests at 28 days of two (2) cylinder averages.
 3. 28-day moving average strength tests of last three (3) test groups.
 4. Standard deviation and coefficient of variation based on 28-day strength tests.
 5. Average strength and number of 28-day tests for most recent month.
 6. Strength test one (1) cylinder at 56 days in the event the 28-day strength tests do not meet strength requirements.
- W. Test Footings (Shafts; Piers; Caissons): Same diameter and type specified for footings, placed in same manner. Accepted test footings may be used in the Work.
- X. Noncompliant Test Reports: Fax test reports indicating noncompliance immediately to each party on the test report distribution list. Copies shall be on different colored paper.
- Y. Inspect application of curing compound and monitor curing conditions to assure compliance with Specification requirements. Report curing deficiencies to Contractor immediately and submit a written report to Architect.

3.9 TESTING OF NONSHRINK GROUT

- A. Make one (1) strength test for all plates grouted and for all grout used in joints between members.
- B. Each test shall consist of four (4) cubes, two (2) tested at seven (7) days and two (2) at 28 days, made and tested in accordance with ASTM C109, with the exception that grout shall be restrained from expansion by a top plate.

3.10 STRUCTURAL STEEL

- A. Inspect structural steel during and after erection for compliance with Contract Documents and shop drawings. Review and report on fabricator's quality control procedures and capabilities.
- B. Field Inspection:
 1. Proper erection of pieces.
 2. Proper touch up painting of shop primed structural steel exposed to view or in crawl space.
 3. Proper installation of bolts.
 4. Plumbness of structure and proper bracing.
 5. Proper field painting.
 6. Initial inspection of welding process and periodically thereafter as necessary.
 7. Visual examination of completed welds.
 8. Ultrasonic testing of penetration field welds.
 9. Installation of field welded shear studs.
 10. Inspect shop fabricated members, upon arrival at the site, for defects incurred during transit and handling.
 11. Measure and record camber of beams upon arrival and before erection for compliance with specified camber. Measure lying flat with web horizontal. Return members outside

specified camber tolerance to shop for correction.

- C. Qualifications of Welders: Fabricator and erector shall provide the testing laboratory with names of welders employed on Work, along with certification that each welder has passed qualification tests within the past 12 months, using procedures covered in AWS D1.1 *Structural Welding Code - Steel*. Verify welder qualifications.
- D. Inspection of Field Welding shall Include:
 - 1. Visually inspect fillet welds for size, soundness, and proper return around ends. Inspect seams, folds, and delaminations.
 - 2. Visually inspect welds for proper repair of painting.
 - 3. Ultrasonically test penetration welds in accordance with ASTM E164.
 - 4. Inspect surfaces to be welded. Note surface preparations, fit up, and cleanliness of surface. Verify electrodes for size, type, and condition.
 - 5. Welding inspector shall be present during alignment and fit up of members being welded, and shall verify for correct surface preparation of root openings, sound weld metal, and proper penetration in the root pass. Where weld has not penetrated completely, inspector shall order the joint to be chipped down to sound metal, or gouged out, and rewelded. Thoroughly inspect root passes for cracks. Gouge out cracks and rewelded to two inches (2") beyond each end of crack.
 - 6. Inspector shall verify that welds have been marked with welder's symbol and shall mark welds requiring repairs and re-inspection. Inspector shall maintain a written record of welds. Work completed and inspected shall receive an identification mark by the inspector. Identify unacceptable material and Work identified by word *reject* or *repair* marked directly on the material.
 - 7. Testing agency shall advise the Owner and Architect of any shop and/or field conditions that may require further tests and examination by means other than those specified. Additional tests and examinations shall be performed as authorized by the Owner and Architect.
 - 8. Owner reserves the right to use ultrasonic or radiographic inspection to verify adequacy of welds. Testing procedures and acceptance criteria shall be as specified in AWS D1.1.
 - 9. Weld quality to comply with the American Institute of Steel Construction (AISC) Manual of Steel Construction.
 - 10. Determine percentage of weld tested by the number of welds that fail the initial testing.
 - 11. Reweld and retest welds that fail until the welds pass. Test two (2) additional welds for every weld failure.
- E. Inspect bolted construction in accordance with AISC *Specification for Structural Steel Buildings*:
 - 1. Visually inspect bolts ensuring that plies have been brought into snug contact.
 - 2. Inspect high strength bolt in accordance with Section 9 of the *Specifications for Structural Joints Using ASTM A325 Bolts*.
- F. Inspect stud welding in accordance with AWS D1.1 *Structural Welding Code*:
 - 1. Weld at least two (2) shear studs at the start of each production period to determine correct generator, control unit, and stud welder setting. The studs shall be capable of being bent 45 degrees from vertical without weld failure.
 - 2. When the temperature is below 32 degrees F, test one (1) stud in each 100 after cooling. Do not weld studs at temperatures below zero (0) degrees F or when surface is wet with rain or snow. If stud fails in the weld, two (2) new studs shall pass the test before resumption of welding.
 - 3. Visually inspect studs for compliance with the requirements of the Contract Documents. Verify number, spacing, and weld quality. If, after welding, visual inspection reveals that a sound weld or a full 360-degree fillet has not been obtained for a particular stud, that stud shall be struck with a hammer and bent 15 degrees off

perpendicular in the direction away from the missing weld. Studs failing test shall be replaced.

3.11 REINFORCING STEEL MECHANICAL SPLICES

- A. Inspection and Observation Services:
 - 1. Visually inspect and report on completed condition of each mechanical splice of reinforcing steel.
 - 2. Visually inspect each mechanical splice to ensure compliance with the ICC-ES Reports and the manufacturer's published criteria for acceptable completed splices.
 - 3. Place special emphasis on the inspection of the end preparation of each bar to be spliced required by the ICC-ES Report.
- B. Reports:
 - 1. Submit reports to Architect:
 - a. Copies of manufacturer's published criteria for acceptable completed splices prior to observing mechanical splices.
 - b. Reports on each mechanical splice shall indicate location of the splice, size of bars spliced, and acceptability or rejection of splice. Indicate reasons for rejection on each report.

3.12 METAL FLOOR DECK

- A. Field inspection shall consist of:
 - 1. Verifying types, gauges, and finishes for compliance with Contract Documents and shop drawings.
 - 2. Examine composite floor deck exposed to crawl space for damage to galvanizing due to welding or construction activities. Repair galvanized composite floor deck in accordance with the Specifications.
 - 3. Examine the erection of metal deck, fastenings, reinforcing of holes, deck reinforcing, miscellaneous deck supports, hanger tabs, shear studs, deck closures, painting, or other coating.
 - 4. Certification of welders.
 - 5. Inspect and test field welded shear studs used to fasten metal floor decking to supporting steel as specified for structural steel.

3.13 METAL ROOF DECK

- A. Field inspection shall consist of:
 - 1. Verify types, gauges, and finishes for compliance with Contract Documents and shop drawings.
 - 2. Examine the erection of the metal deck, including fastenings at supports and side laps, reinforcing of holes, and miscellaneous deck supports.
 - 3. Certification of welders.
 - 4. Visual inspection of at least 25 percent of welds.

3.14 EXPANSION BOLT INSTALLATION

- A. Inspect drilling of each hole and installation of each expansion bolt for compliance with Contract Documents and shop drawings.
- B. Verify installation torque for each expansion bolt for compliance with manufacturer's installation instructions.

3.15 TESTING OF ROOFING

- A. Inspection and Observation Services (As Required):
 - 1. Inspection of roof deck prior to start of Work.
 - 2. Inspect onsite condition of stored roofing materials.
 - 3. Inspection during roofing, roof insulation, and sheet metal Work to ascertain compliance with Contract Documents.
 - 4. Observation of roof test cuts performed by Contractor to ascertain that they are properly made.
 - 5. Observation of patching of roof test cuts to ascertain that they are properly made.
- B. Testing Services (As Required):
 - 1. Perform dissection and analysis on cuts provided by Contractor to confirm number of plies, bonding of plies, weight of bitumen and softening temperature to ascertain compliance with Specifications.

3.16 MASONRY

- A. Inspection and Observation Services:
 - 1. Inspection of placement of reinforcement including condition, grade, size, location, spacing, and lap splices.
 - 2. Review mortar design mixes.
 - 3. Inspection of laying, mortaring, and grouting of concrete masonry units and elements.
- B. Testing Services:
 - 1. References (as applicable for tests required):
 - a. ASTM International (ASTM):
 - 1) C140 - Standard Test Methods of Sampling and Testing Concrete Masonry Units.
 - 2) C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
 - 3) C1019 - Standard Test Method for Sampling and Testing Grout.
 - 2. Testing of Concrete Masonry Units (CMU):
 - a. Pre-construction - Perform the following tests in accordance with ASTM C140:
 - 1) Compressive Strength.
 - 2) Absorption.
 - 3) Weight.
 - 4) Moisture Content.
 - 5) Dimensions.
 - 3. Mortar Tests:
 - a. Pre-construction - Perform the following tests in accordance with ASTM C780 on each type of mortar mix used on the Project:
 - 1) 28-day compressive strength.
 - 2) Water retention.
 - b. Construction: Perform 28-day compressive strength test in accordance with ASTM C780 on each type of mortar mix used on the Project at the rate of one (1) test per 2,000 square feet of masonry.
 - 4. Refer to and include Work for reinforcing steel specified.
 - 5. Grout tests:
 - a. Pre-construction - Perform the following tests in accordance with ASTM C1019 on each type of grout mix used on the Project:
 - 1) Slump test.
 - 2) 28-Day compressive strength.
 - b. Construction: Perform 28-day compressive strength test in accordance with ASTM C1019 on each type of grout mix used on the Project at the rate of one (1) test per 2,000 square feet of masonry.
 - 6. Prism test: Perform pre-construction 28-day compressive strength test on concrete masonry walls.

3.17 REPAIR AND PROTECTION

- A. On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes:
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 29: Cutting and Patching.
- B. Protect construction exposed by or for quality control service activities.
- C. Repair and protection are Contractor's responsibility regardless of the assignment of responsibility for quality control services.

END OF SECTION 01 45 23

SECTION 01 50 00 TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities, including but not limited to:
 - 1. Water service and distribution.
 - 2. Sanitary facilities, including toilets, wash facilities, and drinking water facilities.
 - 3. Heating and cooling facilities.
 - 4. Ventilation.
 - 5. Electric power service.
 - 6. Lighting.
 - 7. Telephone service (land line)
 - 8. Waste disposal facilities.
 - 9. Field office.
 - 10. Storage and fabrication sheds.
 - 11. Lifts and hoists.
 - 12. Construction aids and miscellaneous services and facilities.
 - 13. Environmental protection.
 - 14. Pest control.
 - 15. Enclosure fence.
 - 16. Security enclosure and lockup.
 - 17. Barricades, warning signs, and lights.
 - 18. Temporary partitions.
 - 19. Fire protection.
 - 20. Accessories necessary for a complete installation.
 - 21. Temporary signage.
- B. Use Charges:
 - 1. Installation, removal of, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of the Project, testing agencies, and authorities having jurisdiction.
 - 2. Water and sewer service: Pay sewer service use charges for water used and sewer usage by all entities for construction operations.
 - 3. Electric power service: Pay electric power service use charges for electricity used by all entities for construction operations.

1.3 SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Moisture Protection Plan:
 - 1. Describe procedures and controls for protecting materials and construction from water absorption and damage:

- a. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
 - b. Indicate procedures for discarding water damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water damaged work.
 - c. Indicate sequencing of work that requires water, such as sprayed fire resistive materials, plastering, and tile grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
- C. Dust and HVAC Control Plan:
1. Submit coordination drawing and narrative that indicates the dust and HVAC control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
 - a. HVAC system isolation schematic drawing.
 - b. Location of proposed air-filtration system discharge.
 - c. Waste handling procedures.
 - d. Other dust control measures.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
1. Accessible Temporary Egress:
 - a. Comply with 2022 California Building Code (CBC) CCR Title 24, Part 2, (as adopted and amended by DSA).
 - b. Comply with applicable provisions in the U.S. Architectural and Transportation Barriers Compliance Board ADA-ABA Accessibility Guidelines (ADAAG), ICC/ANSI A117.1.
- B. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- C. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Architect. Provide materials suitable for use intended.
- B. Chain Link Fencing: Minimum 2 inches (50 mm), 0.148-inch (3.8 mm) thick, galvanized steel, chain link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch (60 mm) OD line posts and 2-7/8 inch (73 mm) OD corner and pull posts.
- C. Polyethylene Sheet: Reinforced, fire-resistive sheet, ten (10) mils (0.25 mm) minimum thickness, with flame spread rating of 15 or less per ASTM E84.
- D. Dust Control Adhesive Surface Walk-off Mats: Provide mats a minimum of 36 inches by 60 inches (914 mm x 1624 mm).
- E. Insulation: Unfaced mineral fiber blanket, manufactured from glass, slag wool, or rock wool;

- with maximum flame spread and smoke developed indexes of 25 and 50, respectively.
- F. Lumber and Plywood: Comply with requirements in Section 06 10 53: Miscellaneous Rough Carpentry.
 - G. Gypsum Board: Minimum 1/2-inch (12.7 mm) thick by 48 inches (1219 mm) wide by maximum available lengths; Type X or Type C panels with tapered edges. Comply with Section 09 21 16: Gypsum Board Assemblies.
 - H. Paint: Comply with requirements in Section 09 90 00: Painting and Coating.
 - I. Tarpaulins: Fire resistive labeled with flame-spread rating of 15 or less.
 - J. Water: Potable.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
 - 1. Furniture required for Project site documents including file cabinets, plan tables, plan racks, and bookcases.
 - 2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot-square tack and marker boards.
 - 3. Drinking water and private toilet.
 - 4. Coffee machine and supplies.
 - 5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F
 - 6. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. Drinking Water: Containerized, tap dispenser, bottled water drinking water units, including paper cup supply. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 degrees F to 55 degrees F (7.2 degrees C to 12.7 degrees C).
- C. Electrical Outlets: Properly configured, NEMA polarized outlets to prevent insertion of 110V to 120V plugs into higher voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.

- D. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.
- E. HVAC Equipment:
 - 1. Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid propane gas or fuel oil heaters with individual space thermostatic control:
 - a. Heating units: Listed and labeled for type of fuel being consumed by a qualified testing agency acceptable to authorities having jurisdiction and marked for intended location and application.
 - b. Permanent HVAC system: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction. Clean HVAC system as required in Section 01 77 00: Closeout Procedures and install new filter with MERV 11 or greater.
- F. Air Filtration Units: Primary and secondary HEPA filter equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

3.2 INSTALLATION

- A. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work:
 - 1. Locate facilities to limit site disturbance as specified in Section 01 10 00: Summary.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION

- A. Install temporary service. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage:
 - 1. Provide temporary utilities to remove effluent lawfully:
 - a. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities:
 - 1. Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type,

- number, location, operation, and maintenance of fixtures and facilities:
- a. Disposable supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
 - b. Wash facilities: Install wash facilities supplied with potable water at convenient locations for personnel who handle materials that require wash up. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.
- E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- F. Isolation of Work Areas in Occupied Facilities:
1. Prevent dust, fumes, and odors from entering occupied areas:
 - a. Prior to commencing Work, isolate the HVAC system in area where Work is to be performed according to coordination drawings:
 - 1) Disconnect supply and return ductwork in Work area from HVAC systems servicing occupied areas.
 - 2) Maintain negative air pressure within Work area using HEPA equipped air filtration units, starting with commencement of temporary partition construction and continuing until removal of temporary partitions is complete.
 - b. Maintain dust partitions during the Work. Use vacuum collection attachments on dust producing equipment. Isolate limited Work within occupied areas using portable dust containment devices.
 - c. Perform daily construction cleanup and final cleanup using approved, HEPA filter equipped vacuum equipment.
- G. Ventilation and Humidity Control:
1. Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption:
 - a. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- H. Electric Power Service:
1. Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations. Install electric power service underground unless otherwise indicated:
 - a. Electric distribution - Provide receptacle outlets adequate for connection of power tools and equipment:
 - 1) Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length voltage ratio.
 - 2) Provide warning signs at power outlets other than 110 to 120-V.
 - 3) Provide metal conduit, tubing, or metallic cable for wiring exposed to possible damage. Provide rigid steel conduits for wiring exposed on grades, floors, decks, or traffic areas.
 - 4) Provide metal conduit enclosures or boxes for wiring devices.
 - 5) Provide four (4) gang outlets, spaced so 100-foot (30 m) extension cord can reach each area for power hand tools and task lighting. Provide a separate 125-V ac, 20-A circuit for each outlet.

- I. Lighting:
 - 1. Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions:
 - a. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 - b. Install lighting for Project identification sign.
- J. Telephone Service:
 - 1. Provide temporary telephone service in common use facilities for use by construction personnel, Architect, and inspection services. Install a minimum of one (1) telephone line(s) for each field office:
 - a. Provide dedicated telephone line for each facsimile machine in each field office.
 - b. At each telephone, post a list of important telephone numbers:
 - 1) Police and fire departments.
 - 2) Ambulance service.
 - 3) Contractor's home office.
 - 4) Contractor's emergency after-hours telephone number.
 - 5) Architect's office.
 - 6) Engineers' offices.
 - 7) Owner's office.
 - 8) Principal subcontractors' field and home offices.
 - c. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.
- K. Electronic Communication Service:
 - 1. Provide a desktop computer and printer/scanner in the primary field office adequate for use by Architect, inspection services, and Owner to access Project electronic documents and maintain electronic communications:
 - a. Internet service: Broadband modem, router, and ISP equipped with hardware firewall.
 - b. Internet security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.
 - c. Backup: External hard drive, minimum one (1) terabyte, with automated backup software providing daily backups.

3.4 SUPPORT FACILITIES INSTALLATION

- A. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E136. Comply with NFPA 241:
 - 1. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities under conditions acceptable to Owner.
- B. Temporary Use of Permanent Roads and Paved Areas:
 - 1. Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations:
 - a. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 - b. Prepare subgrade and install sub-base and base for temporary roads and paved areas.
 - c. Recondition base after temporary use, including removing contaminated material, regrading, proof rolling, compacting, and testing.

- d. Delay installation of final course of permanent pavement until immediately before Substantial Completion.
- C. Traffic Controls:
 - 1. Comply with requirements of authorities having jurisdiction:
 - a. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - b. Maintain access for fire-fighting equipment and access to fire hydrants.
- D. Parking: Provide temporary parking areas for construction personnel.
- E. Dewatering Facilities and Drains:
 - 1. Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water:
 - a. Dispose of rainwater in a lawful manner that will not result in flooding the Project or adjoining properties, or endanger permanent Work or temporary facilities.
- F. Project Signs: Not listed in 3.5 Below.
 - 1. Provide Project signs as indicated. Unauthorized signs are not permitted:
 - a. Identification signs: Provide Project identification signs as indicated on Drawings.
 - b. Temporary signs:
 - 1) Provide other signs as indicated and as required to inform public and individuals seeking entrance to the Project:
 - a) Provide temporary, directional signs for construction personnel and visitors.
 - c. Maintain and touchup signs so they are legible at all times.
- G. Waste Disposal Facilities: Provide waste collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01 73 00: Execution.
- H. Lifts and Hoists:
 - 1. Provide facilities necessary for hoisting materials and personnel:
 - a. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- I. Temporary Elevator Use: Use of elevators is not permitted.
- J. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
- K. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.5 SIGNS

- A. Furnish and install a project sign 6'-0" by 8'-0" in size. Image will be provided to the graphics printing company by the Architect after Award of Contract. Contractor will be responsible for the cost of printing the image, mounting the sign on an aluminum substrate and installing the sign at the site. The sign will include the name of the project, District, name and title of Board of Trustees, District Superintendent, Contractor, Architect, and each of the project consultants.
- B. Other signs permitted at the site:

1. Warning signs.
 2. Directional signs.
 3. Identification signs at field offices.
 4. Emergency medical services sign.
 5. Signs required by Authorities Having Jurisdiction
 6. Storm Water Pollution Prevention Plan sign (SWPPP)
- C. Contractor shall allow no other signs to be displayed at the project site, unless authorized by the Owner/District.

3.6 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities:
1. Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities to the satisfaction of Owner and Architect.
- B. Environmental Protection:
1. Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- C. Temporary Erosion and Sedimentation Control:
1. Provide measures to prevent soil erosion and discharge of soil bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of authorities having jurisdiction:
 - a. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree or plant protection zones.
 - b. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
 - c. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 - d. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- D. Stormwater Control:
1. Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Tree and Plant Protection:
1. Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- F. Pest Control:
1. Engage pest control services to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- G. Site Enclosure Fence:
1. Before construction operations begin, provide site enclosure fence to prevent people and animals from easily entering site except by entrance gates:

- a. Extent of fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
- H. Security Enclosure and Lockup:
 - 1. Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each Workday.
- I. Barricades, Warning Signs, and Lights:
 - 1. Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- J. Temporary Egress:
 - 1. Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- K. Temporary Enclosures:
 - 1. Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather-tight enclosure for building exterior:
 - a. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- L. Temporary Partitions:
 - 1. Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate occupied areas from fumes and noise:
 - a. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side and fire retardant treated plywood on construction operations side.
 - b. Construct dustproof partitions with two layers of 6-mil (0.14 mm) polyethylene sheet on each side. Cover floor with two (2) layers of 6-mil (0.14 mm) polyethylene sheet, extending sheets 18 inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire retardant treated plywood. Do not apply tape to finish floor surfaces:
 - 1) Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches (1219 mm) between doors. Maintain water dampened foot mats in vestibule.
 - c. Where fire resistance rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
 - d. Insulate partitions to control noise transmission to occupied areas.
 - e. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
 - f. Protect air handling equipment.
 - g. Provide walk-off mats at each entrance through temporary partition.
- M. Temporary Fire Protection:
 - 1. Install and maintain temporary fire protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program:
 - a. Prohibit smoking in construction areas.
 - b. Supervise welding operations, combustion type, temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - c. Develop and supervise an overall fire prevention and protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post

warnings and information.

- d. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.7 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture Protection Plan:
 1. Avoid trapping water in finished Work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase:
 1. Before installation of weather barriers, when materials are subject to wetting and exposure to airborne mold spores, protect as follows:
 - a. Protect porous materials from water damage.
 - b. Protect stored and installed material from flowing or standing water.
 - c. Keep porous and organic materials from coming into prolonged contact with concrete.
 - d. Remove standing water from decks.
 - e. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Phase:
 1. After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 - a. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 - b. Keep interior spaces reasonably clean and protected from water damage.
 - c. Periodically collect and remove waste containing cellulose or other organic matter.
 - d. Discard or replace water-damaged material.
 - e. Do not install material that is wet.
 - f. Discard, replace, or clean stored or installed material that begins to grow mold.
 - g. Perform Work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Condition Phase of Construction:
 1. After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
 - a. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 - b. Use permanent HVAC system to control humidity.
 - c. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits and moisture control:
 - 1) Hygroscopic materials that may support mold growth, including wood and gypsum-based products, which become wet during the course of construction and remain wet for 48 hours are considered defective and are to be removed and replaced.
 - 2) Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
 - 3) Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.8 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision:
 - 1. Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance:
 - 1. Maintain facilities in good operating condition until removal:
 - a. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover:
 - 1. Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion unless otherwise required and approved by Owner and Architect.
- D. Termination and Removal:
 - 1. Remove each temporary facility when need when its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired:
 - a. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - b. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 - c. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 22: Substantial Completion Procedures.

END OF SECTION

SECTION 01 57 15 INTEGRATED PEST MANAGEMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements including but not limited to:
 - 1. Indoor populations of rodents, insects (including termites), arachnids, and arthropods.
 - 2. Outdoor populations of potentially indoor-infesting species within property boundaries.
 - 3. Nests of stinging insects within 20 feet of the building and within the property boundaries.
 - 4. Pest populations that are incidental invaders inside the building, including but not limited to:
 - a. Birds, bats, snakes, and vertebrates other than commensal rodents.
 - b. Pests that primarily feed on outdoor vegetation.
 - 5. Initial building and site inspection.
 - 6. Development of an Integrated Pest Management (IPM) Plan for building, site, and local ecosystems.
 - 7. Implementation of IPM Plan.
 - 8. Documentation of IPM services.

1.3 DEFINITIONS

- A. Definitions: Defined in ASTM E2114.
- B. Action Threshold:
 - 1. The level at which action is initiated determined by an acceptable threshold of pests that can be tolerated:
 - a. The action threshold reflects the pest management objective for the site. The presence of some pests does not necessarily require action. When pest populations exceed established action thresholds, action is taken.
- C. Biological Control: The use of living organisms such as parasites, predators, or pathogens to maintain pest populations.
- D. Cultural Control: The manipulations of site ecosystem that make it less friendly to the establishment and proliferation of pest populations.
- E. Exclusion: The practice of structural and procedural modifications to reduce access used by pests.
- F. Integrated Pest Management (IPM): An approach to pest management that uses current, comprehensive information on the life cycles of pests and interactions with the environment to identify and implement effective methods of pest control with the least possible hazard to people, property, and the environment.
- G. Mechanical Control: The use of one or more physical components of the environment, such as temperature, humidity, or light, to the detriment of the pest.

- H. Phenology: The annual cycles of plants and animals and their response to seasonal changes in the environment.

1.4 SUBMITTALS

- A. Integrated Pest Management (IPM) Plan:
1. Minimum ten (10) days prior to pre-construction meeting, submit an IPM Plan including, but not limited to, the following:
 - a. Verify key pests and action thresholds for each key pest appropriate to Project, local ecosystem, and climate.
 - b. Proposed IPM strategies:
 - 1) For each key pest, submit an appropriate strategy for the building, site, and local ecosystems. Indicate strategies for inspection, prevention, and response to identified pest problems:
 - a) Inspection: Describe methods and procedures for identifying sites of pest harborage and access, and for objective assessments of pest population levels throughout the term of the Contract.
 - b) Prevention: Describe recommended methods and procedures for prevention of pest harborage and access.
 - c) Response: Indicate prioritization of strategies including utilization of nonchemical controls and lesser risk options before resorting to chemical control and actions with greater risk factors.
 2. For proposed materials and equipment, provide brand names of pesticide application equipment, rodent bait boxes, insect and rodent trapping devices, pest monitoring devices, pest detection equipment, and pest control devices or equipment that may be used to provide service:
 - a. Commercial Pesticide Applicator certificates or licenses: Submit photocopies of Commercial Pesticide Applicator certificates or licenses issued by the State of California for each applicator performing onsite services.
 - b. Pesticides:
 - 1) Submit:
 - a) Product data indicating conformance to U.S. National Organics Program (NOP) Final Rule list.
 - b) Current EPA registered label.
 - c) Material Safety Data Sheet (MSDS). Current prepared MSDS (updated within the previous five [5] years) including responses to Sections 1 through 16 in accordance with ANSI Z400.1:
 - a) Section 11: Toxicological Information. Include data used to determine the hazards cited in Section 3. Identify acute data, carcinogenicity, reproductive effects, and target organ effects.
 - b) Section 12: Ecological Information. Include data regarding environmental impacts in the event of an accidental release.
 - c) Section 13: Disposal Considerations. Include data regarding the proper disposal of the chemical. Indicate whether or not the product is considered to be "hazardous waste" according to the US EPA Hazardous Waste Regulations 40 CFR 261.
 - d) Section 14: Transportation Information. Identify hazard class for shipping.
 - e) Section 15: Regulatory Information. Identify federal, state, and local regulations applicable to the material.
 3. Service schedule:
 - a. Submit service schedule that includes weekly or monthly frequency of applications, specific day(s) of the week, and approximate duration of each application:
 - 1) Commencement of service: Start of construction.
 4. Revise and resubmit Plan as required by Owner. Approval of IPM Plan does not relieve Contractor of responsibility for compliance with applicable environmental regulations.

- B. Baseline IPM Reports:
 - 1. Prior to commencement of IPM Plan, submit the following:
 - a. Initial building inspection report: Conduct site visit to verify the pest control needs of each location and identify problem areas and necessary equipment, structural features, or management practices that contribute to pest infestations. Submit report summarizing observations. Indicate proposed revisions, if any, to approved IPM Plan necessary based upon results of the initial building inspection.
 - a. Summary of conventional pest management controls for key pests: Submit summary of conventional pest management materials and methods applicable to site and building for key pests. Include each type of pesticide, application rates, estimated annual quantity required, and environmental issues of concern.
- C. Operations and Maintenance Manual:
 - 1. Submit instructions for operations and maintenance procedures associated with IPM services:
 - a. Include overview of potential pest problems, conventional practices and environmental impacts, and IPM practices and environmental impacts.
 - b. Coordinate with landscaping maintenance program.
 - c. Coordinate with building cleaning and routine maintenance programs.
- D. Field Quality Control Documentation:
 - 1. Submit the following:
 - a. IPM inspection reports.
 - b. IPM deficiency reports.
 - c. IPM log book.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Provide pesticides registered with U.S. Environmental Protection Agency (EPA) and acceptable to local jurisdictions.
- B. Pest Controller Qualifications:
 - 1. Firm having a minimum of five (5) years of documented experience in performing pest control services, specifying who is certified as Commercial Pesticide Applicators in the category of Industrial, Institutional, Structural, and Health Related Pest Control, and who employs Certified Pesticide Applicators. Uncertified applicators working under the supervision of a Certified Applicator are not permitted to provide services.
 - 2. IPM Star certification:
 - a. IPM Star Service Provider in accordance with the IPM Institute of North America's certification program.
- C. Prohibited Pesticides:
 - 1. Do not apply pesticides that are not included in the approved IPM Plan or approved in writing by Owner:
 - a. Notification: Notify Owner a minimum of 72 hours prior to application of pesticides. Exceptions may be made for applications made for emergencies, where an imminent threat to health exists (i.e., stinging insects). For emergency applications, make notification as soon as practical.
- D. Pre-construction Meeting: Conduct meeting with Owner, Architect, and subcontractors to discuss the proposed IPM Plan and to develop mutual understanding relative to details of environmental protection.
- E. Coordination:
 - 1. Coordinate with Indoor Air Quality (IAQ) Management Plan to verify moisture controls

- are appropriate to IPM Plan.
2. Coordinate with Waste Management Plan to verify sanitation levels are appropriate to anticipated IPM Plan.
 3. Coordinate with progress cleaning methods verifying sanitation levels are appropriate to anticipated IPM Plan.

1.6 PERFORMANCE REQUIREMENTS

A. Key Pests and Action Thresholds:

Key Pest	Action Threshold	
	Interior	Exterior
Birds	1 bird	1 nest on building
Rats, Rodents, Opossum, similar	Any evidence of presence within building envelope	Any evidence of rats
Flies	1 complaint (when one or more become a nuisance)	1 complaint (when one or more become a nuisance); 30 per day based on monitoring count
Ants	1 complaint	1 fire ant mound within 100 feet of building/pavement
Cockroaches	1 cockroach in public areas or fresh food areas	n/a
Pantry Pests (meal moth)	1 complaint	n/a
Crickets	1 complaint	n/a
Weeds	n/a	tbd

B. Minimization of Risk:

1. Employ the pesticide with least risk, most precise application technique, and minimum quantity of pesticide necessary to achieve control:
 - a. Application of pesticides in an exterior or interior area shall not occur until a visual inspection is performed or monitoring devices indicate the presence of pests in that area.
 - b. Owner will evaluate recommendations for preventive pesticide treatments where inspection indicates a potential insect or rodent infestation on a case by case basis. Owner will approve preventative pesticide application in writing prior to treatment.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not store pesticides onsite.
- B. Transport, handle, and use pesticides in strict accordance with the manufacturer's label instructions and applicable laws and regulations.

PART 2 GENERAL

2.1 CHEMICAL CONTROLS

- A. Prohibited Pesticides:
 1. Pesticides containing active ingredients classified as known, likely or probable

carcinogens or reproductive toxins according to any of the following lists: State of California EPA List of Chemicals Known to Cause Cancer or Reproductive Toxicity, State of Illinois EPA List of Known Endocrine Disrupters, US EPA List of Chemicals Evaluated for Carcinogenic Potential.

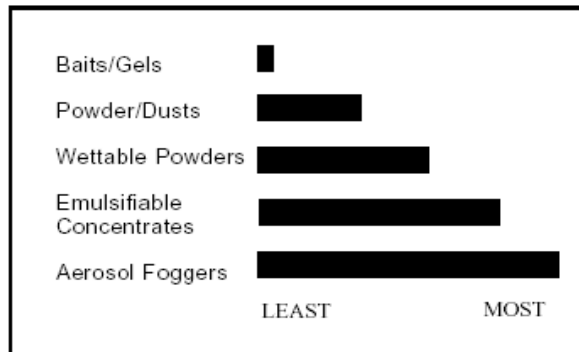
2. Pesticides containing inert ingredients included on US EPA's List 1: Inerts of Toxicological Concern.
3. Pesticide formulations and uses presenting a potential physical hazard or dust/powder inhalation hazard to building occupants.
4. Pesticides with label precautionary statements including "toxic" or "extremely toxic" to bees, birds, fish or wildlife. *Does not apply to pesticides used as per label directions to control bird, fish, wildlife or stinging insect pests.*
5. Pesticides with label precautionary statements including specific warnings regarding ground or surface water contamination.

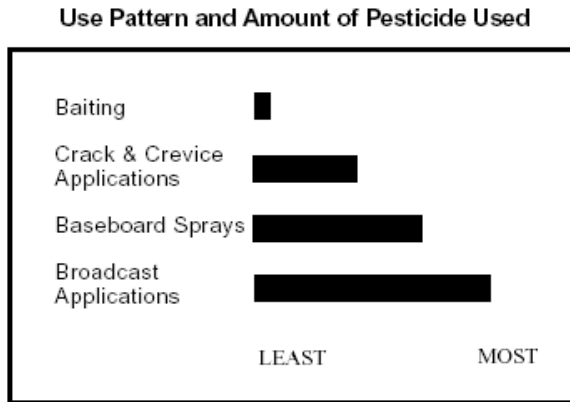
B. Lesser Risk Pesticides:

1. Materials listed on the U.S. National Organic Program's Final Rule, US Code of Federal Regulations 7CFR 205 list of acceptable materials and as follows:
 - a. Crawling insects - Boric acid-based or plant-based pesticides:
 - 1) Botanical pesticides: Pyrethrum, neem formulations, rotenone, and others as approved by Owner.
 - b. Rodents - Vitamin D3 (Cholecalciferol) or Quintox.
 - c. Weeds - Plant based pesticides and herbicides. Coordinate with Section 32 90 00: Planting:
 - 1) Botanical pesticides: Pyrethrum, neem formulations, rotenone, and others as approved by Owner.
 - d. Plant diseases - Plant based fertilizers. Coordinate with Section 32 90 00: Planting:
 - 1) Compost teas: Verify that compost tea does not include invasive species, including seeds. Verify that compost tea does not include animal pathogens.

C. Lesser Risk Pesticide Application Methodologies:

Likelihood the Pesticide Will Become Airborne





PART 3 GENERAL

3.1 NON-CHEMICAL PEST MANAGEMENT

- A. Provide IPM in accordance with approved IPM Plan and as follows:
1. Cultural controls:
 - a. Sanitation and exclusion: Recommend structural and procedural modifications as appropriate to reduce food, water, harborage, and access used by pests.
 - b. Soils: Maintain healthy, biologically active soils. Coordinate with Section 32 90 00: Planting.
 - c. Habitat for beneficial organisms: Recommend modifications as appropriate to promote healthy habitat for beneficial organisms. Habitat enhancement may include flowering annual or perennial plants that provide pollen and nectar needed during certain parts of the insect life cycle, overwintering sites, and wind protection. Coordinate with Section 32 90 00: Planting.
 - d. Phenology: Determine correlation with insect emergence and pest control. Develop recommendations as appropriate.
 2. Mechanical controls:
 - a. Traps:
 - 1) Rodents: Trapping devices shall be the standard method for indoor rodent control. All such devices shall be concealed out of the general view and in protected areas so as not to be affected by routine cleaning and other operations.
 - 2) Insects: Trapping devices shall be the standard method for indoor fly control.
 - b. Vacuums:
 - 1) Insects: Portable vacuums shall be the standard method for initial cleanouts of cockroach infestations, ants, termites, and for control of spiders in webs.
 - c. Flame weeding: Unless otherwise approved by Owner, flame weeding shall not be permitted.
 - d. Mulches, living or non-living:
 - 1) Weeds: Mulch shall be used for suppression of weeds, insect pests, and plant diseases as appropriate. Coordinate with Section 32 90 00: Planting.
 - e. Boiling water:
 - 1) Fire Ants (exterior): Boiling water shall be the standard method for control of exterior fire ants. Use boiling water at a rate of approximately three (3) gallons per mound.
 3. Biological controls:
 - a. Lady bugs, nematodes, and other biological controls: Permitted only for control of exterior ants, aphids, and/or other insects as appropriate. Coordinate with Section 32 90 00: Planting.
 - b. Bats: Permitted only for control of exterior insects as appropriate.

3.2 CHEMICAL PEST MANAGEMENT

- A. Chemical Controls: Unless otherwise approved by Owner, Contractor shall use non-chemical methods of control. When pesticide use is necessary, Contractor shall employ the least risk, NOP-listed pesticide, most precise application technique, and minimum quantity of pesticide necessary to achieve control.
- B. Bait Boxes:
 - 1. Bait boxes shall be maintained with an emphasis on the safety of non-target organisms:
 - a. Bait boxes shall be placed out of the general view, in locations where they will not be disturbed by routine operations.
 - b. Lids shall be securely locked or fastened shut.
 - c. Bait boxes shall be securely attached or anchored to floor, ground, wall, or another immovable surface, so that the box cannot be picked up or moved.
 - d. Bait shall be secured in the feeding chamber of the box and never placed in the runway or entryways of the box.
 - e. Bait boxes shall be labeled on the inside with Contractor's business name and address and dated by Contractor's technician at the time of installation and each servicing.

3.3 PEST REMOVAL

- A. Pest Removal: Remove traps, bait boxes, and their contents according to the approved IPM Plan and as requested by Owner.

3.4 SPECIAL REQUESTS AND EMERGENCY SERVICE

- A. On occasion, Owner may request that Contractor perform corrective, special, or emergency service(s) that are beyond routine service requests. Contractor shall respond to these exceptional circumstances and complete the necessary work within three (3) hours after receipt of the request.

3.5 FIELD QUALITY CONTROL

- A. Inspection:
 - 1. Inspect building and site for pests and beneficials to gather information about the health of the landscaping and local ecosystem, pests, and natural enemies:
 - a. Methods:
 - 1) Use methods indicated in approved IPM Plan and as follows:
 - a) Sweep nets, sticky traps, and pheromone traps may be used to collect insects for both identification and population density information.
 - b) Leaf counts may be used for recording plant growth stages.
 - c) Square foot or larger grids laid out in a field may provide a basis for comparative weed counts.
 - d) Records of rainfall and temperature may be used to help predict the likelihood of disease infections.
 - b. Schedule: Inspect at regular intervals and at critical times in accordance with approved IPM Plan.
 - c. Reports: Document results of inspections. Submit using form approved by Owner.
- B. Recommendations:
 - 1. Throughout the term of this Contract, Contractor shall be responsible for advising Owner about any structural, sanitary, or procedural modifications that would reduce pest food, water, harborage, or access:

- a. Contractor shall be responsible for adequately suppressing all pests included in this Contract regardless of whether or not the suggested modifications are implemented.
 - b. Contractor will not be held responsible for carrying out structural modifications as part of the pest control effort; however, minor applications of caulk and other sealing materials by Contractor to eliminate pest harborage or access may be approved by Owner on a case by case basis. Contractor shall obtain the approval of Owner prior to application of sealing material and other structural modification.
- C. Log Book:
 - 1. Maintain a pest control logbook or file at the site. For each visit of the applicator, record:
 - a. IPM Plan: A copy of the approved IPM Plan.
 - b. IPM contact list: Include contact information for Contractor and Owner contact. Indicate emergency contact information for Contractor.
 - c. Schedule: Contractor's service schedule for the property. Identify IPM activity that has been performed.
 - d. Product data: A list of all pesticides used on property and product data for each as follows:
 - 1) Product data indicating conformance to U.S. National Organics Program (NOP) Final Rule list.
 - 2) Current EPA-registered label.
 - 3) Material Safety Data Sheet.
 - e. IPM inspection reports and deficiency reports.
 - f. Pest diagrams: Plans and site drawings noting the location of pest activity, including the location of all traps, trapping devices, and bait stations in or around the site.

END OF SECTION

SECTION 01 57 23 TEMPORARY STORM WATER POLLUTION CONTROL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Requirements:
 - 1. Contractor shall exercise every reasonable precaution to protect channels, storm drains, and bodies of water from pollution.
 - 2. Schedule and conduct operations to minimize or avoid muddying and silting channels, drains, and waters.
 - 3. As required, obtain permits for erosion and water pollution control from the appropriate jurisdictional agency before starting Work.
 - 4. Provide any necessary water pollution control devices to prevent, control, and abate water pollution, and implement good housekeeping pollution control measures to reduce the discharge of pollutants from Work sites to the maximum extent practicable. These water pollution control devices include drains, gutters, slope protection blankets and retention basins, and shall be constructed concurrently with other Work at the earliest practicable time.
 - 5. Exercise care in preserving vegetation and protecting property to avoid disturbing areas beyond the limits of the Work. Promptly repair any damage caused by Contractor operations.
 - 6. Comply with the specific requirements based on acreage of disturbed soil.
 - 7. Penalties: Failure to comply with this Section may result in significant fines and possible imprisonment. The RWQCB or other prosecuting authority may assess fines of up to \$32,500 per day for each violation. Should Owner be fined or penalized as a result of Contractor failing to comply with this Section, Contractor shall reimburse Owner for any and all fines, penalties and related costs.
 - 8. Notification and report: If pollution occurs in the Work area for any reason or when Contractor becomes aware of any violation of this Section, correct the problem and immediately notify the Inspector. In addition, submit a written report to the Engineer within seven (7) calendar days describing the incident and the corrective actions taken. If either the Inspector or Engineer is first to observe pollution or a violation, Contractor shall also explain in the written report why the Work was inadequately monitored.
 - 9. The provisions of this Section describe minimum compliance and do not preclude other more stringent stormwater pollution control measures that may be required in the Contract.

1.3 DEFINITIONS

- A. Construction Activity: Operations such as clearing; grading; disturbances to the ground, such as stockpiling; or excavation that results in soil disturbances. If construction activity is part of a larger common plan of development, the amount of disturbed soil is the total land area of disturbed soil that results under the common plan.

1.4 LIABILITIES AND PENALTIES

- A. Payment of penalties for noncompliance by Contractor shall be the sole responsibility of Contractor.

- B. Compliance with the Clean Water Act is the sole responsibility of Contractor. Owner shall recover all costs of any fine against Owner due to noncompliance by Contractor by appropriate Owner Assessment.

PART 2 (NOT USED)
PART 3 EXECUTION

3.1 GENERAL

- A. Construction activity:
1. Comply with the following minimum water quality protection requirements:
 - a. Retain eroded sediments and other pollutants onsite and do not allow transportation from the site by sheet flow, swales, area drains, natural drainage, or wind. Control slope and channel erosion by implementing an effective combination of best management practices (BMPs). Such BMPs include scheduling grading during non-rainy seasons, planting and maintaining vegetation on slopes, and covering erosion-susceptible slopes.
 - b. Protect stockpiles of earth and other construction-related materials from being transported from the site by wind or water.
 - c. Properly store and handle fuels, oils, solvents, and other toxic materials to not contaminate the soil or surface waters, enter the groundwater, or be placed where they may enter a live stream, channel, drain, or other water conveyance facility. Protect all approved toxic storage containers from weather. Clean spills immediately and properly dispose of cleanup materials. Spills shall not be washed into live streams, channels, drains, or other water conveyance facilities:
 - 1) If rain or storm water runoff comes in contact with pollutants (such as soil stabilizers, paint, or fluid from vehicles) report to Inspector immediately. Contractor will be required to sample and remediate contaminated water.
 - d. Do not wash excess or waste concrete into the public way or any drainage system. Retain concrete wastes onsite until they can be appropriately disposed of or recycled.
 - e. Deposit trash and construction-related solid wastes in covered receptacles to prevent contamination of rainwater and dispersal by wind.
 - f. Do not allow sediments and other materials to be tracked from the site by vehicle traffic. Stabilize construction entrance roadways to inhibit sediments from being deposited onto public ways. Immediately sweep up accidental depositions. Do not allow depositions to be washed away by rain or by any other means.
 - g. Contain non-stormwater runoff from equipment or vehicle washing and any other activity at the worksite.
 - h. At completion of the Work, clear the worksite of debris and restore to a condition at least equal to or better than prior to construction.

3.2 MAINTENANCE

- A. To ensure the proper implementation and functioning of control measures, Contractor shall regularly inspect and maintain the construction site. Contractor shall identify corrective actions and time needed to address any deficient measures or reinstate any measures that have been discontinued. Inspections of the construction site shall be conducted by Contractor to identify deficient measures, as follows:
1. Prior to a forecasted storm.
 2. At 24-hour intervals during extended precipitation events.
 3. After all precipitation that causes runoff capable of carrying sediment from the construction site.

4. Routinely, at a minimum of once every week during the rainy season (October 1st– April 30th) and once every month during the non-rainy season (May 1st – September 30th).
- B. All temporary and/or permanent post-construction control measures shall be maintained and regularly inspected by Project Contractor after all improvements are in place and accepted by Owner. Temporary and/or permanent post-construction landscaping maintenance shall include, but not be limited to, watering, seeding, hydro-seeding, matting, slope stabilization, re-vegetation, and any other maintenance control measures recommended by Owner to insure proper erosion control and plant growth.

END OF SECTION 01 57 23

SECTION 01 60 00 PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products, including but not limited to:
 - 1. Product delivery, storage, and handling.
 - 2. Manufacturers' written warranties on products.
 - 3. Special warranties.
 - 4. Comparable products.

1.3 DEFINITIONS

- A. Basis of Design Product Specification:
 - 1. A Specification in which a specific manufacturer's product is named and accompanied by the words *basis of design*, including make, model number, or other designation to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the Specification.
- B. Products:
 - 1. Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term *product* includes the terms *material*, *equipment*, *system*, *assembly*, and terms of similar intent:
 - a. Named products: Items identified by manufacturer's product name, including make, model number, or other designation shown or listed in manufacturer's published product literature current as of date of the Contract Documents.
 - b. New products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - c. Comparable product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

1.4 SUBMITTALS

- A. Comparable Product Requests:
 - 1. Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title, and Drawing number(s) and title(s):
 - a. Include data to indicate compliance with the specified requirements.
 - b. Architect's action: If necessary, Architect will request additional information or documentation for evaluation within one (1) week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven (7) days

of receipt of additional information or documentation, whichever is later:

- 1) Form of Approval: As specified in Section 01 33 00: Submittal Procedures.
- 2) Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis of Design Product Specification Submittal:

1. Comply with requirements in Section 01 33 00: Submittal Procedures. Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options:

1. If Contractor is given option of selecting between two (2) or more products for use on Project, select a product compatible with products previously selected, even if previously selected products were also options:
 - a. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 - b. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 WARRANTY

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents:

1. Manufacturer's warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Warranties:

1. Prepare a written document that contains appropriate terms and identification, ready for execution:
 - a. Specified form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 - b. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time:

1. Comply with requirements in Section 01 77 00: Closeout Procedures.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original

- sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents, and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

PART 2 PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. Product Requirements:

1. Provide products that comply with the Contract Documents, are undamaged, and unless otherwise indicated, are new at time of installation:
 - a. Provide products complete with accessories, trim, finish, fasteners, and items needed for complete installation and indicated use and effect.
 - b. Standard products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - c. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 - d. Where products are accompanied by the phrase *as selected*, Architect will make selection.
 - e. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

5. Basis of Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and characteristics based on the product named. Comply with requirements for consideration of an unnamed product by one of the named manufacturers.
- C. Visual Matching Specification:
 1. Where Specifications require *match Architect's sample*, provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches:
 - a. If no product available within specified category matches and complies with specified requirements, comply with requirements of Section 01 25 00: Substitution Procedures and Form for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase *selected by Architect* or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration:
 1. Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
 - a. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 - b. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - c. Evidence that proposed product provides specified warranty.
 - d. List of similar installations for completed projects with project names and addresses, and names and addresses of architects and owners, if requested.
 - e. Samples, if requested.

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 73 00 EXECUTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Coordination of Owner-installed products.
 - 5. Progress cleaning.
 - 6. Starting and adjusting.
 - 7. Protection of installed construction.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 SUBMITTALS

- A. Certificates: Submit certificate signed by land surveyor or professional Engineer certifying that location and elevation of improvements comply with requirements.
- B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- C. Certified Surveys: Submit two (2) copies signed by land surveyor.
- D. Final Property Survey: Submit ten (10) copies showing the Work performed and record survey data.

1.5 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor legally qualified to practice in the State of California, who is experienced in providing land surveying services of the kind indicated.
- B. Manufacturer's Installation Instructions: Obtain and maintain onsite manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Comply with requirements specified in other Sections.
- B. In-Place Materials:
 - 1. Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible:
 - a. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Existing Conditions:
 - 1. The existence and location of underground and other utilities and construction indicated as existing are not warranted. Before beginning site Work, investigate and verify existence and location of underground utilities, mechanical and electrical systems, and construction affecting the Work:
 - a. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water service piping, underground electrical services, and other utilities.
 - b. Furnish location data for work related to the Work that must be performed by public utilities serving the site.
- B. Examination and Acceptance of Conditions:
 - 1. Before proceeding with each component of the Work, examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations:
 - a. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - b. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - c. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report:
 - 1. Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
- D. Proceed with installation after correcting unsatisfactory conditions. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field

measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01 31 00: Project Management and Coordination.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. Engage a land surveyor or professional Engineer to lay out the Work using accepted surveying practices:
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as necessary to locate each element of Project.
 - 2. Establish limits on use of site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level, and plumb of every major element as the Work progresses.
 - 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two (2) or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points:
 - 1. Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations:
 - a. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or

- control points to Architect before proceeding.
 - b. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks:
- 1. Establish and maintain a minimum of two (2) permanent benchmarks on site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark:
 - a. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - b. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - c. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- E. Final Property Survey:
- 1. Engage a land surveyor or professional Engineer to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor or professional Engineer, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey:
 - a. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
 - b. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

- A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated:
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 - 4. Maintain minimum headroom clearance of 96 inches (2,440 mm) in occupied spaces and 90 inches (2,300 mm) in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions ensuring the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items onsite and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

- G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check shop drawings of other Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment:
 - 1. Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions:
 - a. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - b. Allow for building movement, including thermal expansion and contraction.
 - c. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous. Materials containing asbestos and BCPs are prohibited.

3.6 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to site for Owner's construction personnel.
- B. Coordination:
 - 1. Coordinate construction and operations of the Work with Work performed by Owner's construction personnel:
 - a. Construction schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 - b. Pre-installation conferences: Include Owner's construction personnel at pre-installation conferences covering portions of the Work that are to receive Owner's Work. Attend pre-installation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.7 PROGRESS CLEANING

- A. Clean site and Work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully:
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven (7) days during normal weather or three (3) days if the temperature is expected to rise above 80 degrees F (27 degrees C).
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - 4. Use containers intended for holding waste materials of type to be stored.
 - 5. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

- B. Site: Maintain site free of waste materials and debris.
- C. Work Areas:
 - 1. Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work:
 - a. Remove liquid spills promptly.
 - b. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire Work area, as appropriate.
- D. Installed Work: Keep installed Work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials onsite. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 50 00: Temporary Facilities and Controls.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with mechanical, plumbing, and electrical requirements.
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00: Quality Requirements.

3.9 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION

SECTION 01 73 29 CUTTING AND PATCHING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes procedural requirements for cutting and patching.

1.3 DEFINITIONS

- A. Cutting: Removal of existing construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other work.

1.4 SUBMITTALS

- A. Cutting and Patching Plan:
 - 1. Submit plan describing procedures at least ten (10) days prior to the time cutting and patching will be performed. Include the following information:
 - a. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 - b. Changes to in-place construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 - c. Products: List products used for patching and firms or entities that will perform patching work.
 - d. Dates: Indicate when cutting and patching will be performed.
 - e. Utilities and mechanical and electrical systems:
 - 1) List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted:
 - a) Include description of provisions for temporary services and systems during interruption of permanent services and systems.

1.5 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
- B. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
- C. Operational Elements:

1. Do not cut and patch operating elements and related components that results in reducing the capacity to perform as intended or that results in increased maintenance or decreased operational life or safety:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire suppression systems.
 - e. Mechanical systems' piping and ducts.
 - f. Control systems.
 - g. Communication systems.
 - h. Fire detection and alarm systems.
 - i. Conveying systems.
 - j. Electrical wiring systems.
 - k. Operating systems of special construction.
- D. Miscellaneous Elements:
 1. Do not cut and patch the following elements or related components that change the load bearing capacity, resulting in a reduction of capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety:
 - a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain wall construction.
 - d. Equipment supports.
 - e. Piping, ductwork, vessels, and equipment.
 - f. Noise and vibration control elements and systems.
 - g. Sprayed fire resistive material.
- E. Visual Requirements:
 1. Do not cut and patch construction resulting in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner:
 - a. If possible, retain original installer or fabricator to cut and patch exposed Work. If possible, engage original installer or fabricator. If original installer is not available, engage recognized, experienced, and specialized firm for the Work:
 - 1) Processed concrete finishes.
 - 2) Ornamental metal.
 - 3) Matched veneer woodwork.
 - 4) Preformed metal panels.
 - 5) Roofing.
 - 6) Firestopping.
 - 7) Window system.
 - 8) Fluid applied flooring.
 - 9) Wall covering.
 - 10) HVAC enclosures, cabinets, or covers.
- F. Cutting and Patching Conference: Before proceeding, meet at site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.6 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or

damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Comply with specified requirements.
- B. Existing Materials:
 - 1. Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible:
 - a. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed:
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Services: Where removal, relocation, or abandonment is necessary, bypass existing services before cutting to avoid interruption of services to occupied areas.

3.3 CUTTING AND PATCHING

- A. Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at earliest feasible time, and complete without delay:
 - 1. Cut existing construction to provide for installation of components or performance of construction, and subsequently patch as necessary to restore surfaces to an original condition.
 - 2. Cut in place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Temporary Support: Provide temporary support of Work to be cut.

- C. Protection: Protect in place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 10 00: Summary and what is shown on Drawings.
- E. Cutting:
 - 1. Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original installer; comply with original installer's written recommendations:
 - a. Use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - b. Finished surfaces: Cut or drill from exposed or finished side into concealed surfaces.
 - c. Concrete and masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - d. Excavating and backfilling: Comply with requirements in applicable earthwork specifications by cutting and patching operations.
 - e. Mechanical and electrical services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - f. Proceed with patching after construction operations requiring cutting are complete.
- F. Patching:
 - 1. Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications:
 - a. Inspection:
 - 1) Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 - b. Exposed finishes:
 - 1) Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction to eliminate evidence of patching and refinishing:
 - a) Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b) Restore damaged pipe covering to its original condition.
 - 2. Floors and walls: Where walls or partitions are removed, extend one finished area into another, patch and repair surfaces in new space. Provide even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - 3. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 - 4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
 - 5. Exterior building enclosure: Patch components and restore enclosure to a weathertight condition.

END OF SECTION

SECTION 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous demolition and construction waste.
 - 2. Recycling nonhazardous demolition and construction waste.
 - 3. Disposing of nonhazardous demolition and construction waste.

1.3 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 SUBMITTALS

- A. Waste Management Plan: Submit plan within ten (10) days of date established for commencement of the Work.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end of Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable

- waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
 - G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.5 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Firm having minimum ten (10) years of documented experience in specializing in waste management coordination.
- B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. Waste Management Conference:
 - 1. Conduct conference at site. Review methods and procedures related to waste management including, but not limited to, the following:
 - a. Review and discuss waste management plan including responsibilities of waste management coordinator.
 - b. Review requirements for documenting quantities of each type of waste and its disposition.
 - c. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - d. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - e. Review waste management requirements for each trade.

1.6 PERFORMANCE REQUIREMENTS

- A. Conform to County regulations regarding Solid Waste Control.

1.7 WASTE MANAGEMENT PLAN

- A. Develop a waste management plan and requirements. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition site clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan:
 - 1. List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation

procedures:

- a. Salvaged materials for reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
- b. Salvaged materials for sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
- c. Salvaged materials for donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
- d. Recycled materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
- e. Disposed materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
- f. Handling and transportation procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

D. Cost/Revenue Analysis:

1. Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:
 - a. Total quantity of waste.
 - b. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
 - c. Total cost of disposal (with no waste management).
 - d. Revenue from salvaged materials.
 - e. Revenue from recycled materials.
 - f. Savings in hauling and tipping fees by donating materials.
 - g. Savings in hauling and tipping fees that are avoided.
 - h. Handling and transportation costs. Include cost of collection containers for each type of waste.
 - i. Net additional cost or net savings from waste management plan.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 PLAN IMPLEMENTATION

- A. Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract:
 1. Comply with operation, termination, and removal requirements in Section 01 50 00: Temporary Facilities and Controls.
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.
- C. Training:
 1. Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work:
 - a. Distribute waste management plan to everyone concerned within three (3) days of submittal return.
 - b. Distribute waste management plan to entities when they first begin work onsite.

Review plan procedures and locations established for salvage, recycling, and disposal.

- D. Site Access and Temporary Controls:
 - 1. Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities:
 - a. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 - b. Comply with Section 01 50 00: Temporary Facilities and Controls for the control of dust and dirt, environmental protection, and noise control.
- E. Waste Management in Historic Zones or Areas: Hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, by 12 inches (300 mm) or more.

3.2 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Reuse in the Work:
 - 1. Salvage items for reuse and handle:
 - a. Clean salvaged items.
 - b. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - c. Store items in a secure area until installation.
 - d. Protect items from damage during transport and storage.
 - e. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- B. Salvaged Items for Sale and Donation: Not permitted on Project site.
- C. Salvaged Items for Owner's Use:
 - 1. Salvage items for Owner's use and handle as follows:
 - a. Clean salvaged items.
 - b. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - c. Store items in a secure area until delivery to Owner.
 - d. Transport items to Owner's storage area designated by Owner.
 - e. Protect items from damage during transport and storage.
- D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors, unless otherwise designated by Owner.
- E. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- F. Plumbing Fixtures: Separate by type and size.
- G. Lighting Fixtures: Separate lamps by type and protect from breakage.
- H. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 RECYCLING WASTE

- A. Recycle paper and beverage containers used by onsite workers.

- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Owner.
- C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- D. Procedures:
 - 1. Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan:
 - a. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin:
 - 1) Inspect containers and bins for contamination and remove contaminated materials if found.
 - b. Stockpile processed materials onsite without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - c. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - d. Store components off the ground and protect from the weather.
 - e. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.4 DISPOSAL OF WASTE

- A. Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction:
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of to accumulate onsite.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning:
 - 1. Do not burn waste materials:
 - a. Burning of waste materials is permitted only at designated areas on Owner's property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.
- C. Disposal: Remove waste materials and dispose of at designated spoil areas on Owner's property.

END OF SECTION

SECTION 01 77 00 CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 PRE-CLOSEOUT MEETING

- A. Pre-Closeout Meeting: Schedule and convene a pre-closeout meeting with Owner and Architect in accordance with Section 01 31 00: Project Management and Coordination.

1.3 SUBSTANTIAL COMPLETION

- A. The items identified in the Contract Documents, including the Supplementary Conditions and the following items shall be completed before Substantial Completion will be granted:
 - 1. Contractor's completion list (punch list): Submit a thorough list of items to be completed or corrected, along with a written request for Substantial Completion and for review of the Work or portion of the Work. Architect's or Engineer's Project representative, at their discretion, may attend and assist in the preparation of Contractor's punch list.
 - 2. Architect's supplemental punch list: Architect/Engineer, along with Owner at Owner's discretion, will inspect the Work utilizing Contractor's prepared punch list, noting completed items and incomplete items, and will prepare a supplemental list of items that have been omitted or incomplete items that were not previously noted.
 - 3. Operations and maintenance manuals: Submit as described.
 - 4. Final cleaning: Provide final cleaning and adequate protection of installed construction as described.
 - 5. Starting of systems: Start up equipment and systems as described.
 - 6. Testing and balancing: Testing and balancing of systems must be performed and completed by Owner's forces, and the report submitted and accepted by Architect/Engineer and Owner, as described in the Contract Documents. Make adjustments to equipment as required to achieve acceptance.
 - 7. Demonstrations: If required by individual Specification Sections or by Owner, provide demonstrations and instructions for use of equipment as described.
- B. Date of Substantial Completion: Complete or correct items identified on punch list and confirm that all items have been corrected prior to Architect's re-inspection. Architect/Engineer, along with Owner, will re-inspect the corrected work to establish the Date of Substantial Completion. Incomplete items remaining will be appended to the Certificate of Substantial Completion (form similar to AIA G704 and as accepted by the Architect and Owner). The Date of Substantial Completion represents day one of the closeout period and represents the date of commencement of Contractor's correctional period and all warranty periods as described and required by the Contract Documents, except as amended in the Certificate of Substantial Completion and elsewhere in the Contract Documents.
- C. Certificate of Substantial Completion: When the Work or designated portion thereof is substantially complete, Architect will prepare the Certificate of Substantial Completion to be executed by Owner and Contractor. Items on the appended punch list shall be completed or corrected within the time limits established in the Certificate.

1.4 PUNCH LIST

- A. A comprehensive list prepared by Contractor prior to Substantial Completion, and attached thereto, to establish all items to be corrected, or limited items of work to be completed, if any. This list is intended to represent a limited number of items needing attention.
- B. Punch lists shall be furnished to Architect in Microsoft Excel and PDF formats. The punch list shall be in matrix form and shall include the following information for each punch list item:
 - 1. Room number or other suitable location identifier.
 - 2. Description of the Work.
 - 3. Subcontractor/trade sign-off that the work has been verified to be 100 percent complete and in accordance with the Contract Documents.
 - 4. Subcontractor/trade sign-off date.
 - 5. General Contractor sign-off that the work has been verified to be 100 percent complete and in accordance with the Contract Documents.
 - 6. General Contractor/trade sign-off date.
 - 7. A/E consultant sign-off.
 - 8. A/E consultant sign-off date.
 - 9. If requested by Owner, provide two (2) additional similar columns for their sign-off.
 - 10. In the case of excessive repetition of the same item at various locations, the punch list may contain "general notes/items" that shall be applied to the entire Project. It shall be the responsibility of the Contractor/Subcontractor to thoroughly examine the entire Project and make corrective measures at all applicable locations.
- C. Should Architect determine that Contractor's punch list lacks sufficient detail or requires extensive supplementation, the punch list will be returned to Contractor for re-inspection and revision. The date of Substantial Completion will be delayed until the punch list submitted is a reasonable representation of the Work to be done.
- D. A significantly large number of items to be completed or corrected will preclude Architect from issuing a Certificate of Substantial Completion. Owner and Architect will be the sole judges of what constitutes a significantly large number of items. It is anticipated that the detailed list of items of Work to be completed or corrected at the Date of Substantial Completion will be no longer than five (5) typed pages.
- E. Contractor's superintendent shall participate in the preparation of Contractor's punch list that is submitted to Architect and Owner for supplementation. Upon receipt, Architect and consultants shall perform a spot review to determine the adequacy and completeness of Contractor's punch list.
- F. Upon receipt of an acceptable Contractor's punch list, Contractor's superintendent shall accompany Architect, his consultants and Owner (at his discretion) during their observation and the preparation of their supplements to Contractor's punch list:
 - 1. The superintendent shall record or otherwise take note of all supplementary items.
 - 2. Architect will endeavor to furnish to Contractor typed, hand written, or recorded supplements to the punch list in a prompt manner; however, any delay in Contractor receiving said supplements from Architect will not be cause for a claim for additional cost or extension of time as Contractor's superintendent shall have been in attendance during the inspections of Architect and his consultants and will have been expected to take his own notes.

1.5 OPERATIONS AND MAINTENANCE MANUAL

- A. As a requirement for Substantial Completion, the final operation and maintenance manual shall be submitted to, and reviewed and accepted by Architect prior to issuance of the

- Certificate.
- B. Prepare a 3-ring D-slant binder cover and spline with printed title "OPERATIONS AND MAINTENANCE MANUAL," title of Project, and subject matter of binder when multiple binders are required.
 - C. Submit one (1) copy of preliminary operations and maintenance manuals to respective consultants (civil, MEP, structural, etc.) for review of conformance with Contract requirements prior to submitting final to Architect. Allow time for proper review.
 - D. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
 - E. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
 - F. Contents:
 - 1. Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:
 - a. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, subcontractors, and major equipment suppliers.
 - b. Part 2: Operation and Maintenance, arranged by system and subdivided by Specification Section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:
 - 1) Significant design criteria.
 - 2) List of equipment.
 - 3) Parts list for each component.
 - 4) Equipment start-up instructions
 - 5) Operating instructions.
 - 6) Maintenance instructions for equipment and systems.
 - 7) Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 - c. Part 3: Project documents and certificates, including the following:
 - 1) Product data.
 - 2) Air and water balance reports.
 - 3) Photocopies of warranties, certificates and bonds. Submit originals with Closeout Documents as specified below.
 - G. Submit one (1) final original and two (2) copies to Architect.
 - H. Contractor shall provide a DVD, in PDF Format, the following documents after approval by Architect, consultants, and Owner: Closeout Manual, MSDS binder, O&M Manuals, Specifications and approved submittals. Documents shall be hyperlinked to the Table of Contents.

1.6 PROJECT CLOSEOUT

- A. Final Payment will not be authorized by Architect until Architect finds the Work acceptable under the Contract Documents, subject to the completion and acceptance of the following requirements and other applicable Contract requirements:
 - 1. Close-out Documents: Provide bound closeout documents as described. Refer to the Supplementary Conditions for additional information.
 - 2. Record Documents: Submit as described.
 - 3. Extra materials: Provide extra stock, materials, and products as described when

- required by individual Specification Sections.
4. Locks: Make final changeover of permanent locks and transmit keys to Owner. Advise Owner's personnel of changeover in security provisions.
 5. Temporary Facilities: Discontinue and remove temporary facilities from the site, along with mockups, construction aids, and similar elements.
 6. Warranties, Certificates and Bonds: Execute and assemble transferable warranty documents, certificates, and bonds from subcontractors, suppliers, and manufacturers as described.
 7. Final Inspection and Acceptance by Architect is achieved as described.

1.7 CLOSEOUT DOCUMENTS

- A. Coordinate the following items with the requirements of Conditions of the Contract.
- B. Prepare 3-ring D-slant binder cover and spine with printed title "CLOSEOUT DOCUMENTS", title of Project, and subject matter of binder when multiple binders are required. Submit one (1) original and two (2) copies.
- C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. The closeout documents shall be neatly organized and easily useable as determined by Architect and Owner. Separate closeout document binders from operations and maintenance manuals. Documents identified as "affidavit" shall be notarized.
- E. Prepare a table of contents for each volume, with each item description identified, typed on white paper, in five (5) parts as follows:
 1. Part 1: Directory listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, subcontractors, and major equipment suppliers. All General Contractor's vendors/suppliers and subcontractors that provided materials or performed any work related to this Project must be listed on this form.
 2. Part 2: Closeout documents and affidavits, including the following:
 - a. Consent of Surety to Final Payment on a form similar to AIA G707 and as accepted by the Architect and Owner.
 - b. Contractor's Affidavit of Payment of Debts and Claims on a form similar to AIA G706 and as accepted by the Architect and Owner.
 - c. Contractor's Affidavit of Release of Liens on a form similar to AIA G706A and as accepted by the Architect and Owner.
 3. Part 3: Project documents and certificates, including the following:
 - a. Copy of Certificate of Substantial Completion.
 - b. Copy of All Permits.
 - c. Copy of Final Utility Bill or letter of transfer.
 - d. Copy of Certificate of Occupancy.
 - e. Copy of Certification of Project Compliance: Owner and Architect will initiate form and forward to Contractor for signature once Substantial Completion is established (Owner to be provided original separately).
 4. Part 4: Warranties and Release of Liens; compile sequentially based on Specification Sections:
 - a. General Contractor's warranty: Submit on company letterhead as described below. This Warranty shall state all sections of Work performed by General Contractor's own forces, and warranty period for each section of Work.
 - b. Subcontractor's release of lien: Include Contractor's, Subcontractor's, and direct material and equipment supplier's separate final releases.
 - c. Hazardous material certificate: Affidavits from Contractor, subcontractors and General Contractor's vendors or suppliers stating that no hazardous materials/products have been used or installed in this Project.

- d. Subcontractor's warranty: This warranty shall state all sections of Work performed by the Subcontractor and warranty period.
 - e. Special/extended warranties: List and provide notarized warranties requested by Owner, or required by or incorporated in the Contract Documents.
 - f. Spreadsheet depicting all items and materials that carry a warranty longer than one (1) year. Include information consisting of material/supplier/installer/Specification Section/length of warranty and contact information.
5. Part 5: Receipts:
- a. Extra stock: Provide original receipts for delivery of "extra stock" items as described below. Receipts must be signed by an authorized Owner's representative.
 - b. Keys: Provide original receipts for delivery of "keys." Receipts must be signed by an authorized Owner's representative.
 - c. Sign-in sheets: Provide signatures of attendees from all demonstrations.
- F. In addition to the three (3) required closeout binders listed above, provide Architect with one (1) separate binder for their records containing the following:
- 1. Directory listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, subcontractors, and major equipment suppliers.
 - 2. All MSDS sheets for the Project.
 - 3. All warranties from Contractor, subcontractors, direct suppliers, and manufacturers.
- G. Failure to complete and closeout Project after substantial completion may result in liquidated damages being assessed to Contractor. Refer to Conditions of the Contract for additional requirements and liquidated damages.

1.8 FINAL CLEANING

- A. Execute final cleaning prior to final Project inspection and acceptance.
- B. Clean interior and exterior glass, and surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces, mop hard floor surfaces.
- C. Remove smudges, marks, stains, fingerprints, soil, dirt, spots, dust, lint, and other foreign materials from finished and exposed surfaces
- D. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.
- E. Clean and replace filters of operating equipment as required by Contract Documents
- F. Clean debris from roofs, gutters, downspouts, and drainage systems.
- G. Clean site; sweep paved areas, rake clean landscaped surfaces.
- H. Remove waste and surplus materials, rubbish, and temporary construction facilities from site.

1.9 PROTECTING INSTALLED CONSTRUCTION

- A. Protect installed Work and provide special protection where specified in individual Specification Sections until Work is accepted by Architect and Owner.
- B. Provide temporary and removable protection for installed products. Control activity in

- immediate work area to prevent damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Prohibit traffic from landscaped areas.

1.10 STARTING OF SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect/Engineer and Owner 48 hours prior to start-up of each item.
- C. Verify each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by equipment or system manufacturer.
- E. Verify wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of Contractors' personnel, and installer in accordance with manufacturers' instructions.
- G. When specified in individual Specification Sections or required by manufacturer, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. When specified in individual Specification Sections or required by Owner or Architect/Engineer, submit a written report in accordance with Section 01 33 00, Submittal Procedures, that equipment or system has been properly installed and is functioning correctly.

1.11 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of products to Owner's personnel a minimum of 48 hours prior to date of Final Completion in accordance with Owner's requirements.
- B. Demonstrate Project equipment instructed by qualified manufacturer's representative who is knowledgeable about the Project and equipment.
- C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six (6) months.
- D. Utilize maintenance manual as basis for instruction. Review contents of manual with Owner's personnel to explain all aspects of operation and maintenance.
- E. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing,

- maintenance, and shutdown of each item of equipment.
- F. Prepare and insert additional data in maintenance manuals when needed for when additional data becomes apparent during instruction.
 - G. Review and verify proper start-up and operation of equipment prior to scheduling demonstrations with Owner.
 - H. All demonstrations are to be documented by video and submitted to Owner in DVD format along with the closeout documents. General Contractor is responsible for all video and compilation onto DVD with linked menus.

1.12 PROJECT RECORD DOCUMENTS

- A. Project Record Documents, as described in Section 01 78 39: Project Record Documents, shall be submitted at Project closeout. Final payment will not be authorized by Architect until final review and acceptance by Architect and Engineers is achieved in accordance with Owner's requirements.
- B. At Contractor's request, and with associated fee, Architect may provide electronic versions of the construction Drawing and Specification files for Contractor's use, subject to the terms and conditions of Architect's standard electronic document transfer agreement.
- C. Submit reproducibles to respective consultants (civil, structural, MEP, etc.) for review. Consultant will mark-up corrections and return to Contractor for final revisions. Make final revisions prior to submitting to Architect:
 - 1. Format: One (1) set of film positive reproducibles and two (2) sets of bluelines of approved reproducibles.
 - 2. Provide Owner with one (1) set of Record Drawings on a non-rewritable CD in AutoCAD® latest release.
 - 3. Provide Owner with one (1) set of Record Drawings on a non-rewritable CD in PDF format.
 - 4. Label electronic CAD files and PDF files in the same manner as the sheets (example, A2.02 First Floor Area 'A', etc.)

1.13 EXTRA STOCK, MATERIALS, AND MAINTENANCE PRODUCTS

- A. Furnish extra stock, maintenance, and extra products in quantities specified in individual Specification Sections.
- B. Deliver to Project site or to District Maintenance Department as directed by Owner; obtain signed receipt from Owner's authorized representative prior to final application for payment. Delivery of materials to, or obtaining receipt from anyone other than Owner's authorized representative may constitute breach of this requirement and may require delivery of additional materials at no cost to Owner if original materials are misplaced.
- C. Include signed receipts for delivery of extra stock and materials, including keys, with closeout documents.

1.14 WARRANTIES, CERTIFICATES, AND BONDS

- A. Definitions:
 - 1. Standard product warranties: Preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to Owner.

2. Special warranties: Written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide coverage of specific defects, or both.
- B. In accordance with the general warranty obligations under the General Conditions as amended by the Supplementary Conditions, General Contractor's warranty shall be for a period of one (1) year following the date of Substantial Completion, hereinafter called the one-year warranty period. Contractor's one (1) year general warranty shall include all labor, material, and delivery costs required to correct defective material and installation. This warranty shall not limit Owner's rights with respect to latent defects, gross mistakes, or fraud.
 - C. Contractor's one (1) year warranty shall run concurrently with the one (1) year period for correction of Work required in the General Conditions.
 - D. No service charges or call out charges are allowed to investigate warranty claims.
 - E. In addition to Contractor's one (1) year warranty, special warranties, as described in individual Specifications Sections, shall extend the warranty period for the period specified without limitation in respect to other obligations for which Contractor has under the Contract Documents.
 - F. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of the warranty on the Work that incorporates the products, nor does it relieve the suppliers, manufacturers, and subcontractors required to countersign special warranties with Contractor.
 - G. Warranty Requirements:
 1. When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
 2. When Work covered by a warranty has failed and been corrected by replacement or reconstruction, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
 3. Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. Contractor is responsible for the cost of replacing defective Work regardless of whether Owner has benefited from use of the Work through a portion of its anticipated useful service life.
 4. Written warranties made to Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights, and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which Owner can enforce such other duties, obligations, rights, or remedies.
 5. Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or designated portion of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.
 - H. Compile copies of each required warranty properly executed by Contractor and the Subcontractor, supplier, or manufacturer. Verify documents are in proper form, contain full information, and are notarized. Co-execute warranties, certificates, and bonds when required and include signed warrantees with Closeout Documents submitted to Architect.

1.15 FINAL COMPLETION AND FINAL PAYMENT

- A. Final Notice and Inspection:
 - 1. When all items on the punch list have been corrected, final cleaning has been completed, and installed work has been protected, submit written notice to Architect that the Work is ready for final inspection and acceptance.
 - 2. Upon receipt of written notice that the Work is ready for final inspection and acceptance, Architect and Engineer will make final inspection.
- B. Final Change Order: When the Project closeout items described above are successfully completed and the Work is found acceptable to Architect/Engineer and Owner, a Final Change Order will be executed. This Change Order will include any Allowance adjustments as required by the Contract Documents.
- C. Final Application for Payment: When all of the above items are successfully complete, submit to Architect a final Application for Payment and request for release of retainage.
- D. Release of Retainage: Release of retainage will not be authorized by Architect until Contractor completes all requirements for closeout to the satisfaction of Owner and Architect as described herein.

1.16 TERMINAL INSPECTION

- A. Immediately prior to expiration of the one (1) year period for correction of the Work, Contractor shall make an inspection of the Work in the company of Architect and Owner. Architect and Owner shall be given not less than ten (10) days' notice prior to the anticipated date of terminal inspection.
- B. Where any portion of the work has proven to be defective and requires replacement, repair, or adjustment, Contractor shall immediately provide materials and labor necessary to remedy such defective work and shall execute such work without delay until completed to the satisfaction of Architect and Owner, even if the date of completion of the corrective work may extend beyond the expiration date of the correction period.
- C. Contractor shall not be responsible for correction of Work that has been damaged because of neglect or abuse by Owner, nor the replacement of parts necessitated by normal wear in use.

PART 2 PRODUCTS (NOT USED)
PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 77 10 DSA PROJECT CLOSEOUT AND CERTIFICATION PROCESS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. Related Sections:
 - 1. Section 01 31 00: Project Management and Coordination.
 - 2. Section 01 42 00: References.
 - 3. Section 01 73 00: Execution.
 - 4. Section 01 77 00: Closeout Procedures

1.2 PRE-CONSTRUCTION

- A. DSA Documents Required:
 - 1. **DSA Form 103** to provide DSA and General Contractor with a Structural Testing and Inspections list (T&I).
 - 2. **DSA Form 5** is to be filled out for District to select a Project Inspector (P.I.) to be hired for the particular project type (Class 1, 2 or 3) required. This Project Inspector must be interviewed and approved by the Architect of Record & Structural Engineer of Record. The Project Inspector and Special Testing Laboratory must be DSA Approved.
 - 3. **Pre-Construction Meeting** will be conducted by the Design Professional. Use standard PBK-WLC Pre-Con Sheet and customize for your project. Identify and discuss regulatory responsibilities of Design Professionals, Project Inspector, Testing Lab, General Contractor, the District and DSA.
 - 4. **Provide Documents** such as DSA Approved Plans & Specs, Soils Reports, Hazard Material Report, Addendums and any Material/Color Boards to the General Contractor and Project Inspector.
 - 5. **DSA Approvals.** The Design Professionals responsibility to obtain timely DSA Approval of all Addendums, Construction Change Directives and any changes to the approved Construction Documents. These changes can be a CCD "A" or a CCD "B" to be filled out on the DSA 140 Form. CCD "A" is work that effects changes to Structural Safety, Fire Life Safety or Access Compliance. CCD "B" is all other work that will make DSA aware of other important changes but do not affect Structural Safety, Fire Life Safety or Access Compliance. (Simple color of paint or floor finish, cabinet finishes for example are not to be submitted). Deferred Approvals by DSA will be the responsibility of the General Contractor.
 - 6. **Submit DSA Form 102** for Construction Start Notice and Inspection Card Request. This form will include Notice of Construction Start Date, information on the School District, Scope of Work, Listing of Project Participants (Design Professionals, Project Inspector, In-Plant Inspector if any, General Contractor, Laboratory of Record, Geotechnical Engineer, Project Delivery Method, Collaborators for DSA Box Type of Access granted).

1.3 CONSTRUCTION

- A. Project Review:
 - 1. **Project Inspector** shall provide continuous inspection during construction, provide daily and semi-monthly reports of progress of the scope of work to the District, the Design Professionals and DSA. Participate in resolutions for questions from the contractor and report the status of DSA Field Trip Note issues. Provide a current

written record of all work inspected and monitor testing and special inspections required. The Project Inspector will notify contractor of any defective work or deviation from the DSA Approved Plans. If this work is not corrected a Deviation Notice will be issued by the P.I. This can sometimes require the Design Professionals to issue a CCD to DSA for Approval of additional or amended construction documents.

2. **Design Professional** shall observe the construction, obtain deviations from the approved documents by means of COs, CCDs, RFIs, PCOs, ASIs, etc. Resolve DSA Field Trip Note issues.
3. **General Contractors** shall construct the project per the approved plans, timely corrections of Deviations noted by the Project Inspector or Design Professionals and timely submission of Deferred Approvals.
4. **Testing Laboratory** shall provide material testing and special inspections, submit all materials testing and special inspections reports to DSA, Design Professional, Structural Engineer, and Project Inspector.

1.4 CLOSE OUT & CERTIFICATION

A. Project Closeout:

1. Contractor shall notify the Design Professional & the District when they are completed enough to have a Punch Walk conducted. After the Punch List items have been completed the contractor shall notify the Design Professionals for issuance of a Notice of Substantial Completion that will start the warranty process for work completed.
2. **Certification is a letter** issued by DSA Certifying that the building project has been completed in accordance with requirements as to the safety and design of the Education Code sections 17280-17316 and 81130-81147. Without Certification the School Board has liability for an future damage to public safety and DSA will be unable to approve plans affecting uncertified construction at any time in the future.
3. **Closing document** should be obtained and submitted to DSA as soon as they become obtainable. Close out is initiated by the DSA Field Engineer. DSA will issue a 90 Day Letter requesting outstanding documents or unresolved issued that are required. All these need to be resolved prior to DSA issuing letter of certification.
4. **District responsibilities** include issuing Notice of Completion and submit fee to DSA invoices. DSA Form 168 for final cost of construction and submit to DSA.
5. **Design Professionals responsibilities** include resolving any outstanding issues related to the DSA 90 Day Letter, and submit a Verified Report DSA Form 6A/E.
6. **Contractors & Project Inspectors responsibilities** include submit Verified Report DSA Form 6.
7. **Laboratories responsibilities** include submit Lab Verified Report DSA Form 291, Special Inspection Verified Report DSA Form 292, and submit Geotechnical Verified Report DSA Form 293.

END OF SECTION

SECTION 01 78 23 OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory manuals.
 - 2. Emergency manuals.
 - 3. Systems and equipment operation manuals.
 - 4. Systems and equipment maintenance manuals.
 - 5. Product maintenance manuals.

1.3 DEFINITIONS

- A. Subsystem: A portion of a system with characteristics similar to a system.
- B. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

1.4 SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section:
 - 1. Architect will comment on whether content of operation and maintenance submittals is acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format:
 - 1. Submit operation and maintenance manuals in the following format:
 - a. Submit on digital media acceptable to Architect or by uploading to web-based project software site or by email to Architect. Enable reviewer comments on draft submittals.
 - b. Submit three (3) paper copies. Architect will return two (2) copies.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal:
 - 1. Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments:
 - a. Correct or revise each manual to comply with Architect's and Commissioning Authority's comments. Submit copies of each corrected manual within 15 days of

receipt of Architect's comments and prior to commencing demonstration and training.

- E. Comply with Section 01 77 00: Closeout Procedures for schedule for submitting operation and maintenance documentation. Where applicable use 01 91 13: General Commissioning Requirements.

1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A. Manuals, Electronic Files:
1. Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required:
 - a. Electronic files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - b. File names and bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- B. Manuals, Paper Copy:
1. Submit manuals in the form of hard-copy, bound and labeled volumes:
 - a. Binders:
 - 1) Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2 by 11-inch (215 mm X 280 mm) paper, with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets:
 - a) If two (2) or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b) Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
 - b. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project manual.
 - c. Protective plastic sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment. Enclose title pages and directories in clear plastic sleeves.
 - d. Supplementary text: Prepared on 8-1/2 by 11-inch (215 mm X 280 mm) white bond paper.
 - e. Drawings:
 - 1) Attach reinforced, punched binder tabs on Drawings and bind with text:
 - a) If oversize Drawings are necessary, fold Drawings to same size as text pages and use as foldouts.
 - b) If Drawings are too large to be used as foldouts, fold and place Drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating Drawing titles, descriptions of contents, and Drawing locations.

1.6 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization of Manuals:
 - 1. Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - a. Title page.
 - b. Table of contents.
 - c. Manual contents.
- B. Title Page:
 - 1. Include the following information:
 - a. Subject matter included in manual.
 - b. Name and address of Project.
 - c. Name and address of Owner.
 - d. Date of submittal.
 - e. Name and contact information for Contractor.
 - f. Name and contact information for Construction Manager.
 - g. Name and contact information for Architect.
 - h. Name and contact information for commissioning authority.
 - i. Names and contact information for major consultants to Architect that designed the systems contained in the manuals.
 - j. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents:
 - 1. List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual:
 - a. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.7 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

- A. Operation and Maintenance Documentation Directory:
 - 1. Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:
 - a. List of systems and subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
 - b. List of equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
 - c. Tables of contents: Include a table of contents for each emergency, operation, and maintenance manual.

1.8 EMERGENCY MANUALS

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Content:
 - 1. Organize manual into a separate section for each of the following:
 - a. Type of emergency.
 - b. Emergency instructions.
 - c. Emergency procedures.
- C. Type of Emergency:
 - 1. Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
 - a. Fire.
 - b. Flood.
 - c. Gas leak.
 - d. Water leak.
 - e. Power failure.
 - f. Water outage.
 - g. System, subsystem, or equipment failure.
 - h. Chemical release or spill.
- D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- E. Emergency Procedures:
 - 1. Include the following, as applicable:
 - a. Instructions on stopping.
 - b. Shutdown instructions for each type of emergency.
 - c. Operating instructions for conditions outside normal operating limits.
 - d. Required sequences for electric or electronic systems.
 - e. Special operating instructions and procedures.

1.9 SYSTEMS AND EQUIPMENT OPERATION MANUALS

- A. Systems and Equipment Operation Manual:
 - 1. Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures:
 - a. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - b. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content:
 - 1. In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 - a. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 - b. Performance and design criteria if Contractor has delegated design responsibility.
 - c. Operating standards.

- d. Operating procedures.
 - e. Operating logs.
 - f. Wiring diagrams.
 - g. Control diagrams.
 - h. Piped system diagrams.
 - i. Precautions against improper use.
 - j. License requirements including inspection and renewal dates.
- C. Descriptions:
 - 1. Include the following:
 - a. Product name and model number. Use designations for products indicated on Contract Documents.
 - b. Manufacturer's name.
 - c. Equipment identification with serial number of each component.
 - d. Equipment function.
 - e. Operating characteristics.
 - f. Limiting conditions.
 - g. Performance curves.
 - h. Engineering data and tests.
 - i. Complete nomenclature and number of replacement parts.
- D. Operating Procedures:
 - 1. Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Instructions on stopping.
 - f. Normal shutdown instructions.
 - g. Seasonal and weekend operating instructions.
 - h. Required sequences for electric or electronic systems.
 - i. Special operating instructions and procedures.
- E. Systems and Equipment Controls: Describe the sequence of operation and diagram controls as installed.
- F. Piped Systems: Diagram piping as installed and identify color coding where required for identification.

1.10 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Systems and Equipment Maintenance Manuals:
 - 1. Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information:
 - a. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - b. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.

- C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project manual and Drawing or schedule designation or identifier where applicable.
- D. Manufacturers' Maintenance Documentation:
 - 1. Include the following information for each component part or piece of equipment:
 - a. Standard maintenance instructions and bulletins:
 - 1) Include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one (1) item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable:
 - a) Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
 - b. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - c. Identification and nomenclature of parts and components.
 - d. List of items recommended to be stocked as spare parts.
- E. Maintenance Procedures:
 - 1. Include the following information and items that detail essential maintenance procedures:
 - a. Test and inspection instructions.
 - b. Troubleshooting guide.
 - c. Precautions against improper maintenance.
 - d. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - e. Aligning, adjusting, and checking instructions.
 - f. Demonstration and training video recording, if available.
- F. Maintenance and Service Schedules:
 - 1. Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment:
 - a. Scheduled maintenance and service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 - b. Maintenance and service record: Include manufacturers' forms for recording maintenance.
- G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- I. Warranties and Bonds:
 - 1. Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds:
 - a. Include procedures to follow and required notifications for warranty claims.
- J. Drawings:
 - 1. Prepare Drawings supplementing manufacturers' printed data to illustrate the

relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these Drawings with information contained in record Drawings to ensure correct illustration of completed installation:

- a. Do not use original Project record documents as part of maintenance manuals.

1.11 PRODUCT MAINTENANCE MANUALS

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project manual and Drawing or schedule designation or identifier where applicable.
- D. Product Information:
 1. Include the following, as applicable:
 - a. Product name and model number.
 - b. Manufacturer's name.
 - c. Color, pattern, and texture.
 - d. Material and chemical composition.
 - e. Reordering information for specially manufactured products.
- E. Maintenance Procedures:
 1. Include manufacturer's written recommendations and the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Schedule for routine cleaning and maintenance.
 - e. Schedule for annual inspection and reports.
 - f. Repair instructions.
- F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- G. Warranties and Bonds:
 1. Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds:
 - a. Include procedures to follow and required notifications for warranty claims.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 78 39 PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for Project record documents, including but not limited to:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product data.
 - 4. Miscellaneous record submittals.

1.3 SUBMITTALS

- A. Record Drawings:
 - 1. Number of copies - Submit one (1) set of marked up record prints.
 - 2. Number of Copies - Submit copies of record Drawings:
 - a. Initial submittal:
 - 1) Submit PDF electronic files of scanned record prints and one (1) of file prints.
 - 2) Submit record digital data files and one (1) set of plots.
 - 3) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final submittal:
 - 1) Submit PDF electronic files of scanned record prints and three (3) sets of prints.
 - 2) Submit record digital data files and three (3) sets of record digital data file plots.
 - 3) Plot each Drawing file, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit one (1) paper copy and one (1) annotated PDF electronic files of the Project Specifications, including addenda and Contract modifications.
- C. Record Product Data:
 - 1. Submit one (1) paper copy and one (1) annotated PDF electronic file and directories of each submittal:
 - a. Where record product data are required as part of operation and maintenance manuals, submit duplicate marked up product data as a component of manual.
- D. Miscellaneous Record Submittals: Refer to the individual Specification Sections for miscellaneous record keeping requirements and submittals in connection with various construction activities. Submit one (1) paper copy and annotated PDF electronic files and directories of each submittal.
- E. Reports: Submit written report monthly indicating items incorporated into Project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

1.4 PROJECT RECORD DOCUMENT PROCEDURES

- A. Do not use Project record documents for construction purposes. Protect Project record documents from deterioration and loss. Provide access to Project record documents for Architect's reference:
 - 1. **Do not use** as-built Drawings and Specifications for record Drawings and Specifications.
- B. Recording Procedures: Update Drawings and Specifications on daily bases to record actual conditions. Record information concurrently with construction progress. Do not conceal work until required information is accurately recorded.
- C. Store record documents and samples apart from as-built documents used for construction:
 - 1. Label and file record documents and samples in accordance with Section number listings in table of contents. Label each document **PROJECT RECORD** in neat, large, printed letters.
 - 2. Maintain record documents in clean, dry, and legible condition.
 - 3. Make record documents and samples available for inspection upon request of Architect.

PART 2 PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints:
 - 1. Maintain one (1) set of marked up paper copies of the Contract Drawings and shop drawings:
 - a. Preparation:
 - 1) Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is installer, Subcontractor, or similar entity, to provide information for preparation of corresponding marked up record prints. Show actual installation conditions where installation varies from that shown originally:
 - a) Give attention to information on concealed elements difficult to identify or measure and record later.
 - b) Accurately record information in an acceptable drawing technique.
 - c) Record data as soon as possible after obtaining it.
 - d) Record and check the markup before enclosing concealed installations.
 - e) Cross reference record prints to corresponding shop drawings or archive photographic documentation.
 - 2. Content:
 - a. Types of items requiring marking include, but are not limited to, the following:
 - 1) Dimensional changes to Drawings.
 - 2) Revisions to details shown on Drawings.
 - 3) Depths of foundations below first floor.
 - 4) Locations and depths of underground utilities.
 - 5) Revisions to routing of piping and conduits.
 - 6) Revisions to electrical circuitry.
 - 7) Actual equipment locations.
 - 8) Duct size and routing.
 - 9) Locations of concealed internal utilities.
 - 10) Changes made by Change Order or Construction Change Directive.
 - 11) Changes made following Architect's written orders.
 - 12) Details not on the original Contract Drawings.

- 13) Field records for variable and concealed conditions.
 - 14) Record information on the Work that is shown only schematically.
 3. Mark the Contract Drawings and shop drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked up record prints.
 4. Mark record sets with erasable, red colored pencil. Use colors to distinguish between changes for different categories of the work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files:
1. Immediately before inspection for Certificate of Substantial Completion, review marked up record prints with Architect. When authorized, prepare full set of corrected digital data files of the Contract Drawings:
 - a. Format: Same digital data software program, version, and operating system as the original Contract Drawings and annotated PDF electronic file with comment function enabled.
 - b. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 - c. Refer instances of uncertainty to Architect for resolution.
 - d. Architect will furnish Contractor one (1) set of digital data files of the Contract Drawings for use in recording information:
 - 1) Refer to Section 01 33 00: Submittal Procedures for requirements related to use of Architect's digital data files.
 - 2) Architect will provide data file layer information. Record markups in separate layers.
- C. Newly Prepared Record Drawings:
1. Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor shop drawings are suitable to show actual installation:
 - a. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or modification. Including ALL documents used for Construction Change Directive to DSA.
 - b. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- D. Format:
1. Identify and date each record Drawing; include the designation *PROJECT RECORD DRAWING* in a prominent location:
 - a. Record prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 - b. Format: Annotated PDF electronic file with comment function enabled.
 - c. Record digital data files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 - d. Identification:
 - 1) As follows:
 - a) Project name.
 - b) Date.
 - c) Designation PROJECT RECORD DRAWINGS.

- d) Name of Architect.
- e) Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation:
 - 1. Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and Contract modifications:
 - a. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - b. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - c. Record the name of manufacturer, supplier, installer, and other information necessary to provide a record of selections made.
 - d. For each principal product, indicate whether record product data has been submitted in operation and maintenance manuals instead of submitted as record product data.
 - e. Note related Change Orders, record product data, and record Drawings where applicable.
- B. Format: Submit record Specifications as annotated PDF electronic file and marked up paper copy of Specifications. ALL documents to match PBK format.

2.3 RECORD PRODUCT DATA

- A. Preparation:
 - 1. Mark product data to indicate the actual product installation where installation varies substantially from that indicated in product data submittal:
 - a. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - b. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - c. Note related Change Orders, record Specifications, and record Drawings where applicable.
- B. Format: Submit record product data as annotated PDF electronic file. Include record product data directory organized by Specification Section number and title, electronically linked to each item of record product data.

2.4 RECORD SAMPLES

- A. Record Samples: Determine with Architect and Owner which submitted samples are to be maintained as record samples. Maintain and mark one (1) set to indicate date of review and approval by Architect; note any deviations or variations between reviewed sample and installed product or material.

2.5 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by the individual Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference. Include the following:
 - 1. Reviewed shop drawings, product data, and samples.
 - 2. Field test reports.
 - 3. Inspection certificates and manufacturer's certificates.

4. Inspections by authorities having jurisdiction (AHJ [DSA]).
 5. Documentation of foundation depths.
 6. Special measurements or adjustments.
 7. Tests and inspections.
 8. Surveys.
 9. Design mixes.
 10. DSA submitted CCDs.
- B. Format: Submit miscellaneous record submittals as scanned PDF electronic file(s) of marked up miscellaneous record submittals. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one (1) copy of each submittal during the construction period for Project record document purposes. Post changes and revisions to Project record documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and samples in the field office apart from the Contract Documents used for construction. Do not use Project record documents for construction. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project record documents for Architect's reference during normal working hours.

END OF SECTION

SECTION 01 91 13 GENERAL COMMISSIONING REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section establishes general and administrative requirements pertaining to commissioning (Cx) of equipment, devices, and building systems on the Project. Technical requirements for Cx of particular systems and components are established in the respective technical sections of this Project manual.
- B. It is of primary concern that all operable systems installed in the Project perform in accordance with the Contract Documents, Owner's Project requirements and the basis of design. During Cx, Contractor systematically demonstrates to Owner or Owner's representative that the operable systems have been installed and perform in strict accordance with the Contract Documents.
- C. Commissioning requires cooperation and involvement of all parties throughout the construction process. Contractor shall deliver a successful Cx process. Successful Cx requires that installation of all building systems complies with Contract Document requirements and that full operational check-out and necessary adjustments are performed prior to Substantial Completion with the exception of deferred tests approved in advance by Owner.
- D. Commissioning will encompass and coordinate traditionally separate functions of:
 - 1. System documentation.
 - 2. Installation checkout.
 - 3. System verification checklists and start-up.
 - 4. Control system calibration and point-to-point checkout.
 - 5. Testing, adjusting, and balancing (TAB).
 - 6. Functional performance tests.
 - 7. Integrated system tests.
 - 8. Contractor demonstration to Owner and training of Owner's personnel:
 - a. This requires assembling all related documentation into one (1) cohesive collection. Commissioning is intended to achieve the following specific objectives of the Contract Documents:
 - 1) Verify and document proper installation and intended performance of equipment, systems, and integrated systems.
 - 2) Ensure that operating and maintenance and Cx documentation requirements are complete.
- E. Provide Owner with functional buildings and systems that meet the Contract Document requirements and Owner's Project requirements at Substantial Completion.

1.3 DEFINITIONS

- A. Basis of Design: A document that records the concepts, calculations, decisions, and product selections used to meet Owner's Project requirements and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions

- and lists of individual items that support the design process.
- B. Commissioning (Cx): A systematic process confirming that building systems have been installed, properly started, and consistently operated in strict accordance with the Project documents, that all systems are complete and functioning in accordance with the Contract Documents at Substantial Completion, and that Contractor has provided Owner adequate system documentation and training.
 - C. Commissioning Authority (CxA): Party having a contractual agreement with Owner to provide third party Cx services as defined herein under CxA's Role and Responsibilities. Commissioning Authority may represent Owner and is authorized to act on behalf of Owner. The CxA does not have authority to alter design or installation procedures without the written approval of Owner or the design team.
 - D. Contract Documents: The General Conditions, Drawings, Specifications, addenda, and other documents developed by the Architect/Engineer (A/E) Team and approved by Owner that constitute the contractual obligations of the Project scope.
 - E. Control Point and Sensor Calibration Verification: Process of verifying the point integrity and/or sensor calibration from the physical point of monitoring (sensor, contact, actuator, etc.) to the digital point location at the Operator's interface within the respective control system (building automation, lighting controls, power status and monitoring, etc.).
 - F. Deferred Testing: Functional performance or integrated system tests performed after Substantial Completion due to partial occupancy, partial equipment acceptance, seasonal requirements, design, or other site conditions that prohibit the test from being performed prior to Substantial Completion.
 - G. Deficiency: Condition of a component, piece of equipment, or system that is not in compliance with the Project documents.
 - H. Functional Performance Test: Test of dynamic function and operation of equipment and systems executed by Contractor and witnessed by the CxA. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, life safety conditions, power failure, etc. Systems are operated through all specified sequences of operation. Components are verified to be responding in accordance with requirements in the Project documents.
 - I. Functional Performance Testing Procedures: Commissioning protocols, detailed test procedures and instructions in tabular and script-type format that fully describe system configuration and steps required to determine if the system is performing and functioning properly.
 - J. Integrated Systems Test: Test of dynamic function and operation of multiple systems. Integrated systems tests are tested under various modes, such as fire alarm and emergency situations, life safety conditions, power failure, etc. Systems are integrally operated through all specified sequences of operation. Systems and interconnections are verified to be responding in accordance with the requirements in the Project documents.
 - K. Integrated Systems Testing Procedures: Commissioning protocols and detailed test procedures and instructions in tabular and script-type format that fully describe system configurations and steps required to determine if the interacting systems are performing and functioning properly.
 - L. Operational Testing: Activities and testing occurring after initial energizing and/or start-up of

equipment that determine whether equipment is operating within the manufacturer's recommendations and the design requirements. These activities are intended to ensure that equipment and systems meet all warranty requirements and are ready for functional performance testing. Common examples are TAB of HVAC systems and initial load testing of electrical equipment.

- M. Owner's Project Requirements: A written document that details the functional requirements of a Project and the expectations of how the facility will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.
- N. Project Documents: Consists of the Contract Documents, approved submittals, Requests for Information (RFI), vendor documentation, operations and maintenance information, and other documentation that determines the requirements for acceptable installation and operation of the specific equipment and systems on the Project.
- O. Start-up: The activities where equipment is initially energized, tested, and operated. Start-up is completed prior to operational testing and functional performance testing, and is an integral item documented in the system verification checklist.
- P. System Verification Checklist: A list of static inspections and material or component tests that verify proper installation of equipment (e.g., belt tension, oil levels, labels affixed, gages in place, sensors calibrated, etc.), start-up activities and documentation, as well as operational testing results. The checklists are meant to document all activities for an individual piece of equipment from procurement on the Project through operational testing are performed in accordance with the requirements in the Project documents.
- Q. Training Plan: A detailed plan prepared by Contractor and reviewed by Owner and CxA that outlines the training activities, instructors, time durations, and system requirements in accordance with the Contract Documents and Cx plan.
- R. Trending: Data collection of monitored points using the building automation system, lighting controls system, power status and monitoring system, or independent data acquisition instrumentation.

1.4 COMMISSIONING TEAM

- A. Owner shall appoint the following Members:
 - 1. Owner's project manager and any other designated representatives of Owner's staff.
 - 2. CxA.
 - 3. A/E.
 - 4. TAB Firm – may be subcontracted to the CxA.
- B. Contractor shall appoint the following Members:
 - 1. Individuals, each having authority to act on behalf of the entity they represent, explicitly organized to implement the Cx process through coordinated actions. At a minimum, Contractor shall designate a Cx coordinator and each major subcontractor (MEP, building automation, etc.) shall have a dedicated representative.
 - 2. Vendor representatives (as needed) required for start-up, operational testing, functional performance testing, integrated systems testing, and Owner training activities.
 - 3. Representatives of independent testing agencies (TAB, Electrical Testing Agency, etc.).

1.5 ROLES AND RESPONSIBILITIES

- A. Roles and responsibilities of Cx team members related to the Cx process are provided in this Section. The respective entities defined below shall fulfill the listed roles and responsibilities as contained herein. Specific technical roles and responsibilities are defined in other Sections of the Project Specifications.
- B. Owner's Roles and Responsibilities:
 - 1. Provide guidance in development of Owner's Project requirements.
 - 2. Review technical Specifications containing Cx requirements.
 - 3. Approve the Cx scope of Work and schedule of Cx activities.
 - 4. Assign Owner's representatives and schedule them to participate in Cx activities, including the following:
 - a. Commissioning team meetings.
 - b. Review and approval of the Cx plan, training plan, system verification checklist templates, functional performance test procedures, integrated systems test procedures, deferred testing plans, final Cx process report, systems manual, measurement and verification plan, and other Cx documents.
 - c. Attend Owner training sessions in operation and maintenance of systems and equipment.
 - d. Observation of Contractor's demonstration of systems and equipment operation.
- C. Commissioning Authority's Roles and Responsibilities:
 - 1. Prepare the Cx plan with Owner's and Contractor's review and input.
 - 2. Periodically attend and/or review the proceedings of the regular construction meetings hosted by Contractor to understand the progress of construction activities on the Project.
 - 3. Conduct and document Cx team meetings including the Cx kickoff meeting.
 - 4. Perform site visits as necessary to observe component and system installations prior to energizing or start-up of equipment and systems.
 - 5. Review and comment on product data and shop drawing submittals and coordination drawings applicable to systems being commissioned.
 - 6. Following submittal review and approvals by the A/E team, review the sequences of operation and coordinate with Contractor and A/E team in order to prepare the functional performance test procedures and integrated systems test procedures. Submit to Owner and Contractor for review and comment prior to facilitating functional performance tests and integrated systems tests on the Project.
 - 7. Upon written notice that equipment or systems are ready for initial energizing or start-up, review the progress of the systems verification checklists for the respective systems and components and ensure that all requirements have been completed by Contractor to permit energizing or start-up in accordance with the Project documents; CxA shall issue written notice to Owner and Contractor that equipment is ready to energize or start-up. Commissioning Authority will witness and ensure proper documentation is provided by Contractor for major equipment energizing and start-ups as executed by Contractor with appropriate notice as indicated herein.
 - 8. Witness, verify, and document results of functional performance tests and integrated systems tests.
 - 9. Coordinate resolution of deficiencies identified during site observations, equipment energizing or start-up, functional performance testing, integrated systems testing, deferred testing, and during the warranty period.
 - 10. Review the operations and maintenance documents to ensure that as-built information and correct data is included prior to Owner training sessions; review final operations and maintenance submittal to ensure compliance with the requirements in the Project documents and provide written comments to Owner.
 - 11. Review Contractor's training plan and individual training agendas for compliance with the requirements in the Project documents. Recommend acceptance to Owner prior to Contractor scheduling training sessions with Owner. Review the attendance and content of the training sessions to ensure the requirements of the Project documents

are completed. Conduct a survey of Owner's personnel to evaluate the effectiveness of Owner training.

12. Compile the final Cx process report and submit to Owner for review and approval.

D. A/E's Roles and Responsibilities:

1. Specify control sequences of operation within the Contract Documents that comply with Owner's Project requirements and basis of design.
2. Incorporate Cx requirements into the Contract Documents if requested by Owner.
3. Attend Cx team meetings.
4. Review the Cx plan, system verification checklists templates, functional performance test procedures, integrated systems test procedures, deferred testing plans, and other Cx documents as required by Owner or the Contract Documents.
5. Review Contractor's training plan and provide comments to Owner.
6. Approve technical requirements for correction of deficiencies identified during Cx, deferred tests, and during the warranty period.
7. Review operation and maintenance manuals and provide comments to Owner.

E. Contractor's Roles and Responsibilities:

1. Contractor shall review and provide comments on documents produced by the CxA, and shall accept the Cx plan, system verification checklists, functional performance test procedures, and integrated system test procedures as approved by Owner.
2. Provide an individual, subject to Owner's approval, experienced in construction and Cx of building systems to organize, schedule, conduct, and document Contractor's responsibilities in the Cx process. Contractor shall assign this individual to act as Contractor's Cx coordinator. Contractor's Cx coordinator may have additional duties such as MEP coordinator, but not as project manager or superintendent. Submit qualifications demonstrating the Cx coordinator's technical expertise and experience to Owner for approval. If Contractor chooses to subcontract its Cx obligations, then Contractor must submit the subcontractor's qualifications and personnel to Owner for Owner's approval.
3. Furnish and install systems that meet all requirements of the Contract Documents.
4. Ensure that Cx process activities are incorporated into the master Project schedule. Contractor shall coordinate with the CxA and Owner to determine the required activities, durations, and predecessors.
5. Submit inspection requests, start-up requests, and all supporting documentation in accordance with the Contract Documents, General Conditions, and Cx plan.
6. Cooperate with Owner's representative(s), provide access to work, and provide adequate labor, resources, and time for Cx.
7. Furnish copies of all shop drawings and submittals, manufacturers' literature, maintenance information, and any other information required for the Cx process. Contractor must submit to Owner installation and checkout materials shipped inside equipment and actual field checkout sheet forms used by the factory or field technicians. This requirement does not supersede any additional requirements contained in the Contract Documents.
8. Schedule and conduct pre-installation meetings and pre-commissioning meetings with subcontractors and equipment suppliers related to Cx. Contractor must invite A/E, Owner, and CxA to attend the pre-installation meetings and pre-commissioning meetings.
9. Provide qualified personnel, including subcontractors as required, to fully perform the testing and operational demonstrations required by the Contract Documents and the Cx plan, including any deferred testing or re-testing related to warranty work.
10. Correct deficiencies identified during any stage of the Cx process.
11. Coordinate with the CxA to develop the training plan and submit to Owner for approval. Provide training to Owner's personnel in accordance with the Contract Documents and the approved training plan. Coordinate with Owner to schedule training sessions and coordinate subcontractor/vendor participation in all training sessions.

12. Perform deferred testing and make necessary amendments to operating and maintenance manuals and as-built drawings for applicable issues identified during the deferred testing.
13. Perform system maintenance during construction as specified and recommended by Owner and send the maintenance records to Owner for record.
14. Document the equipment as it arrives onsite to ensure that the submitted and received equipment is correct as it arrives onsite, including the completion of the system verification sections pertaining to the procurement process.

1.6 SYSTEMS TO BE COMMISSIONED

- A. The following systems shall be commissioned according to the process defined in this Section:
 1. Major HVAC Systems (including but not limited to the list below):
 - a. Air handling units.
 - b. Fan coil units.
 - c. Exhaust fans.
 - d. Supply fans.
 - e. Pumps.
 - f. Chillers.
 - g. Boilers.
 2. Terminal units (ten percent [10%] sampling).
 3. Building automation system.
 4. Lighting controls - occupancy sensors (25 percent greater than 25 sensors installed, 100 percent less than 25 sensors installed).
 5. Lighting - daylight controls.
 6. Lighting - time switch controls.
 7. Normal and emergency power systems.

PART 2 PRODUCTS

2.1 COMMISSIONING PLAN

- A. Document developed by the CxA that provides the structure, schedule, and coordination plan for the Cx process from the pre-construction phase through the occupancy phase. The Cx plan shall describe the Project and systems to be commissioned, Cx process activities and deliverables, procedures to follow throughout the process, specific roles and responsibilities for each participant, and general description of testing and verification methods.
- B. The Cx plan shall comply with Owner Project requirements.
- C. The Cx team shall review the Cx plan prior to the pre-commissioning meeting and submit written comments or questions to the CxA to be addressed in the meeting.
- D. Following the pre-commissioning meeting, the CxA shall incorporate all changes discussed and agreed upon in the pre-commissioning meeting and submit the final Cx plan to the Cx team for approval and acceptance.
- E. If changes to the Cx plan are needed during the Cx process, the CxA shall edit the plan and distribute to the Cx team for approval and acceptance.
- F. Contractor's acceptance shall constitute acceptance of all parties subcontracted to Contractor. Contractor shall ensure that all subcontractors and vendors agree and accept the Cx plan.

2.2 SYSTEM VERIFICATION CHECKLISTS

- A. System verification checklists are important to ensure that the equipment and systems are connected and operational and that functional performance testing proceeds without unnecessary delays. These checklists document the inspections and procedures necessary to take a piece of equipment from a static state into an operating state. These checklists augment the manufacturer's start-up checklists to provide a complete document from procurement to the start of functional performance testing when combined.
- B. The CxA shall develop the system verification checklist templates for review by the Cx team. Contractor, appropriate subcontractors, and vendors shall support the CxA in development of system verification checklists for each system and components by providing any necessary supporting documentation as requested by the CxA and reviewing and commenting on the checklist templates in accordance with the Project Specifications and the Cx plan.
- C. Once the checklist templates are reviewed and accepted, the CxA will produce checklists for all equipment and components to be commissioned on the Project utilizing an electronic Cx database that is accessible via web portal or local field tool (i.e., iPad, tablet, laptop, etc.).
- D. The CxA shall provide login access and training to Contractor and other members of the Cx team in the use of the electronic Cx database.
- E. Contractor shall be responsible for completing the required sections of the system verification checklists utilizing the electronic Cx database and providing all supporting documentation via electronic transmittal to the CxA. Additional requirements for completion of the checklists are included in this Section and other technical Sections of the Specifications.
- F. Once equipment arrives on the Project site, Contractor or subcontractors shall begin completing the individual checklists and continue throughout the installation process. The checklists are meant to be progressive and a tool for tracking progress.
- G. Once the system verification checklists are electronically completed, the CxA will review and approve the checklists and supporting documentation and compile the information to include in the final Cx process report.

2.3 FUNCTIONAL PERFORMANCE TESTING PROCEDURES

- A. The purpose of the functional performance testing procedures is to verify and document that the equipment and systems on the project individually perform in accordance with the requirements in the Contract Documents and meet Owner's Project requirements.
- B. The CxA shall develop specific script-type test procedures to verify and document proper operation of each piece of equipment and system. Contractor shall provide any supporting information to the CxA that may be needed including, but not limited to, product submittals, operations and maintenance information, and sequences of operation. Once developed, the CxA will issue to the Cx team for review and comment.
- C. The Cx team shall review the functional performance testing procedures and submit written comments or questions to the CxA. Contractor shall ensure that the subcontractors and any vendors that would be involved with functional performance testing review the procedures and provide comments.
- D. The CxA will coordinate with the Cx team to address any comments and produce the final

functional performance testing procedures for acceptance by the Cx team. Contractor's acceptance shall constitute acceptance of all parties subcontracted to Contractor.

- E. Contractor shall utilize the functional performance testing procedures for any pre-testing activities prior to functional performance testing.

2.4 INTEGRATED SYSTEMS TESTING PROCEDURES

- A. The purpose of the integrated systems testing procedures is to verify and document that all the integrated equipment and systems on the Project perform together in accordance with the requirements in the Contract Documents and meet Owner's Project requirements.
- B. The CxA shall develop specific script-type test procedures to verify and document proper operation of the integrated systems throughout the facility. Contractor shall provide any supporting information to the CxA that may be needed including but not limited to product submittals, operation and maintenance information, and sequences of operation. Once developed, the CxA will issue to the Cx team for review and comment.
- C. The Cx team shall review the integrated systems testing procedures and submit written comments or questions to the CxA. Contractor shall ensure that the subcontractors and any vendors that would be involved with integrated systems testing review the procedures and provide comments.
- D. The CxA shall coordinate with the Cx team to address any comments and produce the final integrated systems testing procedures for acceptance by the Cx team. Contractor's acceptance shall constitute acceptance of all parties subcontracted to Contractor.
- E. The CxA shall also develop the integrated system test personnel matrix that will be utilized to track the individual testing teams involved with the integrated system test. The CxA will distribute the matrix to the Cx team so that Contractor and Owner can assign the appropriate personnel to the appropriate teams.
- F. The CxA shall also host a coordination meeting prior to the integrated system test to review the integrated system test procedures, complete any final coordination, review safety procedures, and answer any questions.
- G. The CxA estimates there will be two integrated system tests on the Project. The first will test the data center systems separately and the second will test the entire facility. Requirements of the testing are included in the respective technical Sections of the Project Specifications.
- H. The integrated systems testing procedures shall be utilized by Contractor for any pre-testing activities prior to official integrated systems testing.

2.5 TRAINING PLAN

- A. Contractor, in coordination with Owner and CxA, shall develop the training plan with Project specific requirements for Owner training, after reviewing the different systems to be installed and commissioned. The purpose of the training plan is to specifically communicate the required content and training durations required by Owner based upon the type of equipment and Owner's experience.
- B. Contractor shall review all of the individual technical sections of this Specification for specific training requirements.
- C. Contractor shall coordinate with Owner to ensure that the proposed training requirements

- meet Owner's needs and expectations.
- D. Contractor shall coordinate with the subcontractors and vendors to ensure Owner training requirements can be achieved and gather any additional information or recommendations.
- E. Any changes to the training requirements in this specification must follow contractual protocols.
- F. The training plan shall include a list of systems and equipment for which training will be provided according to the three-tiered training approach outlined in the Project Specifications.
- G. All training sessions shall have a syllabus indicating the following as a minimum in addition to any other specification requirements:
 - 1. Session objectives.
 - 2. Proposed instructor(s).
 - 3. Instructor qualifications.
 - 4. Training materials that will be provided.
 - 5. Location and durations of the various parts of the training session (i.e., classroom, onsite, etc.).
 - 6. Applicable Specification Sections and operation and maintenance manual sections.
 - 7. Detailed outline of training session content.
- H. Contractor shall coordinate with the CxA to organize the systemic training sessions comparable to the organization of the systems manual.
- I. Owner training must be completed prior to Contractor obtaining Substantial Completion by Owner.

2.6 FINAL COMMISSIONING PROCESS REPORT

- A. The CxA shall prepare the final Cx process report that will include the following:
 - 1. Executive summary.
 - 2. Participants and roles.
 - 3. Brief building description.
 - 4. Overview of Cx and testing scope.
 - 5. General description of testing and verification methods.
 - 6. Appendices with supporting information, issues log, and communications.
- B. Contractor shall coordinate with the CxA to provide any additional information that may be needed to complete the final Cx process report.
- C. Contractor shall resolve any outstanding Cx items prior to the CxA preparing the final Cx report.
- D. The CxA shall issue the final Cx process report to the Cx team for review. Owner shall approve the final Cx process report after any comments or discrepancies are resolved by the CxA.

PART 3 EXECUTION

3.1 PROJECT SCHEDULE

- A. Contractor shall integrate all Cx activities into the detailed Project schedule. All parties will address scheduling problems and make necessary notifications in a timely manner to

expedite the Cx process.

3.2 COMMISSIONING TEAM MEETINGS

- A. Upon obtaining Owner's approval of the Cx plan, the CxA shall coordinate with the Cx team to schedule, plan, and conduct a pre-commissioning meeting with all parties involved in the Cx process. This meeting should include the major subcontractors, specialty manufacturers/suppliers, A/E, TAB Firm, Electrical Testing Agency, and Owner's representatives as participants.
- B. Contractor shall prepare for the pre-commissioning meeting by supplying the following documents created by the CxA to all applicable subcontractors and vendors: Cx plan, example system verification checklists, example functional performance test procedures, and example integrated systems test procedures.
- C. The CxA shall conduct the pre-commissioning meeting and review all aspects of the Cx plan and applicable Specifications.
- D. The Cx plan shall be reviewed with all attendees and the scope of work discussed. Contractor should be prepared to distribute copies of the pertinent sections to the various subcontractors involved in the Cx process.
- E. The outcome of the meeting shall be an understanding of the Cx process, roles and responsibilities, and consensus acceptance of the Cx plan by the Cx team.
- F. Contractor may request additional meetings with the CxA and individual subcontractors to clarify roles, responsibilities, and procedures as needed.

3.3 TEST EQUIPMENT

- A. Contractor shall provide all specialized tools, test equipment, and instruments required to execute start-up, checkout, and testing of equipment.
- B. All specialized tools, test equipment and instruments required to execute start-up, checkout, and testing of equipment shall be of sufficient quality and accuracy to test and/or measure system performance within specified tolerances. A testing laboratory must have calibrated test equipment within the previous 12 months. Calibration shall be NIST traceable. Contractor must calibrate test equipment and instruments according to manufacturer's recommended intervals and whenever the test equipment is dropped or damaged. Calibration tags must be affixed to the test equipment or certificates readily available.

3.4 REPORTING

- A. Beginning at the procurement stage for the equipment included in the Cx scope, Contractor shall communicate at least monthly with all members of the Cx team, keeping them apprised of construction progress and scheduling changes.
- B. Contractor shall submit deficiency reports to Owner within five (5) days of the deficiency occurrence. This includes responses to items noted by the CxA.

3.5 DEFICIENCY RESOLUTION

- A. The CxA shall document any issues noted during observation or testing activities in the CxIL. The CxIL shall be distributed electronically to the Cx team at regular intervals.

- B. Contractor shall respond in writing to the CxA within ten [10] days to all new CxIL items regardless of the disposition. This response does not constitute a request for re-verification, only an acknowledgement of the outstanding item. Contractor should utilize CxIL responses to update the Cx team on the progress of deficiency resolution.
- C. Contractor shall respond to the CxA and Owner indicating CxIL items that are completed and ready for the CxA to verify completion.
- D. If any item indicated complete by Contractor is found to be incomplete by the CxA upon re-verification, Contractor is responsible for all costs and additional compensation resulting from incomplete CxIL items.

3.6 REQUEST FOR ENERGIZING / START-UP OF EQUIPMENT

- A. Owner and/or Owner's representative may install lockout devices on equipment in addition to Contractor's lockout/tagout devices once permanent power is connected to the facility. This lock would be removed once the proper start-up notification is received by Owner and/or the CxA, and the CxA has reviewed the appropriate system verification checklists and supporting documentation to verify the equipment is ready for energizing and/or start-up.
- B. These requirements do not supersede any additional requirements noted elsewhere in the Contract Documents or as required by applicable code authorities.
- C. Contractor shall notify Owner and the CxA in writing to request initial energizing and/or start-up of equipment and systems at least 72 hours (not including weekends or holidays) prior to the scheduled start-up.
- D. Contractor shall complete the applicable sections of the system verification checklists evidencing Contractor's thorough inspection of the system and readiness for start-up activities as required by the Project documents and the Cx plan. Contractor shall submit required supporting documentation to Owner and/or the CxA including, but not limited to, factory testing reports, alignment reports, electrical testing reports and any other documentation required by the Project documents prior to energizing and/or start-up.
- E. The CxA shall review the system verification checklists and supporting documentation within the 72-hour notice period and confirm in writing that the systems and equipment are approved to proceed with energizing and start-up.
- F. The CxA and/or owner may witness equipment energizing and/or start-up at the scheduled time, but witness is not required, unless noted elsewhere in the Specifications, as long as written approval is received as noted herein.
- G. Contractor shall perform start-up under supervision of the responsible manufacturer's representative in accordance with manufacturer's instructions and Project document requirements.
- H. Contractor shall complete all required factory start-up documentation and applicable items in the system verification checklist, prior to startup, to ensure compliance with the requirements in the Project documents.

3.7 OPERATIONAL TESTING

- A. Once the appropriate start-up activities are completed, Contractor shall complete all necessary operational testing requirements included in the Project documents prior to

- functional performance testing. Specific requirements for systems and equipment are included in other technical Sections of the Specifications.
- B. Contractor shall complete all operational testing items in the system verification checklist and submit all supporting documentation to Owner and/or CxA for review.
 - C. Contractor and manufacturer's representatives shall supervise and coordinate adjustments and balancing of all devices and systems for proper operation prior to requesting a functional performance test.
 - D. Contractor shall clearly list outstanding items or system verification checklist items not completed successfully. Contractor shall obtain from subcontractor or vendor completed forms documenting any outstanding deficiencies within five (5) days of completion of energizing and/or start-up activities.
 - E. Contractor shall review completed deficiencies to determine if outstanding items prevent execution of the functional performance tests and shall issue any necessary responses to Owner and/or the CxA.
 - F. Contractor shall notify Owner and CxA in writing to request functional performance testing of equipment and systems at least 72 hours (not including weekends or holidays) prior to the scheduled activities. Owner may require Contractor to reschedule functional performance testing to ensure availability of Owner's representative(s) as needed.
 - G. The CxA shall review the system verification checklists and supporting documentation within the 72-hour notice period and confirm in writing that the systems and equipment are approved to proceed with functional performance testing.
 - H. If any item indicated complete by Contractor is found to be incomplete by the CxA upon re-verification Contractor is responsible for all costs and additional compensation resulting from incomplete system verification checklist items.

3.8 CONTROL POINT AND SENSOR CALIBRATION VERIFICATION

- A. Automation systems installed on the Project must be fully verified for point integrity and sensor calibration prior to functional performance testing. Additional requirements for this verification are listed in other technical Sections of the Specifications.
- B. Contractor shall verify these points according to the requirements in the Project documents as part of start-up and operational testing of systems.
- C. The TAB contractor shall independently verify each sensor and point and document the results to be included in the final TAB report.
- D. The CxA will witness, at their discretion, this verification and/or independently verify and document the results to be included in the final Cx process report.
- E. These activities must be completed prior to Contractor requesting functional performance testing as indicated herein.

3.9 FUNCTIONAL PERFORMANCE TESTING

- A. The objective of functional performance testing is to demonstrate that each system operates according to the requirements in the Project documents and meets Owner's Project requirements and basis of design.

- B. Contractor shall operate, or cause to be operated, each system, device, or equipment item, both intermittently and continuously, for a duration period as indicated in the Specification Section(s) for each item and/or in accordance with the Project documents, the Cx plan and applicable functional performance testing procedures.
- C. Contractor shall operate each component device and each building system to the full extent of its capability, from minimum to maximum, and under automatic control and manual control.
- D. The CxA and members of the Cx team, including Owner's personnel, may observe functional performance testing of equipment components and systems. The CxA shall facilitate the functional performance testing activities according to the accepted functional performance testing procedures and record the results of all testing activities.
- E. The CxA shall record any deficiencies noted during the testing in the CxIL. If significant deficiencies exist, Owner and/or CxA may request that the testing activities be terminated and re-scheduled after proper verification by Contractor. Contractor is responsible for all costs and additional compensation resulting from deficiencies and incomplete systems noted during scheduled functional performance testing.
- F. All functional performance testing of integrated systems must be completed in accordance with the Project documents and the Cx plan prior to Contractor scheduling the integrated systems testing activities.

3.10 INTEGRATED SYSTEMS TESTING

- A. The objective of integrated systems testing is to demonstrate that each integrated system operates jointly and/or independently of other systems according to the requirements in the Contract Documents.
- B. Contractor shall operate each system, jointly and independently of other systems, through selected modes of operation (fire alarm integration with HVAC, emergency power modes, equipment failures among related systems, etc.) according to the accepted integrated systems testing procedures developed by the CxA. The CxA shall facilitate and document the testing, organizing the appropriate testing teams and providing sufficient instruction to all participants to conduct efficient and effective testing activities.
- C. Integrated systems testing typically involves multiple teams with representation from the CxA, Owner, and Contractor. Contractor shall provide any needed communication equipment (i.e., radios) or make available any centralized intercom or paging system for communication with all testing groups.
- D. Contractor shall provide no less than seven (7) days (not including weekends or holidays) notice when requesting to conduct the integrated systems testing. All personnel must be assigned to the personnel matrix by the CxA and a coordination meeting held within the seven (7) day period as prescribed elsewhere in this Section.
- E. Contractor conducts integrated systems testing after all applicable functional performance testing is satisfactorily completed and approved by Owner and/or CxA.
- F. The CxA shall record any deficiencies noted during the testing in the CxIL. If significant deficiencies exist, Owner and/or CxA may request that the testing activities be terminated and re-scheduled after proper verification by Contractor. Contractor is responsible for all costs and additional compensation resulting from deficiencies and incomplete systems noted during scheduled integrated systems testing.

3.11 DEMONSTRATION AND OWNER TRAINING

- A. Contractor, in coordination with Owner and CxA, shall develop the training plan with Project-specific requirements for Owner training as required throughout various Sections of the Project Specifications.
- B. The specific requirements for scheduling and conducting Owner training are included in other sections of this Specification.
- C. Owner training activities shall not occur until the training plan is approved by Owner and Contractor has submitted all operation and maintenance information for review and use during the training sessions.
- D. Contractor shall notify the CxA of all training sessions. Contractor shall record attendance of the training sessions and Owner shall ensure the appropriate personnel are in attendance.
- E. The CxA shall ensure the content of Owner training sessions meets the requirements in the Project documents.
- F. The CxA may conduct surveys of Owner's personnel to gauge the effectiveness of Owner training sessions. If unfavorable surveys are received by Owner's personnel indicating unsatisfactory training, Owner reserves the right to require Contractor to re-train in those specific areas of nonconformance until the requirements in the Project documents are satisfactorily completed.
- G. Owner training must be completed prior to Contractor obtaining substantial completion by Owner.

3.12 DEFERRED / SEASONAL TESTING

- A. All construction phase requirements of the Cx process must be completed prior to Substantial Completion or as indicated elsewhere in this Specification.
- B. If any testing or other requirements cannot be completed prior to Substantial Completion due to the building structure, required occupancy condition, or other condition, performance of such test may be delayed to later in the warranty period, upon approval of Owner. Contractor shall reschedule testing according to the protocols described in this Section and any other operational protocols prescribed by Owner.
- C. Contractor shall complete all outstanding Cx requirements as part of this Contract during the warranty period. Contractor shall schedule all activities with Owner and/or CxA.
- D. The CxA shall document any deferred testing activities and ensure the appropriate Cx documents are updated. Contractor shall provide any additional documentation needed by the CxA to complete these requirements.

END OF SECTION

SECTION 02 41 00 SITE DEMOLITION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section is for the Demolition of the site including but not limited removal of all existing building structures and infrastructure elements noted on the Construction Documents.
- B. Related Sections:
 - 1. Section 01 50 00: Construction Facilities and Temporary Controls.

1.3 REGULATORY REQUIREMENTS

- A. Conform to applicable jurisdictions authority regulations and codes for disposal of debris.
- B. Coordinate clearing Work with utility companies.
- C. Maintain emergency access ways at all times.
- D. Contractor shall comply with all applicable laws and ordinances regarding hazardous materials, including contaminated soils, hazardous material transformers, and similar materials or components.

1.4 SUBMITTALS

- A. Schedule: Submit a detailed sequence of demolition and removal work, including dates for shutoff, capping, and continuance of utility services.
- B. Procedures: Submit written procedures documenting the proposed methods to be used to control dust and noise.

1.5 EXISTING CONDITIONS

- A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.
- B. Conduct demolition to minimize interference with adjacent structures or items to remain. Maintain protected egress and access at all times.

1.06 PROTECTION

- A. Adequate protection measures shall be provided to protect workmen and passers-by on and

off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.

- B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.
- C. Safety Precautions Prevent damage to existing elements identified to remain or to be salvaged and prevent injury to the public and workmen engaged on site. Demolish roofs, walls and other building elements in such manner that demolished materials fall within foundation lines of building. Do not allow demolition debris to accumulate on site. Pull down hazardous work at end of each day; do not leave standing or hanging overnight, or over weekends.
 - 1. Protect existing items which are not indicated to be altered. Protect utilities designated to remain from damage.
 - 2. Protect trees, plant growth, and features designated to remain as final landscaping as shown on drawings.
 - 3. Protect bench-marks from damage or displacement.
- D. Trees: Carefully protect existing trees that are to remain. Provide temporary irrigation as necessary to maintain health of trees.
- E. Fire Safety: The contractor shall conform to chapter 33 of the California Fire Code (CFC), "Fire Safety During Construction and Demolition", at all times during the construction process. A copy of this chapter can be provided.
- F. Any construction review of the Contractor's performance conducted by the Geotechnical Engineer is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.
- G. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. The contractor shall make a reasonable effort on a daily basis to keep all excavations and the site free from water during entire progress of work, regardless of cause, source, or nature of water.
- H. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.
- I. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine conditions of work in place before beginning work; report defects.
- B. Report existence of hazardous materials or unsafe structural conditions.

3.2 PREPARATION

- A. Scheduling:
 - 1. General: Coordinate and schedule demolition work as required by the Owner and as necessary to facilitate construction progress.
- B. Hazardous Materials:
 - 1. General: Identify chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations, and notify such jurisdictional agencies as may be required. Collect and legally dispose of such materials at official disposal locations away from the site.
 - 2. Asbestos: If asbestos or materials containing asbestos are encountered, stop work immediately and contact the Owner. Do not proceed with demolition until directed by Owner.
- C. Utility and Service Termination
 - 1. Locate and identify existing utility, service and irrigation system components affected by work of this contract. Review existing record drawings, conduct site investigations, contact Underground Service Alert and other qualified cable/pipe/line locator services, and implement all other means necessary to define the location of underground systems.
 - 2. Prior to beginning any demolition, properly disconnect all water, gas and electrical power supply at appropriate disconnect locations. Obtain all necessary releases and approvals from serving utility companies.
 - 3. Prior to demolition or disconnect, obtain Owners approval that such system does not impact facilities or systems beyond the extent of this contract.
 - 4. Mark location of disconnected systems. Identify and indicate stub-out locations on Project Record Documents.
- D. Verify that existing plant life and features designated to remain are tagged or identified.
 - 1. The Architect will mark the features, trees, and shrubs to remain within the construction area. Contractor shall not commence clearing and grubbing operations until authorized by the Owner and all protective measures are in place.
- E. Coordinate the time and duration of all system disconnects with Owner.

3.3 DEMOLITION

- A. General Requirements
 - 1. Clear areas required for access to site and execution of Work, including pavements, structures, foundations, vegetation, trash and debris.
 - 2. Coordinate with Owner the time of day and route to remove demolished materials from premises.
 - 3. Remove demolished materials from site as work progresses. Upon completion of work, leave areas of work in clean condition.
 - 4. Remove all buried debris, rubble, trash, or other material not deemed suitable by the Geotechnical Engineer.
 - 5. Fill all voids or excavations resulting from clearing, demolition, or removal of vegetation with specified fill material.
- B. Fixture and Equipment Removal:
 - 1. Remove existing fixtures and equipment as identified and shown on drawings and required by Architect.
 - 2. Verify all service connections to fixtures and equipment designated for removal have been properly disconnected.
 - 3. Remove all conductors from conduit at all abandoned circuits.

3.4 UTILITY AND BUILDING SERVICES REMOVAL AND RE-INSTALLATION

- A. Where crossing paths and potential points of interference with existing utility services are shown or can be reasonably inferred from surface conditions or evidence of subsurface systems, such as meter boxes, vaults, relief vents, cleanouts and similar components.
 - 1. Review all contract documents showing crossing paths and potential points of interference.
 - 2. Pot-hole or determine by other means the accurate depth and location of such utilities.
 - 3. Incorporate all costs required to complete work under this contract, including additional trenching, re-routing of existing and new utilities, and all means necessary to construct work under this contract.
 - 4. No additional cost to the Owner will be allowed for work necessary to accommodate utility conflicts where such crossing paths are shown on contract drawings or can be reasonably inferred from surface conditions or components.
- B. Remove all conductors from conduit at all abandoned electrical circuits.
- C. Seal off ends of all piping, drains and other components as directed by Architect and serving utility.
- D. Where necessary to maintain service to existing utility and building systems, relocate or redirect all conduit and conductors, piping, drains, and associated system components.
 - 1. Re-circuit all electrical as required.
 - 2. Re-circuit all landscape irrigation valving and control systems as required.
 - 3. Temporarily terminate landscape system components in approved boxes or with approved caps, suitable for re-connection or extension.
 - 4. Extend or otherwise modify all site drainage systems, including catch basins, drain inlets and piping. Fine grade to maintain proper drainage flow pattern to drains.
- E. Demolish structure in an orderly and careful manner.
 - 1. Use of explosives prohibited.

3.5 SITE PAVEMENT REMOVAL

- A. Remove sidewalk and curb where required for new construction as specified and as indicated on the Drawings.
 - 1. Remove all paving by saw-cutting.
 - 2. Remove concrete paving and curbing at locations shown on drawings. Locate closest adjacent expansion or weakened plane joint to define start of removal or saw-cutting.
- B. Remove asphalt concrete paving areas where required for new construction as specified and as indicated on the Drawings.
 - 1. Remove all paving by saw-cutting.
 - 2. Remove paving assembly as required to expose subgrade.

3.6 LANDSCAPE AND IRRIGATION SYSTEMS DEMOLITION AND RENOVATION

- A. Clearing, grubbing, and planting demolition.
 - 1. Remove grass and grass roots to a minimum depth of two inches below existing grade.
 - 2. Remove all shrubs, plants and other vegetation within the area of the work unless designated to remain. Grub and remove all roots of all vegetation to a depth of 24 inches below existing grade.
 - 3. Remove only those trees which are specifically designated for removal, or as shown on the drawings, within the construction area. Remove all stumps. Remove root ball and root systems larger than 1 inch in diameter to a depth of two feet below existing or

- finished grades, whichever is lower and a minimum of five feet beyond the edge of paving, structure, wall or walkway.
4. Hand cut existing tree roots over 1 inch in diameter as necessary for trenching or other new construction, apply multiple coats of emulsified asphalt sealant especially made for horticultural use on cut or damaged plant tissues to cut faces and adjacent surfaces. Cover exposed roots with wet burlap to prevent roots from dying out until backfilling is complete.
 5. Disking and mixing of vegetation, trash, debris, and other deleterious materials with surface soils prior to grading is not permitted.
 6. Remove all buried debris, organic material, rubble, trash, or other material not deemed suitable by the Geotechnical Engineer.
 7. Fill all voids or excavations resulting from clearing, demolition, or removal of vegetation with fill material in compliance with Section 31 00 00.
 8. Selected equipment of such sizes and capacities that the existing environment is disturbed as little as possible, and to afford ease of mobility within limited and relatively confined work areas. Make every effort to preserve the topography in its natural state.
 9. Keep drains, catch basins, surface drainage courses and related drainage system components clear of debris and construction materials.
 10. Remove irrigation piping and appurtenances as necessary within area of work, unless noted otherwise to remain. Replace irrigation piping and appurtenances to irrigate new and/or existing landscaping. Contractor shall be responsible for temporary landscape irrigation until such time that irrigation system is restored and operational.

3.7 DISPOSAL

- A. Demolished materials become property of the Contractor and shall be removed from premises, except those items specifically listed to be retained by Owner.
- B. Dispose of all demolished material, trash, debris, and other materials not used in the work in accordance with the regulations of jurisdictional authority.
- C. It is recommended that all materials that are of a recyclable nature, be transported to a suitable legal recycling facility instead of a dump or refuse facility (unless they are one-in-the same).
- D. Burning and Burying of Materials: NOT ALLOWED.
- E. Haul Routes:
 1. Obtain permits as required by jurisdictional agencies. Establish haul routes in advance; post flagmen for the safety of the public and workmen.
 2. Keep streets free of mud, rubbish, etc.; assume responsibility for damage resulting from hauling operations; hold Owner free of liability in connection therewith.
- F. Remove demolished materials and debris from site on a daily basis.

3.8 CLEANING

- A. Upon completion of work of this Section promptly remove from the working area all scraps, debris.
- B. Clean excess material from surface of all remaining paved surfaces and utility structures.
- C. Power wash all concrete surfaces to remove stains, dried mud, tire marks, and rust spots.

END OF SECTION 02 41 00

SECTION 02 41 13 SELECTIVE SITE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Furnishing all labor, materials, and equipment necessary for demolition, dismantling, cutting, and alterations as indicated, specified, and required for completion of the Project, as applicable.
 - 2. Work required to demolish, modify, salvage, relocate, dispose, and convert existing structures, pavements, utilities, fencing, trees and vegetation and miscellaneous items as required for the construction of the improvements as indicated on the Drawings and as specified here-in.
 - 3. Protect all on-site personnel and the public at all areas of demolition.
 - a. Provide traffic control for heavy machinery and equipment used for demolition and construction of indicted items.
 - 4. Complete erosion and dust control measures.
 - 5. Protect, support, and maintain adjoining structure, utilities, site work facilities, and miscellaneous items surrounding the demolition work from damage or harmful effects.
 - a. Where applicable disconnect and cap utilities, electrical wiring and or landscape irrigation as needed to to achieve intent of the project indicated.
 - b. Salvage items to be retained by Owner as indicated o n Drawings or described by the pre-construction job-walk.
 - 6. In accordance with all applicable state and local laws, properly dispose of all hazardous materials as required, obtain EPA generator number from the Owner, and prepare safety plans.
- B. Related Sections. See Related Sections for additional requirements applicable to this Section.
 - 1. Section 01 10 00: Summary.
 - 2. Section 01 40 00: Quality Requirements.
 - 3. Section 01 50 00: Temporary Facilities and Controls.
- C. Referenced Standards:
 - 1. All work to be done in accordance with the City of Modesto Standard Specifications and Plans, where conflicts occur between the City of Modesto Standard Specifications and Plans and the specifications noted herein, the more stringent interpretation shall apply.
 - 2. All work to comply with the 2022 California Building Codes.

1.1 DEFINITIONS

- A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain Owner's property.
- B. Remove and Salvage: Items indicated to be removed and salvaged remain Owner's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to location as directed by Owner's representative.

- C. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse. Store and protect against damage. Reinstall items in locations indicated.
- D. Existing to Remain: Protect construction indicated to remain against damage and soiling during demolition. When permitted by Owner's representative, items may be removed to a suitable, protected storage location during demolition and then cleaned and reinstalled in their original locations.
- E. Replace: Remove and legally dispose of existing item(s) indicated and install new like item(s) that conform to Project Specifications.

1.2 QUALITY ASSURANCE

- A. Comply with the following:
 - 1. Applicable codes, ordinances, and regulations of local, municipal, state, and federal authorities having jurisdiction.
 - 2. Comply strictly to San Joaquin Valley Air Pollution Control District, for dust and pollution control.
 - 3. Obtain necessary permits and notices; post where required.
 - 4. Comply with safety requirements of the local fire department.
 - 5. Comply with ANSI A10.6.
- B. Notify affected utility companies before starting Work and comply with their requirements.
- C. Carefully perform demolition work by skilled workers experienced in building demolition procedures, using appropriate tools and equipment. Perform work, at all times, under the direct supervision of a supervisor approved by Owner.
- D. Coordinate demolition with other trades to ensure correct sequence, limits, and methods of proposed demolition. Schedule work to create least possible inconvenience to the public and to facility operations.
- E. Pre-Demolition:
 - 1. Conduct conference at Project site seven (7) days prior to scheduled installation:
 - a. Conference agenda shall include review and discussion of requirements of authorities having jurisdiction, instructions and requirements of serving utilities, sequencing and interface considerations, and Project conditions.
 - b. Conference shall be attended by supervisory and quality control personnel of Contractor and all subcontractors performing this and directly related work. Submit minutes of meeting to design builder's representative for Project record purposes.
- F. Ownership of Materials:
 - 1. Except for items or materials indicated to be reused, salvaged, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from the site with further disposition at Contractor's option.
- G. Schedule all demolition work to meet the requirements of the drawings and as specified here-in. Minimize disruption to the work of Owner's staff and the public. Exercise due concern and procedures for maintaining plant operation and diligently direct all activities towards maintaining continuous operation of the existing plant and minimizing operation inconvenience.

1.3 DISPOSAL OF MATERIAL REMOVED BY DEMOLITION WORK

- A. Unless noted otherwise all materials removed by demolition work shall become the property

of the Contractor as soon as actual demolition is initiated.

1. The Contractor shall remove demolition materials as soon as possible but in no case shall store materials removed by demolition on the project site longer than 5 working days.
2. Demolition materials other than concrete and soil shall be properly contained in covered waste disposal bins. Concrete and soil shall be tightly stockpiled until removal.

1.4 SUBMITTALS

- A. All submittals shall be in accordance with Section 01 33 00.
- B. Submit letters to the Architect/Owner showing proposed start and finish dates, times, and detailed descriptions of demolition work a minimum of 14 days in advance of such work.

PART 2 PRODUCTS

2.1 PATCHING MATERIALS

- A. NOT USED

PART 3 EXECUTION

3.1 PROTECTION

- A. Maintain free and safe passage for all on-site personnel at all times.
- B. Prevent movement or settlement of structures or surrounding areas scheduled to remain to demolition work. Provide bracing, shoring, and debris barriers as required and assume responsibility for the safety and support of affected structures.
- C. Protect existing finishes, equipment, and adjacent work which remains from damage. Cut finish surfaces such as masonry, tile, plaster, wood, gypsum wallboard, concrete, or metals by methods which will terminate or join work in a straight line at an appropriate construction joints or otherwise point of division. Pre-determine exact location at the pre-construction job walk.
- D. Protect existing vegetation, landscaping and irrigation systems scheduled to remain.
- E. Cease operations and notify the Architect/Owner immediately if the safety of any structure or utility appears to be endangered. Take additional precautions to properly support such structure(s) and do not resume demolition operations until safety is restored.
- F. Utility locations shown on the Drawings are approximate and may vary from where they are shown. The Contractor shall contact Underground Service Alert (800-642-2444) and obtain field marking to determine the exact locations of utilities owned by local agencies. Record, preserve and protect the field markings.
- G. Blasting and the use of explosives shall not be permitted for any demolition work.
- H. Promptly repair any damage caused to facilities or landscaping by demolition operations as at no additional cost to the Owner. The minimum quality of repair shall be equal to that which existed prior to the start of work.

3.2 SEQUENCE OF WORK

- A. The sequence of demolition and the modifications of existing facilities shall be in accordance with Section 01 32 00.
- B. The Contractor shall mark all facility components to be demolished in advance of demolition to permit Architect/Owner review. The purpose of this requirement is to provide an opportunity to avoid unnecessary or erroneous demolition. The Contractor remains responsible for demolition as indicated and specified in the Contract Documents.
- C. The Contractor shall schedule a meeting and meet with the Architect/Owner at the site of the proposed demolition in advance of the start of demolition. Contractor shall ensure that subcontractors are present if necessary or requested by the Architect/Owner.

3.3 REMOVAL AND ABANDONMENT OF BURIED PIPING

- A. Unless specifically noted on the Drawings to be abandoned-in-place, all abandoned buried piping shall be excavated and removed from the site.
- B. Piping specifically noted to be abandoned-in-place shall have each open end filled with concrete grout to a minimum distance of 5 feet or 5 pipe diameters, whichever is greater, unless otherwise specified or shown.

3.4 CLEAN-UP

- A. The Contractor shall remove from the site all debris resulting from the demolition operations as it accumulates and at least 2 times a week. Upon completion of the immediate demolition work, the Contractor shall thoroughly clean each area, including dusting, vacuuming, sweeping, and window cleaning.
- B. The Contractor is to maintain a clean and orderly site at all time. Including and limited to providing the need to have emergency vehicles access to the site to cover any and all emergency operations or recovery.

END OF SECTION #

SECTION 03 10 00 CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section is related to concrete forming and accessories and includes:
 - 1. Formwork for cast-in-place concrete, with shoring, bracing, and anchorage.
 - 2. Installation of items to be embedded in concrete, such as anchor bolts, inserts, embeds, and sleeves.
 - 3. Openings for other work.
 - 4. Form accessories.
 - 5. Form stripping.
- B. Related Sections:
 - 1. Section 03 20 00: Concrete Reinforcing.
 - 2. Section 03 30 00: Cast-in-Place Concrete.
- C. Reference Standards:
 - 1. ACI 117 Standard Specifications for Tolerances for Concrete Construction and Materials.
 - 2. ACI 301 Specifications for Structural Concrete.
 - 3. ACI 318-14 Building Code Requirements for Structural Concrete and Commentary.
 - 4. ACI 347 Guide to Formwork for Concrete.
 - 5. National Institute of Standards and Technology - PS 1 Structural Plywood
 - 6. 2022 California Building Code.
 - 7. 2022 California Building Code, Title 24 CCR, Chapter 19A.
 - 8. APA American Plywood Association Design and Construction Guide. PS 1-109 Structural Plywood.
 - 9. Local AQMD – San Joaquin Valley Air Pollution District.

1.3 SUBMITTALS

- A. See Section 01 33 00: Submittal Procedures.
- B. Product Data: Provide data on void form materials and installation requirements.
- C. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties. Review and approval will not include form strength and adequacy.
- D. Keep an accurate record of the dates of removal of forms, form shores and reshores, and furnish copies to the SEOR.

1.4 QUALITY ASSURANCE

- A. Comply with the pertinent provisions of Section 01 40 00: Quality Requirements.
- B. Construct forms according to ACI 347, "Guide to Formwork for Concrete," and conforming to

tolerances of ACI 117, "Standard Specifications for Tolerances for Concrete Construction and Materials."

- C. Designer Qualifications: Design formwork under direct supervision of a Professional Structural Engineer experienced in design of concrete formwork and licensed in California.
- D. Maintain one copy of each installation standard on site throughout the duration of concrete work.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00: Product Requirements, delivering materials in a timely manner to ensure uninterrupted progress.
- B. Store prefabricated forms off ground in ventilated and protected manner to prevent deterioration from moisture.
 - A. Deliver void forms and installation instructions in manufacturer's packaging.
 - B. Store void forms off ground in ventilated and protected manner to prevent deterioration from moisture.

PART 2 PRODUCTS

2.1 FORMWORK - GENERAL

- A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.
- B. Design and construct to provide resultant concrete that conforms to design with respect to shape, lines, and dimensions.
- C. Comply with applicable state and local codes with respect to design, fabrication, erection, and removal of formwork.
- D. Comply with relevant portions of ACI 347, ACI 301, and ACI 318.

2.2 WOOD FORM MATERIALS

- A. Softwood Plywood: PS 1, B-B Medium or High Density Concrete Form Overlay, Class I, grade marked, not mill oiled.
- B. Lumber: DF species; WCLIB Construction grade or better, WWPA No. 1 grade or better; with grade stamp clearly visible.

2.3 REMOVABLE PREFABRICATED FORMS

- A. Void Forms: Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set; two inches (2") thick.

2.4 FORMWORK ACCESSORIES

- A. Form Ties: Prefabricated rod, flat band, wire, internally threaded disconnecting type, or equal, not leaving metal within 1-1/2 inches of concrete surface.

- B. Form Release Agent:
 - 1. Capable of releasing forms from hardened concrete without staining or discoloring concrete or forming bug holes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied:
 - a. Composition: Colorless reactive, mineral oil-based, soy-based, or vegetable oil-based compound.
 - b. Do not use materials containing diesel oil or petroleum-based compounds.
 - c. VOC content: In compliance with applicable local, state, and federal regulations.
- C. Embedded Anchor Shapes, Plates, Angles and Bars: As specified in Section 05 12 00: Structural Steel Framing.

2.5 PREFABRICATED FORMS

- A. Tubular Column Type: Round, spirally wound laminated fiber material, surface treated with release agent, non-reusable, of sizes indicated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify lines, levels, and centers before proceeding with formwork. Ensure that dimensions agree with Drawings.

3.2 EARTH FORMS

- A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete. Sides of all footings and grade beams shall be formed, unless the member detail provides at least three inches (3") clear cover to reinforcement and indicates the member is cast against earth. Remove formwork prior to backfilling operations.

3.3 ERECTION - FORMWORK

- A. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301.
- B. Rigidly construct forms to prevent mortar leakage, sagging, displacement, or bulging between studs. Use clean, sound, approved form material, coated with specified materials only, not oil. Provide backing on all plywood joints.
- C. Coat forms with the specified resin coating, not form oil. Construct forms to exact shapes, sizes, lines, and dimensions required to obtain level, plumb, and straight surfaces. Provide openings, offsets, keys, reglets, anchorages, recesses, moldings, chamfers, blocking, screeds, drips, bulkheads, and all other required features. Make forms easily removable without hammering or prying against concrete. Space forms apart with metal spreaders. Construct forms to accurate alignment, locations, and grades, and provide against sagging, leakage of concrete mortar, or displacement occurring during and after placing of concrete. Coordinate installation of inserts and anchors in forms according to shop drawings and requirements for Work of other Sections.
- D. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- E. Corners and angles: Provide 3/4-inch by 3/4-inch beveled chamfer strips for all exposed

concrete corners and angles square unless indicated otherwise.

- F. Reglets and Rebates: Form required reglets and rebates to receive frames, flashing, and other equipment. Obtain required dimensions, details, and precise positions for Work to be installed under other Sections and form concrete accordingly.
- G. Form Joints: Align joints and make watertight. Keep form joints to a minimum. Fill joints to produce smooth surfaces, intersections, and arises. Use polymer foam or equivalent fillers at joints and where forms abut or overlap existing concrete to prevent leakage of mortar.
- H. Recesses, Drips, and Profiles: Provide smooth milled wood or pre-formed rubber or plastic shapes of types shown and required.
- I. Cleanouts and Cleaning: Provide temporary openings in all wall forms and other vertical forms for cleaning and inspection. Clean forms and surfaces to receive concrete prior to placing.
- J. Re-Use: Clean and recondition form material before re-use.

3.4 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. All necessary pipe sleeves, anchors, or other required inserts shall be accurately installed as part of the work of other Sections, according to Section 03 30 00: Cast-In-Place Concrete, for submittal requirements related to this scope.
- B. Obtain approval before framing openings in structural members that are not indicated on Drawings.
- C. Provide formed openings where required for items to be embedded in passing through concrete work.
- D. Locate and set in place items that will be cast directly into concrete.
- E. Conduits or Pipes:
 - 1. Locate so as not to reduce strength of the concrete.
 - 2. Do not place pipes, other than conduits, in a slab 4-1/2 inches thick or less in any case. Conduit buried in a concrete slab shall not have an outside dimension greater than 1/3 the slab thickness nor be placed below the bottom reinforcing or over the top reinforcing.
 - 3. Sleeves: Pipe sleeves may pass through the slab or walls if not exposed to rusting or other deterioration and are of uncounted or galvanized iron or steel. Provide sleeves of diameter large enough to pass any hub or coupling on pipe, including any insulation.
 - 4. Conduits may be embedded in walls only if the outside diameter does not exceed 1/3 the wall thickness, are spaced no closer than three (3) diameters on centers, and not

impair the strength of the structure.

- F. Coordinate with work of other Sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.
- G. Install accessories in accordance with manufacturer's instructions so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- H. Install waterstops in accordance with manufacturer's instructions, so they are continuous without displacing reinforcement. Heat seal joints so they are watertight.
- I. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- J. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fit so joints will not be apparent in exposed concrete surfaces.

3.6 FORM CLEANING

- A. Clean forms as erection proceeds to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.

3.7 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 117, unless otherwise indicated.
- B. Deflection: Limit deflection of forming surfaces from concrete pressure to $L/240$.
- C. Finish Lines:
 - 1. Position formwork to maintain hardened concrete finish lines within following permissible deviations:
 - a. Variation from plumb:

In 10'-0"	1/4 inch
In any story or 20'-0"	3/8 inch
In 40'-0" or more	3/4 inch
 - b. Variation from level or grades indicated:

In 10'-0"	1/4 inch
In any story or 20'-0"	3/8 inch
In 40'-0" or more	3/4 inch
 - c. Cross-sectional dimensions:

Minus	1/4 inch
Plus	1/2 inch

3.8 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00: Quality Requirements.
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.

3.9 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own

weight and all superimposed loads as determined by testing field cured cylinders, but not sooner than specified in ACI 347. Load supporting forms may be removed when concrete has attained 75 percent of required 28-day compressive strength, but no sooner than three (3) days, provided construction is reshored. Vertical formwork for cast-in-place concrete walls may be removed no sooner than one (1) day following concrete placement, provided that Contractor can demonstrate that no sloughing or sagging of concrete will occur:

1. Reshore structural members as specified per ACI 347.
 2. Remove formwork progressively so unbalanced loads are not imposed on the structure.
 3. Avoid damage to concrete surfaces during removal.
 4. Remove formwork in same sequence as concrete placement to achieve similar concrete surface coloration.
- B. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- C. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- D. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged form.

END OF SECTION 03 10 00

SECTION 03 20 00 CONCRETE REINFORCING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section is related to concrete reinforcement and includes:
 - 1. Reinforcing steel for cast-in-place concrete foundations.
 - 2. Reinforcing steel for cast-in-place concrete slabs-on-grade.
 - 3. Supports and accessories for steel reinforcement.
- B. Related Sections:
 - 1. Section 03 10 00: Concrete Forming and Accessories.
 - 2. Section 03 30 00: Cast-in-Place Concrete.
- C. Reference Standards:
 - 1. ACI 301 Specifications for Structural Concrete.
 - 2. ACI 318 Building Code Requirements for Structural Concrete and Commentary.
 - 3. ACI SP-066 ACI Detailing Manual.
 - 4. ASTM A615/A615M Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - 5. ASTM A706/A706M Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.
 - 6. ASTM A775/A775M Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
 - 7. ASTM D3963/D3963M Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars.
 - 8. AWS D1.4 Structural Welding Code - Reinforcing Steel.
 - 9. CRSI Concrete Reinforcing Steel Institute Manual of Standard Practice.
 - 10. CRSI Concrete Reinforcing Steel Institute Placing Reinforcing Bars.

1.3 SUBMITTALS

- A. See Section 01 33 00: Submittal Procedures.
- B. Shop Drawings:
 - 1. Comply with requirements of ACI SP-066. Include the following:
 - a. Complete bar layout.
 - b. Representative sections.
 - c. Details for congested conditions.
 - d. Proposed layout where vertical and horizontal bars intersect.
 - e. Bar schedules.
 - f. Typical bending diagrams and offsets.
 - g. Shapes of bent bars.
 - h. Spacing of bars.
 - i. Splice lengths and locations.
- C. Where welding is proposed:
 - 1. Detail welding to conform to AWS D1.4.

2. Submit copies of welding operator's certificate.
 3. Where reinforcement complying with ASTM A615 is to be welded, chemical tests shall be performed to determine the weldability in accordance with ACI 318.
 4. Weld procedure specifications (WPS):
 - a. All WPS's shall be submitted to the Structural Engineer of Record (SEOR) for review and approval prior to use.
 - b. For WPS's that have been qualified by test, the supporting Procedure Qualification Record (PQR) shall be submitted to the SEOR for review and approval.
 - c. Included shall be WPS for repair welds.
- D. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

1.4 QUALITY ASSURANCE

- A. Comply with the pertinent provisions of Section 01 40 00: Quality Requirements.
- B. Perform work of this Section in accordance with ACI 301.
- C. Welders' Certificates: Submit certifications for welders employed on the Project, verifying AWS qualification within the previous 12 months.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00: Product Requirements, delivering materials in a timely manner to ensure uninterrupted progress.
- B. Bundle bars, tag with identification, and transport and store so as not to damage any material. Use metal tags indicating size, length, and other marking shown on placement drawings. Maintain tags after bundles are broken.
- C. Avoid exposure to dirt, moisture, or conditions harmful to reinforcement.
- D. Extra Material:
 1. Provide an allowance of an additional ten percent (10%) of the total reinforced steel tonnage in addition to the quantities shown on the Drawings. This additional steel shall be installed in sizes and locations as directed by the structural Engineer.

PART 2 PRODUCTS

2.1 REINFORCEMENT

- A. Reinforcing Steel:
 1. ASTM A615/A615M, Grade 60 (60,000 psi):
 - a. Deformed billet-steel bars.
 - b. Unfinished.
 - c. Only to be used for conditions where bars will not be welded.
- B. Reinforcing Steel:
 1. ASTM A706/A706M, Grade 60 (60,000 psi) deformed low-alloy steel bars:
 - a. Unfinished.
 - b. Used in all cases where welding of bars is required.
- C. Reinforcement Accessories:
 1. Tie wire: ASTM A1064, annealed copper bearing steel, minimum 16 gage, 0.0508 inch.
 2. Chairs, bolsters, bar supports, spacers:

- a. Sized and shaped for adequate support of reinforcement during concrete placement. Standard manufactured products shall conform to the Concrete Reinforcing Institute Manual of Standard Practice, latest edition.
- 3. Use dense precast concrete supports with embedded wire ties for reinforcement placed on grade. Elsewhere, use wire bar supports.
- D. Welding electrodes: AWS D1.4, Table 5.1 and 5.3, low hydrogen electrodes, E8018 for Grade 60 steel.

2.2 REBAR SPLICING

- A. Coupler Systems: Mechanical devices for splicing reinforcing bars conforming to the requirements of ACI 318; capable of developing 1.25fy of the steel reinforcing yield strength in tension and compression.
- B. For reinforcement, all mechanical splices in Special Structural Walls, Special Moment Frames, and Concrete Diaphragms shall be Type 2, conforming to the requirements of ACI 318, capable of developing 1.25fy of the steel reinforcing yield strength in tension and compression, and develop the specified tensile strength of the spliced bar:
 - 1. Products:
 - a. Dayton Superior Corporation; Bar Lock Coupler System: www.daytonsuperior.com (ICC-ESR 2481).
 - b. Lenton Lock Couplers (IAPMO-ES 129).
- C. Dowel Bar Splicer with Dowel-Ins:
 - 1. Mechanical devices for connecting dowels; capable of developing full steel reinforcing design strength in tension and compression.
 - a. Products:
 - 1) Dayton Superior Corporation; Dowel Bar Splicer D101A with Straight Dowel-In: www.daytonsuperior.com.
 - 2) Lenton Form Savers (IAPMO-ES 129).

2.3 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI - Manual of Standard Practice.
- B. Bending and Forming:
 - 1. Fabricate bars of the indicated sizes and bend and form to required shapes and lengths by methods not injurious to materials.
 - 2. Do not heat reinforcement for bending.
 - 3. Bend bars No. 6 size and larger in the shop only.
 - 4. Bars with unscheduled kinks or bends are subject to rejection.
 - 5. Use only tested and approved bar materials.
- C. Welding:
 - 1. Use only ASTM A706 steel where welding is proposed:
 - a. Perform welding where shown or approved, by the direct electric arc process in accordance with AWS D1.4 using specified low hydrogen electrodes.
 - b. Preheat six inches (6") each side of joint.
 - c. Protect joints from drafts during the cooling process; accelerated cooling is prohibited.
 - d. Do not tack weld bars.
 - e. Welding shall not be done on or within two (2) bar diameters of any bent portion of a bar that has been bent cold.
 - f. Welding of crossing bars shall not be permitted for assembly reinforcement unless

- authorized by the SEOR.
- g. Clean metal surfaces to be welded of all loose scale and foreign material.
 - h. Clean welds each time electrode is changed and chip burned edges before placing welds.
 - i. When wire brushed, the completed welds must exhibit uniform section, smooth welded metal, feather edges without undercuts or overlays, freedom from porosity and clinkers, and good fusion and penetration to the base metal.
 - j. Cut out welds or parts of welds found defective with chisel and replace with proper welding.
 - k. Fillet welds may be considered prequalified per AWS D1.4.
 - l. Other welds are to be qualified per AWS D1.4.
- D. Where ASTM A615 steel is to be used or occurs in existing elements and is to be welded:
- 1. Complete chemical analyses shall be performed to determine chemical composition and, for a new bar, provided in the mill certifications to determine weldability in accordance with ACI 318 with modifications per AWS D1.4.
 - 2. The carbon equivalency (CE) shall be clearly defined and bars with a CE above 0.75 shall not be welded.
 - 3. Welding Procedure Specifications and supporting PQRs with required testing per AWS D1.4 shall be provided for review and approval prior to welding.
 - 4. These WPS and PQRs shall be specific to the CE as determined above, and shall, in addition to the other AWS requirement, include minimum and maximum preheat and interpass temperatures that are specified to the CE. This preheat and interpass temperature shall be strictly enforced in the field.
 - 5. If separate shipments of bars vary the weldability, the process listed in the above requirements shall be repeated for these new bars.
- E. Locate reinforcing splices not indicated on Drawings at point of minimum stress. Review locations of splices with SEOR.
- F. Bar support shall be concrete or metal chairs, spacers or hangers. Reinforcing bars shall not be supported by forms.
- G. Bar supports shall be provided for reinforcing at slabs on grade also. No lifting of bars into place as the concrete is being poured.

PART 3 EXECUTION

3.1 PLACEMENT

- A. Before placing bars, and again before concrete is placed, clean bars of loose rust and/or mill scale, dirt, oil, or any other coating that may be deleterious or could reduce bond with the concrete.
- B. Securing in place:
- 1. Accurately place bars and wire tie in precise position where bars cross.
 - 2. Bend ends of wire ties away from the forms.
 - 3. Wire tie bars to the corners of ties and stirrups.
 - 4. Support bars according to the Concrete Reinforcing Steel Institute (CRSI) "Placing Reinforcing Bars," using approved accessories and chairs.
 - 5. Place precast concrete cubes with embedded wire ties to supporting reinforcing steel bars in concrete placed on grade and in footings.
 - 6. Take adequate precautions to ensure that reinforcing bar position and spacing is maintained during concrete placement.

- C. Do not displace or damage vapor barrier.
- D. Maintain concrete cover around reinforcing per requirements on Drawings.
- E. Splices:
 - 1. Do not splice reinforcing bars at the points of maximum stress except where indicated.
 - 2. Lap splices as shown or required to develop the full strength or stress of the bars.
 - 3. Stagger splices in horizontal wall bars at least 48 inches longitudinally in alternate bars and opposite faces.
 - 4. Splice bars only at locations shown on the drawings. Where splices are not detailed, lap bars using a Class B lap as defined in ACI 318 and stagger adjacent splices 48 bar diameters minimum unless otherwise noted.
- F. Joints:
 - 1. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - a. Place joints perpendicular to main reinforcement.
 - b. Continue reinforcement across construction joints unless otherwise indicated
- G. Field Welding: As specified for fabrication.

3.2 FIELD QUALITY CONTROL

- A. Comply with all pertinent provisions of Section 01 40 00: Quality Requirements.
- B. Supervision: Perform Work to this Section under supervision of a capable superintendent.
- C. An independent testing agency, as specified in Section 01 40 00: Quality Requirements, shall inspect installed reinforcement for conformance to Contract Documents before concrete placement.
- D. Where welding is done in the shop or at the site, perform welding of reinforcing bars under inspection of the testing laboratory welding inspector in accordance with Chapter 17 of the CBC. The welding inspector shall make a systematic record of all welds:
 - 1. Identification marks of welders.
 - 2. List of defective welds.
 - 3. Manner of correction of defects:
 - a. The welding inspector shall check the material, equipment details of construction and procedures, as well as the welds. The inspector shall check the ability of the welder. The welding inspector shall furnish the structural Engineer and the enforcement agency with a verified report that the welding required to be inspected is proper and has been done in conformity with the approved Plans and Specifications. The welding inspector shall use all means necessary to determine the quality of the weld. The inspector may use gamma ray, magnaflux, trepanning, sonics, or any other aid to visual inspection, which the inspector may deem necessary to assure the adequacy of the welding.

END OF SECTION 03 20 00

SECTION 03 30 00 CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Footings and foundation walls.
 - 2. Interior slabs-on-grade.
 - 3. Exterior slabs-on-grade.
 - 4. Concrete filled floor deck.
 - 5. Concrete stairways and elevated Landings.
- B. Related Sections:
 - 1. 03 10 00 Concrete Forming and Accessories
 - 2. 03 20 00 Concrete Reinforcing

1.3 DEFINITIONS

- A. Cementitious Materials:
 - 1. Portland cement alone or in combination with one or more of the following, subject to compliance with requirements:
 - a. Blended hydraulic cement.
 - b. Fly ash and other pozzolans.
 - c. Ground granulated blast-furnace slag.
 - d. Silica fume.
- B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Shop Drawings:
 - 1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - a. Location of construction joints is subject to approval of the Architect.

- E. Certificates: Weighmaster's certificates.
- F. Material Certificates:
 - 1. For each of the following, signed by manufacturers:
 - a. Cementitious materials
 - b. Admixtures.
 - c. Waterstops.
 - d. Curing materials.
 - e. Floor and slab treatments.
 - f. Bonding agents.
 - g. Adhesives.
 - h. Vapor Barriers.
 - i. Semi-rigid joint filler.
 - j. Joint-filler strips.
 - k. Repair materials.
- G. Material Test Reports:
 - 1. For the following, from a qualified testing agency, indicating compliance with requirements:
 - a. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
 - b. Vapor Barrier: Provide third party documentation that all testing was performed on a single production roll and a summary of test results per ASTM E1745 Section 8.1.
- H. Concrete Contractor's Certification
 - 1. Provide ACI floor finisher certification documents for at least three finishers who will be installing slab placements.
- I. Concrete Batch Plant Certifications. Name and address of the concrete supplier's batch plant and plant certifications by National Ready-Mix Concrete Association and/or State Department of Transportation.
- J. Concrete Mix Design: Fill out and submit attached Concrete Mix Design Submittal Form for interior slabs. Submit only one form indicating same mix design proportions for all interior slabs concrete.
 - 1. Submit complete information.
 - 2. Submit only one mixture design indicating same mix design for all interior slabs.
- K. Slab Joint and Placement Plan:
 - 1. Provide a pour plan identifying the following:
 - a. Exterior walls and column grid locations.
 - b. Extent of pours including width, length, slab placement area and volume.
 - c. Locations of construction joints.
 - d. Location of sawn contraction joints if different from those shown or if not shown on the drawings.
 - 2. Slab joint and placement plan shall be developed and submitted on a full-sized copy of the Architectural Floor Plan.
- L. Pre-Slab Installation Meeting
 - 1. Provide record of notification of pre-slab meeting including company name, persons contacted, and date and method of contact.
 - 2. Provide meeting minutes to all participants and CUSD Construction Manager including sign-in sheet.

- M. Delivery Tickets:
 - 1. Copies of delivery tickets for each load of concrete delivered to site.
 - 2. Indicate on each ticket information required by ASTM C94 including additional information required for slabs.
 - 3. Information on ticket shall include quantities of all material batched including the amount of free water in the aggregate and the quantity of water that can be added at the site without exceeding the maximum water cement ratio of the approved mix design. Aggregate moisture corrections shall be based on ASTM definitions of aggregate moisture content and absorption.
 - 4. Mix identification number on ticket shall match number on submitted and approved mix design.
- N. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- O. Warranty:
 - 1. Vapor barrier manufacturer written warranty citing (a) compliance with the designated ASTM E1745 classification, and (b) no manufacturing defects in the product for, at least, **5** years

1.5 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:
 - a. CBC 2022 California Building Code (CCR Title 24, Part 2, as adopted and amended by DSA).
 - b. American Concrete Institute (ACI) Publications:
 - 1) Comply with the following unless modified by requirements in the Contract Documents:
 - a) ACI 301, "Specifications for Structural Concrete."
 - b) ACI 117, "Specification for Tolerances for Concrete Construction and Materials and Commentary."
 - c) ACI 302.1R, "Guide to Concrete Floor and Slab Construction."
 - d) ACI 302.2R, "Guide for Concrete Slabs that receive Moisture-Sensitive Flooring Materials."
 - e) ACI 305R, "Guide to Hot Weather Concreting."
 - f) ACI 306R, "Guide to Cold Weather Concreting."
 - g) ACI 318, "Building Code Requirements for Structural Concrete and Commentary."
- B. Floor Finisher Qualifications (For placements larger than 10,000 square feet.):
 - 1. The concrete floor finishing subcontractor Lead Finisher and at least two additional members of the finishing crew shall be certified under the Concrete Flatwork Finisher Training and Certification Program as granted by the American Concrete Institute and shall be present during finishing.
 - 2. The concrete floor finisher subcontractor shall have experience in finishing interior floors of similar size and scope in at least 5 previous projects.
- C. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.
- D. Concrete Supplier Approval
 - 1. The concrete supplier shall be fully approved and acceptable by the concrete subcontractor as the producer of concrete for which the subcontractor is to place and finish. Prepare Statement of Approval of Concrete Supplier stating project name, name of concrete supplier, along with the statement of approval and the signatures of the Contractor and concrete floor subcontractor. Submit statement as specified in

Submittals paragraph above

- E. Manufacturer Qualifications:
 - 1. A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment:
 - a. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- F. District will employ Concrete Oversight Management (COM) services for this project.
- G. Source Quality Control: Furnish Weighmaster's certificates for all concrete.
- H. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."
- I. Concrete Testing Service: Engage a qualified independent testing agency approved by DSA to perform material evaluation tests and to design concrete mixtures.
- J. Installation of vapor barrier shall be in accordance with ASTM E1643 and manufacturer's installation guides and recommendations. Provide Architect written site reports from manufacturer's field service representative, indicating observation of vapor barrier installation prior to concrete placement.
- K. Workmanship:
 - 1. Remove and replace or repair concrete related work which does not conform to specified requirements including strength, tolerances and finishes as directed by Owner.
 - 2. Contractor shall be responsible for cost of corrections or delays to other work affected by, or resulting from, corrections to concrete Work.
 - 3. If results of compressive strength tests reveal deficiencies in concrete, meet requirements of ACI 301.
- L. Concrete Plant Certification: Certify primary and secondary plants proposed for furnishing concrete as being approved at highest level by NRCMA and by Department of Transportation in State where project is located.

1.6 MEETINGS

- A. Pre-construction concrete slab Installation:
 - 1. Plan, host, and attend a pre-slab installation meeting to be conducted at site by Architect and CUSD Concrete Oversight Management team (CUSD COM).
 - 2. Schedule meeting approximately 14 days prior to first concrete slab installation and after all concrete submittals have been submitted and approved.
 - 3. Require responsible representatives of each party involved with the concrete slab work to attend the meeting. Representatives to be present shall include personnel who are directly involved in overseeing the work and who have authority to control the concreting work.
 - 4. Notify all required attendees in writing of scheduled time and place at least two weeks in advance of meeting. Include copy of agenda with invitation.
 - 5. The meeting shall convene only when all parties are present.
 - 6. Minutes of the meeting shall be recorded, typed, printed, and distributed to all parties concerned by the General Contractor within 5 days of the meeting. One copy of the minutes shall also be transmitted to the Owner's representative for information purposes.
 - 7. Attendees shall include, but not be limited to the following:
 - a. CUSD Construction Manager
 - b. CUSD Consultant

- c. CUSD COM
- d. Architect
- e. General Contractor
 - 1. Project manager
 - 2. Superintendent (present during all slab placements)
- f. Concrete Subcontractor
 - 1. Project manager
 - 2. Finish Foreman (present during all slab placements)
- g. Concrete floor polishing subcontractor
- h. Concrete Supplier
 - 1. Quality Assurance Representative (present during all slab placements)
- i. CUSD testing agency representative (present during all slab placements)
- 8. Changes to the contract documents from recommendations or discussions at the Pre-Construction meeting shall be approved in writing by the CUSD Construction Manager/Architect prior to implementation. CUSD COM is not authorized to change any specified requirement or to approve execution of any portion of the work.
- 9. Initial orientation meeting to discuss overall expectations, responsibilities, best practices, tolerances, coordination of trades, testing procedures and responsibilities, and specifics on how the Concrete Oversight Management (COM) team will coordinate and operate along with the GC, concrete contractor, project manager, Architect, etc..
 - a. Coordinate the work with other related work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
 - c. Prior to submitting design mixes, review detailed requirements for preparing concrete design mixes and determine procedures for satisfactory concrete operations.
 - d. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
 - e. Prior to submitting design mixes, review detailed requirements for preparing concrete design mixes and determine procedures for satisfactory concrete operations.
 - f. Review requirements for submittals, status of coordinating work, and availability of materials.
 - g. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications.
 - h. Coordination with Curing Agent and Polished Concrete installers.
- 10. Review the following:
 - a. Procedures for CUSD Concrete Oversight Management team
 - b. Special inspection and testing and inspecting agency procedures for field quality control.
 - c. Construction joints, control joints, isolation joints, and joint-filler strips.
 - d. Semirigid joint fillers.
 - e. Vapor-retarder installation.
 - f. Anchor rod and anchorage device installation tolerances.
 - g. Cold and hot weather concreting procedures.
 - h. Concrete finishes and finishing.
 - i. Curing procedures.
 - j. Forms and form-removal limitations.
 - k. Shoring and reshoring procedures.
 - l. Methods for achieving specified floor and slab flatness and levelness.
 - m. Floor and slab flatness and levelness measurements.
 - n. Concrete repair procedures.
 - o. Concrete protection.

- B. Pre-pour meetings: (Conduct pre-pour meetings prior to each and every pour)
 - 1. Discuss plan for the upcoming pour.
 - a. Discuss and approve pour sequencing.
 - b. CUSD COM must approve.
 - c. Address joint placement if any changes or concerns arise.
 - d. Trade coordination.
 - e. Discuss any other concerns for upcoming pour such as weather, etc.
 - 2. Review previous pour results.
 - a. Ff/FI reports.
 - b. Any other test results needing review.
 - c. Address any issues that caused problems and require adjustments for upcoming pours.
 - d. Quickly review upcoming pour schedules.
 - 3. At the discretion of Architect/GC/CUSD COM attendees shall include, but not be limited to the following:
 - a. CUSD Construction Manager
 - b. CUSD Consultant
 - c. CUSD COM
 - d. Architect
 - e. General Contractor
 - f. Project manager
 - g. Superintendent (present during all slab placements)
 - h. Concrete Subcontractor
 - i. Project manager
 - j. Finish Foreman (present during all slab placements)
 - k. Concrete Supplier
 - l. Quality Assurance Representative (present during all slab placements)
 - m. CUSD testing agency representative (present during all slab placements)
 - 4. Notify all required attendees in writing of scheduled time and place at least two weeks in advance of meeting. Include copy of agenda with invitation.
 - a. Notify which representatives will be required to attend in writing.
 - 5. Minutes of the meeting shall be recorded, typed, printed, and distributed to all parties concerned by the Contractor within 5 days of the meeting. One copy of the minutes shall also be transmitted to the Owner's representative for information purposes.
- C. Progress: Scheduled by the Contractor during the performance of the work.
 - 1. Review for proper installation of work progress.
 - a. Schedule installation review at the start of installation with the Vapor Retarder Manufacturer to ensure all of the manufacturers written instructions are complied with.
 - 2. Identify any installation problems and acceptable corrective measures.
 - 3. Identify any measures to maintain or regain project schedule if necessary.
- D. Completion: Scheduled by the Contractor upon proper completion of the work.
 - 1. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - a. Prior to covering up the Vapor Retarder installation with concrete, have the Vapor Retarder manufacturer inspect and provide a certified report to the Architect the condition of the Vapor Retarder prior to being covered with concrete, and that the installation was in full compliance with the manufacturer's written instructions.
 - 2. Maintain installed work until the Notice of Substantial Completion has been executed.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

- B. Comply with ASTM C94/C94M and ACI 301 (ACI 301M).

1.8 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 306.1 and as follows.
1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 2. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).
 3. Do not use frozen materials or materials containing ice or snow.
 4. Do not place concrete in contact with surfaces less than 35 deg F (1.7 deg C), other than reinforcing steel.
 5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M), and as follows:
1. Maintain concrete temperature at time of discharge to not exceed 95 deg F (35 deg C).
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

1.9 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement sheet vapor retarder/termite barrier material and accessories for sheet vapor retarder/ termite barrier and accessories that do not comply with requirements or that fail to resist penetration by termites within specified warranty period.
1. Warranty Period: 10 years from date of Substantial Completion.
- B. Provide 10 years warranty from waterproofing admixture manufacturer that surfaces treated with crystalline waterproofing admixture will remain free from water leakage.

PART 2 PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
1. Plywood, metal, or other approved panel materials.
 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
 - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
 - c. Structural 1, B-B or better; mill oiled and edge sealed.
 - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

- E. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- F. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 40 for #3 bars and smaller, Grade 60 for #4 bars and larger, using deformed bars for #3 and larger.
- B. Welded Reinforcing Bars: Low-Alloy-Steel Reinforcing Bars, ASTM A 706/A 706M, deformed.
- C. Do not use reinforcement having any of the following defects:
 - 1. Bar lengths, depths, or bends exceeding the specified fabricating tolerances.
 - 2. Bends or kinks not indicated on the Drawings or required for this Work.
 - 3. Bars with cross-section reduced due to excessive rust or other causes.

2.3 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type II. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class F.
 - 1. No fly ash to be used in slabs scheduled to receive polished concrete finishes.
- B. Supplementary Cementitious Materials
 - 1. For troweled interior slabs, do not use fly ash, slag, or other supplementary cementitious materials.
- C. Air-Entraining Admixture: Do not air-entrain interior floor slabs with troweled finish.
- D. Normal-Weight Aggregates: ASTM C 33.
 - 1. Coarse-Aggregate Size: 3/4 inch nominal aggregate size.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- E. Lightweight Aggregate: ASTM C 330, 3/8-inch nominal aggregate size.
- F. Water: ASTM C 94 and potable.

- G. Source Limitations:
1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
 2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
 3. Obtain aggregate from single source.
 4. Obtain each type of admixture from single source from single manufacturer.

2.5 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
1. Air-Entraining Admixture: Do not air-entrain interior floor slabs with troweled finish.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.6 VAPOR BARRIERS

- A. Sheet Vapor Barrier: ASTM E 1745, Class A. 15 mils minimum. Maintain permeance of less than 0.01 Perms [grains/(ft² · hr · inHg)] as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5 Include manufacturer's recommended accessories to achieve an ASTM E1643-compliant installation; i.e. sealing seams, penetrations, terminating edges, repairs).
1. Products: Subject to compliance with requirements, acceptable products:
 2. Stego Industries, LLC: Stego Wrap 15 mil Class A.
 - a. Griffolyn (15 mil) Green by Reef Industries, www.reefindustries.com. Perminator (15 mil) by WR Meadows, www.wrmeadows.com. Moistop Ultra (15 mil) by Fortifiber Building Systems Group. Substitutions with Architect's approval, and pursuant to conditions of Divisions 00 and 01.
- B. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

2.7 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz. /sq. yd. when dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309.
1. Shall not discolor concrete or other materials, shall not leave an oily residue upon evaporation of solvent.
 2. Shall afford moisture loss not greater than 0.055 grams/cm² at minimum average

- of 300 square feet.
- 3. Meet State of California Air Regulation Board Solvent Emission Standards.
- 4. Temporary (dissipating) Film Forming Curing Compound to be used for all interior exposed concrete finishes
- E. Non-shrink Grout:
 - 1. Factory premixed grout; ASTM C1107.
 - 2. Compressive strength: 5,000 psi at 28 days.
- F. Exterior Concrete Walks: Provide a capillary break consisting of 2" of clean dry sand, ASTM C33, evenly spread on top of the compacted subgrade.
- G. Chemical Hardener: Fluosilicate solution designed for densification of cured concrete slabs.
- H. Slip Resistant Aggregate: 95 percent minimum fused homogeneous aluminum oxide.

2.8 BONDING AND JOINTING PRODUCTS

- A. Latex Bonding Agent: Non-dispersible acrylic latex, complying with ASTM C 1059 Type II.
- B. Epoxy Bonding System: Complying with ASTM C 881/C 881M and of Type required for specific application.
- C. Waterproofing Admixture Slurry: Slurry coat of portland cement, sand, and crystalline waterproofing additive, mixed with water in proportions recommended by manufacturer to achieve waterproofing at cold joints in concrete.
- D. Waterstops: Rubber, complying with COE CRD-C 513.
 - 1. Configuration: As indicated on the drawings.
 - 2. Size: As indicated on the drawings.
- E. Reglets: Formed steel sheet, galvanized, with temporary filler to prevent concrete intrusion during placement.
 - 1. Size: As indicated on drawings.
 - 2. Size: 1/2 inch throat, 1/2 inch deep.
- F. Joint Filler: Nonextruding, resilient asphalt impregnated fiberboard or felt, complying with ASTM D 1751, 1/4 inch thick and 4 inches deep; tongue and groove profile.
- G. Slab Construction Joint Devices: Combination keyed joint form and screed, galvanized steel, with minimum 1 inch diameter holes for conduit or rebars to pass through at 6 inches on center; ribbed steel stakes for setting.
 - 1. Provide removable plastic cap strip that forms wedge-shaped joint for sealant installation.
 - 2. Height: To suit slab thickness.
- H. Sealant and Primer: As recommended by manufacturer.

2.9 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
 - 2. All concrete mix designs shall be prepared and stamped by a California registered Civil Engineer.

- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 15 percent.
 - 2. For troweled interior slabs, do not use fly ash, slag, or other supplementary cementitious materials.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
- D. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.10 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings, Foundation Walls, and Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: 4000 psi at 28 days unless otherwise noted.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
 - 3. Minimum Cementitious Materials Content: 5.5 sacks of cement per cubic yard.
 - 4. Slump Limit: 4 inches, plus or minus 1 inch.

2.11 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.12 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

2.13 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment:
 - 1. Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces:
 - a. Basis-of-design product: Subject to compliance with requirements, provide Moxie International Inc.; **Moxie Shield 1500 Concrete Sealer or Moxie Shield MFSII Flooring Sealer**, P.O. Box 838 Loomis, CA 95650; Contact Manufacturer's representative: P:916-251-0825, F: 877-330-1930 Email: info@moxieshield.com.
 - b. Products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

PART 3 EXECUTION

3.1 PREPARATION

- A. Preplacement Inspection: All trades and participants involved shall verify that preparations

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are in conformance with Contract documents. Use approved sign-off forms.

- B. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
 - 1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.
 - 2. Use latex bonding agent only for non-load-bearing applications.
- C. Where new concrete with integral waterproofing is to be bonded to previously placed concrete, prepare surfaces to be treated in accordance with waterproofing manufacturer's instructions. Saturate cold joint surface with clean water, and remove excess water before application of coat of waterproofing admixture slurry. Apply slurry coat uniformly with semi-stiff bristle brush at rate recommended by waterproofing manufacturer.
- D. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

3.2 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Construct forms tight enough to prevent loss of concrete mortar.
- D. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- E. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.3 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded. In no case shall any bolt or anchor be stabbed in place while or after the concrete is poured.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

3.4 REMOVING AND REUSING FORMS

- A. General:
 - 1. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained:
 - a. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 75

- percent of its 28-day design compressive strength.
 - b. Do not strip vertical concrete in less than seven (7) days.
 - c. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.5 SHORES AND RESHORES

- A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
- 1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.6 VAPOR RETARDERS

- A. Sheet Vapor Barriers:
- 1. Ensure that subsoil is approved by Architect or Geotechnical Engineer Level and compact base material.
 - 2. Place, protect, and repair sheet vapor barrier according to ASTM E1643 and manufacturer's written instructions:
 - a. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible
 - b. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments, such as dowels, water stops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself
 - c. Lap joints six inches (6") and seal with manufacturer's recommended tape.
 - d. Apply seam tape/textured tape/double-sided tape to a clean and dry vapor barrier
 - e. Seal all penetrations (including pipes) per manufacturer's instructions.
 - f. No penetration of the vapor barrier is allowed except for reinforcing and permanent utilities. Avoid the use of stakes driven through vapor barrier by utilizing screed and forming systems that will not puncture the vapor barrier
 - g. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area six inches (6") and taping all four sides with tape.
 - h. Utilize vapor barrier sealing accessories from the same manufacturer as the vapor barrier membrane
 - i. Protect all installed moisture barrier construction from precipitation and water penetration by covering and providing positive drainage away from the moisture barrier.
 - j. Cover slab openings and block-outs around columns to prevent water penetration of moisture barrier.

3.7 STEEL REINFORCEMENT

- A. General:
- 1. Comply with CRSI's "Manual of Standard Practice" for placing reinforcement:

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- a. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- b. Clean reinforcement and remove loose dust and mill scale, earth, oil, and other materials that reduce bond or destroy bond with concrete.
- c. Position, support, and secure reinforcement against displacement by forms, construction, and the concrete placement operations. Provide metal chairs, dobies, or other aids manufactured for this purpose.
- d. Place reinforcement to obtain the required concrete coverages for concrete protection.

3.8 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- C. Contraction Joints in Slabs-on-Grade:
 1. Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one inch (1") as follows:
 - a. Grooved joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 - b. Sawed joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide, 1/4 slab depth joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks. Saw cut slab as soon as surface has hardened to where it can support the equipment and operator, normally within two (2) hours after finishing. Use saw designed for cutting fresh concrete, such as "Soff-Cut" or equal.
- D. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate 1/2 of dowel length to prevent concrete bonding to one side of joint.
- E. Provide slab joints as indicated on Drawings.
 1. Use saws, blades, skid plates, and accessories by Soff-Cut (800) 288-5040 or approved equal.
 2. Provide at least two Soff-Cut saws with blades capable of achieving the required depth of saw cut. Employ number of saws and workers sufficient to complete cutting saw joints before shrinkage produces cracking.
 3. Start cutting sawed joints as soon as concrete has hardened sufficiently to prevent raveling or dislodging of aggregates. This will typically be from 1 hour in hot weather to 4 hours in cold weather after completing finishing of slab in that joint location.
 4. Adhere felt or similar material to the bottom of the saw base plate as necessary to minimize surface scratching and debris build up.
 - 1) Scratches along the joints due to cutting joints will not be acceptable on floors scheduled to receive exposed concrete finishes
 - 2) Contractor is responsible to employ necessary measures to prevent the saw base from causing scratches
 5. Saw cut to width of 1/8 inch by 1/4 the slab depth, unless noted otherwise on drawings.
 6. After saw cutting with attached vacuum system, immediately clean slab surface of all sawing residues using vacuum with HEPA-rated filter.
 7. Extend sawed joint to the slab boundaries and abutments, including columns, drains, and other penetrations in the path of a defined joint. Implement methods and timing of the saw cut beyond the limits of the SoffCut saw reach to provide a consistent depth of cut with minimal raveling of joint edges.

8. See Drawings for additional requirements.
- F. Saw-Cut Control Joint Dust Collection: Connect one of the following dust collection systems directly to each Soff-Cut saw being used. Provide collection system model recommended by the manufacturer to maintain dust emissions below the permissible level. Immediately clean any remaining residue after cutting, prior to cure.
 1. Pulse Vac by BW Manufacturing.
 2. DustDroid by Dustless Technologies.
 3. Soff-Vac by Husqvarna USA.
 4. Or approved equal

3.9 CONVEYING

- A. Handle concrete from mixer to place of final deposit as rapidly as practicable and in manner which will assure obtaining specified quality of concrete.
- B. Re-tempering: Discard concrete which has already begun to set. Do not re-temper with water
- C. Equipment: Provide mixing and conveying equipment of proper size and design to ensure a continuous flow of concrete to delivery end. Do not use aluminum equipment in contact with concrete.

3.10 CONCRETE PLACEMENT

- A. Notify Architect not less than 24 hours prior to commencement of placement operations.
- B. Unless otherwise specified, place concrete in accordance with the requirements of ACI 301.
- C. The concrete supplier shall have a quality control representative at site for concrete placements.
- D. General Contractor and/or the superintendent shall be on site during placement of the concrete.
- E. Supervision for the General Contractor and the Concrete Floor Subcontractor shall be on site for the entire duration of each concrete slab placement.
- F. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- G. Place concrete according to the pre-approved sequencing plan determined in the pre-pour meeting.
 - a Placement sequencing must be approved by the Architect and/or CUSD project manager.
- H. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- I. Depositing Concrete.
 1. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 2. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 3. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

- 1) Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
- 2) Maintain reinforcement in position on chairs during concrete placement.
- 3) Screed slab surfaces with a straightedge and strike off to correct elevations.
- 4) Slope surfaces uniformly to drains where required.
- 5) Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
Do not further disturb slab surfaces before starting finishing operations.
4. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
5. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate
6. Do not deposit concrete which has partially hardened or has been contaminated by foreign matter.
7. Deposit concrete continuously in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause seams or planes of weakness.
8. Between construction joints, place concrete in a continuous operation such that concrete is plastic at all times and flows readily into spaces between reinforcement.
9. Use placement procedures to avoid segregation.
10. Deposit concrete as near as possible to its final position.
11. Integral color concrete floor slabs:
 - 1) Clean tools to prevent contamination. Clean and bag boots when working on surface.
 - 2) Employ methods to prevent dust and air-born debris from entering building and settling on slab surface during finishing operations.
12. Do not place concrete over standing water, mud, frost, ice or snow.
13. Do not use wet screeds.
- B. Consolidation:
 1. Consolidate concrete complying with ACI 301 by vibrating, spading or rodding so that concrete is thoroughly worked around reinforcing, embedded items and into the corner of forms.
 2. Consolidate each layer of concrete with previously placed layers in manner that will eliminate air or stone pockets which may cause honeycombing, pitting or places of weakness.
 3. Do not insert vibrator into portions of concrete that have begun to set.
 4. Do not use vibrators to transport concrete.
 5. Keep spare vibrator on job site during concrete operations.
 6. Use internal vibrator for formed elements, not form vibrators.
 7. Slabs:
 - a. Consolidate slabs with vibrating screed.
 - b. Use internal vibration along construction joints at both formed and slab abutments. Vibrate under plate dowels. Mark forms before concreting to properly locate dowels after concreting.
 - c. Do not use grate tampers, jitterbugs, or mesh rollers.
- J. After concrete placement, adjust forms and bracing as necessary to maintain proper alignment and eliminate leakage of cement paste.
- K. Maintain records of concrete placement. Record date, location, quantity, airtemperature, and test samples taken.

- L. Do not place concrete floors and slabs in a checkerboard sequence.
- M. Saw cut joints within 2 hours after placing whenever possible. Use 1/8 inch thick blade, cut 1/4 depth of slab thickness.

3.11 FINISHING FORMED SURFACES

- A. Rough-Formed Finish:
 - 1. As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities:
 - a. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish:
 - 1. As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities:
 - a. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, to be covered with a coating or covering material applied directly to concrete.
- C. Rubbed Finish:
 - 1. Apply the following to smooth-formed finished as-cast concrete where indicated:
 - a. Smooth-rubbed finish: Not later than one (1) day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 - b. Grout-cleaned finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one-part portland cement to 1-1/2-parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
 - c. Cork-floated finish: Wet concrete surfaces and apply a stiff grout. Mix one-part portland cement and one-part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.12 FINISHING FLOORS AND SLABS

- A. General:
 - 1. Do not add water to any slab surface during finishing operations.
 - 2. Do not add cement to any slab surface during finishing operations.
 - 3. Perform no finishing operation while water is present on slab surface.
- B. Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces.
- C. Initial Leveling:

1. Complete bull floating, darbying and straight-edging before any bleed water is present on slab surface.
2. Use a checkrod or highway straightedge 10 feet wide minimum for initial and later leveling instead of bull float where overall floor tolerances specified are greater than FF 20 / FL15.

D. Hand and Power Floating:

1. Do not start floating until following conditions are met:
 - a. Bleeding is complete and water is gone, including water sheen on slab surface.
 - b. Mortar is not thrown by rotating blades of power float.
2. The finisher shall determine the proper time to start finishing procedures for interior slab placements on the basis the above conditions. It is noted for advisory purposes, however, that typical setting of concrete materials will allow for initial power floating to begin 3-1/2 hour's \pm 1 hour after initial strike-off (screeding), at which time the concrete should support a finisher on foot without more than a 1/4 inch indentation in the slab surface. Variations in concrete materials, nature and proportion of supplementary cementing materials, and concrete temperature will cause setting behavior to vary.
3. Under no circumstances during the finishing process will foot traffic be permitted on slabs scheduled to receive polished concrete finishes. If absolutely necessary, sliders may be used for limited access with the approval of the Architect and/or CUSD project manager. This will need to be address in the pre-pour meetings.
 - a. Any foot traffic on slabs scheduled to receive polished concrete finishes or use of sliders without approval will be cause for automatic rejection of the concrete floor at the contractor's expense.

E. Troweling for Interior Slabs:

1. Hand or power float floor before starting troweling.
2. Finisher is to delay initial power floating as long as it possible to avoid creating high and low areas from moving excessive surface mortar material around.
3. At this stage only minor adjustments in the surface are intended to be made and the concrete should be firm enough to prevent FF tolerances from being negatively affected.
4. For first troweling, keep blade as flat as possible and use low speed, minimizing "washboard" or "chatter marks" and "pitting".
5. Trowel two times minimum with first two trowelings at right angles. Some burn marks are acceptable. Cease troweling before trowel blades scratch surface.
6. Allow time between trowelings for concrete to stiffen and water sheen to disappear.
7. Do not add water to slab surface during troweling.
 - d. Adding water to the slab surface during finishing will be cause for automatic rejection of the concrete floor at the contractor's expense
8. Do not run trowel machines on existing hardened concrete slabs. Trowels shall be carried off of slab surfaces. When parking power trowels on fresh concrete, place on top of plywood or spray area with evaporation retarder before placing trowel on top of slab.
9. Trowel as many times as possible to enhance surface sheen, without scratching the slab surface but without creating surface burn marks or to cause surface delamination from overworking the surface
10. Finished surface should be uniform in texture and appearance and free of any trowel marks, "chatter", ridges or any surface irregularity.
11. Lead finisher/foreman who finished the field sample shall be present for entire fresh concrete finishing process until final troweling is completed.

- E. Pitch to drains: Form 18 inch radius around floor drains and pitch concrete surface to drains at rate of 1/4 inch per foot nominal, unless noted otherwise in Drawings.

3.13 CONCRETE FINISHES

- A. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4

inch in one direction.

1. Apply scratch finish to surfaces that are to receive concrete floor toppings or mortar setting beds for bonded cementitious floor finishes.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Conform to section 03 30 00 3.12 FINISHING FLOORS AND SLABS and comply with ACI 302.1R
 2. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 3. Finish to specified FF/FL tolerances as well as measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft. long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch and 1/16 inch in 2 ft.
 4. The contractor shall anticipate that grinding will be required as a result of curling or other slab defects. Grinding required to bring the slab surface into acceptable tolerances for finished flooring installation shall be included as part of the Work.
 - a. For all concrete specified to receive an exposed concrete finish, any grinding and which trade will perform the grinding must first be approved by the Architect/CUSD project manager
 - b. Grinding is not to be performed by the concrete contractor or the GC unless approved by the Architect/CUSD project manager
- D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

3.14 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends

- lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.15 CONCRETE SURFACE REPAIRS

- A. For all concrete specified to receive an exposed concrete finish, all repairs must first be approved by the Architect and/or CUSD project manager
 1. Repairs are to be performed by the appropriate flooring contractor per the Architect/CUSD direction and approval.
 2. Repairs are not to be performed by the concrete contractor or the GC unless first approved by the Architect/CUSD
- B. For any specified floor finishes other than exposed concrete finishes, the following repair procedures apply
- C. Defective Concrete:
 1. Repair and patch defective areas when approved by Architect.
 2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- D. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
- E. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete.
 - a. Limit cut depth to 3/4 inch (19 mm).
Make edges of cuts perpendicular to concrete surface.
Clean, dampen with water, and brush-coat holes and voids with bonding agent.
Fill and compact with patching mortar before bonding agent has dried.
Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.
 - a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that will affect concrete's durability and

structural performance as determined by Architect.

- F. Repairing Unformed Surfaces:
1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.
 - a. Correct low and high areas.
 - b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 3. After concrete has cured at least 14 days, correct high areas by grinding.
 4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.
 - a. Finish repaired areas to blend into adjacent concrete.
 5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.
 - a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 - b. Feather edges to match adjacent floor elevations.
 6. Correct other low areas scheduled to remain exposed with repair topping.
 - a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations.
 - b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 7. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete.
 - a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around.
 - b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
 - c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
 - d. Place, compact, and finish to blend with adjacent finished concrete.
 - e. Cure in same manner as adjacent concrete.
 8. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar.
 - a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
 - b. Dampen cleaned concrete surfaces and apply bonding agent.
 - c. Place patching mortar before bonding agent has dried.
 - d. Compact patching mortar and finish to match adjacent concrete.
 - e. Keep patched area continuously moist for at least 72 hours.
- G. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- H. Repair materials and installation not specified above may be used, subject to Architect's approval.
- I. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.

3.16 TOLERANCES AND FINISH REQUIREMENTS

- A. Construct concrete conforming to the tolerances specified in ACI 117 "Specifications for Tolerances for Concrete Construction and Materials", latest edition, as applicable, unless exceeded by requirements of regulatory agencies or otherwise indicated or specified.
- B. Floor Finish Tolerances: Except as otherwise designated, conform to the following:
 - 1. Interior slabs-on-grade:
 - a. Flatness: Overall FF 35, with a minimum local value of FF 24 (ASTM E1155).
 - Levelness: Overall FL 25, with a minimum local value of FL 17 (ASTM E1155).
 - 2. Fill over steel deck:
 - a. Flatness: Overall FF 35, with a minimum local value of FF 24 (ASTM E1155).
 - Levelness: Not applicable, per ACI 117.
 - 3. Interior Slabs to receive Polished Flooring:
 - a. Flatness: Overall FF 40, with a minimum local value of FF 28 (ASTM E1155).
 - b. Levelness: Overall FL 25, with a minimum local value of FL 17 (ASTM E1155).
 - 4. Slabs to receive adhered flooring shall also comply with the flooring manufacturer's requirements.
 - 5. Slabs in areas furnished with modular partitions shall also comply with the partition manufacturer's tolerance requirements.
 - 6. Fill and/or grind completed floors as necessary to achieve specified finish tolerances and as otherwise required for proper installation of building components.
 - a. Any remediation work must be coordinated with the GC, Architect, Owner consultant, prior to repair work being performed.
 - 1. At the sole discretion of the Architect/Owner, the necessary remediation work shall be performed by the appropriate flooring contractor, not by the concrete contractor.
- C. In addition to specified tolerance requirements, finish and measure surface so gaps at any point between concrete surface and an unleveled, freestanding, 10-ft.-long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch and 1/16 inch in 2 feet (610 mm).
- D. Floors which are specified to receive any exposed concrete finish
 - 1. Concrete finish must be dense, smooth, and uniform in texture and appearance
 - 2. Free of surface voids
 - 3. Free of trowel marks including "chatter" and any ridges or gouges
 - 4. Free of knee board or slider impressions
 - 5. Finish surface to produce maximum sheen free of scratches and trowel marks.
 - 6. Random, mottled light burn marks are acceptable.
- E. For any floors receiving concrete polishing finishes, any local values below acceptable tolerances shall require polishing contractor to remediate, and all related costs will be the responsibility of the concrete contractor.
- F. At the sole discretion of the Architect and/or CUSD failure to comply with the Flatness F(F) specified and Levelness F(L) specified, or other specified finish requirements, shall result in the removal and replacement of the concrete floor.

3.17 CONCRETE PROTECTION

- A. Provide a "Concrete Floor Protection Plan" to CUSD and COM rep. prior to placement of interior slabs that addresses how the following tasks will be implemented:
 - 1. Communication of protection plan to subcontractors and vendors, including those directly contracted by CUSD.
 - 2. Keeping the slab clean of dirt and grime.
 - 3. Prevention of stored materials in exposed floor areas until completion of construction.

4. When and how floor covering protection will be provided in high traffic areas.
 5. Condition, inspection, and operational procedures for construction equipment allowed on the slab surface, including but not limited to:
 - a. Diapering to contain any potential fluid leaks.
 - b. Use of non-marking tires
 - c. Inspection of tire treads for any debris that may mar the slab surface.
 6. Procedures for cleaning up slab spills, including use of and availability of cleaning chemicals and absorptive materials at the site.
- B. Slab Protection:
1. Protect finished floors to prevent damage by construction traffic and activities until Owner possession.
 2. Protect concrete slabs from staining, gouges, and scratching.
 3. Diaper hydraulic powered equipment
 4. Protect from petroleum stains.
 5. Prohibit use of acids or acidic detergents over concrete surfaces.
 6. Prohibit vehicles from interior concrete slabs.
 7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
 8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.
 9. Place drop cloths or other breathable slab protection under parked vehicles.
 10. Do not store structural steel or metal fabrications on slab.
 11. Do not allow pipe cutting machine on slab.
 12. Adequately protect concrete inserts and other embedded items from movement, mechanical injury, or from damage by elements.
 13. Provide access ramps of compacted earth or other means along exposed concrete edges of floor slabs to prevent equipment and machinery from impacting edges. Barricade all other exposed edges to vehicular traffic which may damage edges.
- C. Traffic protect curing compound floor surfaces as follows:
1. Barricade concrete surfaces immediately after placing and finishing.
 2. 3 full days (72 hours) after placement:
 3. 7 full days (168 hours) after placement: Heavy loading permitted but not before concrete has attained, by test, its design strength as noted herein.

3.18 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. CUSD will engage with COM team to produce concrete placement data in real-time during concrete slab pours as well as immediate FF/FL testing the day of each pour with reports to be made available within 72 hours following each pour.
- D. Inspections:
1. Steel reinforcement placement.
 2. Steel reinforcement welding.
 3. Headed bolts and studs.
 4. Verification of use of required design mixture.
 5. Concrete placement, including conveying and depositing.
 6. Curing procedures and maintenance of curing temperature.
 7. Verification of concrete strength before removal of shores and forms from beams and

slabs.

- E. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 2. Testing Frequency: Obtain at least one composite sample for each 50 cu. yd. or fraction thereof of each concrete mixture placed each day, but not less than once for each 2000 square feet of surface area for slabs or walls.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
 6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 7. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
 8. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
 9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
 10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
 11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
 13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored

cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.

14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

- F. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

3.19 PROTECTION

- A. Protect concrete surfaces as follows:
1. Protect from petroleum stains.
 2. Diaper hydraulic equipment used over concrete surfaces.
 3. Prohibit vehicles from interior concrete slabs.
 4. Prohibit use of pipe-cutting machinery over concrete surfaces.
 5. Prohibit placement of steel items on concrete surfaces.
 6. Prohibit use of acids or acidic detergents over concrete surfaces.
 7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
 8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.
- B. Foot traffic not allowed on slabs to receive a polished concrete finish.
1. Equipment usage in these areas shall take necessary measures to avoid impressions. The use of sliders may be acceptable upon Architect review.

END OF SECTION

SECTION 06 10 00 ROUGH CARPENTRY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes rough carpentry, light hardware, and miscellaneous items of work not included in another Section. This Section also includes:
 - 1. Structural wood supports, grounds, backing, and blocking required for millwork and casework items that are an integral part of wall, floor, and/or ceiling construction.
 - 2. Plywood sheathing.
- B. Related Sections:
 - 1. Section 03 10 00: Concrete Forming and Accessories.
 - 2. Section 03 30 00: Cast-In-Place Concrete.
- C. Reference Standards:
 - 1. The following references, codes, and standards are hereby made a part of this Section and carpentry work shall conform to applicable requirements therein except as otherwise specified herein or shown on the Drawings. Nothing contained in the Drawings or these Specifications shall be construed as permitting work that is contrary to code requirements:
 - a. Standard Grading and Dressing Rule #16, of the West Coast Lumber Inspection Bureau.
 - b. Grading Rules for Western Lumber of the Western Wood Products Association.
 - c. Standard Specifications for Grades of California Redwood Lumber of the Redwood Inspection Service.
 - d. American Wood Preservers Association (AWPA) Standard C 2-77 Lumber, Timbers, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes.
 - e. American Wood Preservers Bureau (AWPB) Quality Control Standards.

1.3 QUALITY ASSURANCE

- A. Lumber and plywood shall be grade or quality marked by WWPA, WCLIB, APA, AWPB, or by other grading and inspection agencies acceptable to the Architect. Grade marks shall include the designation "S-DRY"(or "MC-15" as applies) where applicable. Grade and quality marks shall not be apparent on surfaces exposed in the finished work.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store kiln dried materials in enclosed areas, protected from moisture and separated from contact with concrete or soil.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Temporary Construction: Clean lumber at Contractor's option, rough or smooth, as usage requires.
- B. Lumber Not Otherwise Specified or Noted:
 - 1. Douglas fir or larch, graded and grademarked, according to Reference Standard 1.02 A or B, #1 grade:
 - a. Boards: Construction grade.
- C. Sill Plates (On Concrete): Construction grade light framing, pressure treated as hereinafter specified; as noted on Plans.
- D. Plywood for Walls and Roofs; As Noted On Plans:
 - 1. Unless glue type is otherwise specified, exterior plywood, interior plywood exposed to continuing moisture, and pressure treated plywood shall be fabricated with exterior glue. Plywood with interior glue shall be fully protected from soaking or continuing moisture at all times.
- E. Rough Hardware:
 - 1. Nails, spikes, bolts, screws, tacks, and framing connectors of standard manufacture as required. Hot dip galvanize items exposed to moisture or to exterior and those items that are in contact with wood pressure treated with waterborne salts:
 - a. Bolts and nuts: ASTM A307, Grade A.
 - b. Lag bolts: Fed. Spec. FF-B-561. Pre-drill per CBC.
 - c. Nails: Fed. Spec. FF-N-101, common unless otherwise noted or specified.
 - d. Joist hangers and framing connectors: Simpson or approved equal, unless otherwise noted.
 - e. Power driven fasteners: Hilti, Ramset, or approved equal, each use and fastener type subject to prior approval of Architect.
- F. Pressure Treatment (Decay and Termite Prevention):
 - 1. Pressure treat for decay and termite prevention, Douglas fir or larch wood materials that are embedded in or set against concrete.
 - 2. Treat in accordance with Reference Standard 1.02 E and quality mark as per Reference Standard 1.02 F.
 - 3. Treat with any of the following processes at Contractor option. Creosote type preservatives are not permitted:
 - a. Penta in an LPG carrier (Cellon) or Penta in Hydrocarbon Solvent-Type D (Dow Process) AWPB LP-4 quality marked.
 - b. Ammoniacal copper arsenate (ACA) or chromated copper arsenate (CCA) in a water carrier (AWPB LP-2 quality marked).
 - c. Disodium Octaborate Tetrahydrate (DOT) such as Advance Guard/Hi-bor by Osmose, Inc.
 - d. Members treated with waterborne salts shall be dried to a moisture content not exceeding 19 percent after treatment.
 - 4. Where possible, precut material before treatment.
 - 5. Holes and cutoffs and handling and storage shall be in accordance with AWPA M-4.
 - 6. Ensure that ferrous metal fastenings and items in contact with wood treated with waterborne salts are hot dip galvanized (1.25 oz. coating) where required by ICC reports.
- G. Building Paper and Felt: Kraft waterproof building paper or 15# unperforated asphalt saturated rag felt per CBC Standard 14-1.

- H. Framing Connectors: Simpson Strong Tie Corp., or equal.

2.2 MOISTURE CONTENT

- A. 19 percent maximum for two times thickness and less; 19 percent maximum for thickness greater than two times and less than four times; and 22 percent maximum for thickness greater than four times.

2.3 SIZES

- A. Surfaced to "DRY" sizes. Sizes noted are nominal unless shown as net.

2.4 SURFACING

- A. All wood materials exposed in the finished work shall have re-sawn surfaces of clean natural color unless noted or specified otherwise. Concealed framing lumber shall be S4S.

PART 3 EXECUTION

3.1 ERECTION AND INSTALLATION

- A. Framing: Conform to CBC where same covers points not indicated on Drawings. Properly lay out framing with pieces closely fitted, accurately plumbed, leveled and aligned, and rigidly secured in place.
- B. Except as specifically shown on structural drawings, cutting of all wood, etc. is limited to those cuts permitted by CBC.
- C. Bridging and Blocking: Conform to CBC. Provide two times blocking at intersections of finished surfaces for adequate bearing and at points where required to support fixtures, cabinets, hardware, and other equipment mounted on walls.
- D. Plywood (General): Unless more stringent requirements are indicated on the Drawings or required by code, application of plywood shall be in accordance with recommendations of the American Plywood Association.
- E. Connections and Fastenings: Conform to CBC. Unless otherwise specified or shown on the Drawings, conform to minimum nailing requirements of CBC. For bolted connections, provide washers under heads and nuts bearing on wood, and draw nuts tight. Retighten before closing in framing. Exercise care in nailing through exposed sheathing and siding and ensure that fasteners penetrate into framing members

END OF SECTION 06 10 00

SECTION 10 14 00 GRAPHICS AND SIGNAGE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements including but not limited to:
 - 1. Room identification signs.
 - 2. Restroom signs.
 - 3. Misc. identification signs.
 - 4. Informational signs (not identification signs).
 - 5. Accessories necessary for a complete installation.
 - 6. Custom Vinyl Wall Graphics.
 - 7. Custom Wallpaper.
- B. Related Sections:
 - 1. Section 06 10 00: Rough Carpentry.

1.3 SUBMITTALS

- A. Product Data: Technical data for each type of signage.
- B. Shop Drawings:
 - 1. Submit fabrication and installation details and attachments to other work:
 - a. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - b. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
 - c. Exterior applied signage on face of wall to include mounting brackets and support anchorage to fit condition.
- C. Samples: Submit one sample of each specified sign type, full-sized.

1.4 QUALITY ASSURANCE

- A. Field Inspections:
 - 1. All new tactile signage must be field inspected after installation per CBC 11B-703.1.1.2.
- B. Accessibility Requirements:
 - 1. Raised characters shall comply with CBC Section 11B-302.2.
 - a. Depth: It shall be 1/32-inch (0.8 mm) minimum above their background, shall be sans serif uppercase, and be duplicated in Braille.
 - b. Height: It shall be 5/8-inch (15.9 mm) minimum and 2 inches (51 mm) maximum based on the height of the uppercase letter "I." See CBC Section 11B-703.2.5.
 - c. Finish and Contrast: Characters and their background shall have a non-glare finish. Character shall contrast with their background with either light characters on a dark background or dark characters on a light background. See CBC Section 11B-

703.5.1.

- d. Proportions: It shall be selected from fonts where the width of the uppercase letter "O" is 60% minimum and 110% maximum of the height of the uppercase letter "I." Stroke thickness of the uppercase letter "I" shall be 15% maximum of the height of the character. See CBC Sections 11B-703.22.4 and 11B-703.2.8.
- e. Character Spacing: Spacing between individual raised characters shall comply with CBC Section 11B-703.2.7 and 11B-703.2.8.
- f. Format: Text shall be in a horizontal format. See CBC Section 11B-703.2.9.
- g. Braille: It shall be contracted (Grade 2) and shall comply with CBC Sections 11B-703.3 and 11B-703.4. Braille dots shall have a domed or rounded shape and shall comply with CBC Table and Figure 11B-703.3.1.
- h. Mounting Height: Tactile characters on signs shall be located 48 inches minimum to the baseline of the lowest Braille cells and 60 inches maximum to the baseline of the highest line of raised characters above the finish floor or ground surface. See CBC Section and Figure 11B-703.4.4.
- i. Mounting Location:
 - 1) A tactile sign shall be located per CBC Section and Figure 11B-703.4.2 as follows:
 - a) Alongside a single door at the latch side.
 - b) On the inactive leaf at double doors with one active leaf.
 - c) To the right of the right-hand door at double doors with two active leaves.
 - d) On the nearest adjacent wall where there is no wall space at the latch side of a single door or at the right side of double doors with two active leaves.
 - e) So that a clear floor space of 18 inches x 18 inches minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45-degree open position.
- j. Visual Characters: Shall comply with CBC Section 11B-703.5 and shall be 40 inches minimum above finish floor or ground.
- k. Pictograms: Shall comply with CBC Section 11B-703.6.
- l. Symbols of Accessibility: Shall comply with CBC Section 11B-703.7.
- m. Variable Message Signs: Shall comply with CBC Section 11B-703.8.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Manufacturers:
 - 1. Subject to compliance with requirements, provide products by one of the following:
 - a. Apco Signs
 - b. ProScreen Inc.
 - c. Best Sign Systems, Inc.
 - d. InPro Corporation (IPC).
- B. Aluminum Castings: ASTM B26/B26M, alloy and temper recommended by sign manufacturer for casting process used and for type of use and finish indicated. Refer to drawings for location.
- C. Aluminum Sheet and Plate: ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated. Refer to drawings for location.
- D. Aluminum Extrusions: ASTM B221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- E. Acrylic Sheet: ASTM D4802, category standard with manufacturer for each sign, Type UVF

- (UV filtering).
- F. Plastic Laminate Sheet: NEMA LD 3, general purpose HGS grade, 0.048-inch (1.2-mm) nominal thickness.
 - G. Vinyl Film: UV resistant vinyl film of nominal thickness indicated, with pressure sensitive, permanent adhesive on back; die cut to form characters or images indicated and suitable for exterior applications.
 - H. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.
 - I. Accessories:
 - 1. Fasteners and Anchors:
 - a. As necessary for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
 - 1) Use concealed fasteners and anchors unless indicated to be exposed.
 - 2) Exposed Metal Fastener Components: Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
 - 2. Sign Mounting Fasteners:
 - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly, unless otherwise indicated.
 - 3. Adhesive: Recommended by sign manufacturer.
 - 4. Two Face Tape: High bond, foam core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.
 - 5. Bituminous Paint: Cold applied asphalt emulsion complying with ASTM D1187.

2.2 SIGNAGE

- A. Laminated Plastic Tactile Room, Restroom and Miscellaneous Identification Signs:
 - 1. Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 - a. Laminated Sheet Sign:
 - 1) Photopolymer face sheet with raised graphics laminated over subsurface graphics to acrylic backing sheet to produce composite sheet:
 - a) Color(s): Selected by Architect from manufacture's full range of standard colors.
 - b. Sign Panel Perimeter:
 - 1) Finish edges smooth:
 - a) Edge Condition: Beveled.
 - b) Corner Condition in Elevation: Square.
 - c. Mounting at Walls: Stainless steel vandal-proof pin-in-head torx screws Surface mounted to wall with concealed anchors.
 - d. Mounting at Glazing: Clear silicone adhesive.
 - e. Text and Typeface, Panel and Photo Polymer Signs:
 - 1) Accessible raised characters and Braille. Finish raised characters to contrast with background color, and finish Braille to match background color:
 - a) Raised Characters: Refer to Drawings.
 - b) California Contracted Grade 2 Braille: Refer to Drawings.
 - c) Pictograms: Field height of minimum 6 inches; no characters or braille in pictogram field; nonglare, field contrast to pictogram, text descriptors below pictogram field
 - d) Accessibility Symbols: Where used, symbols shall comply with CBC 11B-703.7.

- B. Dimensional Lettering:
 - 1. Characters with uniform faces, sharp corners, and precisely formed lines and profiles:
 - a. Material: Cast aluminum.
 - b. Height: Indicated on Drawings.
 - c. Finishes:
 - 1) Baked Enamel or Powder Coat Finish: Color to be selected by the Architect from manufacture's full range of standard colors.
 - 2) Overcoat: Baked on clear coating.
 - d. Mounting: Concealed studs.
 - e. Typeface: Selected by Architect.
- C. Field Applied, Vinyl Character Sign:
 - 1. Prespaced characters die cut from 3 mil to 3.5 mil (0.076 mm to 0.089 mm) thick, weather resistant vinyl film with release liner on the back and carrier film on the front for onsite alignment and application:
 - a. Manufacturers:
 - 1) Subject to compliance with requirements, provide products by one of the following:
 - a) Allen Markings.
 - b) APCO Graphics, Inc.
 - c) Mohawk Sign Systems.
 - d) Seton Identification Products.
 - 2) Size: Indicated on Drawings.
 - 3) Substrate: Indicated on Drawings.

2.3 FABRICATION

- A. Provide sign assemblies according to requirements indicated:
 - 1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
 - 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 - 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
 - 4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 - 5. Internally brace signs for stability and for securing fasteners.
 - 6. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
 - 7. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.
- B. Brackets:
 - 1. Fabricate brackets, fittings, and hardware for bracket mounted signs to suit sign construction and mounting conditions indicated. Modify brackets as necessary:
 - a. Aluminum Brackets: Factory finish brackets with baked enamel or powder coat finish to match sign background color unless otherwise indicated.

2.4 FLAT CUT METAL LOGO

- A. Custom Flat Cut Metal Logo Manufacturer: Gemini
- B. Physical Properties:
 - 1. Material: Stainless Steel C304
 - 2. Sheet Size: 46.5" x 95" Max. refer to Architectural drawings for layout and sizes.
 - 3. Thickness: 1/4 inches
 - 4. Weight: 14 oz. per lineal yard.
 - 5. Color: Clear factory finish coating.
 - 6. Location: As indicated on Drawings.
 - 7. Digital Image: Request from Architect.
- C. Installation: Clean and prepare surface per manufacturer's installation instructions.
- D. Warranty: Per Manufacturer's standard warranty.

2.5 FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.
- E. Aluminum Finishes:
 - 1. Clear Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.
 - 2. Baked Enamel or Powder Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

- A. Field Measurements: Verify locations of anchorage devices and electrical service embedded in permanent construction by other installers by field measurements before fabrication and indicate measurements on Shop Drawings.

3.2 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of signage work. Verify sign support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- B. Proceed with installation after correcting unsatisfactory conditions.

3.3 INSTALLATION

- A. Install signs using mounting methods indicated and according to manufacturer's written instructions:
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 - 3. Interior Wall Signs:
 - a. Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches (75 mm) of sign without encountering protruding objects or standing within swing of door:
 - 1) See drawings for the mounting height and location of each sign.
 - 4. Before installation, verify sign surfaces are clean and free of materials or debris that impair installation.
 - 5. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Mounting Height:
 - 1. Tactile characters on signs shall be located 48 inches minimum to the baseline of the lowest Braille cells and 60 inches maximum to the baseline of the highest line of raised characters above the finish floor or ground surface, pursuant to CBC Section and Figure 11B-703.4.1.
- C. Mounting Location:
 - 1. A tactile sign shall be located as follows, pursuant to CBC Section and Figure 11B-703.4.2:
 - a. Alongside a single door at the latch side.
 - b. On the inactive leaf at double doors with one active leaf.
 - c. To the right of the right-hand door at double doors with two active leaves.
 - d. On the nearest adjacent wall where there is no wall space at the latch side of a single door or at the right side of double doors with two active leaves.
 - e. So that a clear floor space of 18 inches by 18 inches minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45-degree open position.
- D. Mounting Methods:
 - 1. Exposed Fastener: Install vandal-resistant fastener; set screw head flush with sign face.
 - 2. Concealed Studs:
 - a. Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface:
 - 1) Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
 - 2) Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
 - 3. Brackets: Remove loose debris from substrate surface and install backbar or bracket supports in position so that signage is correctly located and aligned.
 - 4. Shim Plate Mounting: Provide 1/8 inch (3 mm) thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other direct mounting methods are impractical. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach signs to plate using method specified above.
- E. Visual Characters shall comply with CBC Section 11B-703.5 and shall be 40 inches

- minimum above finish floor or ground.
- F. Field Applied, Vinyl Character Signs: Clean and dry substrate. Align sign characters in final position before removing release liner. Remove release liner in stages and apply and firmly press characters into final position. Press from the middle outward to obtain good bond without blisters or fishmouths. Remove carrier film without disturbing applied vinyl film.
 - G. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.
 - H. DSA Inspections: Signs and identifications or other information shall be field inspected after installation and approved by Division of the State Architect prior to the issuance of a final certificate of occupancy, or final approval where no certificate of occupancy is issued. The inspection shall include, but not limited to, verification that Braille dots and cells are properly spaced, and the size, proportion, and type of raised characters are in compliance with CBC, Section 11B-703.1.1.2.

3.4 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

3.5 SCHEDULE – SIGN TYPES

- A. Entrance Door Signage:
 - 1. 6" H x 9" L, nominal rectangular shape.
 - 2. 1-1/2" high Tactile Text.
 - 3. Braille Required.
- B. Room ID Signage:
 - 1. 6" H x 9" L, nominal rectangular shape.
 - 2. 1-1/2" high Tactile Text.
 - 3. Braille Required.
- C. Room ID Signage (Adjacent to doors):
 - 1. 6" H x 9" L, nominal rectangular shape.
 - 2. 1-1/2" high Tactile Text.
 - 3. Braille Required.
- D. Room Door Signage (On doors):
 - 1. Refer to drawings.
 - 2. Braille Required.
- E. Exit Door and Exit Signage:
 - 1. 6" H x 9" L, nominal rectangular shape.
 - 2. 1-1/2" high Tactile Text.
 - 3. Braille Required.

- F. Wayfinding Signage:
 - 1. 12" H x 18" L, nominal rectangular shape.
 - 2. 4" high Tactile Text.
 - 3. Braille Required.
 - 4. Graphics: none.
 - 5. Locations: (16) at Building Y, (16) at Building Z, as indicated by Architect
- G. International Symbol of Accessibility, (ISA):
 - 1. 6" H x 6" L, nominal square shape.
 - 2. 1-1/2" high Tactile Text.
 - 3. Material applications:
 - a. Glazing: Vinyl Decals.
 - b. All other locations: Laminated Plastic.

END OF SECTION 10 14 00

SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUBSTITUTIONS OF PRODUCTS

- A. The products described in the Proposal Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution. The materials and equipment named in, and the procedures covered by these specifications have been selected as a standard because of quality, particular suitability or record of satisfactory performance. It is not intended to preclude the use of equal or better materials or equipment provided that same meets the requirements of the particular project and is approved in an Addendum as a substitution prior to the submission of proposals.
- B. No substitution will be considered prior to receipt of proposals unless written request for approval has been received by the Architect and Engineer at a minimum of seven (7) business days prior to the date for receipt of proposals. Each such request shall include a specification line by line review annotated to certify compliance, the name of the manufacturer and model, material or equipment for which it is to be substituted and a complete description of the proposed substitute including dimensional drawings, cutsheets, performance and test data and any other information necessary for an evaluation. The Engineers decision of approval or disapproval of a proposed substitution shall be final.
- C. If the Engineer approves any proposed substitution prior to receipt of proposals, such approval will be set forth in an Addendum. Offerors shall not rely upon approvals made in any other manner.
- D. The Engineer and Owner reserve the right to disapprove the use of any manufacturer who in their judgment is unsuitable for use on the Project and that decision will be final.
- E. Availability of specified items:
1. Verify prior to submittal of Proposal that all specified items will be available in time for installation during orderly and timely progress of the work.
 2. In the event specified items will not be so available, notify the Architect / Engineer prior to receipt of Proposals. Submit Request for Substitutions in accordance with this section.
 3. The request will not be considered if the product or method cannot be provided as a result of the Contractor's failure to pursue the work promptly or coordinate activities properly.

4. Costs of delays because of non-availability of specified items, when such delays could have been avoided by the Contractor, will be back-charged as necessary and shall not be borne by the Owner.
- F. A request constitutes a representation that Offeror:
1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
 2. Will provide same warranty for Substitution as for specified product, except when inability to provide specified Warranty is reason for request for substitution as described above.
 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 4. Waives claims for additional costs or time extension which may subsequently become apparent.
 5. Will reimburse the Owner and pay for all costs, including Architect/Engineer's redesign and evaluation costs resulting from the use of the proposed substitution, or for review or redesign services associated with re-approval by authorities having jurisdiction.
- G. **No substitutions will be considered after the Award of Contract.**

1.3 SUMMARY

- A. Provide all work for electrical systems required in the project to be properly installed, tested and performing their intended function.

1.4 QUALITY ASSURANCE

- A. Perform all work in accordance with the latest edition of the national electrical code, and local codes.
- B. All electrical materials and distribution, and utilization equipment shall be UL Listed.
- C. All equipment and materials shall be new and unused and of United States Domestic manufacture unless approved otherwise by engineer or owner.
- D. Eliminate any abnormal sources of noise that are considered by the architect not to be an inherent part of the electrical systems as designed.

1.5 COORDINATION WITH OTHER TRADES

- A. Coordinate the work of this division with all other divisions to ensure that all components of the electrical system will be installed at the proper time and fit the available space.
- B. Locate and size all openings in work of other trades required for the proper installation of the electrical system components.
- C. Make all electrical connections to all equipment furnished by this division and any other division.

- D. Make all electrical connections from all 120 volt and greater dampers and switches to associated exhaust fan(s) furnished by any other division.

1.6 DRAWINGS

- A. The drawings are schematic in nature, but show the various components of the systems approximately to scale and attempt to indicate how they are to be integrated with other parts of the building. Determine exact locations by review of equipment manufacturer's data, by job site measurements, by checking the requirements of other trades, and by reviewing all Contract Documents. The size of the electrical equipment indicated on the Drawings may be based on the dimensions of a particular manufacturer. While other listed manufacturers will be acceptable, it is the responsibility of the Contractor to determine if the equipment that Contractor proposes to furnish will fit in the space. The drawings are not intended to show exact locations of conduit and wire, or to indicate all wire terminators, connectors, conduit fittings, boxes or supports, but rather to indicate distribution, circuitry, and control.
- B. The Electrical Drawings are necessarily diagrammatic in character and cannot show every connection in detail or conduit in its exact location. These details are subject to the requirements of ordinances and also structural and architectural conditions. The Contractor shall carefully investigate structural and finish conditions and shall coordinate the separate trades in order to avoid interference between the various phases of work. Work shall be laid out so that it will be concealed in furred chases and suspended ceilings, etc., in finished portions of the building, unless specifically noted to be exposed. Work shall be installed to avoid crippling of structural members. All exposed work shall be installed parallel or perpendicular to the lines of the building unless otherwise noted.
- C. When the mechanical and electrical Drawings do not give exact details as to the elevation of pipe, conduit and ducts, physically arrange the systems to fit in the space available at the elevations intended with the proper grades for the functioning of the system involved. Exposed conduit is generally intended to be installed true and square to the building construction, and located as high as possible against the structure in a neat and workmanlike manner. The Drawings do not show all required offsets and their location details. Work shall be concealed in all finished areas.

1.7 SUBMITTALS

- A. Specification Review:
 - 1. Include a paragraph-by-paragraph written specification review for each product listed requiring a submittal. Denote any proposed deviations from specifications.

1.8 EXISTING CONDITIONS

- A. Do all work required to maintain electrical services to the Owner occupied portions of the building during construction.
- B. No connection to existing services or utilities shall be made without Owner's knowledge and permission. All such connections shall be planned and scheduled to minimize the length of service interruption required. Request for shutdown shall be made to Owner at least two (2) weeks in advance and shall be accompanied by detailed written schedule of activities during shutdown and list of materials required for connection and renewal of service. It shall be understood that all such service interruptions shall be made at the Owner's convenience, not the Contractor's. No increase in contract amount will be allowed for reasons of premium time, inefficiency of operations or other considerations not calculated in original bid.

- C. All items removed shall be stored on-site. Schedule a review of the items with the Owner. Remove from site all items the Owner does not choose to keep. Deliver Owner designated items to Owner's storage facility.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- B. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.
- C. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

PART 2 - PRODUCTS

- A. Provide allowance in bid for twenty-five 20A/1p circuits of 100 feet in length from source for miscellaneous needs during the course of construction. Include one duplex receptacle per circuit, all associated labor and all necessary accessories (conductor, conduit, supports, etc.) required for proper installation.
- B. Provide allowance in bid for twenty-five light switching circuit drops of twenty feet in length for miscellaneous needs during construction. Include one 277V light switch per circuit, all associated labor and all necessary accessories (conductor, conduit, supports, etc.) required for proper installation.
- C. Provide allowance in bid for ten additional exit signs for miscellaneous needs during construction. Include circuiting, all associated labor and all necessary accessories required for proper installation.

PART 3 - EXECUTION

3.1 EXISTING WORK

- A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.
- B. Provide temporary wiring and connections to maintain existing systems in service during construction.
- C. When performing work on energized equipment or circuits, use personnel experienced and trained in similar operations.
- D. Remove, relocate, and extend existing installations to accommodate new construction.
- E. Repair adjacent construction and finishes damaged during demolition and extension work.

3.2 OWNER INSTRUCTION

- A. Provide on-site Owner training for all new equipment.

- B. Use Operation and Maintenance manuals and actual equipment installed as basis for instruction.
- C. At conclusion of on-site training program have Owner personnel sign written certification they have completed training and understand equipment operation. Include copy of training certificates in final Operation and Maintenance manual submission.

END OF SECTION 26 05 00

SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section

1.2 SUMMARY

- A. Section includes:
 - 1. Wires and cables rated for 600 volts or less.
 - 2. Connectors, splices, and terminations rated for 600 volts or less.
 - 3. Lugs and pads rated for 600 volts or less.
- B. System Description:
 - 1. Provide wires, cables, connectors, lugs, strain reliefs, racking insulators for a complete and operational electrical system.
- C. Reference Standards:
 - 1. California Electrical Code (CEC) based on NFPA 70 (NEC). California Code of Regulations, Title 24, Part 3.
 - 2. National Electrical Manufacturers Association (NEMA):
 - a. WC 70 Power Cables Rated 2,000 V or Less for the Distribution of Electrical Energy.
 - 3. National Electrical Testing Association (NETA):
 - a. ATS Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
 - 4. Underwriters Laboratories, Inc. (UL):
 - a. 83 UL Standard for Safety Thermoplastic-Insulated Wires and Cables.
 - b. 486 Standard for Wire Connectors.
 - 5. American Society for Testing and Materials (ASTM):
 - a. B1 Standard Specification for Hard-Drawn Copper Wire.
 - b. B3 Standard Specification for Soft or Annealed Copper Wire.
 - c. B8 Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.

1.3 SUBMITTALS

- A. Provide product data for the following equipment:
 - 1. Wires.
 - 2. Cables.
 - 3. Connectors.
 - 4. Lugs.
 - 5. Splice Kits.
- B. Provide the insulation cable testing report in the project closeout documentation, refer to Closeout Requirements in the General Conditions portion of this specification.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Confirm to requirements of the CEC, latest adopted version with amendments by local

- Authority Having Jurisdiction (AHJ).
2. Furnish products listed by UL or other testing firm acceptable to AHJ.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Wires and Cables:
1. Southwire Company
 2. Encore Wire Corporation
 3. Cerro Wire and Cable Co.
 4. General Cable Corp.; a brand of Prysmian Group
 5. Okonite Co.
 6. Alan Wire
 7. LS Cable and System USA
 8. American Wire and Cable
- B. Connectors:
1. FCI Burndy Corp.
 2. Cooper Crouse Hinds.
 3. O.Z./ Gedney Co.
 4. Thomas & Betts Co.
 5. 3-M Co.
 6. Ideal Industries Co.
 7. Polaris Electrical Connectors
 8. ILSCO
- C. Wire connectors shall be minimum 75 degree centigrade rated and properly sized for the number of conductors being connected, terminated, spliced etc. All above grade connectors shall be solderless lug or plastic wire nut type, screw on, pressure cable type (wire nut or spring nut type), 600 Volt, 105-degree C, with skirt to cover all portions of stripped wires. Connector shall be U.L. rated for number and size of conductors being joined together as a splice.
- D. Splices:
1. Branch Circuit Splices: Ideal, Scotch-Lock, 3M, or approved.
 2. Feeder Splices: Compression barrel splice with two layers Scotch 23 and four layers of Scotch 33+ as vapor barrier.
 3. Screw Terminal Lugs.
 4. Kearney Split Bolt.

2.2 WIRES AND CABLES FOR LINE VOLTAGE SYSTEM AND CONTROLS.

- A. Wire and Cable Shall Be:
1. Copper, 600 volt rated throughout. Conductors 12AWG to 10AWG, solid or stranded. Conductors 8AWG and larger, stranded.
 2. Phase color to be consistent at all feeder terminations; A-B-C, top to bottom, left to right, front to back. Phasing tape shall be permitted on sizes #6 and larger.
- B. Each phase wire shall be uniquely color-coded as indicated below:
1. 120/ 240 Volts
Phase A – Black
Phase B – Red
Neutral – White
Ground – Green

2. 120/ 208 Volts
Phase A – Black
Phase B – Red
Phase C – Blue
Neutral – White
Ground – Green
 3. 277/ 480 Volts
Phase A – Brown
Phase B – Orange
Phase C – Yellow
Neutral – White or Natural Gray
Ground – Green
 4. Isolated Grounds: Green with Yellow Stripes
- C. All conductors shall be copper unless otherwise noted. Minimum size for individual conductors shall be #12 AWG unless otherwise noted. Sizes #8 AWG and larger shall be stranded conductor. Individual conductors shall be insulated with type, XHHW, THW, THHN/ THWN 600- volt insulation unless otherwise noted. Control, signal, communication conductors shall be as dictated by the vendor of that equipment or as specified here-in. Proper insulation type shall be used for the proper environmental application (i.e., waterproof, wet location, plenum, temperature rated). If a condition exists where the application is uncertain, contact the Engineer for direction. Contractor is responsible to follow specific cabling requirements described in other sections of this specification relative to various communications and controls systems as well as the respective riser diagrams shown on plans. If a discrepancy occurs, communicate such discrepancy to the Architect and Engineer immediately for resolution.
- D. Insulation types THWN, THHN or XHHW. Minimum insulation rating of 90C for branch circuits.
- E. Refer to signal and communications specification sections for cable requirements.

2.3 CONNECTORS

- A. Copper Pads: Drilled and tapped for multiple conductor terminals.
- B. Lugs: Indent/ compression type for use with stranded branch circuit or control conductors.
- C. Solid Conductor Branch Circuits: Spring connectors, wire nuts, for conductors 12 through 8AWG.

2.4 LUGS AND PADS

- A. Ampacity: Cross-sectional area of pad for multiple conductor terminations to match ampere rating of panelboard bus or equipment line terminals.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Installation: Conductors shall not be installed until after conduit systems are permanently in place. Use an approved non-hardening type wire pulling lubricant if lubricant is to be used. Maintain all conduits and wire pulls free from foreign material. If due to field conditions, more than a total of 300 degrees of bend are required; a pull box shall be furnished and installed for ease of installation. Said pull boxes must be sized and rated for the appropriate

application and must remain easily accessible upon completion of the project (approval of the location shall be obtained from the Architect prior to installation). Show these pullboxes on the field record drawings. Conductors installed in underground raceways on site shall be duct sealed and taped where they exit the raceway to prevent the entrance of foreign material and moisture after the conductors are installed. Proper drainage shall be provided for underground pull and splice boxes.

- B. Insulation: Use proper insulation types where temperature and environment are a factor.
- C. Labeling: All conductors in panels, switchboards, terminal cabinets, vaults, pull boxes, and junction boxes shall be labeled with tape number markers indicating circuit number and identifying system. All labeling shall be permanent. See Section 26 05 53: Identification of Electrical Systems.
- D. All conductors, wiring, cable where installed below floor, slab or underground shall be considered wet locations, and shall be rated accordingly. Non-waterproof cabling is not allowed in any below grade or wet application.
- E. Cables routed together in cable tray shall be stacked, organized and tie wrapped together in a neat and workman like manner. Random cable routing is not acceptable.
- F. Cable and conductors routed through pull boxes and vaults shall be properly supported. Bend radius of cable or conductor shall not be less than six times the overall cable diameter.
- G. Wires and Cables:
 - 1. Conductor Installation:
 - a. Install conductors in raceways having adequate, code size cross-sectional area for wires indicated.
 - b. Install conductors with care to avoid damage to insulation.
 - c. Do not apply greater tension on conductors than recommended by manufacturer during installation.
 - d. Use of pulling compounds is permitted. Clean residue from exposed conductors and raceway entrances after conductor installation.
 - 2. Conductor Size and Quantity:
 - a. Install no conductors smaller than 12AWG unless otherwise shown (e.g. – Fire alarm and communications systems, as defined in their respective specifications sections and/ or drawings).
 - b. Provide all required conductors for a fully operable system.
 - 3. Provide dedicated neutrals (one neutral conductor for each phase conductor). Exceptions may only be granted with Electrical Engineer approval.
 - 4. Conductors in Cabinets:
 - a. Cable and train all wires in panels and cabinets for power and control neatly and uniformly. Use plastic ties in panels and cabinets.
 - b. Tie and bundle feeder conductors in wireways of panelboards.
 - c. Hold conductors away from sharp metal edges.

3.2 FIELD QUALITY CONTROL

- A. Field inspection and test shall be performed under provisions of NETA ATS section 7.3 (2) - Low Voltage Cables, 600-Volt Maximum as follows:
 - 1. Visual and Mechanical Inspection:
 - a. Compare cable data with drawings and specifications.
 - b. Inspect exposed sections of cable for physical damage and correct connection in accordance with single-line diagram.
 - c. Inspect all bolted electrical connections for high resistance using one of the following methods:

- 1) Use of low-resistance ohm-meter in accordance with NETA section 7.3.2.2 (Electrical Tests).
- 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data from NETA ATS Table 10.12.
- d. Inspect compression-applied connectors for correct cable match and indentation.
- e. Verify cable color coding with applicable specifications and CEC.
2. Electrical Tests
 - a. Perform insulation-resistance test on each conductor with respect to ground and adjacent conductors. Applied potential shall be 500 volts dc for 300 volt rated cable and 1000 volts dc for 600 volt rated cable. Test duration shall be one minute.
 - b. Perform resistance measurements through all bolted connections with low-resistance ohmmeter, if applicable, in accordance with Section 7.3.2.1 (Visual and Mechanical Inspection).
 - c. Perform continuity test to insure correct cable connection.
 - d. Correct malfunctions and/ or deficiencies immediately as detected at no additional cost to the District, including additional verification testing.
 - e. Subsequent to final wire and cable terminations, energize all circuitry and demonstrate functional adequacy in accordance with system requirements.
3. Test Values
 - a. Compare bolted connection resistance to values of similar connections.
 - b. Bolt-torque levels should be in accordance with NETA ATS Table 10.12 unless otherwise specified by the manufacturer.
 - c. Micro-ohm or milli-volt drop values shall not exceed the high levels of the normal range as indicated in the manufacturer's published data. If manufacturer's data is not available, investigate any values which deviate from similar connections by more than 50 percent of the lowest value.
 - d. Minimum insulation-resistance values should not be less than 50 meg-ohms.
 - e. Investigate deviations between adjacent phases.

END OF SECTION 26 05 19

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section Includes:
 - 1. Grounding and bonding requirements of electrical installations for personnel safety and to provide a low impedance path for possible ground fault currents as described in CEC Article 250.
 - 2. "Grounding electrode system" refers to all electrodes required by CEC, as well as including made, supplementary, lightning protection system and telecommunications system grounding electrodes.
 - 3. The terms "connect" and "bond" are used interchangeably in this specification and have the same meaning.
- B. Related Sections:
 - 1. Section 26 05 00: Common Work Results for Electrical.
 - 2. Section 26 05 19: Low-Voltage Electrical Power Conductors and Cables.
- C. Reference Standards:
 - 1. California Electrical Code (CEC) based on NFPA 70. California Code of Regulations, Title 24, Part 3.
 - 2. Institute of Electrical and Electronics Engineers (IEEE):
 - a. 81 IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System.
 - b. 142 Recommended Practice for Grounding of Industrial and Commercial Power Systems.
 - c. 1100 Recommended Practice for Powering and Grounding Electronic Equipment
 - 3. National Electrical Testing Association (NETA):
 - a. ATS Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems
 - 4. Underwriters Laboratories, Inc. (UL):
 - a. 83 UL Standard for Safety Thermoplastic-Insulated Wires and Cables.
 - b. 467 Grounding and Bonding Equipment.
 - 5. American Society for Testing and Materials (ASTM):
 - a. B1 Standard Specification for Hard-Drawn Copper Wire.
 - b. B3 Standard Specification for Soft or Annealed Copper Wire.
 - c. B8 Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.

PART 2 PRODUCTS

2.1 GROUNDING AND BONDING CONDUCTORS

- A. Equipment grounding conductors shall be UL 83 insulated stranded copper, except that sizes No. 10 AWG and smaller shall be solid copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes No. 4 AWG and larger shall be permitted to be identified per CEC.

- B. Bonding conductors shall be ASTM B8 bare stranded copper, except that sizes No. 10 AWG and smaller shall be ASTM B1 solid bare copper wire.
- C. Conductor sizes shall not be less than what is shown on the drawings and not less than required by the CEC, whichever is greater.

2.2 SPLICES AND TERMINATION COMPONENTS

- A. Components shall meet or exceed UL 467 and be clearly marked with the manufacturer, catalog number, and permitted conductor size(s).

PART 3 EXECUTION

3.1 GENERAL

- A. Ground in accordance with the CEC, as shown on drawings, and as hereinafter specified.
- B. System Grounding:
 - 1. Secondary service neutrals: Ground at the supply side of the secondary disconnecting means and at the related transformers.
 - 2. Separately derived systems (transformers downstream from the service entrance): Ground the secondary neutral.
- C. Equipment Grounding: Metallic structures (including ductwork and building steel), enclosures, fire sprinklers, plumbing piping, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits shall be bonded and grounded.

3.2 INACCESSIBLE GROUNDING CONNECTIONS

- A. Make grounding connections which are buried or otherwise normally inaccessible (except connections for which periodic testing access is required) by exothermic weld.

3.3 SECONDARY EQUIPMENT AND CIRCUITS

- A. Main Bonding Jumper: Bond the secondary service neutral to the ground bus in the service equipment.
- B. Metallic Piping, Building Steel, and Supplemental Electrode(s):
 - 1. Provide a grounding electrode conductor sized per CEC between the service equipment ground bus and all metallic water and gas pipe systems, building steel, and supplemental or made electrodes. Jumper insulating joints in the metallic piping. All connections to electrodes shall be made with fittings that conform to UL 467.
 - 2. Provide a supplemental ground electrode and bond to the grounding electrode system.
- C. Service Disconnect: Provide a ground bar bolted to the enclosure with lugs for connecting the various grounding conductors.
- D. Switchgear, Switchboards, and Motor Control Centers:
 - 1. Connect the various feeder equipment grounding conductors to the ground bus in the enclosure with suitable pressure connectors.
 - 2. For service entrance equipment, connect the grounding electrode conductor to the ground bus.
 - 3. Connect metallic conduits, which terminate without mechanical connection to the housing, by grounding bushings and grounding conductor to the equipment ground

bus.

- E. Transformers:
 - 1. Exterior: Exterior transformers supplying interior service equipment shall have the neutral grounded at the transformer secondary. Provide a grounding electrode at the transformer.
 - 2. Separately derived systems (transformers downstream from service equipment): Ground the secondary neutral at the transformer. Provide a grounding electrode conductor from bar at the service equipment.
- F. Conduit Systems:
 - 1. Ground all metallic conduit systems. All metallic conduit systems shall contain an equipment grounding conductor sized per CEC.
 - 2. Nonmetallic conduit systems shall contain an equipment grounding conductor, except that non-metallic feeder conduits which carry a grounded conductor from exterior transformers to interior or building-mounted service entrance equipment need not contain an equipment grounding conductor.
 - 3. Metal conduit containing only a grounding conductor, and which is provided for mechanical protection of the conductor, shall be bonded to that conductor at the entrance and exit from the conduit.
- G. Feeders and Branch Circuits: Install equipment grounding conductors with all feeders, power, and lighting branch circuits.
- H. Boxes, Cabinets, Enclosures, and Panelboards:
 - 1. Bond the equipment grounding conductor to each pullbox, junction box, outlet box, device box, cabinets, and other enclosures through which the conductor passes.
 - 2. Provide lugs in each box and enclosure for equipment grounding conductor termination.
 - 3. Provide ground bars in panelboards, bolted to the housing, with sufficient lugs to terminate the equipment grounding conductors.
- I. Motors and Starters: Provide lugs in motor terminal box and starter housing or motor control center compartment to terminate equipment grounding conductors.
- J. Receptacles shall not be grounded through their mounting screws. Ground with a jumper from the receptacle green ground terminal to the device box ground screw and the branch circuit equipment grounding conductor.
- K. Ground lighting fixtures to the equipment grounding conductor of the wiring system when the green ground is provided; otherwise, ground the fixtures through the conduit systems. Fixtures connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.
- L. Fixed electrical appliances and equipment shall be provided with a ground lug for termination of the equipment grounding conductor.

3.4 CONDUCTIVE PIPING

- A. Bond all conductive piping systems, interior and exterior, to the building to the grounding electrode system. Bonding connections shall be made as close as practical to the equipment ground bus.

3.5 TELECOMMUNICATIONS SYSTEM

- A. Bond telecommunications system grounding equipment to the electrical grounding electrode

system. Refer to communications backbone cabling specification section.

3.6 GROUND RESISTANCE

- A. Grounding system resistance to ground shall not exceed 15 ohms. Make necessary modifications or additions to the grounding electrode system for compliance without additional cost to the Owner. Final tests shall assure that this requirement is met, and test results shall be submitted to the Owner with final close out documents.
- B. Resistance of the grounding electrode system shall be measured using a four-terminal fall-of-potential method as defined in IEEE Standard 81. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not less than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.
- C. Below-grade connections shall be visually inspected by the Inspector of Record (IOR) prior to backfilling. The Contractor shall notify the IOR 24 hours before the connections are ready for inspection.
- D. Furnish a copy of tests to Owner at completion of project.

END OF SECTION 26 05 26

SECTION 26 05 33 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
1. Conduit and fittings.
 2. Outlet boxes.
 3. Weatherproof outlet boxes.
 4. Junction and pull boxes.
 5. Floor boxes.
 6. Cabinets, termination cabinets.
 7. Gutters.

1.3 SUBMITTALS

- A. Provide Product Data for the Following Equipment:
1. Conduit and fittings.
 2. Outlet boxes.
 3. Weatherproof outlet boxes.
 4. Junction and pull boxes.
 5. Floor boxes.
 6. Cabinets, termination cabinets.
 7. Gutters.
 8. Putty pads.
 9. Raceways
- B. Submit detailed conduit routing plan, for review and approval, prior to installation as follows:
1. Exposed and/ or concealed in building walls for conduits larger than 2-inch outside diameter.
 2. All underground conduits (3/4-inch and larger) in duct bank; concealed in floor slabs, equipment pads and concrete slabs.

1.4 SUBMITTALS

- A. Minimum acceptable conduit sizes are summarized in the following table:

	Minimum Size
Underground, site wiring	1"
Underground <ul style="list-style-type: none">• Building Wiring Aboveground <ul style="list-style-type: none">• Equipment or panel feeders• Telecommunications	3/4"
Aboveground <ul style="list-style-type: none">• Lighting or branch circuit wiring• Fire alarm• Security	1/2"

Other	3/4"
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1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Conform to requirements of the CEC, latest adopted version with amendments by local AHJs.
 - 2. Furnish products listed by UL or other independent and nationally recognized testing firm.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- B. Protect PVC and PVC-coated metallic conduit from sunlight.
- C. Protection of and cleanliness of pathways and raceways must be assured during the construction process in order to eliminate the possibility of debris entering the conduit, duct, pathway resulting in decreased wire capacity and potential damage to installed conductors and cables.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Polyvinyl Chloride (PVC) coated galvanized rigid steel conduit and intermediate metal conduit shall be in accordance with NEMA RN 1. Coating shall be applied under controlled factory conditions. Prior to coating, conduit shall meet requirements of ANSI C80.1 and UL 6 or ANSI C80.6 and UL 1242 as appropriate. PVC coated conduits shall have ultra-violet (UV) inhibitor in the coating material.
- B. Intermediate Metal Conduit (IMC). Raceway shall be hot dipped galvanized mild steel in accordance with ANSI C80.6 and UL 1242 and shall bear the UL label. Conduit shall have same characteristics of rigid steel except for thinner wall.
- C. Galvanized Rigid Steel Conduit (GRSC or RGS), couplings and elbows shall be hot dip galvanized, rigid mild steel in accordance with ANSI C80.1 and UL 6. The conduit interior and exterior surfaces shall have a continuous zinc coating with a transparent overcoat of enamel, lacquer, or zinc chromate. Conduit shall be formed with continuous welded seams with a uniform wall thickness, in minimum 10-foot lengths, with threaded ends.
- D. Electrical Metallic Tubing (EMT). Electrical metallic tubing, including elbows and bends, shall be zinc coated, mild steel in accordance with the requirements of ANSI C80.3 and UL 797. The interior and exterior surfaces of the tubing shall have a continuous zinc coating. Conduit shall be formed with a continuous welded seam, with a uniform wall thickness, in minimum 10-foot lengths.
- E. Non-Metallic Conduit shall be as follows:
 - 1. Schedule 40: Conduit shall be 90 degree Celsius, polyvinyl chloride in conformance with NEMA TC-2 and UL 651 requirements.
 - 2. Spacers used in duct bank installations shall be high impact plastic, interlocking bases, and intermediate type spacers. Place spacers between 6 and 10 feet apart.

- F. Flexible Metal Conduit shall be galvanized steel meeting the requirements of UL 1. Flexible aluminum conduit is not permitted.
- G. Liquid-Tight Flexible Metal Conduit shall be plastic jacketed, galvanized steel, "Sealtite" Type EF for general service areas or Type HC for high temperature when used under raised floor or in air plenums. Conduit shall be UL listed.
- H. Manufacturers:
 - 1. Outlet Boxes: Bowers, Raco, Orbit, Steel City or equal.
 - 2. Weatherproof Outlet Boxes: Bell, Red Dot, Carlon or equal.
 - 3. Floor Boxes: Wiremold/ Walker, Hubbell, Steel City, or equal.
 - 4. Junction and Pull Boxes: Circle AW, Hoffman, Wireguard or equal.
 - 5. Box Extension Adapter: Bell, Red Dot, Carlon or equal.
 - 6. Conduit Fittings: O-Z Gedney, Thomas & Betts, Raco, Crouse Hinds, or equal.
 - 7. Putty pads: 3M, Hilti, or equal.
 - 8. Heavy wall rigid non-metallic conduit, Carlon, Certainteed, R&G Sloane or equal.
 - 9. Extra heavy wall non-metallic conduit, Carlon, Certainteed, R&G Sloane or equal.
 - 10. Flexible Metal Conduit (FMC), Alfex, American Flexible Conduit or equal.
 - 11. Liquid tight flexible metal conduit, Anacanda (type UA), Electri-flex Liguatite or equal.
 - 12. Floor Boxes, Single Gang, Walker/ Wiremold 880 CS Series or approved equal.
 - 13. Floor Boxes, Multiple Gang, Walker/ Wiremold RFB Series or Walker Omnibox multi-service floor box with carpet plates, and/ or water resistant device covers.
 - 14. Masonry Boxes, outlets in concrete, Raco Series 690 or equal.
- I. Listed products for termination, coupling, extending, benching supports of raceways shall be used.

2.2 OUTLET BOXES

- A. NEMA 1 gutter, junction and pull boxes shall be fabricated from code gage steel finished in grey enamel with screw cover fronts and concentric knockouts in all sides.
- B. NEMA 3R gutter, junction and pull boxes shall be fabricated from code gage galvanized steel with screw cover fronts and concentric knockouts in the bottom only. Any penetrations to the side, top or back shall be weatherproofed in an approved manner such as "MYERS" gasketed type hub or equal.
- C. Steel outlet boxes and plaster rings shall be galvanized rigid assemblies, either one piece pressed or factory welded construction containing the size and number of knockouts required. Steel outlet boxes shall be manufactured, sized and installed in accordance with CECArticle 314. Device Outlet: Installation of one or two devices at common location, minimum 4" square, minimum 1-1/2" deep. Single or 2 gang flush device plaster ring. Raco or equal.
- D. Luminaire Outlet: minimum 4" square with correct plaster ring depth, minimum 1-1/2" deep with 3/8" luminaire stud if required. Provide proper depth plaster ring on bracket outlets and on ceiling outlets.
- E. Construction: Provide galvanized steel interior outlet wiring boxes, of the type, shape and size, including depth of box, to suit each respective location and installation; constructed with stamped knockouts in back and sides, and with threaded holes with screws for securing box covers or wiring devices. Boxes shall be properly secured to the structure such that they are flush with the finish surface. Boxes shall be made structurally secure by means of the proper fastening devices.

- F. Accessories: Provide outlet box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, plaster rings, luminaire studs, cable clamps and metal straps for supporting outlet boxes, compatible with outlet boxes being used and meeting requirements of individual wiring situations.

2.3 JUNCTION AND PULL BOXES

- A. Construction: Provide galvanized sheet steel junction and pull boxes, with screw-on covers; of the type shape and size, to suit each respective location and installation; with welded seams and equipped with steel nuts, bolts, screws and washers.
- B. Location:
 - 1. Install junction boxes above accessible ceilings for drops into walls for receptacle outlets from overhead.
 - 2. Install junction boxes and pull boxes as required to facilitate the installation of conductors and limiting the accumulated angular sum of bends between boxes, cabinets and appliances to 300 degrees.
 - 3. Locations: Junction boxes shall be located only where necessary and only in equipment rooms, closets, and accessible attic and underfloor spaces. A horizontal distance of 24" shall separate outlet boxes on opposite sides of occupancy separation walls, fire-rated walls or partitions.
 - 4. Labeling: Junction box covers shall be marked with indelible ink indicated the circuit numbers passing through the box.

2.4 CONDUIT FITTINGS

- A. Requirements: Provide corrosion-resistant punched-steel box knockout closures, conduit locknuts and plastic conduit bushings of the type and size to suit each respective use and installation.
- B. Steel boxes may allow for field knock-out modifications, but shall in all other ways conform to code requirements.

2.5 FLOOR BOXES - SINGLE GANG

- A. Construction: Deep cast iron fully adjustable before and after concrete pour with all required components for complete activation. Verify required components for application of service fittings, covers, monuments, and the like, attached to floor boxes.
- B. Activations:
 - 1. Flush: Provide brass duplex or single signal cover, hinged with set screw lock. Carpet or tile finish ring.
 - 2. Monuments: Provide stainless steel monuments with power receptacle or data grommet as noted.
 - 3. Coordinate specific application of systems as noted on Drawings.

2.6 FLOOR BOXES - MULTIPLE GANG

- A. Construction: Deep cast iron, fully adjustable before and after pour. Equal to Walker/ Wiremold RFB Series or Walker Omnibox multi-service floor box with carpet plates, and/ or water resistant device covers. Verify color. Partition for different power or signal applications. Provide required power receptacle devices and signal grommets or receptacles as noted. Flange type shall be compatible with floor covering for either carpet or vinyl as required and shall be brass type not polycarbonate.

- B. Floor mounted boxes shall be water tight and cast iron when installed in grade level concrete slab floor, fully adjustable with interior and exterior leveling screws. Receptacle flange shall be brass with a duplex lift lid. Flange type shall be compatible with floor type. Before installation, coordinate exact location with Architect.

2.7 PUTTY PADS

- A. Intumescent moldable firestop putty designed to protect electrical outlet boxes.
- B. Provide putty pads of proper type around outlet boxes and/ or as detailed on plan to meet sound transmission restrictions and fire ratings of walls

PART 3 EXECUTION

3.1 INSTALLATION

- A. Conduit systems listed below are for use in installations where they are permitted to be used by CEC and/ or other occupancy restrictions. The below installation methods do not intend to suggest that these materials be installed in conflict with any applicable code. Special attention to applications shall be made in building types such as wet location, hazardous locations, assembly occupancy and multi-story, but not limited to these. Requirements which are more restrictive than the CEC may be called for by the drawings and/ or these specifications. These requirements must be adhered to. The Electrical Contractor shall be responsible to use the proper conduit system for the application. Exposed conduit is not allowed below ceilings or above slab of floor, without prior approval from Electrical Engineer. All conduits shall be concealed except in electrical and telecommunication rooms or where shown to be surface mounted. Exposed conduit (where allowed) shall be run square and plumb with building lines in an approved manner. Support roof mount conduits, where allowed, with minimum 12" wide approved rooftop supports (B-Line Durablok or approved equal) unless otherwise detailed in roof requirements or as specified in roofing specification. Strap conduits to blocks with proper sized conduit straps. Spacing of support shall be a minimum as provided for in the CEC. All exposed conduit mounted below 8' above finished grade shall be strapped at a minimum of 5' spacing.
- B. Non-Metallic Rigid Conduit shall be used in concrete slabs, below concrete slabs on grade, or underground outside of a building slab or foundation. Maintain minimum depth requirements and cover with appropriate fill material. Conduit shall be heavy wall Schedule 40 or 80, rigid PVC only. Rigid utility P&C duct shall not be used in any application. Properly sized grounding conductors shall be installed per CEC article 250, in all non-metallic conduit branch circuit and feeder runs. PVC conduit shall be formed or field bent only with the use of properly approved bending tools such as to not decrease the internal bore of the conduit. All conduits shall be cut square and reamed of burrs. Approved and compatible glue shall be used on all PVC fittings to attain watertight joints.
- C. Galvanized Rigid Steel (GRS) conduit shall be used where exposed less than 8'-0" above finished grade to 18" below finished grade and where subject to physical damage. Conduits shall be cut square and reamed to remove burrs and sharp edges. Strap conduit below 8' above grade at 5' intervals. Unless otherwise noted, threadless setscrew and threadless weathertight fittings may be used in lieu of threaded fittings. All threaded ends entering a junction box of any type shall require one locknut on the inside and one on the outside of the enclosure and be provided with a plastic bushing or grounding bushing where necessary for proper grounding. Where exposed to moisture, a watertight hub or other approved method shall be required. All conduits shall be stubbed up straight and uniform into junction boxes, panels, cabinets, etc., and shall be (GRS) properly supported and strapped. All GRS conduit located below grade, shall be tape wrapped.

- D. Electrical Metallic Tubing (EMT) shall be used as allowed by code and as permitted by this specification. It shall not be in contact with soil or the concrete slab on the ground floor of any structure. Connectors and couplings shall be steel insulated set screw type where installed in indoor dry locations not subject to moisture. Where the potential for moisture is present, compression type weathertight fittings are required. One hole conduit straps are permitted from 1/2" to 1" and two hole conduit straps are required for size 1-1/4" and larger. EMT shall not be allowed in areas subject to severe physical damage. Install copper ground wire sized per CEC 250-122 in all EMT conduits.
- E. Flexible conduit may be used where concealed in building construction or above dropped ceilings, but shall meet the following criteria: No individual circuit path from distribution panel to last device shall exceed a cumulative length of 6' of flexible conduit from start to end. Flexible conduit shall not exceed a total directional change of 270 bending degrees in any one run between conduit terminations. Squeeze type or Jake type steel flex fittings of a grounding type are required. Flexible conduit must be supported in accordance with CEC. Where exposed to the weather, moisture, or spray down flexible conduit shall be of the liquidtight type. Fittings shall be manufactured for use with liquidtight flexible conduit. All motor connections shall be made with liquidtight flex. Flexible conduit may not be used where exposed except for last 2' of equipment connection and unless otherwise noted or approved. A copper ground wire sized per CEC 250-122 shall be installed in all flexible conduit runs. Flexible conduit may not be used exposed. Weatherproof liquid tight conduit shall not be used at roof level for equipment connections with lengths exceeding 24" nor shall it be used to circumvent a rigid conduit system in a horizontal direction. Connect recessed lighting fixtures to conduit runs with a maximum of 6' of flexible metal conduit extending from junction box to fixture.
- F. Underground conduits and transition to above grade/ slab shall be as follows:
1. PVC elbows 2" and smaller are allowed, or if top of elbow is minimum 18" BFG or below top of slab, otherwise GRS elbows are required.
 2. GRS risers are required from elbow below grade to equipment (device, outlet, panel, cabinet, etc.) above grade.
 3. GRS elbows/risers to be PVC coated or 10 MIL tape wrapped (1/2" lapped) to 3" above finish grade or top of slab.
- G. Conduit Supports: Conduit runs may be supported by one-hole and two-hole straps or supports as manufactured by Unistrut, Minerallac, Caddy or equals. Supports may be fastened by means of anchors, shields, beam clamps, toggle bolts, or other approved methods appropriate for the application and size of conduit. Pipe nailers (J-hooks) may only be used for 1" conduit and smaller and only in wood frame construction. Conduit support methods are subject to review by the engineer and authority having jurisdiction for adequacy. Installations deemed inadequate shall be corrected by the contractor at no cost to the Owner.
- H. Bends and offsets shall be made with approved tools for the type of conduit being utilized. Bends shall be made without kinking or destroying the smooth bore of the conduit. Parallel conduits shall be run straight and true with bends uniform and symmetrical. Minimum radii shall be per CEC 344-24.
- I. Conduit Stub-outs below grade shall be capped with plastic cap, and identified by placing a pull box marked with correctly identified utility such as "Elec", "Tel", etc. Dimension for exact location on field record drawings. Provide lids for proper field application (i.e. traffic, incidental, pedestrian).
- J. Conduit Seals - Where below grade conduits enter structure through slab or retaining wall of building or basement, seal the inside of each conduit as follows:
1. Provide damming material around conductors 3" into conduit. Polywater or equal.

2. Fill 3" of conduit with 3M #2123 sealing compound.
 3. Wrap conductors where they exit the conduit with 3M #2229 "Scotch Seal" mastic tape. Lap tape to approximate diameter of the raceway and wrap outside of conduit opening with (minimum) one turn.
 4. Use conduit sealing bushings type CSB (O-Z/ Gedney) or equal.
 5. Empty conduits shall be sealed with standard non-hardening duct seal compound and then capped to prevent entrance of moisture and gases and to meet fire resistance requirements.
 6. Provide cable drip loop minimum 12" high.
- K. Marker tape: Place marker tape at 12" below finish grade along and above buried conduits. Label tape "CAUTION: ELECTRICAL LINES BELOW" or similar wording.
- L. Electrical and communications systems raceways routed underground shall not occupy the same trench as plumbing utilities such as sewer, water, storm drain, gas or other wet or dry gaseous utility system. A minimum of 12" of undisturbed earth is required. Where utilities must cross in closer proximity to each other due to physical constraints, 6" minimum crossing distances are allowed.
- M. Conduits, routed below footings, slabs, grade beams, columns, and other structural elements shall be installed in strict compliance with structural details and criteria shown on structural plans. Clearances below structural elements and sleeves through structural elements must be carefully planned to avoid conflict and must be approved by the structural engineer if conflict arises.
- N. All conduit or raceways passing through fire rated walls, floors, or ceilings shall be installed with a listed penetration method which protects the opening to the same rating as the assembly and is non hardening.
- O. Location: Locate boxes and conduit bodies so as to ensure accessibility of electrical wiring.
- P. Anchoring: Secure boxes rigidly to the substrate upon which they are being mounted, or solidly embed boxes in concrete or masonry.
- Q. Special Application: Provide weatherproof outlets for locations exposed to weather or moisture.
- R. Knockout Closures: Provide knockout closures to cap unused knockout holes where blanks have been removed.
- S. Mount outlet boxes, unless otherwise required by ADA, or noted on drawings, the following distances above the finished floor:
1. Receptacles, Telephone, TV & Data outlets. (measured to bottom of outlet box): +15".
 2. Outlet above counter (measured to top of outlet box): +46".
 3. Control (light) Switches. (measured to top of outlet box): +48".
 4. Fire Alarm Manual Pull Stations, T-stats. (measured to top of outlet box): +48".
 5. Fire Alarm Visuals: the lower of +80" to bottom of lens, or 6" below ceiling.
 6. Other Outlets: As indicated in other sections of specifications or as detailed on drawings.
- T. Coordinate all electrical device locations with the architectural floor plan and interior and exterior elevations to prevent mounting devices within elements that they may conflict such as cabinetry, mirrors, planters, etc.
- U. Size outlet and junction boxes to minimum wire fill space requirements. Upsize box as

required to allow ease of wire installation and device installation.

- V. Outlet and junction boxes in fire rated walls shall be gauged and spaced so as not to exceed the maximum penetration allowed by the assembly without compromising the fire rating. If a conflict arises relative to a specific condition, the contractor shall follow the requirements of the fire authority and ask for guidance from the design team. At no time should a larger box be installed prior to resolution of conflict.

END OF SECTION 26 05 33

SECTION 27 00 00 COMMUNICATIONS

1.1 GENERAL

A. SCOPE OF WORK:

1. The work under this section includes all final design, material, equipment, supplies, labor, testing, and accessories required to furnish and install a complete Structured Cabling System (SCS), Intercom/PA/Clock System, and CCTV System, as indicated on the drawings and as specified herein. These systems shall be defined as all cables, equipment, products, etc., as indicated on the drawings, and mentioned in these specifications.
2. It is the intent of the Drawings and Specifications, which are presented in a "design-build" format, for the Contractor to design, provide and install a complete, fully operational, and tested system.
3. All miscellaneous system components including, but not limited to, cables, termination equipment, punch blocks, patch panels, ladder racks, backboards, equipment racks, speakers, clocks, cameras, enclosures, terminal cabinets, and any other related items shall be furnished and installed complete under this section, such that the system shall perform all functions listed herein in compliance with all of the specified requirements.
4. Schedule is paramount to the project's success. With this, the structured cabling Contractor will have to be a team player, continually working with the team to facilitate expeditious design, procurement, and construction processes.
5. This project will be performed in a phased construction format. Each phase of construction will be completely installed, labeled and tested, to the greatest extent physically possible, before moving to the next phase.
6. Connect all structured cabling back to building "F" IDF.

1.2 RELATED WORK, STANDARDS, DOCUMENTS AND PUBLICATIONS

A. Each agency's relative codes, standards, and recommended practices apply to the voice/data cabling systems and their components as specified herein:

1. American National Standards Institute (ANSI)
 - a. ANSI T1.336 Engineering requirements for a universal telecommunications frame
 - b. ANSI T1.404 Network and customer installation interfaces – DS3 and metallic interface specification
2. Building Industry Consulting Service International (BICSI)
 - a. Telecommunications Distribution Methods Manual (TDMM) – latest edition.
 - b. Customer Owned Outside Plant Design Manual (CO-OSP) – latest edition.
3. Comité Consultatif International de Télégraphique et Téléphonique (CCITT)
4. Federal Communications Commission (FCC)
 - a. FCC Rules Part 68
5. American Society for Testing and Materials (ASTM)
 - a. E814-02 Standard Test Method for Fire Tests of Through-Penetration Fire Stops
6. Insulated Cable Engineers Association (ICEA)
 - a. Communications Wire and Cable for Premises Wiring.
7. International Electrotechnical Commission (IEC)
 - a. IEC 61935-01 Generic Cabling Systems - Specification for the testing of balanced communication cabling in accordance with ISO/IEC 11801 Part 1: Installed Cabling
 - b. IEC 61935-02 Generic Cabling Systems - Specification for the testing of balanced communication cabling in accordance with ISO/IEC 11801 Part 2: Patch Cords and Work Area Cords
8. Institute of Electrical and Electronics Engineers (IEEE)
 - a. IEEE 802 Specification for Local Area Networks, latest edition.
 - b. IEEE 802.3an Specification for 10GBASE-T Ethernet, latest edition.
 - c. ANSI/IEEE C62.41 – Guide on the Surge Environment in Low-Voltage (1000V or

- less) AC Power Circuits, latest edition.
9. International Organization for Standardization (ISO)
 - a. ISO/IEC 11801 Information Technology – Generic Cabling for Customer Premises, latest edition.
 - b. ISO TR 24750 Technical Report
 10. National Fire Protection Association (NFPA)
 - a. ANSI/NFPA-70 National Electric Code – Current version as adopted by AHJ(NEC)
 - b. ANSI/NFPA-75 Standard for the protection of information technology equipment
 11. National Electrical Manufacturers Association (NEMA)
 12. Occupational Safety and Health Administration (OSHA)
 13. Telecommunications Industry Association (TIA)
 - a. TIA/EIA-492AAAC Detail Specification for 850nm Laser-Optimized 50 micron Core Diameter/125 micron Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers.
 - b. TIA/EIA-492AAD Detail Specification for 850nm Laser-Optimized 50 micron Core Diameter/125 micron Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers Suitable for Manufacturing OM4 Cabled Optical Fiber.
 - c. TIA-526-7 Optical Power Loss of Installed Single-Mode Fiber Cable Plant.
 - d. TIA-526-14-B Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant; IEC 61280-4-1 Edition 2, Fiber-Optic Communications Subsystem Test Procedure- Part 4-1: Installed Cable Plant- Multimode Attenuation Measurement.
 - e. ANSI/TIA-568-C.0 Telecommunications Cabling for Customer Premises, latest edition.
 - f. ANSI/TIA-568-C.1 Commercial Building Telecommunications Cabling Standard, latest edition.
 - g. ANSI/TIA-568-C.2 Twisted-Pair Telecommunications Cabling and Components Standard, latest edition.
 - h. ANSI/TIA-568-C.3 Optical Fiber Cabling Components Standard, latest edition.
 - i. ANSI/TIA-568-C.4 Broadband Coaxial Cabling and Components Standard, latest edition.
 - j. ANSI/TIA-569-B Telecommunications Pathways and Spaces, latest edition.
 - k. ANSI/TIA/EIA-598-C Optical Fiber Cable Color Coding.
 - l. ANSI/TIA-606-B Administration Standard for Commercial Telecommunications Infrastructure.
 - m. ANSI/TIA-607-B Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications, latest edition.
 - n. ANSI/TIA-758-B Customer-Owned Outside Plant Telecommunications Infrastructure Standard, latest edition.
 - o. ANSI/TIA-862-A Building Automation Systems Cabling Standard, latest edition.
 - p. ANSI/TIA-942-A Telecommunications Infrastructure Standard for Data Centers, latest edition.
 - q. ANSI/TIA-1152 Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling, latest edition.
 14. Underwriters Laboratories Standards (UL)
 - a. UL 5 Surface Metal Raceways and Fittings, latest edition.
 - b. UL 5A Nonmetallic Surface Raceways and Fittings, latest edition.
 - c. UL 5B Strut-Type Channel Raceways and Fittings, latest edition.
 - d. UL 5C Surface Raceways and Fittings for Use with Data, Signal, and Control Circuits, latest edition.
 - e. UL 514A Metallic Outlet Boxes, latest edition.
 - f. UL 514B Conduit, Tubing, and Cable Fittings, latest edition.
 - g. UL 514C Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers, latest edition.
 - h. UL 514D Cover Plates for Flush-Mounted Wiring Devices, latest edition.
 - i. UL 943 Ground-Fault Circuit-Interrupters (GFCI), latest edition.

- j. UL 1363 Relocatable Power Taps, latest edition.
- k. UL 1449 Transient Voltage Surge Suppressors, latest edition.
- l. UL 1685 Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables, latest edition.
- m. UL 1863 Communications-Circuit Accessories, latest edition.
- 15. Intetel Testing Services ETL SEMKO (ETL)

- B. The Contractor shall be responsible for obtaining and utilizing the latest Structured Cabling, Architectural, and Electrical plans.

1.3 GENERAL REQUIREMENTS

- A. Manufacturer: The term "manufacturer" shall be defined as the company, or group of companies, that actually produces the products meeting the requirements of Section 2 of this document. The manufacturer shall have a minimum of seven - (7) years of experience in manufacturing products of this type and shall be ISO 9001 Certified. The products, summarized in this specification, shall be supplied by a single manufacturer, with the exception of:
- 1. Data racks and other hardware that is not defined as part of the channel test configuration by ANSI/TIA/EIA 568-C.
 - 2. Fiber Optic Cable and Outside Plant (OSP) fiber cable.
 - 3. Channel solutions consisting of cabling and connectivity hardware independently tested as by UL or ETL and that are listed Section 2 of this document.
 - 4. Cables manufactured by another manufacturer specifically called out on the drawings.
- B. Contractor: The term "Contractor" shall be defined as the company, or group of companies, that actually installs the products per Section 3 of this document. The Contractor selected to provide the installation of this system shall be certified by the manufacturer in all aspects of design, installation and testing of the products described herein.
- 1. The Contractor shall hold a valid State of California C-7 Low-Voltage license, shall have completed at least ten (10) projects of comparable scope, shall have been in business of furnishing and installing systems of this scope and magnitude for at least the past five (5) consecutive years, and capable of being bonded to assure the Owner's Project Manager of performance and satisfactory service during the guarantee period.
 - 2. The Contractor shall have a minimum of one (1) Registered Communications Distribution Designer (BICSI RCDD) and a minimum of two (2) BICSI TECHNICIAN level technicians on staff as fulltime employees of the Contractor.
 - 3. All work shall be performed under the supervision of a company accredited and trained by the manufacturer and such accreditation must be presented. Contractor must be accredited a minimum of one hundred eighty (180) days prior to bid submittal date.
 - 4. The Contractor shall be a manufacturer's Authorized Installer and Warranty Station for the equipment offered and shall maintain a fully equipped service organization capable of furnishing adequate repair service to the equipment.
 - 5. All personnel performing work on this project must have successfully completed the manufacturer's training course prior to performance of any work on this project. Accreditation will consist of individual employee certifications issued by the manufacturer. All personnel engaged in the testing of fiber optic and category-6 metallic premise horizontal and distribution systems must have successfully completed the test equipment manufacturer's training. Certification of such training must be presented prior to any work performed on this project.
 - 6. The Contractor selected for this Project shall adhere to the engineering, installation and testing procedures and utilize the authorized manufacturer components and distribution channels in provisioning this Project.
 - 7. The Contractor shall own and maintain tools and equipment necessary for successful installation and testing of fiber optic cable, and category-6 metallic premise horizontal

- and distribution systems and have personnel who are manufacturer trained in the use of such testing tools and equipment.
8. The Contractor shall hold all other licenses required by the legally constituted authorities having jurisdiction over the work.
 9. The Contractor shall have the capability to produce the AutoCAD documentation as required elsewhere in this specification.
 10. The Contractor shall provide a fingerprint check for all personnel working on School sites. The test shall be performed by the Department of Justice pursuant to California Education Code Section 45125.1.
 11. For additional Contractor requirements, see Section 1.6.A.1 (b) of this document in its entirety.

1.4 QUALITY ASSURANCE

- A. It is the intent of these specifications to establish an installation standard of quality for labor and materials. For any proposed product substitution or when the Contractor intends to include a product substitution for the bid pricing, provide a substitution request submittal to the Owner's Project Manager for review no later than fifteen (15) calendar days prior to Bid submittal. This report shall include all of the following items:
 1. Description of how the proposed product(s) will impact meeting the project completion date, indicate all item(s) with lead times and expected delivery date(s).
 2. Itemized cost comparisons between the proposed product(s) and the listed product(s).
 3. Detailed technical analysis of the electrical and mechanical specification differences between the proposed product(s) and the listed product(s).
 4. ETL "Verified" or UL "Verified" test lab documentation for the proposed product(s) and assemblies proposed.
 5. Proposed product identification, manufacturer literature (specifications and cut sheets).
 6. Name, address and current contact information of several (minimum of 2) similar projects where the substituted product(s) have been used.
 7. Name, address and contact information of the proposed product(s) manufacturer's local representative.
 8. Sample proposed product(s) manufacturer's component and application warranty. Detailed warranty requirements are described in Section 1.10 GENERAL SYSTEM PRODUCT, INSTALLATION AND OVERALL SYSTEM WARRANTY of this document.
- B. The Owner's Design Team/Project Manager/Project Engineer must approve any proposed product(s) substitution item in writing. The Owner's Design Team/Project Manager/Project Engineer reserves the right to require a complete sample of any proposed product(s) and may request a sample tested by an independent testing consultant to prove commensurate quality. The decision of the Owner's Design Team/Project Manager/Project Engineer regarding the proposed product(s) will be final.
- C. If a proposed product(s) is given final acceptance by the Owner's Project Manager, the Contractor shall reimburse the Owner's Design Team/Project Manager/Project Engineer for the costs to review the proposed product(s) substitution(s), and for any additional engineering charges, and shall pay all charges of other trades resulting from this product use, at no cost to the Owner.
- D. CCTV Qualification Statement
 1. Provide a current letter of recommendation from Bosch. The Contractor must be certified with Bosch and be BVMS Certified for at least twelve (12) months prior to letter of recommendation. The letter of recommendation must be provided to the District at time of bid.
 2. Provide individual installer's experience and qualifications, which shall include three (3) years of projects of similar complexity. Include names and locations of two (2) projects successfully completed in the previous three (3) years.

3. Provide documentation stating you have been in the telecommunication contracting business for a minimum of five (5) years under the same name and are located within a four (4) hour response time of the District.
4. Provide BVMS certification documentation of the certified installer for this project at time of bid.
5. Provide complete instructions on correct operation of system to personnel designated by District. All instructions shall be given during one (1) predetermined time period, coordinated with the District Technology Representative. At the completion of training, the Contractor shall send a confirming letter to the District Technology Representative with the date of instruction, names of District's personnel who were instructed, and a summary statement of the instruction presented.

1.5 GENERAL SUBMITTAL REQUIREMENT

- A. Submittals shall be presented and formatted per the guidelines in the Division 1 section of this RFP package.
- B. All cut sheets shall represent the latest version, part number, and revision of the product. Where multiple products or part numbers appear on a page, a bold arrow or circle shall indicate which product or part numbers are to be used as part of the installation. The submittal shall include all descriptive pages associated with the product, not just the page showing the part number.

1.6 PRE-INSTALLATION SUBMITTAL REQUIREMENTS

- A. Within fifteen (15) calendar days after the date of award of the Contract, the Contractor shall submit the following:
 1. Submittal Binder: Submit eight (8) copies of the complete Submittal Binder to the Owner for review. The binder shall consist of five (5) major sections with each section separated by index tabs. Each page in the binder shall be numbered sequentially and shall be summarized in the index.
 - a. The FIRST section shall be the "title sheet" which shall include the submittal date, project title and address, name and contact information of the Contractor, and name of the Owner. Include an Index sheet that shall contain a Table of Contents identifying page numbers for each section and the section's items.
 - b. The SECOND section shall include the following items:
 - 1) CONTRACTOR'S LICENSE: A copy of the low voltage Contractor's valid State of California C-7 Low-Voltage license.
 - 2) PROOF OF EXPERIENCE: Proof (written documentation) that the low voltage Contractor has been regularly engaged in the business of low voltage contracting consisting of, but not limited to, engineering, fabrication, installation, and servicing of communication systems of the type specified herein for at least the past five (5) consecutive years.
 - 3) PENDING LITIGATION: Provide a statement summarizing any pending litigation involving any officer or principal of/or the company, the nature of the litigation and what effect the litigation may carry as it relates to this work in the worst-case scenario. Non-disclosure of this item, if later discovered, may result, at the Owner's discretion, in the Contractor bearing all costs and any cost related to associated delays in the progress of the work.
 - 4) INSURANCE CERTIFICATES: Copy of low voltage Contractor's current liability insurance and state industrial insurance certificates in conformance with the contract documents.
 - 5) PROJECT LIST: A List containing at least ten (10) California installations completed within the last five (5) years by the low voltage Contractor that are comparable in scope and nature to that specified in the contract document. Contractor must include up-to-date contact information for each project listed

- including contact name, title, email address and phone number.
- 6) **SERVICE CAPABILITY:** Documentation indicating in detail that the low voltage Contractor has competent engineering, installation, service personnel and facilities with reasonable stock of service parts within 75 air-miles of the job site. Do not submit a Contractor's company sales brochure as documentation.
- 7) **AUTHORIZATION LETTERS:** Letters from the low voltage equipment manufacturer stating that the low voltage bidding Contractor is a Factory Authorized Distributor/Installer and is trained and certified for the equipment he proposes to use on this project and is licensed to purchase and install software required to provide the specified functions.
- 8) **CERTIFICATION:** Copy of the following current BICSI certifications. Provide proof that the certificate holders are full time employees of the low voltage Contractor's local facility servicing this project and will be actively involved on site for the duration of this project.
- a) BICSI RCDD, minimum of (1). Mandatory requirement: Shall be on site a minimum of one (1) day per workweek.
- b) BICSI TECHNICIAN, minimum of (2). Mandatory requirement: Shall be on site a minimum of five (5) full 8-hour days per workweek.
- 9) **PROOF OF TRAINED PERSONNEL:** Documentation that the Contractor has full time on-staff personnel, manufacturer trained and BICSI certified, for the equipment proposed for this project, and on-staff manufacturer trained and certified by the Test Equipment manufacturer in the proper use of the test equipment required on this project. Provide copies of all manufacturers' training/certification documentation, and Test Equipment manufacturer's training/certification documentation. Provide a statement that personnel meeting these qualifications are in the local facility and will be maintained at that facility throughout the project and the warranty period.
- 10) The THIRD section shall contain a detailed and complete Bill of Materials including the product description, part number and manufacturer name, quantity, unit of measure, and corresponding specification section number or drawing sheet number where that product is referenced. Also listed in the Bill of Materials shall be test equipment to be used to test the optical fiber, copper, and coax components. Include all patch cords and other specialized components.
- See example format below:

Description	Part #	Quantity	UoM	Spec	Test Equip.
Cat-6 Station cable	Belden #12345	10 boxes	1000ft/box	2.03	Fluke DTX-1800

This information may be used by the Owner to evaluate the Contractor's general understanding of the project scope during the bid evaluation. Errors/Omissions from this Bill of Materials does not relieve the Contractor from providing all material, components, labor, etc., as outlined in this document and on the drawings to provide a complete and fully functional system(s).

- 11) The FOURTH section shall contain original manufacturer cut sheets for all of the materials that meet the requirements listed in Section 2 of this document, and all materials described on the construction drawings. Also include manufacturer's cut sheets for all testing equipment to be used for completion of the project. All pages shall be numbered sequentially corresponding to the bill of materials list. On each cut-sheet, provide an indicating arrow next to each part number of proposed material.
- 12) The FIFTH section shall contain a designation schedule for each system component location, and complete "E" size (30" x 42") (unless otherwise

specified) bond drawings, showing system wiring plans. The professionally drafted drawings shall be generated on Autodesk AutoCAD 2004 or later computer design software. These drawings shall also include:

- a) MDF and IDF Diagrams - Including:
 - i. Cable routing, conduit sleeve(s) locations, sizes and fill count
 - ii. Floor plan identifying locations of all components and apparatus
 - iii. Detailed layout and elevations of the wall field(s)
 - iv. Labeling plan
 - b) Site Plan – Including:
 - i. Conduit quantity, sizes and routing of all site conduits including in-ground vaults, pull boxes, and manholes, including labeling plan.
 - ii. Building designations
 - iii. MDF and IDF locations and labeling in each building
 - iv. Cabling type and quantity between MDF and each IDF location
 - c) Work Area Floor Plans - Including:
 - i. Detailed cable routes, including quantity of cables.
 - ii. Device locations and quantities
 - iii. Approved labeling plan for all work area outlets, cabling, and devices.
 - d) Cross Connect Documentation - Including:
 - i. Cross-connect records for all voice, data, speaker, clock and IP camera devices. Provide in Excel format.
 - e) Riser Distribution Plan
 - f) Rack elevations of all MDF and IDF equipment properly labeled
 - g) 1/4-inch scale floor plans of all MDF and IDF data rooms identifying all equipment properly labeled.
 - h) Cable Tray, Conduit, and Raceway Plans (if applicable) with quantities, cable type and cable quantity for each.
 - i) Campus Distribution Plan (if applicable)
- c. Failure to comply with any of the requirements listed above may result in the rejection of the entire submittal package.

1.7 PROJECT DIRECTION

- A. Single Point of Contact: Contractor will provide an English proficient, single point of contact, i.e., Project Manager, to speak for the Contractor and to provide the following functions:
- 1. Initiate and coordinate tasks with Owner's Project Manager, and others as specified by Owner's Project Manager.
 - 2. Provide day-to-day direction and on-site supervision of Contractor personnel.
 - 3. Shall be readily available to the Owner/Owner's Project Manager 24 hours a day / 7 days a week throughout the duration of the Project.
 - 4. Shall have full time cellular phone capability, and the ability to send/receive email correspondence, accessible by the Owner's Project Manager.
 - 5. Ensure conformance with all Contract provisions.
 - 6. Participate in weekly site project meetings and construction meetings.
 - 7. Provide detailed and written weekly status reports to Owner's Project Manager. The content shall be substantive enough to bring about a full understanding of all situations current and situations future. Weekly reports shall include but are not limited to detailed Weekly Progress Report, RFI status log (Request for Information), Change Order Log (pending and approved), Project Addendum Log. Each of the above must show assigned responsibilities and event history. Weekly reports shall include milestone information, resource updates (staff and materials), and any conditions or incidents that may impact the Project Schedule. Contractor shall provide hard copies to Owner.
 - 8. This individual will remain as Project Manager for the duration of the project. The Contractor may change Project Managers only with the Owner's Project Manager's

written approval.

1.8 PLANNING

- A. Planning meetings and schedule: Within fifteen (15) calendar days after the date of award of the Contract, an initial planning meeting will be held with the successful bidder to clarify all requirements (systems, services, distribution methods, etc.), identify responsibilities, and schedule the events that will transpire during the implementation of the project. Within seven (7) calendar days of this initial meeting, the Contractor shall provide a written report and project schedule to clearly document the events and responsibilities associated with the project. Contractor's project schedule shall conform to the overall Project Construction Schedule issued by the Construction Management Company or the Owner. Contractor is required to attend all planning and other construction meetings as requested by the Owner, Architect, or Engineer.

1.9 POST INSTALLATION SUBMITTAL REQUIREMENTS

- A. Within fifteen (15) calendar days after the completion of work, the Contractor shall submit the following:
1. Record Documentation:
 - a. Final Test Results – Test results for each cable indicating tests performed, results obtained, and values measured. Test results shall be provided in electronic format (CD) with the associated application (if required) for viewing. Testing shall be conducted in accordance with Section 3.09 of this document.
 - b. As-Built Drawings – Contractor shall provide two (2) complete sets of professionally drafted "E" size (30" x 42"), unless otherwise noted, reproducible bond as-built drawings, generated on Autodesk AutoCAD 2004 or later. Contractor shall provide/create all backgrounds, site plan and floor plans. Borders shall be Contractor-provided, or Architect provided. All borders shall be reviewed by Owner or Architect prior to acceptance by Owner.
 - 1) MDF and IDF Diagrams including:
 - a) Cable routing, conduit sleeve(s) locations, sizes and fill count
 - b) Floor plan identifying locations of all components and apparatus
 - c) Detailed layout and elevations of the wall field(s)
 - d) Labeling plan
 - 2) Site Plan – Including:
 - a) Conduit quantity, sizes and routing of all site conduits including in-ground vaults, pull boxes, and manholes, including labeling plan.
 - b) Building designations
 - c) MDF and IDF locations and labeling in each building
 - d) Cabling type and quantity between MDF and each IDF location
 - 3) Work Area Floor Plans - Including:
 - a) Detailed cable routes, including quantity of cables.
 - b) Device locations and quantities
 - c) Approved labeling plan for all work area outlets, cabling, and devices.
 - 4) Cross Connect Documentation - Including:
 - a) Cross-connect records for all voice, data, speaker, clock and IP camera devices. Provide in Excel format.
 - 5) Riser Distribution Plan
 - 6) Rack elevations of all MDF and IDF equipment properly labeled
 - 7) 1/4-inch scale floor plans of all MDF and I DF data rooms identifying all equipment properly labeled.
 - 8) Cable Tray, Conduit, and Raceway Plans (if applicable) with quantities, cable type and cable quantity for each.
 - 9) Campus Distribution Plan (if applicable)

- B. Contractor shall provide to Owner two (2) sets of CDs containing all post-installation submittals and close-out documentation.
- C. As-Built Documentation Display in Each MDF and IDF: Within fifteen (15) days after the completion of work, the Contractor shall install a complete Contractor-provided, professionally drafted as-built floor plan in each MDF and IDF. These documents shall be mounted in a suitably-sized frame containing a Plexiglas cover. Each floor plan, generated on Autodesk AutoCAD 2004, or later, computer design software and printed in color. Size of plans displayed shall be full size, or at the discretion of the District, half-size. The plans shall depict all jack locations in each classroom, office, and all other areas. Also depicted shall be speaker, clock, wireless access point, terminal cabinets, MDF, IDF, pull boxes, vaults, cameras, television jack locations, or any other communications outlet cable installed by the Contractor. All jack locations shall be color-coordinated with the Owner's labeling scheme as described elsewhere in this specification.
- D. Warranty Documentation:
 - 1. Contractor shall apply for all Manufacturers' Extended Warranties on behalf of the Owner. Contractor shall present to Owner all General and Specific Warranty Documents per Warranty Specifications Sections. Warranty shall commence after final acceptance of System and Project close-out by the Owner.

1.10 GENERAL SYSTEM PRODUCT, INSTALLATION AND OVERALL SYSTEM WARRANTY

- A. A twenty-five (25) year Extended Product Warranty and Application Assurance for the Voice/Data/Intercom-Clock/CCTV wiring systems shall be provided as follows:
 - 1. 25 Year Extended Product Warranty
 - a. The 25 Year Extended Product Warranty shall ensure against product defects, that all approved cabling components exceed the specifications of ANSI/TIA/EIA 568-B and ISO/IEC 11801, exceed the attenuation and NEXT requirements of ANSI/TIA/EIA 568-B and ISO/IEC 11801 for cabling channels, that the installation will exceed the loss and bandwidth requirements of ANSI/TIA/EIA 568-B and ISO/IEC 11801 for fiber channels, for a twenty-five (25) year period. The warranty shall apply to all passive SCS components.
 - b. The 25 Year Extended Product Warranty shall cover the replacement or repair of defective product(s) and labor for the replacement or repair of such defective product(s) for a twenty-five (25) year period.
 - 2. 25 Year Application Assurance
 - a. The 25 Year Application Assurance shall cover the failure of the wiring system to support the application which it was designed to support, as well as additional application(s) introduced in the future, up to 350Mbps parallel transmission schemes, by recognized standards or user forums that use the ANSI/TIA/EIA 568-B or ISO/IEC 11801 component and channel specifications for cabling, for a twenty-five (25) year period.
 - 3. System Certification
 - a. Upon successful completion of the installation and subsequent inspection, the Owner's Project Manager shall be provided with a numbered certificate, from the manufacturing company, registering the installation.
- B. Manufacturer Site Certifications are not allowed, regardless of project size.
- C. A five (5)-year labor and material warranty for the Intercom/PA/Clock system shall be provided.
- D. A three (3)-year labor and material warranty for the CCTV system shall be provided.

1.11 GENERAL ENGINEERING AND DESIGN GUIDELINES

- A. Cabling System Installation Practices
1. Cable tie (tie wrap) devices shall not be utilized at any time. Only Velcro™-type strap devices are permitted. Velcro™-type straps are to be utilized in the MDF's and IDF's at a maximum interval of three (3) feet.
 2. All pull rope devices are to be replaced in all pathways with new pull rope or approved pull string, for future use.
 3. All intra-building cabling shall be routed either parallel or at right angles to the building structure and/or walls.
 4. All innerduct shall be supported at a maximum of eighteen (18) inch intervals if running vertical and maximum of forty-eight (48) inch intervals if running horizontal.
 5. No cabling is to be pulled through electrical conduit (L-bend) devices. If conduit devices are pre-existing and it is determined by the review of the District's representative that sufficient space in the conduit is available, the Contractor shall remove the conduit cover and pull the cable through the conduit, then carefully reinstall the cover.
 6. Communications cabling shall never be tied to electrical power cables or devices, lighting systems, or co-exist in any pathway with power cabling.
 7. Any visible damage to a cable such as kinks or bends in violation of the minimum bend radius shall render the cable segment defective and shall be removed and replaced.
 8. All materials shall be new, unused, and delivered to job site in original manufacturer or distributor cartons or packages. No previously installed material shall be used at any time.
- B. Equipment Room – Main Distribution Frame (MDF)
1. Site Selection: Careful consideration is required in the selection of the ideal site for equipment placements. Site selection should comply with all provisions of TIA 569; including the following:
 - a. Floor Loading: If equipment room is not on ground level or a basement, the floor support system should be designed for distribution loading greater than 250 lbs./ft, and a concentrated loading should be greater than 1000 lbs./ft over the area of the greatest stress to be specified.
 - b. Room Size: An allowance shall be made for non-uniform occupancy throughout the building. Provide 0.75 square feet of equipment room space for every 100 square feet of workstation space, or a minimum of 150 square feet, whichever is greater.
 - c. Water Infiltration: The equipment room shall be free of water. No plumbing or waste pipes shall enter or pass through the equipment room.
 - d. Environmental Requirements: The equipment room should be provided with temperature control equipment (HVAC) to maintain the temperature inside the room between 64-75 degrees Fahrenheit, while the equipment is operating.
 - e. Power Requirements: A separate power supply serving the equipment room shall be provided and terminating at its own electrical panel.
- C. Special Design Cases-IDF to Adjacent Buildings
1. In the event that a building with minor data needs is located nearby another building that contains an Intermediate Distribution Frame room (IDF), connectivity may be provided as if it were a horizontal run from the IDF to the adjacent building, if the following conditions are met. The total installed cable length from the IDF to the jacks in the adjacent building must be less than 295 feet (90 meters). Category-6 cable shall be used. This should be done while maintaining the minimum 25-year manufacturer's warranty. Utilize outside plant rated cable when installed in underground conduit. Cable shall not be installed aurally between above-ground poles or other structures.
 - a. Each outlet shall be cabled with Category-6 cable terminating to a Category-6 modular jack. Each jack will be Category-6 RJ-45 with a 110-termination using the 568-wiring scheme.
 2. Room additional drops.
 - a. Provide 1 drop (cable, jack and faceplate) on the back wall of the classroom. This

- is to power an I.P. clock/speaker.
- b. Jack to be above ceiling or at ceiling line where clock is to be placed.
- c. Retrofit cable 6' length above ceiling with plug connection. Wire plugs directly to speaker board – no box.
- 3. One (1) wireless access point, ceiling mounted in the center of the room below the T-bar grid, shall be provided in each classroom.
- 4. Surface Mounted Raceways:
 - a. In existing structures, or where called out on the plan documents, Wiremold 2300 or 5400-series surface mounted raceway system shall be used for surface-mount applications.
 - b. In new construction projects, surface mount raceway shall not be utilized unless specifically called out on the plan documents and approved by the Owner's project engineer.
 - c. Wiremold raceway shall be properly fastened into wall studs at intervals not to exceed 16-inches in horizontal runs and 2 feet in vertical runs. Wiremold must be mounted flush to the wall with no visible gap between the Wiremold and wall.
 - d. The voice/data cabling shall occupy one channel only of the two-channel system.
 - e. Wiremold raceway shall be installed to the station outlets branching off the main cable routes or separate runs shall be installed to individual outlets as required. At no time shall the raceway fill rate exceed 40 percent.
 - f. Each Wiremold raceway run shall include the appropriate cover and utilize cover clips to hide seams between cover sections.
 - g. Each vertical Wiremold raceway run that penetrates a ceiling shall include an entrance end fitting with cover. Ceiling fittings shall be installed so that it is in direct contact with the ceiling, without any gaps between ceiling and fitting cover. Ceiling openings shall be neatly and squarely trimmed by the Contractor to the satisfaction of the District.
 - h. In order to meet and exceed all current and future cable bend radius requirements, Contractor shall only install Wiremold radiused "FO"-type elbows and tee fittings.

1.12 SPECIFIC SYSTEM REQUIREMENTS

- A. Backbone Infrastructure Cabling – Data
 - 1. Backbone Fiber Optic Cabling
 - a. For distances up to 1800 feet (550 meters), the Contractor shall provide one (1) OM4 12-strand multimode fiber optic cable for backbone connectivity between the MDF and each IDF. For cabling to isolated structures with limited data needs, such as a concession stand, 4-strand OM4 multimode fiber optic cable may be considered.
 - b. For distances greater than 1800 feet (550 meters), the Contractor shall provide one (1) 12-strand single mode fiber optic cable for backbone connectivity between the MDF and each IDF.
 - c. At the MDF, provide a 20-foot slack loop neatly coiled, labeled and secured. At each IDF, provide a 10-foot slack loop neatly coiled, labeled and secured.
 - d. Splicing of fiber optic cable shall not be permitted.
 - e. All exposed fiber optic cable shall be enclosed in inner-duct. Inner-duct is not required within dedicated inter-building conduits.
 - f. Provide 1-meter and 2 -meter fiber optic patch cords for each pair of strands terminated at the MDF and each IDF.
 - g. See Part 2 of this document for fiber optic cable specifications.
 - 2. MDF/IDF UTP Termination Equipment
 - a. The horizontal cross-connect for data circuits shall consist of patch cords from the horizontal Category-6 termination panels to the network equipment within the same or adjacent racks.
 - b. The MDF horizontal data cross-connect shall be contained in 19"x 7' rack(s) or free-standing lockable cabinet, the IDF shall be terminated in an appropriately

- sized locking cabinet or equivalent as described in Part 2 of this document.
- c. 2-post and 4-post open racks shall be installed with vertical wire management on each side. Patch panels shall be 24 or 48 modular jack ports, wired to T568B, with 1U horizontal wire management immediately below each patch panel.
 - d. Category-6 patch cords and drop cords shall be provided by Contractor. Provide one (1) 3-foot cord or 7-foot cord for the MDF/IDF and one (1) 14-foot cord for each outlet jack port. In instances where longer cords are required, the Contractor is to clarify the requirement with the District before installing any longer cords.
 - e. See Part 2 of this document for cable specifications.

PART 2 PRODUCTS

2.1 STRUCTURED CABLING SYSTEM

- A. Acceptable Manufacturers - all equipment listed herein will be by:
 - 1. SCS components: Leviton eXtreme 6+ cat-6 UTP System with BerkTek Lanmark 1000 cable, Belden System 3600, or Engineer approved substitute.
 - 2. Cabinets, Racks, Wire Management, and Ladder tray: Chatsworth, Encore, Southwest Data Products, or UL Listed and approved/Engineer approved substitute.
 - 3. Riser and Outside Plant (OSP) Fiber Cable: Belden, AMP, or Superior Essex.
 - 4. Riser and OSP Copper Cable: Belden, AMP or Superior Essex.
 - 5. Protectors: Circa, Emerson, or Marconi.
- B. It is the responsibility of the bidder to ensure that the proposed product meets or exceeds every standard set forth in these specifications and the equipment's technical data sheets.
- C. The functions and features specified are vital to the operation of this facility; therefore, inclusion of a component's manufacturer in the list of acceptable manufacturers does not release the Contractor from strict compliance with the requirements of this specification.
- D. See Quality Assurance section of this specification for additional product substitution requirements.

2.2 OUTLETS

- A. Faceplates
 - 1. All Faceplates shall be available in single, duplex, triplex, quad, or six-plex arrangement in a single gang configuration.
 - 2. Faceplates shall be available in eight-plex arrangement in a dual gang box configuration.
 - 3. Surface mount boxes shall be available in single, dual, quad, and six-plex configuration.
 - 4. Modular furniture faceplates shall be available in single, dual, triple and quad configuration for the Owner's modular existing and/or new modular furniture. Faceplates shall be flush-mounted in the modular furniture. Surface mounted boxes/faceplates are unacceptable. The Contractor is responsible for coordinating with the Owner's modular furniture Contractor to determine faceplate requirements. The Contractor shall provide and install all parts/fittings necessary to meet the requirements of this section.
 - 5. Wall mounted phone jack faceplates shall be single gang configuration, constructed of stainless steel and have two standard phone mounting posts located above and below the jack opening. Wall mounted phone faceplates will consist of 8p8c modular (RJ-45) jacks.
 - 6. Faceplates shall have designation windows with clear plastic covers.

- B. Communications outlets shall consist of one, two or three gang utility outlet boxes plates equipped with 8-pin modular (RJ-45) jacks utilizing T568B wiring scheme. All outlet cabling shall terminate on termination blocks at their associated Main Distribution Frame (MDF) room, Intermediate Distribution Frame (IDF) Rooms, or as otherwise indicated on the drawings.
- C. Unless otherwise noted on the floor plans, or within this document, all data wall outlets for 23-AWG copper cable shall be:
 - 1. 8-position/8-conductor (8p8c) modular outlets for data and for voice.
 - 2. Insulation displacement.
 - 3. Support universal applications in a multi-vendor environment, accepting modular RJ-45 plugs for data outlets and for voice outlets.
 - 4. Provide with blank module inserts for all unused module locations. Jack module arrangement is shown on the drawings. Provide color-coded inserts at each outlet, termination block and at patch panels.
- D. Category-6 Gigabit outlets
 - 1. All Category-6 outlets shall meet or exceed Category-6 transmission requirements for connecting hardware, as specified in ANSI/TIA/EIA 568-C Commercial Building Telecommunications Cabling Standard and be part of the UL LAN Certification and Follow-up Program.
 - 2. The Category-6 outlets shall be capable of being in a modular patching situation or as a modular telecommunication outlet (TO) supporting current 10Base-T, Token Ring, 100 Mbps TP-PMD, 155 Mbps ATM, 622 Mbps ATM using parallel transmission schemes and evolving high-speed, high-bandwidth applications, including Ethernet, 1000BASE-T and 1.2 Gbps ATM.
- E. Manufacturers: Leviton, Belden or Engineer approved substitute.

2.3 STATION CABLE

- A. Category-6 UTP cables shall extend between the station location and its associated TC and consist of 4-pair, 23-AWG, unshielded, twisted pairs, and shall terminate on 8 - position modular jacks provided at each outlet.
- B. Category-6 UTP, 4 Pair
 - 1. The high-performance Category-6 UTP cable shall be of the traditional round shape with a central spine design to maintain stable pair position.
 - 2. The cable jacket shall comply with Article 800 N EC and labeled CMP for use as a plenum cable when installed in plenum-rated spaces and labeled CMR when installed in riser-rated and non-plenum-return spaces. CMP and CMR cable shall not be installed in underground conduit unless it includes an outdoor wet-location rating.
- C. All Category-6 high performance cables shall meet or exceed the following:
Electrical Characteristics:

DC Resistance Max	7.7 (Ohms/100m @ 20°C max)
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Physical Characteristics:

	Non – Plenum	Plenum
Conductor size	23AWG	23AWG
Diameter	.235" nominal	.23" nominal
Weight/1000ft	27 lbs.	32 lbs.

Guaranteed Electrical Performance Requirements (dB/100M):

Freq MHz	Insertion Loss Max.	Min. PSNEXT	Min. PSACR	Min. Return Loss
10.0	5.8	62.3	56.5	25.0
16.0	7.4	59.2	51.9	25.0
25.0	9.3	56.3	47.1	25.0
62.5	15.0	50.4	35.4	25.0
100.0	19.3	47.3	28.0	25.0
200.0	28.3	42.8	14.5	21.6
250.0	32.1	41.3	9.2	20.5
300.0	35.6	40.1	4.5	20.1

Freq MHz	Min. Bal. TCL	Min. Bal. ELTCTL		
10.0	42.0	17.0		
16.0	40.0	12.9		
25.0	38.0	9.0		
62.5	34.0	--		
100.0	32.0	--		
200.0	29.0	--		
250.0	28.0	--		
300.0	--	--		

D. Manufacturers: Belden, BerkTek, or Engineer approved substitute.

2.4 MODULAR PATCH PANEL SYSTEM

- A. The termination block shall support the appropriate emerging high-bandwidth applications, including 1 Gbps Ethernet, potentially 1.2 Gbps ATM and 2.4 Gbps ATM, Multi-Tasked Split Screen Computing, Virtual Holographic Video Conferencing, Instant Access Telemedicine, 3D CAD/CAM Engineering, and Internet-Intranet Communications/ Commerce, as well as all 77 channels (550 MHz) of analog broad band video, including 1000 Mbps Ethernet and potentially 1.2 Gbps ATM, and facilitate cross connection and inter connection using modular patch cords.
- B. All Modular jack panels shall be wired to ANSI/TIA/EIA 568-C using T568B wiring scheme.
- C. The wiring block shall be able to accommodate 23 AWG cable conductors.
- D. The Category-6 modular jack panels shall meet or exceed the Category-6 standards requirements in ISO/IEC 11801 and ANSI/TIA/EIA and shall be UL Listed.
- E. A 110-IDC termination block shall provide for the termination of horizontal, equipment, or tie cables.
- F. All patch panels shall have two (2) cable strain relief/management bars (Leviton #49005-CMB or Engineer approved substitute) installed at the rear of the panel to support the terminated horizontal cabling.
- G. Each patch panel shall have one horizontal wire manager installed above and below.
- H. Manufacturer: Belden, Leviton or Engineer approved substitute.

2.5 CATEGORY-6: PATCH/STATION CORDS

- A. Provide Category-6 Modular Patch/Station cords for each assigned port on the patch panel and for each outlet in the station locations. All cords shall conform to the requirements of ANSI/TIA/EIA 568-C Standard, Horizontal Cabling Section. Cords shall be equipped with an 8-pin 8-conductor modular connector on each end and shall conform to the length(s) specified. All cords shall be wired to T568B standards. All cords shall be factory-built by the station cabling manufacturer. Fabrication of cords in the field is prohibited.
- B. All patch cords shall exceed ANSI/TIA/EIA and ISO/IEC Category-6/Class E specifications. Patch cords shall be available in stranded and solid conductor in lengths to twenty (20) feet.
- C. The patch cord shall have built-in exclusion features to prevent accidental polarity reversals and split pairs.
- D. UL Verified for ANSI/TIA/EIA 568-C Electrical Performance
- E. Miscellaneous:
 - 1. UL Listed for Fire Safety
 - 2. ISO 9001 Certified Manufacturer
- F. Manufacturers: Belden, Leviton, or Engineer approved substitute.

2.6 FIBER OPTIC CABLING

- A. OM4, Laser optimized, extended distance fibers with 50-micron cores only.
- B. Fibers must comply with ANSI/TIA/EIA 492 specifications and ISO/IEC 11801 standards.
- C. Fibers will have dual wavelength capability; transmitting at 850 and 1300nm ranges.
- D. Shall be designed to support 10Gb/s applications up to 1800 feet (550 meters).
- E. Specifications.
 - 1. Maximum attenuation @ 850/1300 nm: 2.8/1.0 dB/KM.
 - 2. 550 Meter laser bandwidth 2200 MHz-km @850 nm, 500 MHz-km @1300 nm
 - 3. All fiber in a cable run shall be from the same manufacturer and shall be the same type. A mix of fibers from different manufacturers may not be used.
 - 4. Loose tube cables shall be gel free. Tight buffered cables shall be gel free, riser rated, and plenum rated when installed in a plenum rated environment.
- F. Manufacturers:
 - 1. Outside Plant Cables: Belden, BerkTek or Engineer approved substitute. Provide fan-out kits as required.
 - 2. Building Cables: Plenum-Rated (installed inside plenum innerduct), Belden, BerkTek or Engineer approved substitute.

Core	50 μ m
Performance	Laser optimized 10 Gigabit to 550 meters
Numerical Aperture:	0.200 \pm 0.015
Cladding diameter:	125 μ m \pm 1 μ m
Colored Fiber Diameter:	250 μ m \pm 15 μ m
Minimum Tensile Strength:	100,000 psi
Fiber Minimum Bending Radius:	.75 in. (1.91 cm)

Cable Minimum Bending Radius: During Installation: After Installation:	20 times cable diameter 10 times cable diameter
Operating Temp. Range:	32°F to 122°F (0°C to 50°C)
Storage Temp. Range:	-40°F to 149°F (-40°C to 65°C)
Maximum Fiber Loss (attenuation):	2.8 dB/km at 850 NM 1.0 dB/km at 1300
Minimum Bandwidth:	1500 MHz-km OFL BW at 850 NM 500 MHz-km OFL BW at 1300 NM 2000 MHz-km EMB at 850NM

G. Single Mode Fiber data:

1. Fibers must comply with ANSI/TIA/EIA 492 specifications and I SO/IEC 11801 standards.
2. All fiber shall be color coded to facilitate individual fiber identification.
3. Fiber will have coating to ensure color retention, minimize microbending losses and improve handling. The coating shall be mechanically strippable.
4. Loose tube cables shall be gel free. Tight buffered cables shall be gel free, riser rated, and plenum rated when installed in a plenum rated environment.

Fiber Attribute	Depressed Cladding	Matched Cladding
Cladding Diameter	125.0 \pm 1.0 μ m	125.0 \pm 1.0 μ m
Cladding Non-Circularity	\leq 1.0%	\leq 1.0%
Colored Fiber Diameter	250 \pm 15 μ m	250 \pm 15 μ m
Core Diameter	8.3 μ m	8.3 μ m
Index of Refraction	0.37%	0.33%
Core/Cladding Concentricity	\leq 0.8 μ m	\leq 0.8 μ m
Mode Field Diameter	8.8 \pm 0.5 μ m @ 1310 NM	9.3 \pm 0.5 μ m @ 1310 NM
Minimum Proof Strength	100,000 psi	100,000 psi
Maximum Attenuation	.40 dB/km @ 1310 NM .30 dB/km @ 1550 NM	.40 dB/km @ 1310 NM .30 dB/km @ 1550 NM
Maximum Dispersion	2.8 ps/NM-km 1285 to 1330 NM	3.5 ps/NM-km 1285 to 1330 NM
Fiber Cutoff Wavelength	\leq 1130 NM. \leq 1300 NM	\leq 1150 NM. \leq 1350 NM
Fiber Macrobend (100 turns @ 32 mm diameter)	\leq 0.05 dB @ 1310 NM \leq 0.10 dB @ 1550 NM	\leq 0.05 dB @ 1310 NM \leq 0.10 dB @ 1550 NM
Coating Strip Force	1.3 N \leq F \leq 8.9 N	1.3 N \leq F \leq 8.9 N

Fiber Attribute	True Wave
Cladding Diameter	125.0 \pm 1.0 μ m
Cladding Non-Circularity	\leq 1.0%
Colored Fiber Diameter	250 \pm 15 μ m
Core Diameter	8.3 μ m
Index of Refraction	0.33%
Core/Cladding Concentricity	\leq 0.8 μ m
Mode Field Diameter	8.4 \pm 0.6 μ m @ 1550 NM
Dynamic Fatigue Parameter (nd)	\leq 20
Static Fatigue Parameter (ns)	\leq 20
Fiber Curl	\leq 2 meters
Macrobend (1 turn, 32 mm dia.)	\leq 0.5 dB at 1550 NM
Minimum Proof Strength	100,000 psi
Maximum Attenuation	.40 dB/km @ 1310 NM .30 dB/km @ 1550 NM

Zero Dispersion Wavelength	Not Applicable
Dispersion Slope	Not Applicable
Dispersion (Absolute)	1.0 to 5.0 ps/NM-km from 1550nm to 1565nm
Fiber Cutoff Wavelength	□1150 NM. □1350 NM
Cbl. Cutoff Wavelength	□1260 NM
Fiber Macrobend (100 turns @ 32 mm diameter)	□0.05 dB @ 1310 NM □0.10 dB @ 1550 NM
Coating Strip Force	1.3 N □ F □ 8.9 N

- H. Product Manufacturers:
1. Outside Plant Cables: Belden, BerkTek or Engineer approved substitute, Single mode with buffer/fan-out kits as required.
 2. Building Cables: Belden, BerkTek or Engineer approved substitute.

2.7 FIBER PATCH CORDS

- A. Fiber patch Cords shall be available in either Single mode or Multimode.
- B. Construction shall be either 3.0 mm cordage or 1.6 mm cordage.
- C. Connectors shall be available in Duplex LC or MTRJ.
- D. The 50-micron multimode fiber optic solution and single mode fiber optic solution shall utilize factory- made patch cords.
- E. Product Manufacturers: Leviton, Belden or Engineer approved substitute.

2.8 FIBER DISTRIBUTION CENTER (FDC)/FIBER PATCH PANEL

- A. Fiber Patch Panels - Combination Shelf: The Combination Shelf is a wall or frame mounted unit that terminates, provides cross connection, interconnection, splicing and fiber identification for up to 48 fiber strands. The shelf will provide protection from mechanical stress on the cable and fibers and from macro-bending losses.
 1. The shelf shall be wall or rack mountable depending on the location requirement. The units must fit into a 19" wide frame arrangement and have a jumper routing trough.
 2. When wall mounted the shelf shall consist of a modular enclosure with front access and can be fully administered from the front. When rack mounted the shelf shall consist of a modular enclosure with front and rear access and can be fully administered from the front and rear. The unit shall slide out to allow access from the top. Include splice organizers and fiber breakout kits as required.
 3. The shelf shall have a translucent, removable cover over the connector panels. The connector panels shall snap into the front of the shelf and accommodate LC, or MTRJ connectors as required.
 4. Miscellaneous:
 - a. UL Listed for Fire Safety
 - b. ISO 9001 Certified Manufacturer
 5. Fiber patch panel/shelf shall be labeled according to the Owner's specific requirements.
 6. Product Manufacturers: Leviton, Belden or Engineer approved substitute.

2.9 FIBER OPTIC CONNECTORS

- A. Fiber Optic Connectors: Provide a field installable single mode or multimode type connectors to terminate fiber optic cables from cable-to-cable, cable-to-equipment or

equipment-to-equipment, and to make jumpers. Fiber connectors shall be LC.

1. The connector must:
 - a. Be field installable.
 - b. Be capable of mounting on either 250 um fiber or 900 um buffered fiber.
 - c. Utilize a no-polish and no-epoxy system.
 - d. Meet EIA and IEC standards for repeatability.
 - e. Typical insertion loss 0.1dB. Maximum insertion loss 0.5dB.
 - f. Be available in LC and MTRJ styles.
 - g. Connector shall have a factory-polished fiber stub in the ferrule.
 - h. Connector shall have a translucent back section allowing the use of a visual fault locator to help determine fiber contact during installation.
 - i. Have a locking feature to the coupler and assure non-optical disconnect.
 - j. Miscellaneous:
 - 1) UL Listed for Fire Safety
 - 2) ISO 9001 Certified Manufacturer
2. Product Manufacturers: Leviton, Belden or Engineer approved substitute.

2.10 COPPER CABLING

A. Outside Plant Copper Cables

1. All voice grade wire and cable placed in the outside environment shall be solid, twisted pair, and multi-conductor. The copper twisted pairs shall have a mutual capacitance at 1kHz of 15.7 nF/1,000 ft. The cable shall be resistant to mechanical damage, lightning or damage from wildlife.
2. The aerial air core cable shall be a self-supporting or lashed cable consisting of plastic-insulated solid conductors covered by a plastic core wrap and surrounded by an inner polyethylene jacket, a corrugated aluminum shield, a corrugated steel wrap and a bonded polyethylene jacket (PASP).
3. The buried or underground cable shall have an aluminum steel polyethylene (ASP) sheath and a core of solid-copper conductors, dual insulated with foam skin and plastic, surrounded by FLEXGEL III filling compound.

B. The multi-pair copper cables shall meet the following specifications:

Physical Characteristics:

Gauge	24 AWG
Pair Size	25 to 1,800

Electrical Specifications:

DC Resistance	27.3 Ω /1000 ft (8.96 Ω /100m), maximum
Mutual Capacitance (@ 1kHz)	15.7 nF/1000 ft (5.15 nF/100m) (25 pair), maximum
Impedance	100 Ω (25 pair)

Buried/Underground Cable Attenuation (db/1,000 ft [305m]):	
at 772 kHz	5.6 (25 pair), maximum
at 1.0 MHz	6.4 (25 pair), maximum

Aerial Cable Attenuation (dB/1,000 ft [305m]):	
at 772 kHz	5.9 (25 pair), maximum
at 1.0 MHz	6.7 (25 pair), maximum

C. ISO 9001 Certified Manufacturer: Belden, Superior Essex or Engineer approved substitute.

1. Buried/Underground: CSI ANMW

2. Aerial: CSI BKMP (self-support), CSI BKMA (lashed), CSI BKMH (lashed)

- D. Copper Riser Cables: Shielded or unshielded 24 AWG multi-pair copper cables shall be used as the vertical riser cables. The cable shall support voice, data and building service applications. The bending radius and pulling strength requirements of all backbone cables shall be observed during handling and installation. The multi-pair copper cables shall be in plenum or riser rated form and placed in conduit as required.

1. Shielded: The shielded cable, 200 pair or more, shall consist of solid-copper conductors insulated with expanded polyethylene covered by a PVC skin, be conformance tested to meet ANSI/TIA/EIA 568-C for Category 3 cables, be UL and Listed as CMR. The core shall be overlaid with a corrugated aluminum sheath, which is adhesively bonded to an outer jacket of PVC plastic to form an A LVYN sheath. The copper riser cable shall meet or exceed the following electrical specifications listed below:

a. Electrical Specifications:

Average DC Resistance	26.5 Ω /1,000 ft (8.7 Ω /100m), maximum
Average DC Resistance Unbalance	1.7%, maximum
Mutual Capacitance @ 1kHz	16 nF/1000 ft (5.25 nF/100 m), Maximum
Capacitance Unbalance (pair to ground)	201pF/1,000 ft (65.94 pF/100m) maximum

b. Attenuation (dB/100 m [328 ft.]:

Frequency	Attenuation (Max.)
01.00 MHz	02.3 dB
04.00 MHz	04.9 dB
10.00 MHz	08.5 dB
16.00 MHz	12 dB

c. Worst Pair Near-End Crosstalk (NEXT) dB/100 m [328 ft]:

Frequency	Pair-To-Pair NEXT (Max.)
1.0 MHz	13.8 dB
4.0 MHz	11.2 dB
10.0 MHz	10.2 dB
16.0 MHz	09.2 dB

- d. The PVC sheath shall have improved frictional properties, allowing it to be pulled through conduit without the use of lubricants.

- e. The cable shall be available in 25, 50, 100, 150, 200, 300, 400, 600, 900, 1200, 1500, and 1800 pair counts.

f. Miscellaneous:

- 1) UL Listed for Fire Safety
- 2) ISO 9001 Certified Manufacturer

- g. Product Manufacturers: Belden, Superior Essex or Engineer approved substitute, ARMM-type cable.

2. Non-shielded: The non-shielded non-plenum cable shall consist of 24-AWG solid-copper conductors insulated with color coded PVC, 25 pair cable shall be UL Verified to ANSI/TIA/EIA 568-C for Category 3, 25 to 100 pair shall be conformance tested to meet ANSI/TIA/EIA 568-C for Category 3 cables. The non-shielded cable shall be available in 25, 50, 75 and 100 pair. The copper cable shall meet or exceed the following electrical specifications listed below:

a. Electrical Data:

Maximum DC Resistance	28.6 Ω /1,000 ft (9.4 Ω /100m)
Maximum DC Resistance Unbalanced	5%

Maximum Capacitance Unbalanced (pair to ground)	1,000 pF/1000 ft. (328 pF/m)
Mutual Capacitance @ 1kHz	18 nF/1000 ft (5.9 nF/100 m), maximum

b. Attenuation (dB/100 m [328 ft.]):

Frequency	Attenuation (Max.)
1.00 MHz	2.3 dB
4.00 MHz	4.9 dB
10.00 MHz	8.5 dB
16.00 MHz	12 dB

c. Worst Pair Near-End Crosstalk (NEXT) dB/100 m [328 ft]:

Frequency	Pair-To-Pair NEXT (Max.)
1.0 MHz	13.8 dB
4.0 MHz	11.2 dB
10.0 MHz	10.2 dB
16.0 MHz	9.2 dB

d. Miscellaneous:

- 1) UL Listed for Fire Safety
- 2) ISO 9001 Certified Manufacturer

e. Product Manufacturers: Belden, Superior Essex or Engineer approved substitute, ARMM-type cable.

2.11 VOICE CIRCUIT TERMINATIONS IN THE TELECOMMUNICATIONS CLOSETS

- A. The wiring block shall be 110 -type and support Category 3, 5e and 6 applications and facilitate cross connection and interconnection using either cross connect wire or the appropriate category patch cords.
 1. The wiring blocks shall be fire retardant, molded plastic consisting of horizontal index strips for terminating 25 pairs of conductors each. These index strips shall be marked with five colors on the high teeth, separating the tip and ring of each pair, to establish pair location. A series of fanning strips shall be located on each side of the block for dressing the cable pairs terminated on the adjacent index strips.
 2. The wiring blocks shall accommodate 22- through 26-AWG conductors and shall be able to mount directly on wall surfaces either with or without backboards or on a 24" free-standing frame.
 3. Clear label holders with the appropriate colored inserts shall be provided with the wiring blocks. The insert labels shall contain vertical lines spaced on the basis of circuit size (3-, 4-, or 5-pair) and shall not interfere with running, tracing or removing jumper wire/patch cords. Labels shall be color-coded, and machine labeled/numbered according to Owner's requirements.
 4. The wiring blocks shall be available in 50, 100, and 300 pair sizes. The 100 and 300 pair wiring blocks shall be available with or without legs. The legs allow the cables to pass behind the wiring block and fan out to each side. The space created by the feet, on each side of the block, allows it to be used as a vertical jumper trough. The 50 pair size is not available with legs and shall be utilized for low pair count and/or depth restrictive situations.
 5. The wiring block shall be able to accommodate over 500 repeated insertions without incurring permanent deformation and it shall pass the reliability test of no more than one contact failure in 10,000 connections.
 6. The 110 wiring blocks shall meet the following specifications:
 - a. Physical Characteristics:
 - 1) Height:
 - a) 25/50-Pair – 1.75 in. (4.45 m)
 - b) 100-Pair – 3.6 in. (9.12 cm)

- c) 300-Pair, 10.8 in. (27.41 cm)
 - 2) Width:
 - a) With legs: 10.7 in. (27.23 cm)
 - b) Without legs: 8.5 in. (21.60 cm)
 - 3) Depth:
 - a) With legs: 3.2 in. (8.25 cm)
 - b) Without legs: 1.4 in. (3.60 cm)
 - 4) Electrical Specifications:
 - a) ANSI/TIA/EIA Category 5e, 6
 - 5) For each wiring block shown on the drawings, provide and install 110 type 4-pair or 110 type 5-pair connecting blocks for each horizontal index strip on each wiring block. For example, a 300 pair wiring block serving station cables requires 72 4-pair connecting blocks. A 300 pair wiring block serving riser pairs requires 60 5-pair connecting blocks.
- A. Voice MDF/IDF Rooms, or as otherwise indicated on drawings, locations shall be equipped with termination blocks for termination of voice station and host cable pairs. Voice cable blocks shall consist of a minimum 100 pair. All blocks shall be securely fastened to the room backboards or equipment racks – see drawings. Provide all required D-rings, ladder tray or other approved cable guides as required to provide a neat installation. All cables shall terminate in numerical sequence.

2.12 PROTECTORS

- A. All copper circuits shall be provided with protection between each building with an entrance cable protector panel(s). All building-to-building circuits shall be routed through this protector(s). The protector(s) shall be connected with a #6 AWG copper bonding conductor between the protector ground lug and the MDF/IDF ground point.
- B. Plug in Surge Protection Modules shall be provided for each pair terminated on the chassis. Protector module shall be solid-state type unless otherwise noted.
- 1. 240VDC/300VDC solid-state protector modules shall provide transient and power fault protection for standard telephone line applications. The modules shall be fast acting, self-resetting current limiters to protect against sneak current type faults. These modules shall be UL Listed with integrated test points and Black in color.
 - 2. 30VDC/75VDC solid-state protector modules shall provide transient and power fault protection for digital and data line applications. The modules shall be fast acting, self-resetting current limiters to protect against sneak current type faults. These modules shall be UL Listed with integrated test points and Red in color.
 - 3. In the event that protector modules are not called out in the drawings, SCS Contractor shall include all costs in base bid to provide the 75v solid-state modules w/sneak current protection. Confirm module color with Owner's Engineer prior to ordering. In all cases, SCS Contractor is responsible to coordinate appropriate module with Owner prior to ordering material.
- C. Product Manufacturer: Circa, Emerson or Marconi.

2.13 GROUNDING SYSTEM AND CONDUCTORS

- A. The SCS Contractor shall utilize a Telecommunications Bonding Backbone (TBB) as provided by the Electrical Contractor. The SCS Contractor shall terminate TBB cable(s) on SCS Contractor provided ground busbars located at each MDF/IDF Room, or as otherwise indicated on the drawings. Ground busbars shall be ANSI-J-STD-607-A compliant and UL Listed. Busbars shall be Chatsworth # 40153-012 (Engineer approved substitute by Harger) or as noted on the drawings. Wall mounted cabinets require a horizontal rack busbar (Chatsworth #10610-XXX) Engineer approved substitute by Harger). All communication system bonding and grounding shall be in accordance with the ANSI-J-STD-607-A, the NEC

- and NFPA.
- B. Horizontal cables shall be grounded in compliance with ANSI/NFPA 70 and local requirements and practices.
 - C. Horizontal equipment including cross connect frames, patch panels, cable trays, equipment racks, ladder trays, conduits, active telecommunication equipment, test apparatus and equipment shall be bonded to the TBB ground bus bars utilizing a #6-AWG and 2-hole crimp type grounding lugs. All connections shall be bare metal to bare metal using appropriate antioxidant compound. Burndy mechanical-type grounding lugs and terminals are prohibited. Minimize the length and number of bends of the grounding conductors to the busbar. Attachment to every rack and cabinet shall be made by one of the following methods:
 - 1. Wall mounted IDF cabinets: Attach ground conductor's 2-hole compression lug to the rear rail's top holes of the rack, or front rail's top hole of the cabinet, using either two (2) tri-lobular thread-forming screws (not self-tapping or sheet metal screws) or by using two (2) standard bolts with two (2) "Type B" internal-external tooth lock washers per bolt. If thread-forming screws are not used, remove paint at the connection point and use an approved anti-oxidant prior to attaching the ground conductor.
 - 2. Cabinet/Rack ground busbar- Install a dedicated copper horizontal ground busbar strip at the top of the rear rail of the rack and cabinet. Attach ground conductor's 2- hole compression lug to this ground strip using either tri-lobular thread-forming screws (not self-tapping or sheet metal screws) or by using two (2) standard bolts with two (2) "Type B" internal-external tooth lock washers per bolt.
 - D. The SCS Contractor shall be responsible for providing an approved ground at all newly installed distribution frames, and/or insuring proper bonding to any existing facilities. The SCS Contractor shall also be responsible for ensuring ground continuity by properly bonding all appropriate cabling, cable sheaths, circuit protectors, closures, cabinets, service boxes, and framework.
 - E. SCS Contractor shall label both ends of each grounding conductor as close as practical to the point of termination in a readable position. Ground tag must indicate the location of both ends of the ground conductor (e.g. Rack#1 to TMGB) and tag must include the warning "If this connector or cable is loose or must be removed, please call the District Telecommunications Manager".

2.14 EQUIPMENT RACKS

- A. When shown on drawings, communication closets shall be equipped with floor mounted equipment racks provided by the SCS Contractor to provide termination bays for the multiple cable types in addition to shelves, panels, power strips, etc. The racks shall be made of lightweight aluminum, UL Listed, and include mounting hardware for mounting specified termination equipment to the frame. In addition, the mounting hardware must provide vertical and horizontal wireways for cross-connect wire.
- B. Equipment racks, ladder trays and rack mount accessories shall be Black in color unless otherwise noted.
- C. Floor mounted open racks shall be secured from the base to the structural floor to prevent movement and secured to ladder tray sections installed above. Fasteners installed to the structural floor shall be torqued to the "fastener manufacturer's" recommendation. Racks mounted on raised floors shall be seismically braced to the structural floor below the raised floor to the satisfaction of DSA, and all local, state and federal requirements.

- D. All racks shall be individually grounded to the isolated ground busbar (TMGB, TGB) within the equipment room using a 2-hole compression ground lug and #6 jacketed green cable. Ground wire shall be run as straight as possible, with the length kept as short as possible. Ground wire shall be neatly bundled and secured to the rack and ladder tray. Daisy chaining a ground wire between racks or to other components is not allowed.
- E. Product Manufacturer: Chatsworth, Southwest Data Products, or UL listed and approved/ Engineer approved substitute.

2.15 EQUIPMENT CABINETS

- A. When shown on drawings, communication closets shall be equipped with equipment cabinets to house Owner-provided equipment.
- B. Equipment cabinets and accessories shall be Black in color unless otherwise noted.
- C. Floor mounted cabinets shall be secured to the structural floor to prevent movement using manufacturer recommended floor anchor brackets and fasteners. Fasteners installed to the structural floor shall be torqued to the "fastener manufacturer's" recommendation.
- D. Cabinets shall be configured per the Owner's Project Manager's direction.
- E. All cabinets shall be individually grounded to the isolated ground busbar (TMGB, TGB) within the equipment room using a 2-hole compression ground lug and #6 jacketed green cable. Wall mounted cabinets require a horizontal rack busbar (Chatsworth #10610-XXX, Engineer approved substitute by Harger) installed at the top position of the front rails. Attach ground lug to this horizontal busbar. Ground wire shall be run as straight as possible, with the length kept as short as possible. Ground wire shall be neatly bundled and secured to the cabinet and ladder tray. Daisy chaining of ground wire between cabinets or to other components is not allowed.
- F. Cabinets mounted on raised floors shall be seismically braced to the structural floor below the raised floor to the satisfaction of DSA and all local, state and federal requirements.
- G. Product Manufacturers: Chatsworth, Southwest Data Products, or UL Listed and approved/ Engineer approved substitute.

2.16 WIRELESS ACCESS POINTS

- A. Acceptable manufacturers: Aerohive Networks or equivalent fully compatible equipment.
- B. Interior Wireless Access Points shall meet the following requirements:
 - 1. Support 802.11n 3x3 MIMO with 450 Mbps Data Rate per radio
 - 2. Contain (Qty 2) 802.11n radios per access point and support 2.4 GHz and 5 GHz
 - 3. Utilize omni-directional antennas
 - 4. Contain two Gigabit Ethernet uplink ports
 - 5. Provide built-in classroom management controls to enable a teacher to manage wireless access in the classrooms (i.e. on a per classroom basis a teacher can see how many students connected, allow or deny students access to Internet and direct students to specific web pages)
 - 6. Contain ability to route Apple Bonjour traffic between VLANs (i.e. connect iPad on student VLAN1 to Apple TV on teacher VLAN2)
- C. Exterior Wireless Access Points shall meet the following requirements:
 - 1. Support 802.11n 3x3 MIMO with 450 Mbps Data Rate per radio

2. Contain (Qty 2) 802.11n radios per access point and support 2.4 GHz and 5 GHz
 3. Utilize omni-directional antennas
 4. Contain one Gigabit Ethernet uplink ports
 5. Provide built-in classroom management controls to enable a teacher to manage wireless access in the classrooms (i.e. on a per classroom basis a teacher can see how many students connected, allow or deny students access to Internet and direct students to specific web pages)
 6. Contain ability to route Apple Bonjour traffic between VLANs (i.e. connect iPad on student VLAN1 to Apple TV on teacher VLAN2)
- D. Wireless access points shall be provided as indicated on drawings provided and per these specifications. Prior to installation, verify exact locations of equipment to be installed with District in field prior to rough-in.

2.17 INTERCOM-PUBLIC ADDRESS-CLOCK SYSTEM

- A. Acceptable Manufacturers:
1. All equipment listed herein will be by:
 - a. Intercom/PA/Clock components: Informa Cast, Atlas Sound speaker/clocks.
 - b. UPS: Tripp-Lite Smart UPS
 - c. Ethernet switches: Cisco Catalyst, see system sections for more information.
- B. It is the responsibility of the bidder to ensure that the proposed product meets or exceeds every standard set forth in these specifications and the equipment's technical data sheets.
- C. The functions and features specified are vital to the operation of this facility. Therefore, inclusion of a component's manufacturer in the list of acceptable manufacturers does not release the Contractor from strict compliance with the requirements of this specification.
- D. See Quality Assurance section of this specification for additional product substitution requirements.
- E. All structured cabling system components required for the proper operation of this system, including cabling and connectivity, shall conform to the Structured Cabling System Products listed elsewhere in this document.
- F. Equipment:
1. Atlas sound I8SCMF wall speaker clocks
 2. Atlas sound SEA I8SC enclosure for surface mount applications
 3. Atlas sound FEST- I8SC enclosure for flush mount applications
 4. Atlas sound IHVP speakers
 5. Atlas sound 161ERS enclosure for flush mount applications
 6. Atlas sound 161SES enclosure for surface mount applications
 7. Cisco catalyst 3560-24PS series PoE switches
 8. Patch panels 24-port, see SCS products section
 9. Tripp-lite smart ups #smart750rm1u
 10. Category-6 cable individually home run for each device
 11. All cat 6 cabling shall be certified and violet or purple in color.
 12. The Contractor shall furnish all patch cables that are used in this Project including all Cisco catalyst 3560 SFP interconnect cables.
 13. All equipment shall be installed in a rack-mounted cabinet with a locking security door.
- G. Device Selection/Installation:
1. Each classroom should have an I8SCMF installed in a flush mounted box on the back

- wall of the classroom.
2. I8SCMF should be installed in non-classroom locations anywhere a clock would be required.
 3. I8SCMF speakers will be installed in locations requiring a speaker but no clock.
 4. IHVP speakers will be installed in all exterior locations and any area deemed as a high vandalism area.
 5. All clock and speakers shall be installed per the manufacturer's recommendation.
 6. All wall penetrations and clock & speaker locations that are in plain sight and not covered by a replacement clock speaker combo or outdoor speaker shall be patched and painted to match existing wall.
 7. All outdoor speakers must be adequately sealed to prevent water penetration for the duration of the warranty period. Any equipment damaged by moisture is to be replaced, not repaired, by the Contractor responsible for the warranty period.
 8. Contractor to ensure that bell schedules are programmed, and that a manual bell and public announcement can be accomplished through the existing VoIP telephone system.
 9. Bell sounds shall be clear of any distortion, and at an acceptable level based on ambient noises.
 10. Contractor to provide two (2) spare interior speaker/clock combos and two (2) exterior speakers at the completion of the project to the maintenance and operations audio-visual department

2.18 CLOSED CIRCUIT TELEVISION (CCTV) SYSTEM

- A. Acceptable CCTV Manufacturers. All equipment listed herein will be by:
 1. CCTV Cable: Genesis 4-pr UTP cable.
 2. Cabinets, Racks, Wire Management, and Ladder tray: Chatsworth, Southwest Data Products or UL Listed and approved/Engineer approved substitute.
 3. Riser and Outside Plant (OSP) Fiber Cable: Belden, AMP, or Superior Essex.
 4. CCTV components: Bosch cameras, Bosch VMS, Bosch storage server.
 5. UPS: Tripp-Lite Smart UPS
 6. Ethernet switches: Cisco Catalyst, see system sections for more information.
- B. It is the responsibility of the bidder to ensure that the proposed product meets or exceeds every standard set forth in these specifications and the equipment's technical data sheets.
- C. The functions and features specified are vital to the operation of this facility. Therefore, inclusion of a component's manufacturer in the list of acceptable manufacturers does not release the Contractor from strict compliance with the requirements of this specification.
- D. See Quality Assurance section of this specification for additional product substitution requirements.

2.19 CCTV SYSTEM EQUIPMENT

- A. Outdoor Cameras:

Bosch Dinion	LTC0498/21
Bosch Dinion IP	NBN49828 IP
Bosch Dome	VDN0495V0321
Bosch IP Dome	NDN498V0321P

- B. Indoor Cameras:

Bosch Indoor Dome	LTC/146321
-------------------	------------

- C. Lens:
- | | |
|----------------------|--------------------|
| Bosch Varifocal Lens | 5/50 MM LTC 374/20 |
|----------------------|--------------------|
- D. Bosch Housings and Mounts:
- | | |
|---------------|-----------|
| Bosch Housing | UHI0G0 |
| Bosch Mount | LTC921500 |
- E. Bosch Encoders:
- | | |
|------------------------|-------|
| Single channel encoder | VIPX1 |
| Dual channel encoder | VIPX2 |
- F. Baluns:
- | | |
|-------|---------|
| Nitek | VN43ATF |
|-------|---------|
- G. Cabinets:
- | | |
|--------------|---------------|
| Mid Atlantic | NO-ERK 2125 |
| Mid Atlantic | Doors NO FD21 |
- H. Digital Recorder:
- | | |
|--|--------------------|
| Bosch Recording Station with 15 inch monitor | BRSRAC28100A BRS2U |
| Recording station expansion license | BOS-BRSXCAM04A |
- I. Camera Power Supplies:
- | | |
|-----------------------------|-----------------------------------|
| Amesco Plug in Power Supply | 40VA120VAC |
| Altronics | ALT TV248 (8 Output Power Supply) |
- J. Camera Wiring:
- | |
|---|
| Cat 6 Green Jacket Cable (Genesis) |
| Power over Ethernet |
| WS-3560X-24PS |
| WS-C3750G-12S-S Catalyst 3750 SFP Standard Multilayer image |
- K. Device Selection/Installation:
1. The DVR shall be included with each installation unless the existing DVR has the expansion capacity to include the new camera installation.
 2. All outdoor cameras must be adequately sealed to prevent water penetration for the duration of the warranty period. Any equipment damaged by moisture is to be replaced, not repaired, by the Contractor responsible for the warranty period.
 3. Camera height where possible shall be twenty (20) feet above grade, and five (5) feet down from any accessible roof. Obtain direction from the District in cases where this is not possible.

2.20 TERMINAL BACKBOARDS

- A. Where indicated on drawings, provide new plywood terminal backboards. Use Douglas Fir Plywood, A/C grade, finished one side and prime coat painted on all surfaces with a finish coat of fire retardant intumescent white enamel. On each plywood sheet leave one (1) Fire Marshal Stamp unpainted for inspection. Unless otherwise indicated, use 8'-0" high x length as shown on drawings x 3/4" thick plywood. See backboard elevations for more information.

2.21 UNSPECIFIED EQUIPMENT AND MATERIAL

- A. Any item of equipment or material not specifically addressed on the drawings or in this document and required to provide a complete and functional SCS installation shall be provided in a level of quality consistent with other specified items.

2.22 FIRE RATED PATHWAY

- A. The firewall through-penetration shall be a manufactured, UL Classified, firestop device / system designed to allow cables to penetrate fire-rated walls with a built-in fire sealing system that automatically adjusts to the amount of cables installed.
- B. The firestopping device shall be capable of installation in new construction or retrofit in existing structures.
- C. The device shall be UL Tested and Classified in accordance with ASTM E814 (UL 1479) and with ratings up to and including 2 hours.
- D. Manufacturer: Specified Technologies Inc., EZ-Path (#EZDP33FW) or Engineer approved substitute by Wiremold.

2.23 UNINTERRUPTABLE POWER SUPPLY

- A. Provide the following Tripp Lite UPS products or equivalent at each MDF and IDF location. Contractor shall install and test each UPS component per the manufacturer's directions.

1. ALL IDFs:

1	SU1000RTXL2UA	1000VA, On-Line, rack mount UPS
1	SNMPWEBCARD	Management card- connects UPS to network
2	BP24V70-3U	External battery pack

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

- A. The wiring of the system shall be executed in accordance with the drawings and the equipment manufacturer's wiring diagrams. Should any variations in these requirements occur, the Contractor shall notify the Owner's Project Manager before making any changes. It shall be the responsibility of the manufacturer-authorized distributor of the approved equipment to install the equipment and guarantee the system to operate as per plans and specifications.
- B. Furnish all conductors, equipment plugs, terminal strips, etc., and labor to install a complete and operable system.
- C. The cables within the rack or cabinets shall be numbered for identification using machine generated labels.
- D. Splices of cables are not acceptable.
- E. The labor employed by the Contractor shall be regularly employed in the installation and repair of communication systems and shall be acceptable to the Owner's Project Manager to engage in the installation and service of this system.

- F. The Contractor shall thoroughly clean all equipment and materials. All exposed parts of the equipment, cabinets, and other equipment shall be left in a clean condition, unblemished and free of all dirt, dust, smudges, spots, fingerprints, etc. The Contractor shall remove all debris and rubbish created in the course of this project. The Contractor shall thoroughly clean all buildings of any dirt, debris, rubbish, marks, etc., caused by the performance of this work.
- G. The system must meet all local and other prevailing codes.
- H. All cabling installations shall be performed by qualified technicians.
- I. In order to ensure the least amount of cable untwisting, it is required that all cables shall be stripped using a special tool.
- J. Cable lubricants (i.e. Polywater) shall be used to reduce the cable pull tension stated by the cable manufacturer during cable installation in conduits and innerduct. Contractor shall verify the acceptability of the lubricant to be used with the cable manufacturer, prior to using such a lubricant. Lubricants that harden after installation are not allowed. Submit all proposed lubricants for approval PRIOR to use on low voltage, A/V, coax, fiber, and data cables. Cable lubricants shall be allowed to dry a minimum of 15 days before performing certification tests.
- K. Under no circumstance are "channel locks" or other pliers to be used to install or terminate cables.
- L. Cables may be run exposed above ceilings, provided the cabling is supported independent of other utilities such as conduits, pipes, and the ceiling support systems. The Contractor shall include all costs in base bid for any additional supports/seismic bracing required by the Local Authority having Jurisdiction. The cables shall not be laid directly on the ceiling panels. The use of hook and loop ties shall be done in accordance with the cable manufacturer's requirements. The cable jacket composition must meet local and all other prevailing fire and safety codes.
- M. All firewalls penetrated by structured cabling shall be sealed by use of a non-permanent fire blanket or other method in compliance with the current edition of NFPA and the NEC or other prevailing code and must be a system listed by UL. The Contractor must not use concrete or other non-removable substance for fire stopping on cable trays, wireways or conduits. Contractors who use this method will be required to replace all cables affected and provide the original specified access to each effected area. This requirement also applies to maintaining fire ratings of all floors penetrated by conduits or devices designated for use by voice and data cabling.
- N. All equipment racks shall be bolted to the structural floor by the SCS Contractor in the location shown on drawings. Wall mounted relay rack and wall mounted cabinet kits shall be screwed to studs, not drywall.
- O. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the Contractor before final acceptance at no cost to the Owner.
- P. The cable manufacturer's minimum bend radius and maximum pulling tension shall not be exceeded.
- Q. Cable raceways, when required, shall not be filled greater than the NEC maximum fill for the particular raceway type.
- R. Roof penetrations are prohibited. No conduit shall be installed on roofs or route horizontally

on exterior walls.

3.2 SPECIFIC SYSTEM INSTALLATION REQUIREMENTS

- A. All communications cabling used throughout this project shall comply with the requirements as outlined in the NEC Articles 725, 760, 770, and 800 and the appropriate local codes. All copper cabling shall bear UL listed type CMP (Plenum Rated) and/or CM/G (General Purpose) and/or CMR (Riser Rated). All fiber optic cabling shall bear OFNP (Plenum Rated) and/or OFNR (Riser Rated) and/or OFN/G (General Purpose). SCS Contractor is responsible for installing appropriately rated cable for the environment in which it is installed.
- B. Cable Pathways:
 - 1. In suspended ceiling, accessible ceiling, and raised floor areas where duct, cable trays or conduit are not available, the Contractor shall bundle, in bundles of 48 or less, station or other cabling with half inch hook and loop strips, but not deforming the cable geometry. Cable bundles shall be supported via "J" hooks attached to the existing building structure and framework at a maximum of five (5) foot intervals. Plenum rated hook and loop ties will be used in all appropriate areas. In areas where two or more bundles are traveling in close proximity, utilize a Chatsworth Rapidtrak Cable support system. The Contractor shall adhere to the manufacturers' requirements for bending radius and pulling tension of all cables.
 - 2. Cables or J-hooks shall not be attached to lift out ceiling grid supports or laid directly on the ceiling grid.
 - 3. Cables or J-hooks shall not be attached to or supported by fire sprinkler heads, HVAC ducts, or delivery systems or any environmental sensor located in the ceiling air space.
 - 4. Where additional conduit(s)/sleeve(s) are required, but not provided by the electrical Contractor, the SCS cabling Contractor shall be responsible to provide such conduit(s)/sleeve(s). Conduit(s) and sleeve(s) shall be of suitable material, sized, installed, fire-stopped, and grounded as required by the NEC, ANSI/TIA/EIA standards and all other applicable codes and standards. Any conduit(s) and sleeve(s) added by the SCS Contractor shall be approved by the Owner's Project Manager prior to rough-in.
 - 5. All J-hooks shall be rated and designed for CAT6 cabling.
- C. Sealing of openings between floors, into or through rated fire and smoke walls, existing or created by the Contractor for placement of new or removal of old cable into or through shall be the responsibility of the Contractor. Sealing material (Approved UL listed system) and application of this material shall be accomplished in such a manner that is acceptable to the local fire and building authorities having jurisdiction over this work. Creation of such openings as are necessary for cable passage between locations as shown on the drawings shall be the responsibility of the Contractor's work. Any openings created by or for the Contractor and left unused shall also be sealed as part of this work.
 - 1. Firestopping work shall be performed by a single Contractor to maintain consistency and accountability on the project.
 - 2. The Contractor shall install penetration firestop seal materials in accordance with design requirements, and manufacturer's instructions.
 - 3. The Contractor's installer shall be certified, licensed or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements.
 - 4. All installed through penetration firestops shall be identified via label, or stencil. Label shall state that the fill material around the penetrating item is a firestop, and that it shall not be disturbed unless by an authorized Contractor. The label shall include the firestop brand name, and the classified system number for which it was installed.
 - a. Sample Label:

MANUFACTURER'S NAME:

ATTENTION

Fire Rated Assembly

For Any Changes to This System, Please Refer to UL System Listed Below

PRODUCT:

HOUR RATING:

UL SYSTEM:

INSTALLATION DATE:

INSTALLED BY:

LICENSE NUMBER:

PHONE:

FAX:

- D. The Contractor shall be responsible for damage to any surfaces or work disrupted as a result of his work. Repair of surfaces, including painting, shall be included as necessary.
- E. Cable bundles within the MDF/IDF shall be dressed into bundles of no more than twenty-four (24) cables. Maintain each bundle with half inch-wide hook and loop strips spaced every 12 inches maximum.
- F. The Contractor shall install all patch cords per direction of the Owner's project manager in a neat and systematic fashion. Prior to installing all patch cords, the Contractor shall install patch cords in a single rack to demonstrate work practices to the Owner's project manager. Only after any corrections/modification to the installation as directed by the Owner's project manager, may the Contractor continue installing the patch cords in the remaining racks.
- G. Each equipment cabinet and rack requires its own dedicated grounding connection to the grounding infrastructure. Grounding infrastructure shall consist of a dedicated #6 AWG (min.) green conductor from every rack/cabinet back to the TMGB/TGB. All ground conductor attachments to the TMGB/TGB shall utilize 2-hole compression lugs. See Section 2.13 Grounding System and Conductors of this document for more information.
- H. In raised-floor environments, the ground conductor shall attach to the lowest holes on the front rail of each rack/cabinet.
- I. Rack/cabinet mounted equipment shall be grounded via the chassis, in accordance with manufacturer's instructions. The equipment chassis shall be bonded to the rack/cabinet using one of the following methods:
 - 1. If the equipment has a separate grounding hole or stud, use a #10-AWG ground wire from the chassis ground hole/stud to the rack grounding bus.
 - 2. If the manufacturer suggests grounding via the chassis mounting flanges, use tri-lobular thread-forming screws (not self-tapping or sheet metal screws) to attach the equipment to the rack/cabinet rails. If the equipment mounting flanges are painted, remove the paint and apply an anti-oxidant, or use tri-lobular thread-forming screws and two (2) "Type B" internal-external tooth lock washers to safely ground equipment to the rack.
- J. Bonding of ladder tray sections- Attach bonding straps to each ladder tray section by utilizing either two (2) tri-lobular thread-forming screws (not self-tapping or sheet metal screws) or by using two (2) standard bolts with two (2) "Type B" internal-external tooth lock washers per bolt. If thread-forming screws are not used, remove paint at each connection point and use an approved anti-oxidant prior to attaching the bonding strap.
- K. All installation shall be done in conformance with TIA/EIA 568-C standards, BICSI TDMM guidelines and manufacturer's installation guidelines. The Contractor shall ensure that the maximum pulling tensions of the specified distribution cables are not exceeded and cable bends maintain the proper radius during the placement of the facilities. Failure to follow the appropriate guidelines will require the Contractor to provide, in a timely fashion, any

additional material and labor necessary to properly rectify the situation to the satisfaction and written approval of the Owner's Project Manager. This shall also apply to any and all damages sustained to the cables by the Contractor during the implementation.

1. **Bonding and Grounding:** The Contractor shall be responsible for providing an approved ground at all distribution frames. The Contractor shall also be responsible for ensuring ground continuity by properly bonding all appropriate cabling, closures, cabinets, service boxes, and framework. All grounds shall consist of #6-AWG copper wire and shall be supplied from an approved building ground and bonded to the main electrical ground. All cable sheaths and splice cases shall be grounded to a Telecommunications Ground Bus. All grounding must be in accordance with the NEC, NFPA, ANSI-J-STD-607-A and all local codes and practices. The Electrical Contractor shall be responsible for providing a properly sized grounding conductor from the main electrical ground to the telecommunications ground bus in each MDF/IDF room. The SCS Contractor shall be responsible to provide the telecommunications busbar, attach the Electrical Contractor-provided ground conductor, and bond all required equipment and components within each MDF/IDF to the busbar.
2. **Power Separation:** The Contractor shall not place any distribution cabling alongside power lines, or share the same conduit, channel or sleeve with electrical apparatus.
3. **Miscellaneous Equipment:** The Contractor shall provide any necessary screws, anchors, clamps, hook & loop ties, distribution rings, wire molding (MDF & IDF locations), miscellaneous grounding and support hardware, etc., necessary to facilitate the installation of the System.
4. **Special Equipment and Tools:** It shall be the responsibility of the Contractor to furnish any special installation equipment or tools necessary to properly complete the System. This may include, but is not limited to, tools for terminating cables, testing and splicing equipment for copper/fiber cables, communication devices, jack stands for cable reels, or cable winches.
5. **Labeling:** The Contractor shall be responsible for printed labels for all pull boxes, conduits, cables, protectors, racks, cabinets, patch panels, connector panels, cords, distribution frames, and out let locations, according to the specifications. No labels are to be written by hand. Contractor shall submit sample of all labeling schemes for Owner's consideration and approval. Final label scheme shall be by direction and approval of the Owner.
6. **Cable Storage:** The Contractor shall not roll or store cable reels without an appropriate underlay and the prior written approval of Owner's Project Manager.
7. **Cable Records:** The Contractor shall maintain conductor polarity (tip and ring) identification at the main equipment room (switch room), risers, and station connecting blocks in accordance with industry practices, but only in locations authorized by the Owner's Project Manager. Contractor to provide spread sheet for all outdoor backbone and indoor riser backbone cables tested.

3.3 STRUCTURED CABLING AND INTERCOM-PUBLIC ADDRESS-CLOCK GENERAL INSTALLATION DESCRIPTION

- A. The structured cabling system shall consist of any or all of the following subsystems:
 1. Work Area Subsystem
 2. Horizontal Subsystem
 3. Administration Subsystem
 4. Backbone Subsystem
 5. Equipment Subsystem
- B. **Work Area Subsystem:** The Work Area Subsystem provides the connection between the information outlet and the station equipment in the work area. It consists of cords, adapters, and other transmission electronics.
 1. Contractor shall supply the wiring or cords that connect terminal devices to information outlets. This includes mounting cords and connectors, as well as extension cords.

- C. Horizontal Subsystem: The Horizontal Subsystem provides connections from the horizontal cross connect to the information outlets (IOs) in the work areas. It consists of the horizontal transmission media, the associated connecting hardware terminating this media and IOs in the work area. Each floor of a building is served by its own Horizontal Subsystem.
1. Horizontal Cabling
 - a. Contractor shall supply horizontal cables to connect each information outlet to the backbone subsystem as shown on the drawings.
 - b. Unless otherwise noted on the floor plans or within this document, the type of horizontal cables used for each work location shall be 4-pair unshielded twisted pair (UTP).
 - c. The 4-pair UTP cables shall be run using as far topology format from the administration subsystem to every individual information outlet. All cable routes, other than those dictated on the drawings, are to be approved by Owner's Project Manager prior to installation.
 - d. The length of each individual run of horizontal cable from the administration subsystem to the information outlet shall not exceed 295-ft (90 m).
 - e. Contractor shall observe the bending radius and pulling strength requirements of the 4-pair UTP cable during handling and installation.
 - f. Each run of cable between the termination block and the information outlet shall be continuous without any joints or splices.
 - g. All station cable shall be placed in the interior of walls unless otherwise noted or obstructed.
 - h. In the event Contractor is required to remove ceiling tiles, such Work shall not break or disturb grid. Removal of the ceiling grid must be coordinated with the Owner's Project Manager. All insulation shall be replaced in its original location.
 - i. Avoid electromagnetic interference (EMI) by maintaining adequate physical separation between telecommunications cabling and possible sources such as, but not limited to, electric motors, electric erasers, electric pencil sharpeners, transformers, fluorescent lighting that share distribution space with telecommunications cabling, copiers that share work area space with line cords and terminals, large fax machines and power cords that supports such equipment.
 - j. Contractor shall provide Owner's Project Manager with detailed cable run diagrams for cable runs within raised floors (if shown on plans) detailing exact locations of cable for review and written approval by Owner's Project Manager.
 - k. Conduit runs installed by the Contractor should not exceed 100 feet or contain more than two 90-degree bends without utilizing appropriately sized pull box. Pull boxes are not to be used in lieu of a bend.
 - l. Station cables and tie cables installed within ceiling spaces shall be routed through these spaces at right angles to electrical power circuits.
 - m. Each station cable shall have 1 meter of service slack configured in an "S" shape via J-hooks at rack or wall field end and 1 foot of service loop at station outlet end. Service slack shall be located within 15' of the MDF/IDF as required to maintain a neat and "workmanship like" installation.
- D. Administration Subsystem: The Administration Subsystem links all of the subsystems together. It consists of labeling hardware for providing circuit identification and patch cords or jumper wire used for creating circuit connections at the cross connects. All wall field layouts must be approved by Owner's Project Manager prior to rough-in and installation.
1. Separate termination fields shall be created for voice, data and building service applications.
 2. Termination blocks that require rotation after connection of horizontal/vertical wiring will not be allowed.
 3. Contractor shall supply cross-connect wire, patch cords and fiber patch cords for cross-connection and inter-connection of termination blocks and lightguide interconnection units.

- E. Backbone Subsystem:
1. The main cable route within a building is called the Backbone Subsystem. It links the main distribution frame (MDF) in the equipment room to each intermediate distribution frame (IDF). It consists of the backbone transmission media between these locations and the associated connecting hardware terminating this media. It is normally installed in as tar topology, with first-level backbone cables beginning at the main cross connect. If needed, second-level backbone cables begin at intermediate cross connects.
 2. The backbone subsystem shall include vertical runs (riser) of in-building cable between floors of a multi-story building, if applicable.
 3. All fibers will be run in innerduct and terminated in the MDF/IDF Rooms, or as otherwise indicated on drawings, with connectors, type as specified elsewhere, in rack mounted or wall mounted fiber patch panels equipped with sufficient panels, couplers and jumper storage shelves to terminate and secure all fibers. All innerduct (Carlson or Engineer approved substitute) shall be corrugated and a minimum of 3/4" in diameter unless otherwise indicated on plans. Inner duct shall be plenum, riser or general rated as required by the environment in which it is to be installed.
 4. Contractor shall supply unshielded 23-AWG multi-pair copper cables and optical cables as the riser cables. The cable shall support voice and data applications. Contractor shall observe the bending radius and pulling strength requirements of all backbone cables during handling and installation.
- F. Equipment Room Subsystem: The Equipment Subsystem consists of shared (common) electronic communications equipment in the equipment room or telecommunications closet and the transmission media required to terminate this equipment on distribution hardware.

3.4 CCTV GENERAL INSTALLATION REQUIREMENTS

- A. Workmanship on the installed system shall be of professional quality, best commercial practice, and accomplished by persons experienced in the techniques and standards of the Digital Video surveillance system industry.
- B. Cable/Wiring:
1. All cabling, wiring, and associated cabling components, shall be yellow for the Digital Video Surveillance System.
 - a. SCS cable for the Digital Video Surveillance System: Category-6 (yellow)
 2. All cabling/wiring, shall be as shown, installed and connected as per manufacturer's instructions.
 3. All Cabling/Wiring shall be run in continuous lengths between the MDF/IDF's to the cameras and equipment, no splicing permitted.
 4. All SCS cabling shall retain a 25-foot service loop, coiled per cabling manufacture's recommendations, after termination and properly supported per standards and norms. At the camera, the cable shall be terminated in an 8P 8C (RJ45) Jack and housed in a 1 port surface mount box (white) within the building. The camera shall be connected/patched to the 8P8C (RJ45) jack with a patch cord supplied by the Contractor, and it is the responsibility of the Contractor to verify the lengths prior to ordering (category and manufacture of patch cord to match cabling infrastructure). Special care shall be taken to insure proper slack or loops being left in junction boxes.
 5. Surveillance System Contractor shall check drawings for adequacy of wiring system and include in bid amount all additional wiring necessary for system proposed and actually installed.
- C. Prior to installing the Bosch Video Management Software BVMS on any District owned Personal Computer or workstation, District shall be notified for release of required IP Addresses and permission to proceed.

- D. Install devices in accordance with manufacturer's and engineer's instruction at locations indicated on the drawings.
 - 1. Ensure selected location is secure and offers protection from accidental damage.
 - 2. Location must provide reasonable temperature and humidity conditions, free from sources of electrical and electromagnetic interference.
 - 3. Install cameras with 96-inch minimum clear space below cameras and their mounting. Change type of mounting to achieve required clearance.
- E. Surveillance System coverage areas:
 - 1. Refer to drawings for camera locations. Final selection for placement will be accomplished with a District Technology Representative.
 - 2. Digital masking of private, residential/business areas from the camera's screen shot is required.
- F. Communications of cameras summary:
 - 1. Refer to General Electrical Section 16010.
 - 2. Connectivity/Cabling solution is to be consistent throughout the site, throughout all systems, and match existing solution of each site.
 - 3. Connectivity/Cabling solution for IP cameras shall be 4-pair UTP Category-6 cabling Yellow and OM3 fiber optic cabling.
 - 4. Connectivity/Cabling solution for analog cameras, shall be RG 6 quad shield coax cabling.
 - 5. Connectivity/Cabling solution for encoders and all other associated equipment shall be 4-pair UTP Category-6 cabling Yellow and OM3 fiber optic cable.
 - 6. Route cabling from camera location to nearest IDF.
 - 7. Connectors are to be 8P8C (RJ45) female connector.
 - a. Terminate at the camera with an 8P8C (RJ45) jack installed in a 1 port surface mount box (white.)
 - b. Terminate at the MDF/IDF on existing or new patch panels.
 - 1) Where new patch panels are to be installed, install 1:1 wire manager to patch panel.
 - 2) All new patch panels are to be 48-port unless otherwise noted. Wire managers are to be 2 RMU size and match existing manufacturer's model.

3.5 DAMAGES

- A. The Contractor will be held responsible for any and all damages to portions of the building caused by it, its employees or subcontractors, including but not limited to:
 - 1. Damage to any portion of the building caused by the movement of tools, materials or equipment.
 - 2. Damage to any component of the construction of spaces.
 - 3. Damage to the electrical distribution system.
 - 4. Damage to the electrical, mechanical and/or life safety or other systems caused by inappropriate operation or connections made by the Contractor or other actions of Contractor.
 - 5. Damage to the materials, tools and / or equipment of the Owner, its consultants, agents and tenants.

3.6 PENETRATIONS OF WALLS FLOORS AND CEILINGS

- A. Unless specifically shown on the drawings, the Contractor shall make no penetration of floors, walls or ceiling without the prior written approval of the Owner's Project Manager.
- B. Any penetrations through acoustical walls or other walls for cable pathways / cables shall be sealed by the Contractor in compliance with applicable code requirements and as directed by Owner's Project Manager.

- C. Any penetrations through fire-rated walls for cable pathways / cables shall be sealed by the Contractor as required by code and as directed by Owner's Project Manager. The Contractor shall be required to work together with the General Contractor and the Electrical Contractor to coordinate and develop all fire stopping methods prior to any cable installation. The Contractor shall also, prior to the commencement of on-site activities, submit to Owner's Project Manager, details of any special systems to be used.
- D. Roof penetrations are prohibited. No conduit shall be installed on roofs or route horizontally on exterior walls.

3.7 TESTING/WARRANTY

- A. Structured Cabling System and Intercom/PA/Clock IP System
 - 1. The Contractor shall provide competent, test equipment manufacturer-trained engineers and/or technicians, authorized by the manufacturer of the cabling system, to technically supervise and participate during all tests for the systems.
 - 2. The Contractor shall test and certify the cabling system to minimum standards as set forth in the TIA/EIA-568-C specifications for 100BaseTX Ethernet and for Category-6 cable, token ring, and 1000baseT signals.
 - 3. All cables and termination hardware shall be 100% tested for defects in installation and to verify cable performance under installed conditions. All conductors of each installed cable shall be verified usable by the Contractor before system acceptance. Any defect in the cable system installation including but not limited to cable, connectors, feed-through couplers, patch panels, splices, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed.
 - 4. Each cable shall be tested for continuity on all pairs and/or conductors. Twisted-pair voice cables shall be tested for length, continuity, pair reversals, opens, shorts, transpositions, presence of AC and DC voltages and opens using a "green light" type test set. Twisted-pair horizontal cables shall be tested for the all of the above requirements, plus tests that indicate installed cable performance. These cables shall be tested using a TIA/EIA-568-C.2-1 Category-6 Level III / IEC 61935 Level III or better ETL certified cable tester/analyzer.
 - 5. Shielded/screened cables shall be tested with a device that verifies shield continuity in addition to the above stated tests.
 - 6. The test shall be recorded as pass/fail as indicated by the test set in accordance with the manufacturers recommended procedures and referenced to the appropriate cable identification number and circuit or pair number. Any faults in the wiring shall be corrected and the cable re-tested before final acceptance.
 - 7. Each installed cable shall be tested for installed length using a Time Domain Reflectometer (TDR) type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the TIA/EIA - 568-C Standard. Cable lengths shall be recorded, referencing the cable identification number and circuit or pair number.
 - 8. Multi-pair cables record the following tests on every cable pair in each multipair cable using a TDR type device: record the shortest pair length, continuity, pair reversals, shorts, opens, transpositions, presence of AC and DC voltage.
 - 9. Enhanced Category-6 data cable shall be performance verified using an automated test set. This test set shall be capable of testing for the continuity and length parameters defined above, and provide results for the following tests:
 - a. Attenuation (Insertion Loss).
 - b. Return Loss (RL).
 - c. Near End Crosstalk (NEXT) – measured at both ends of each cable pair.
 - d. Attenuation to Crosstalk Ratio (ACR).
 - e. Power Sum Near End Crosstalk (PSNEXT).
 - f. Power Sum Attenuation to Crosstalk Ratio (PSACR).

- g. Far End Crosstalk (FEXT).
 - h. Level Far End Crosstalk (ELFEXT) or Engineer approved substitute.
 - i. Power Sum Engineer approved substitute Level Far End Crosstalk (PSELFEXT).
10. Test results shall be automatically evaluated by the equipment, using the most up-to-date criteria from the ANSI/TIA/EIA Standard, and the result shown as pass/fail. Test results shall be printed directly from the test unit or from a download file using an application from the test equipment manufacturer. The printed test results shall include all tests performed, the expected test result, and the actual test result achieved.
11. Optical Fiber Cable Testing: All fiber testing shall be performed on all fibers in the completed end to end system by test equipment manufacturer-trained engineers and/or technicians. There shall be no splices unless clearly defined in Section 3 of this specification or on the plan drawings. Testing shall consist of a bi-directional end to end OTDR trace performed per ANSI/TIA/EIA 455-61 & ANSI/TIA/EIA 526 and a bi-directional end to end power meter test performed per ANSI/TIA/EIA 455-53A. The system loss measurements shall be provided at 850 and 1300 nanometers for multimode fibers and 1310 and 1550 for single mode fibers.
- a. Pre-installation cable testing: The Contractor shall test all lightguide cable prior to the installation of the cable. The Contractor shall assume all liability for the replacement of the cable should it be found defective during the warranty period.
 - b. Loss Budget: Fiber links shall have a maximum loss of: (allowable cable loss per km) (km of fiber in link) + (.4dB) (number of connectors) = maximum allowable loss.
 - c. Any link not meeting the requirements of the standard shall be brought into compliance by the Contractor, at no additional charge to Owner.
12. The Contractor shall provide test documentation to the Owner's Project manager in a three-ring binder(s) and in CD format within three weeks after the completion of a specific project. The binder(s) shall be clearly marked on the outside front cover and spine with the words "Test Results", the project name, and the date of completion (month and year). The binder shall be divided by test type. A paper copy of the test results shall be provided that lists all the links that have been tested, and include link name, overall pass/fail evaluation, date and time of test, cable type and NVP value. Detailed test results shall be provided for each link tested and shall include length, propagation delay, delay skew, insertion loss, return loss, NEXT, ELFEXT, ACR, PSNEXT, PSELFEXT, and PSACR. Detailed test results for each link will also include customer site name, name of standard selected to execute the tests, date and time test results were saved in memory of test unit, brand name model and serial number of tester and revision of the tester software and test standards database in the tester. Individual test data within each section shall be presented in the sequence listed in the test summary records. Unless a more frequent calibration cycle is specified by the manufacturer, an annual calibration cycle is anticipated on all test equipment used for this installation.
13. When repairs and re-tests are performed, the problem found, and corrective action taken shall be noted, and both the failed and passed test data shall be collocated in the binder.
14. The entire Intercom/PA/Clock system shall be warranted free of mechanical or electrical defects for a period of five years after final acceptance of the installation.
15. Any Intercom/PA/Clock Any equipment that is not installed per the manufacturer's recommendation shall be replaced promptly and at no cost to the District.
16. Any material showing mechanical or electrical defects shall be replaced promptly at no expense to the District.
17. Contractor shall test all intercom/public address speaker volume levels in the presence of the District's representative. Contractor shall adjust all individual speaker sound levels to the satisfaction of the District's representative.
18. The Intercom/public address system shall provide clear, natural sound uniformly distributed throughout the designated areas.
19. Provide all labor and material warranties for each system, as described elsewhere in

this document.

20. At the District's direction, the Contractor shall perform additional random testing which shall consist of a random sample of up to 10% of each installation distribution system. The Contractor shall assume responsibility for providing the proper test equipment and staff to conduct tests. The District representative shall witness the tests.
21. Should the initial 10% test not be 100% successful (all drops testing over CAT6 up to 250MHz), the Contractor shall assume responsibility to repair/replace non-passing links, at the direction of the District, and the links to re-verify and resubmitted. A 20% random sample shall then be conducted to ensure proper performance of the system.
22. Should there be failure in this re-test, the Contractor shall be responsible to repeat the re-test procedure until such time as all cabling is verified.

B. Closed Circuit Television CCTV System

1. Provide all instruments for testing and demonstrating in the presence of the Owner's inspector that the frequency response is as stated in the factory data sheets. Category-6 UTP cables shall be tested and certified using a Level III cable analyzer (Fluke 4300 or Engineer approved substitute). The CCTV Contractor must submit cable test results for review prior to project completion and acceptance.
2. Adjust all cameras and software to provide a video surveillance system operating at maximum capability.
3. CCTV System Testing and Verification Requirements
 - a. System shall be complete and properly operating prior to calling for the test. The Owner, Inspector, Contractor and Engineer shall walk-test the system at Owner's option and Contractor shall make minor satisfactory adjustments to the system in the presence of the Inspector. This test shall be performed during a time when there are no other persons on the site.
4. Final Installation Checklist. Contractor shall verify the following:
 - a. Network connectivity to all cameras.
 - b. All exterior camera mounts and connections for weather-tight seals.
 - c. All exposed conduits are properly secured and painted to match surrounding surfaces.
 - d. All penetrations properly patched and painted to match surrounding surfaces.
 - e. Proper labeled at camera, patch panel, PoE injector, wall mounted power supply, server and monitor. MAC address label on each camera is machine generated and visible.
 - f. Perform walk-test to verify objects are detected and classified as expected.
 - g. View software installed and tested on all personal computers.
 - h. Camera imager settings set correctly (indoor vs. outdoor mode, AGC, shutter speed, etc.).
 - i. Storage and compression settings for each camera.
 - j. Analytics settings on each camera (indoor vs. outdoor mode, privacy mask, etc.).
 - k. Rules configured for each camera.
 - l. Supervisor password changed from default and provided to District's representative.
 - m. Operator group permissions set and verified.
 - n. Additional user accounts, clients, created.
 - o. Remote access created.
 - p. Storage server functionality.
 - q. Operating system software updated with latest patches.
 - r. Camera time and time zone settings and/or NTP server settings verified.
5. Tests:
 - a. Test all cameras, software and systems, and place in proper and specified working order prior to demonstration of the system.
 - b. Perform all tests as required by Owner and by authorities having jurisdiction over the site.
 - c. Testing shall be in the presence of the Owner, Architect, Construction Manager,

- Engineer, and representatives of the authorities having jurisdiction.
6. Verification of Performance:
 - a. Prior to acceptance of the work, the surveillance system integrator/installer shall demonstrate to the Owner, Architect, Construction Manager, Engineer, and representatives of the authorities having jurisdiction, all features and functions of the system, and shall instruct the Owner in the proper operation and event sequences of the system.
 - b. Arrange with the Owner's designated representative the date and times for performing the system tests. The Owner will select date and time for demonstration and test.
 - c. Demonstrate picture quality and resolution on each camera. Ensure Owner's acceptance.
 - d. Demonstrate acceptable picture view and angle on each camera. Ensure each camera view is acceptable to Owner.
 - e. Demonstrate acceptable picture quality on network workstation monitor and on each video monitor (if required on project).
 - f. Demonstrate switching, recording and playback functions for each camera and network server software.
 - g. Demonstrate how to add and delete cameras, and how to edit camera settings in the system software.
 - h. Demonstrate camera functionality on pan/tilt/zoom cameras (PTZ) throughout the entire range of possible camera positions. Ensure primary views are acceptable. Demonstrate the view obtained by each preprogrammed camera position.
 - i. Demonstrate proper video image retrieval from storage server. Demonstrate proper method of creating long term storage of a video event on various portable media (DVD, thumb drive, and external hard drive).
 - j. Demonstrate acceptable night time automatic activation of day/night cut filters and camera functionality in low light conditions.
 - k. Demonstrate acceptable system's automatic reboot/reactivate functions following unexpected loss of local power.
 7. All cameras shall be adjusted for angle, pitch, and zoom to the Owner's satisfaction prior to acceptance. As part of training, Contractor shall demonstrate how to adjust cameras and lenses, and perform routine maintenance.
 8. Furnish the necessary trained personnel to perform the testing and provide instructions. Allow one (1) week of time for performing the prescribed testing.
 9. Test equipment: Provide two (2) portable radio transceivers to be used when walk-testing the surveillance system. The transceivers shall be capable of communication throughout the entire site.

3.8 COMPLETION OF WORK

- A. At the completion of the Systems, the Contractor shall restore to its former condition, all aspects of the project site and on a daily basis, shall remove all waste and excess materials, rubbish debris, tools and equipment resulting from or used in the services provided under this Contract. All clean up, restoration, and removal noted above will be by the Contractor and at no cost to Owner. If the Contractor fails in its duties under this paragraph, Owner may upon notice to the Contractor perform the necessary clean up and deduct the costs thereof from any amounts due or to become due to the Contractor. It shall be the Contractor's responsibility to remove trash from the areas it is working in and bring trash and debris to the Contractor provided dumpster.

3.9 ADJUSTMENTS

- A. Occupancy Adjustments: When requested within 32 months of the date of substantial completion, provide up to four (4) on-site visits for each site for assistance in adjusting system to suit actual occupied conditions and to optimize performance of the installed

equipment, reference 3.9.A Attachments "System Tuning & Adjustment." Tasks shall include, but are not limited to, the following:

1. Check cable connection
2. Check proper operation of cameras and lenses. Verify operation of auto-iris lenses and adjust back-focus as needed
3. Adjust all preset positions; consult District Technology representative.
4. Adjust camera views as needed: consult District Technology representative.

3.10 INSPECTION

- A. On-going inspections shall be performed during construction by the District's representative. All work shall be performed in a high-quality manner and the overall appearance shall be clean, neat and orderly. Any work that does not meet the District's representative's approval shall be removed and reinstalled by the Contractor at no additional cost to the District.

3.11 LABELING REQUIREMENTS

- A. Numbers must be assigned to each outlet location using the designation convention as described in this document. Plan drawings with outlet locations and configuration information have been furnished to the Contractor. Contractor shall provide the equipment as necessary to generate Panduit PAN-CODE (or Engineer approved substitute) laser printer generated self-laminating labels using the numbering convention shown below and as specified herein. Before any permanent labels are installed on blocks, face plates or cables, Contractor shall submit a sample label of each various type listed below to Owner's Project Manager for written approval to ensure compliance with the labeling scheme, legibility, etc. Final label scheme shall be determined by the Owner's decision. Contractor is responsible to provide and install the labeling scheme as described below.
- B. All faceplates, cables, patch panel and wall field terminations shall be machine labeled and designated as specified in the following examples:
1. Faceplate labeling format:
Building-Room-Port.
The format is B-RRR-PPP.
Wall outlet sample: **D-102-006**
D: Building Number
102: Room Number
006: Port Number
 2. IDF/LIU labeling MUST be inside a properly sized locking cabinet which corresponds with each building number per plan drawings.
IDF cabinet sample: **IDF 5**
IDF: IDF cabinet
5: Building Number
- C. Backbone and Riser Cable Labeling. All backbone and riser cables (copper, fiber, coax, etc.) will be labeled to reflect the origin and destination abbreviation for the cable and pair counts on large font (16 pitch) self-laminating labels, which shall be located within 18 inches of each end of the cable. Labels shall be placed on the cable to be visible without relocating surrounding cables.
- Example #1: IDF2/IDF3/CP100/01
IDF2 Cable Origination
IDF3 Cable Destination
CP100 Cable Type & Pair or Strand Count (ex. 100-pair Copper Cable. Other possibilities include HB for hybrid fiber cable, MM f or multimode cable, and SM for single-mode cable.)

- 01 Cable identification number (ex.: cable #01). There may be more than one backbone or riser cable with the same origin, destination and pair count.
- D. Patch Panel Labels, Horizontal. All patch panels shall have their ports numbered continuously and sequentially. For example, if there are two 48-port patch panels in an IDF cabinet, ports in the first patch panel shall be labeled 001 through 048. Ports in the second patch panel shall be labeled 049 through 096.
- E. Fiber Patch Panel Labels. All fiber patch panels will be labeled using self-laminating laser patch panel label markers. Fiber panel labels shall include all information as specified by the Owner. Contractor is responsible to provide a labeling scheme that meets with the Owner's satisfaction. At a minimum, the fiber panel label card shall indicate: destination of connected cables on the patch panel followed by a slash (/), origination of connected cables on the patch panel followed by a slash (/), and the port number adjacent to the port.
- Example: MDF/IDF2/01
- | | |
|------|--|
| MDF | Destination Patch Panel Location Designation |
| IDF2 | Origination Patch Panel Location Designation |
| 01 | Indicates port number on both origin and destination patch panels. |
- F. Equipment Rack/Cabinet Labeling: All equipment racks/cabinets shall be labeled according to their room identifier and a two-digit number. The labels will be engraved plastic plates, with 1"-high white letters on black background. The labels will be attached to the cross member at the top front of each frame or rack with appropriately sized sheet metal screws. Self-adhesive strips, glues, etc. are unacceptable.
- Example: MDF-01
- | | |
|-----|------------------|
| MDF | Room Designation |
| 01 | Rack Identifier |
- G. Innerduct and Fiber Cable Warning Labeling. The Contractor shall provide and install tags of stamped plastic for tube cable and innerduct. The labeling convention described above within Paragraph E shall apply. Additionally, the Contractor will also install fiber optic warning tags (Panduit #PST-FO) every 12 feet on all exposed fiber optic cable and on innerduct containing fiber optic cable installed within the building, also on innerduct and cable visible in each pull box, manhole, and vault.
- H. MDF/BDF/IDF Floor Plan Mounting Frame: At the MDF location, provide a full-sized floor plan labeled with all drop numbers and their corresponding locations in each room of every building included in the contract scope of work. Each building floor plan shall display each cable number serviced from the MDF and IDFs, the drop's physical location, and the proper device symbol shown on the symbol legend. Mounting frames shall be equipped with removable Plexiglas front covers. Frame and cover shall be sized to house full size floor plan drawing. Coordinate location of frame with Owner's Project Manager prior to installation.
- I. Telecommunications Main Grounding Busbars (TMGB, TGB): All telecom grounding busbars shall be labeled using large font (16 pitch) self-laminating labels. Labels shall indicate "TMGB" or "TGB". If more than 1 bus bar is in the room, include a numerical indication (ex: TMGB-1).

3.12 MISCELLANEOUS PROJECT REQUIREMENTS

- A. Site Cleaning: Throughout the progress of the plant construction, the Contractor shall keep the working area free from debris of all types and remove from the premises all rubbish resulting from any work done by Contractor. On a daily basis and at the completion of its work, the Contractor shall, to the extent possible, leave the premises in a clean and finished

- condition.
- B. Conduits: All backbone cabling will run through dedicated conduits. All new conduits will be supplied with a pull string. Contractor shall supply pull string and pull rope for the installation of all cables in existing conduits. For all conduits left with available capacity, Contractor shall replace pull strings with ¼-inch pull rope during the course of his work. Contractor must seal all conduits with an approved sealing compound.
 - C. Cabling and Termination Identifications: All new cabling shall be of the type specified herein. Any conflicts between cabling types specified and code or design requirements shall be submitted to Owner's Project Manager for review and final disposition. All cabling shall be neatly laced, dressed and adequately supported. Cabling must be concealed to the fullest extent possible. In addition, a numbering and marking scheme must be used to identify all cable and cabling terminations. All cables, regardless of length, shall be marked and/or numbered at both ends. Marking codes and methodologies shall correspond to the instructions in this specification.
 - D. Seismic Requirements: Contractor will install all equipment racks, equipment cabinet enclosures, cable runways, etc. according to DSA and local, state and/or federal code. Contractor will notify Owner's Project Manager of such requirements and shall provide such bracing as required. Contractor to coordinate all installation with the structural Engineer of Record.
 - E. Safety Requirements: Contractor will utilize appropriate personnel and display warning signs, signals, flags and/or barricades at the work site to ensure adherence to safety regulations and as prudence requires.
 - F. Specification/Drawing Status: All specifications and drawings related to this project will be "frozen" after shop drawing approval. The Owner reserves the right to negotiate any future changes with the Contractor at any time.

3.13 MISCELLANEOUS SUPPORT REQUIREMENTS

- A. Upon approval of shop drawings, Contractor shall immediately place orders for all required materials, components, and supplies. In addition, Contractor shall secure and forward written confirmations (including orders and shipping dates) direct from each manufacturer/vendor to the Owner's Project Manager.
- B. Contractor shall expedite shipment of all materials, components and supplies, as necessary to ensure the successful completion of the Project by the date required. All costs for expediting shall be included within Contractor's pricing as provided below.
- C. The system cost herein shall include administration/maintenance training for at least ten Owner's representatives with a minimum allotment of three (3) eight-hour sessions. All training shall include written and/or video materials that shall remain the property of Owner. If materials are written, they shall be provided in quantities sufficient for each person trained; if materials are video, one copy of each will be required. The administration/maintenance training shall include, but not be limited to, the following:
 - 1. Review of as-built documentation, including a site demonstration.
 - 2. All warranty information.
- D. Minimum standards for maintenance purposes shall include optional access to service on a 24 hour-a-day, 365 day-a-year basis. In addition, Contractor shall, upon notification, respond as follows:
 - 1. Emergency Response: Contractor must respond by utilizing remote diagnostics

- capabilities (as applicable) within thirty minutes of notification. If necessary, Contractor must dispatch at least one certified technician for arrival on-site within two hours of notification.
2. Non-Emergency Response: Contractor shall respond by utilizing remote diagnostics capabilities and/or cause dispatch of at least one certified technician for arrival on-site within one business day of notification.
 3. Definition of "Emergency": For maintenance purposes, "emergency" shall be defined as one or more of the following conditions:
 - a. Defects of any riser pairs and/or components involving at least ten percent (10%) of any riser cable's capacity.
 - b. Defects of station cable pairs and/or components involving at least ten percent (10%) of any department or group of voice and/or data stations.
 - c. Defects significantly impairing any single attendant console.
 - d. Defects of any fiber optic cable and/or components involving at least ten percent (10%) of any department's or group's fiber-based systems and/or stations.
 - e. Any pre-defined failure as submitted by Owner and agreed to be Contractor.

3.14 FINAL ACCEPTANCE

- A. The Owner or Owner's representative may visit the site during the installation of the system to ensure that correct installation practices are being followed.
- B. The Owner or Owner's representative will conduct a final job review once the Contractor has finished the job. This review will take place within one week after the Contractor notifies the Owner.
- C. Two copies of all certification data and drawings for all identifications shall be provided to the Owner before the Owner's review.
- D. The Owner or Owner's representative will review the installation and certification data prior to the system acceptance.
- E. The Owner or Owner's representative may test some of the systems features to ensure that the certification data is correct. If a substantial discrepancy is found, the Owner reserves the right to have an independent consultant perform a certification of the entire system. If such a procedure is undertaken, the cost of the testing will be billed back to the Contractor.
- F. In the event that repairs, or adjustments are necessary, the Contractor shall make these repairs at his own expense. All repairs shall be completed within 10 days from the time they are discovered.
- G. The Contractor shall provide two (2) copies of an "operating and servicing manual" for the system within fourteen (14) calendar days of Owner's final acceptance of the system. The manuals shall be bound in flexible binders. All data shall be printed material or typewritten. Each manual shall include the following: instructions necessary for the proper operation and servicing of the system; complete as-built installation drawings of the system (11"x17"); equipment specification cut sheets, complete performance test data, complete warrantee information and replacement parts list with current prices listed, contact information for repair and warranty work requests.
 1. The Contractor shall mount a full size 30" x 42" bond copy of each scaled Site Plan within MDF room and each IDF room with removable Plexiglas front cover. Frame and cover shall be sized to house the site plan and floor plan drawings. Coordinate location of frame with Owner's Project Manager prior to installation.
 2. The Contractor shall hand to the Owner a copy of any applicable installation specific software configurations including all log-in passwords in CD format.
 3. Warranty- The entire system shall be warranted free of mechanical or electrical defects

for a period of three years after the final acceptance of the installation. Any material showing mechanical or electrical defects shall be replaced promptly at no additional expense to the District.

END OF SECTION 27 00 00

**SECTION 28 30 00 FIRE ALARM SYSTEM WITH INTEGRAL EMERGENCY VOICE/ALARM
COMMUNICATION SYSTEM**

PART 1 GENERAL

1.1 SCOPE

- A. The contractor shall furnish and install a Silent Knight Farenhyt Series IFP-2100ECS 24VDC analog addressable fire alarm system with integral Emergency Voice/Alarm Communication System, IDP protocol addressable initiation devices and System Sensor two-wire synchronized notification devices. This system is the Board of Education approved District Standard for Fire Alarm Systems. The Fire Alarm System shall be UL 864, 9th edition compliant and California State Fire Marshal listed.
- B. By submission of a Prime Bid for this project, the Prime Bidder assumes complete and total responsibility for himself and his subcontractors' compliance with this specification in its entirety. If found to be not in compliance with any part of this specification, the Prime Bidder shall bear any burden, financial or otherwise, required to complete the work of this specification to the total satisfaction of Torrance Unified School District.
 - 1. The Fire Alarm System shall be furnished and installed by a Silent Knight Select Farenhyt Engineered Systems Distributor in good standing at the time of the bid. Upon demand by the owner or his representative, the Prime Contractor shall provide proof that he or his listed subcontractor was a Silent Knight Select Farenhyt Engineered Systems Distributor at the time of the bid. Failure to produce said proof shall render the Prime Contractor's bid non-responsive and shall be considered grounds for immediate disqualification of his prime bid.
 - a. For the purposes of this bid, Prime Bidders shall include the Fire Alarm Contractor on their List of Subcontractors that is submitted with their bid, regardless of subcontractor tier. Failure to list the Fire Alarm Contractor shall render the Prime Bidder in non-compliance with this specification and shall render his bid non-responsive and shall be considered grounds for immediate disqualification of his prime bid.
 - b. The Silent Knight Select Farenhyt Engineered Systems Distributor shall furnish all labor, materials, appliances, cabling, tools, equipment, facilities, transportation and services necessary for and incidental to the performance of all operations in connection with furnishing, delivery and installation of all equipment, cabling, programming, configuration, testing and training required by this Section, complete as indicated in the applicable Contract Drawings and/or specified herein.
 - 1) Systems furnished and/or installed by contractors who are not Silent Knight Select Farenhyt Engineered Systems Distributor shall be considered in non-compliance with this specification and subject to replacement at the expense of the Prime Contractor.
- C. This specification provides the requirements for the installation, programming, configuration, testing and maintenance of a complete analog addressable fire alarm system. This system shall include, but shall not be limited to:
 - 1. Main Fire Alarm Control Panel (FACP)
 - a. Network Nodes (on network systems only)
 - 1) Network Interface Module
 - 2) Fiber optic or copper network connection circuits
 - b. System cabinet
 - c. Power supply
 - 2. Digital Signaling Line Circuits (SLC)
 - 3. Notification Appliance Circuits (NAC)
 - 4. RS-485 Serial Communication Bus (S-bus)

5. Voice Communication Bus (V-bus, on systems with voice evacuation only)
 6. Annunciators both integral and remote
 7. Batteries
 8. Wiring
 9. Conduit
 10. Associated peripheral devices and modules
 11. Other relevant components and accessories required to furnish and install a complete and operational fully automatic, addressable reporting Life Safety System.
- D. The fire alarm system shall be capable of providing, at a minimum, the following:
1. Fire Alarm Control Panel (FACP)
 - a. Integral Digital Alarm Communications Transmitter (DACT).
 - b. Network Interface capability via copper and/or fiber optic network.
 2. Analog addressable initiation devices
 3. Analog addressable monitor and/or control modules
 4. Notification appliances
 - a. Compatible with combination horn/strobe two-wire synchronized circuit.
 5. Notification Appliance Circuit (NAC) remote power supply
 - a. RPS-1000 Remote Power Supply shall provide the capability of housing the 5815XL SLC Expander for remote SLC generation.
 - b. Combination horn/strobe two-wire circuit.
 - c. Built-in synchronization capabilities
 6. Integral Voice Evacuation capability
 7. Firefighter Telephone capability
- E. Any material and/or equipment necessary for the proper operation of the system, which is not specified or described herein, shall be deemed part of this Specification.
- F. The Analog Addressable Fire Alarm System specified herein shall be connected to a UL Listed Central Station Monitoring Company via UL and California State Fire Marshal listed radio transmitter.
1. Radio Transmitter for Central Station Monitoring shall be AES Intellinet provided by Allen Alarms.
- G. Contractor shall offer code required fire alarm system inspection and maintenance contract.

1.2 QUALIFICATIONS

- A. Equipment
1. This specification is based on the equipment of manufacturer(s) who have been approved by the Owner and the Manufacturer(s) herein named shall be considered as meeting the requirements of this specification.
 2. The equipment manufacturer shall be a United States manufacturer, who has been regularly engaged in the manufacture of fire alarm systems for at least twenty-five (25) years.
 3. The Board of Education approved District Standard for Fire Alarm Systems is Silent Knight Farenhyt IFP-2000 (IFP-2000ECS for voice evacuation systems).
 - a. Equipment provided for this project shall be the product of Silent Knight Farenhyt by Honeywell. No substitutions shall be approved.
 - 1) Contact Silent Knight West Coast Regional Sales Manager Charlie Gallardo (763) 493-6400 for a list of Silent Knight Select Farenhyt Engineered Systems Distributors for the Southern California Area.
 4. It is the Contractor's responsibility to meet the entire intent of these specifications. Deviations from the specified items shall be at the risk of the Contractor until the date of final acceptance by the Architect of Record, Engineer of Record and the Owner's

representative. All costs for removal, relocation or replacement of a substituted item shall be at the risk of the Prime Contractor.

5. All equipment shall conform to currently adopted applicable codes and ordinances.
6. All equipment shall be California State Fire Marshal (CSFM) listed.
7. All equipment shall bear the label of a Nationally Recognized Testing Laboratory (NRTL) such as Intertek Testing Services NA, Inc. (ITSNA - formerly ETL) or Underwriters Laboratories Inc. (UL) and be listed by their re-examination service.

B. System Supplier/Installer

1. The system shall be furnished and installed by a Silent Knight Select Farenhyt Engineered Systems Distributor who is trained and certified by the Manufacturer in the proper installation, programming, configuration, testing, service and maintenance of the systems specified herein.
2. Subsequent to a successful bid and upon request of the Owner the System Supplier/Installer shall submit a qualification documentation package which shall include the following:
 - a. Evidence of current status as a Silent Knight Select Farenhyt Engineered Systems Distributor.
 - b. Certificate indicating that the contractor employs a minimum of four (4) Farenhyt PHD Certified Technicians.
 - c. Certificates indicating that a minimum of four (4) technicians have attended and completed all requirements of the IFP-2100 training course.
 - d. A list of twenty (20) completed projects of comparable scope, with associated Owners Representative contact names and telephone numbers.
 - e. Evidence of current State of California Contractor's License, C-10.
 - f. Evidence of current State of California Alarm Company Operator License, ACO.
 - g. Per California law all individuals involved in the installation of the fire alarm system shall hold a valid State of California, Division of Apprenticeship Standards (DAS), Fire/Life Safety Technician Certification.
 - 1) Evidence of DAS certification shall be provided immediately upon request at the project site.
 - h. The System Supplier/Installer shall show satisfactory evidence, upon request, that he maintains a fully equipped service organization capable of furnishing adequate inspection, service and maintenance of the system.
 - i. The System Supplier/Installer 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.
 - j. The System Supplier/Installer shall be prepared to offer a service contract for the maintenance of the system beyond the warranty period.
 - k. The System Supplier/Installer shall provide proof that they maintain a complete service and maintenance center within 50 miles of the project address. A complete service center shall include replacement parts in stock in the quantities deemed sufficient by the owner or its representatives.

1.3 RELATED SPECIFICATIONS

- A. The conditions of the General Contract (General, Supplementary, and other Conditions) and typical Division 1 - General Requirements specifications are hereby made a part of this Section.

1.4 RELATED WORK BY OTHERS

- A. Reference Part 3, sub-section 3.01 of this specification.

1.5 RELATED DOCUMENTS

- A. In the event of a conflict between this specification and the construction drawings this specification shall take precedence.

1.6 APPLICABLE CODES AND STANDARDS

- A. The Fire Alarm System shall comply with the currently adopted versions of the following:
1. Building Standards Administrative Code, Part 1, Title 24, California Code of Regulations
 2. California Building Code (CBC) Part 2, Title 24, California Code of Regulations (International Building Code, with California Amendments)
 3. California Electrical Code (CEC) Part 3, Title 24, California Code of Regulations (National Electrical Code with California Amendments)
 4. California Mechanical Code (CMC) Part 4, Title 24, California Code of Regulations (International Mechanical Code with California Amendments)
 5. California Fire Code (CFC) Part 9, Title 24, California Code of Regulations (International Fire Code with California Amendments)
- B. NFPA Standards:
1. The fire alarm system shall comply with the applicable provisions of the following current National Fire Protection Association (NFPA) standards:
 - a. NFPA 12 Carbon Dioxide Extinguishing Systems
 - b. NFPA 12A Halon 1301 Fire Extinguishing Systems
 - c. NFPA 13 Installation of Sprinkler Systems
 - d. NFPA 15 Water Spray Fixed Systems
 - e. NFPA 16 Foam-Water Sprinkler Systems
 - f. NFPA 17 Dry Chemical Extinguishing Systems
 - g. NFPA 17A Wet Chemical Extinguishing Systems
 - h. NFPA 72, National Fire Alarm and Signaling Code:
 - 1) Central Station Fire Alarm Systems
 - 2) Local Fire Alarm Systems
 - 3) Auxiliary Fire Alarm Systems
 - 4) Remote Station Fire Alarm Systems
 - 5) Proprietary Fire Alarm Systems
 - i. NFPA 90A, Installation of Air Conditioning and Ventilating Systems
 - j. NFPA 101, Life Safety Code - Safety to Life from Fire in Buildings and Structures
 - k. NFPA 750 Water Mist Fire Protection Systems
 - l. NFPA 2001 Clean Agent Fire Extinguishing Systems
- C. ADA - Americans with Disabilities Act
- D. CAC – California Administrative Code, Title 24
- E. U.L. Standards
1. The system shall comply with the applicable provisions of the following U.L. Standards and Classifications:
 - a. UL 38, Manual Signaling Boxes for Fire Alarm Systems
 - b. UL 268, Smoke Detectors for Fire Alarm Systems
 - c. UL 268A, Smoke Detectors for Duct Applications
 - d. UL 346, Waterflow Indicators for Fire Protective Signaling Systems
 - e. UL 464, Audible Signal Appliances
 - f. UL 521, Heat Detectors for Fire Protective Signaling Systems
 - g. UL 864, Control Units and Accessories for Fire Alarm Systems
 - h. UL 1480, Speakers for Fire Alarm Use
 - i. UL 1481, Power Supplies for Fire Protective Signaling Systems
 - j. UL 1635, Digital Alarm Communicator System Units
 - k. UL 1638, Visual Signaling Appliances

- l. UL 1971, Signaling Devices for the Hearing Impaired
- m. UOJZ, Control Units, System
- n. SYZV, Control Units, Releasing Device
- o. UOXX, Control Unit Accessories, System
- p. SYSW, Accessories, Releasing Device Service
- q. UL 2075, CO Detectors Connected to FACP

1.7 SUBSTITUTIONS

- A. Silent Knight is the Board of Education Approved District Standard for Fire Alarm Systems. No substitutions shall be approved.

1.8 SUBMITTALS

- A. Within thirty-five (35) calendar days after the date of the award of the contract, the Contractor shall submit to the Architect for review, eight (8) copies of a complete Submittal Package. The Submittal Package shall consist of the following sections, with each section separated with index tabs.
 - 1. Title Page
 - a. Project Title
 - b. Owner's name
 - c. Architect's name
 - d. Electrical Engineer's name
 - e. Contractor's name
 - 2. Index of Submittal Contents
 - a. Each Section of the Submittal Package shall be numbered chronologically and shall be summarized in the Index.
 - 3. Certifications
 - a. Index of Certification Section Contents
 - b. Valid State of California Contractors License
 - c. Manufacturer's Certifications
 - 1) Silent Knight Select Farenhyt Engineered Systems Distributor
 - 2) Silent Knight Farenhyt PHD Certified Technician
 - 3) Factory Trained Technician (IFP-2100)
 - d. California DAS, Fire/Life Safety Technician Certifications
 - 4. Project List
 - a. A substantial list (minimum of 20) of completed projects of comparable scope to that specified herein.
 - 1) Contact information shall be made available upon request.
 - 5. Product Data
 - a. Index of Equipment Data Sheets
 - b. Manufacturer's Data Sheets including cable types
 - c. Applicable Listings and Approvals

PART 2 PRODUCTS

2.1 SYSTEM REQUIREMENTS

- A. Basic Performance and Capabilities
 - 1. System shall be fully programmable and configurable on site to accommodate system expansions and facilitate changes in operation.
 - 2. All software programs shall be stored in non-volatile programmable memory within the FACP.
 - a. Loss of primary and secondary power shall not erase the instructions stored in the memory.

- b. System programming shall be password protected.
 - 3. Alarm, supervisory and trouble signals from analog addressable devices shall be encoded onto NFPA Class B signaling line circuits (SLC).
 - 4. Initiation device circuits (IDC) shall be wired NFPA Class B.
 - 5. Notification appliance circuits shall be wired NFPA Class B.
 - 6. A single ground or open on any system SLC, IDC or NAC shall not cause a system malfunction, loss of operating power or the ability to report an alarm.
 - 7. Alarm signals arriving at the main FACP shall not be lost due to a power failure.
 - 8. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of 120 VAC power in a normal supervisory mode for a period of twenty four (24) hours with five (5) minutes of alarm indication at the end of this period.
 - a. Systems that include voice evacuation shall provide sufficient battery capacity for twenty-four (24) hours with fifteen (15) minutes of alarm in lieu of the five (5) noted above.
 - 9. The system shall automatically transfer to the standby batteries upon power failure. All battery charging and recharging operations shall be automatic. Batteries, once discharged, shall recharge at a rate that complies with NFPA 72 section 10.6.10.3.
- B. System Functional Operation
- 1. The actuation of any approved alarm initiating device shall automatically initiate the following functions:
 - a. Alarm LED on the FACP shall flash.
 - b. Local audible piezo electronic signal in the FACP shall sound.
 - c. The alarm condition description, including the type of point and the location within the protected premises, shall be displayed on the LCD display at the FACP and any remote annunciator(s).
 - d. System shall transmit the condition to a UL Listed Central Station Monitoring Facility. Supervising station shall be approved per CFC section 907.6.5.3 (2013).
 - e. Printing and history storage equipment shall log the information associated with the condition, including the time and date of the alarm occurrence.
 - f. System output programs configured via control-by-event (CBE) programming to be activated by the particular point in alarm shall be executed, and the associated system output (alarm notification appliances and relays) shall be activated on either local outputs or points located on other network nodes.
 - 2. The actuation of any approved supervisory alarm initiating device shall automatically initiate the following functions:
 - a. Supervisory LED on the FACP shall flash.
 - b. Local audible piezo electronic signal in the FACP shall sound.
 - c. The supervisory condition description, including the type of point and the location within the protected premises, shall be displayed on the LCD display at the FACP and any remote annunciator(s).
 - d. System shall transmit the condition to a UL Listed Central Station Monitoring Facility. Supervising station shall be approved per CFC section 907.6.5.3 (2013).
 - e. Printing and history storage equipment shall log the information associated with the condition, including the time and date of the supervisory alarm occurrence.
 - f. System output programs configured via control-by-event (CBE) programming to be activated by the particular point in supervisory alarm shall be executed, and the associated system outputs (relays) shall be activated on either local outputs or points located on other network nodes.
 - 3. Whenever a trouble condition is detected and reported the FACP shall automatically initiate the following functions:
 - a. Trouble LED on the FACP shall flash.
 - b. Local audible piezo electronic signal in the FACP shall sound.
 - c. The trouble condition description, including the type of point and the location within the protected premises, shall be displayed on the LCD display at the FACP and any remote annunciator(s).

- d. System shall transmit the condition to a UL Listed Central Station Monitoring Facility. Supervising station shall be approved per CFC section 907.6.5.3 (2013).
 - e. Printing and history storage equipment shall log the information associated with the condition, including the time and date of the trouble condition occurrence.
 - f. System output programs configured via control-by-event (CBE) programming to be activated by the particular point in trouble condition shall be executed, and the associated system outputs (relays) shall be activated on either local outputs or points located on other network nodes.
- C. Test Functions
- 1. A "Lamp Test" or "Indicator Test mode shall be a standard feature of the FACP and shall test all LED's and the LCD display on the main FACP and remote annunciators.
 - 2. A "Walk Test" mode shall be a standard feature of the FACP.
 - a. The Walk Test feature shall function so that each alarm input tested shall operate the associated notification appliance for two seconds. The FACP will then automatically reset and confirm normal device operation.
 - b. The event memory shall contain the information on the point tested, the zone tripped, the zone restore and the individual point's return to normal.
 - 3. A "Fire Drill mode shall allow the manual testing of the Fire Alarm System notification circuits. The Fire Drill shall be capable of being initiated at the main annunciator, remote annunciators and via a remote contact input.
 - 4. "Bypass Mode" shall allow for any point or NAC circuit to be bypassed without affecting the operation of the total Fire Alarm System.
- D. Remote Monitoring Connection
- 1. The fire alarm system shall be connected via Digital Alarm Communicator Transmitter (DACT) and an NFPA 72, Chapter 26 compliant transmission channel(s) to a UL Listed Central Station Monitoring Company.
 - a. The fire alarm control panel shall provide an integral Digital Alarm Communicator Transmitter (DACT) for signaling to a UL Listed Central Station Monitoring Company.
 - 1) The fire alarm system shall transmit alarm, supervisory alarm and trouble signals with the alarms having priority over the trouble signal.

2.2 SYSTEM COMPONENTS

- A. Fire Alarm Control Panel (FACP)
- 1. The FACP shall be a Silent Knight Farenhyt IFP-2100ECS.
 - a. The basic control panel shall provide:
 - 1) 9 amp power supply expandable to 45 amps via bus connected expander modules.
 - 2) Network Interface Module (only required if this system is to be a part of a network)
 - a) The network interface module shall be a Silent Knight Farenhyt IFP-RPT-FO-KIT Network Repeater KIT for fiber optic or unshielded twisted pair cable connections.
 - (1) 16AWG unshielded twisted pair FPL (SLC) cable shall be used for copper wiring network connections up to a maximum distance of 3000 feet.
 - (2) 6-strand, 62.5/125 micron multimode fiber optic cable with ST connectors shall be used for fiber optic cable connections.
 - (i) Installers of fiber optic cable shall be certified by the manufacturer of the cable and connectivity used.
 - (ii) Fiber optic cable shall be tested utilizing and industry standardized method.

- (iii) Provide fiber optic patch cables as required for a complete and operable system.
 - 3) One (1) Signaling Line Circuit (SLC) capable of supporting 159 addressable detectors and 159 addressable modules
 - a) Additional SLC's may be added via expander modules to a maximum of 636 addressable points per panel, 10,176 addressable points per network
 - 4) Eight (8) programmable "Flexputs"
 - a) Programmable Flexput Circuits shall be capable of being programmed as supervised reverse polarity notification appliance circuits, supervised auxiliary power circuits (continuous or resettable), door holder power or as input circuits in Class A or Class B configuration to support dry contact devices or compatible two-wire smoke detectors
 - 5) 160 character LCD annunciator
 - a) Capability of supervising 8 additional remote annunciators
 - 6) Integral UL listed Digital Alarm Communicator Transmitter (DACT)
 - 7) Ability to automatically test smoke detectors in compliance with NFPA Standards to ensure that they are within listed sensitivity parameters
 - 8) Compensation for accumulation of contaminants that affect detector sensitivity
 - 9) Day/night sensitivity adjustments
 - 10) Maintenance alert feature (differentiated from trouble condition)
 - 11) Detector sensitivity selection
 - 12) Over-current Protection
 - a) All low-voltage circuits shall be protected by microprocessor controlled power limiting or have a self-restoring polyswitch.
 - 13) Ground Fault Detection
 - a) The ground fault detector shall operate the general trouble devices as specified but shall not cause an alarm to be sounded.
 - b) Ground fault shall not interfere with the normal operation of the system, such as alarm or trouble conditions.
 - 14) Auto-programming mode (Jumpstart)
 - a) Jumpstart feature shall automatically enroll all properly connected devices into a functional system within 60 seconds of power up of the panel
 - 15) Ability to upgrade the core operating software on site or over the telephone
 - 16) RS-485 Serial Communication Bus (S-bus). Systems that do not communicate with Intelligent Modules via RS-485 Serial Communication Bus shall not be deemed comparable and shall not be acceptable for this project.
 - a) S-bus shall be of Class A or Class B configuration with a total bus length of 6000 feet.
 - 2. The FACP shall be capable of operating and supervising notification appliance devices as well as addressable initiating detection devices and an integrated supervised dual line digital communicator.
- B. Fire Alarm Control Panel with integral Emergency Voice/Alarm Communication System.
- 1. The Voice Evacuation Control Panel shall be Silent Knight Farenhyt IFP-2100ECS.
 - a. The IFP-2100ECS shall be the FACP on all systems where Networking is not required (Small elementary schools and middle schools) for compliance with CFC required Emergency Voice/Alarm Communication in K -12 schools.
 - b. Remote Voice Evacuation Amplifiers shall be:
 - 1) Silent Knight Farenhyt ECS-50W
 - 2) Silent Knight Farenhyt ECS-DUAL50W
 - 3) Silent Knight Farenhyt ECS-125W.

C. Network Nodes

1. Network Nodes, if required, shall be Silent Knight Farenhyt IFP-2100ECS.
 - a. All Network systems shall have at least one (1) IFP-2100ECS node for compliance with CFC required Emergency Voice/Alarm Communication in K -12 schools.
 - b. All Network Nodes shall have the capability of being connected with either copper cable or fiber optic cable.
- D. Remote Annunciator.
 1. The remote annunciator shall be Silent Knight Farenhyt RA-2000.
 - a. The remote annunciator shall have 160 character LCD display and 5 LED's for general alarm, supervisory, systems trouble, system silence and system power.
 - b. The remote annunciator shall have the same control and display layout as the integrated annunciator at the FACP.
 - c. The remote annunciator shall have the same functionality and operation as the integrated annunciator at the FACP.
 - d. The remote annunciator shall have twenty (20) levels of user codes to limit access to the system to authorized individuals.
 - e. The remote annunciators shall be capable of operating at a maximum wiring distance of 6,000 feet from the control unit on unshielded, non-twisted cable.
 - f. The system shall support a maximum of eight (8) remote annunciators.
- E. The Serial/Parallel Interface Gateway Module shall be Silent Knight Farenhyt 5824.
 1. The 5824 shall be connected to the S-bus and provide serial and parallel ports for connection to peripheral devices.
- F. Remote Power Supply
 1. The Intelligent Remote Power Supply shall be Silent Knight Farenhyt RPS-1000 or Silent Knight 5496.
 - a. The Intelligent Remote Power Supply shall be connected to the FACP via S-bus.
 - 1) The RPS-1000 shall have the capability of accommodating all IFP-2100 add-on modules including the 5815XL SLC Expander.
 - 2) The RPS-1000 shall have 6 amps of output power, six flexput circuits rated at 3 amps each and two form C relay circuits rated at 2.5 amps at 24VDC.
 - 3) The 5496 shall have 6 amps of output power, 4 output circuits that may be programmed as NAC or Auxiliary Power.
 - b. The Intelligent Remote Power Supply shall act as a bus repeater allowing connection of additional S-bus devices to a maximum wiring distance of 6,000 feet from the power supply.
 - c. The Intelligent Remote Power Supply shall have on-board synchronization for System Sensor NAC devices.
- G. Signaling Line Circuit (SLC) Devices
 1. Each SLC shall be capable to accommodating 159 addressable detectors and 159 addressable modules.
 2. Provide SLC devices as indicated on the construction drawings. All devices shall be listed for compatibility with the IFP-2100 FACP.
 - a. SLC Isolation Module shall be Silent Knight IDP-ISO.
 - b. Ceiling mounted smoke detector shall be Silent Knight IDP-Photo.
 - c. Ceiling mounted fixed temperature heat detector shall be Silent Knight IDP-Heat-HT.
 - d. Attic mounted heat detector shall be Silent Knight IDP-Heat-HT.
 - e. Outdoor elevator lobby device shall be Weatherproof Conventional Heat Detector Thermotech #302-AW-135 with IDP-Minimon Monitor Module.
 - f. Addressable Relay Module shall be Silent Knight IDP-Relay.
 - g. Addressable Input Module shall be Silent Knight IDP-Monitor.
 - h. Addressable Mini Input Module shall be Silent Knight IDP-Minimon.

- i. Addressable Beam Detector shall be Silent Knight IDP-Beam-T
 - j. Addressable Manual Pull Station shall be Silent Knight IDP-Pull-DA.
 - k. Addressable Duct Mounted Smoke Detector shall be Silent Knight IDP-PhotoR with DNR Housing and Sampling Tubes.
 - 1) Where allowed by code, addressable relay modules shall be utilized for code required HVAC unit shut down in lieu of duct mounted smoke detectors.
 - 2) Where allowed by code, addressable relay modules in conjunction with line-voltage isolation relays shall be utilized to control Fire/Smoke Damper power circuits, in lieu of duct mounted smoke detectors.
 - l. Addressable Fire / CO Detectors shall be Silent Knight IPD-Fire-CO. Detector shall be provided with local sounder base System Sensor B2000S.
- H. Notification Appliance Circuit (NAC) Devices
- 1. NAC devices shall be the product of Wheelock. All devices shall be listed for compatibility with the IFP-2100 FACP.
 - a. Wall mounted multi-candela strobe shall be Wheelock STW, white in color.
 - b. Ceiling mount multi-candela strobe shall be Wheelock STWC, white in color.
 - c. Exterior weatherproof speaker shall be Wheelock ET-1010, red in color.
 - d. Wall mount multi-candela speaker/strobe shall be Wheelock E70-24MCW, four-wire, WHITE in color.
 - e. Ceiling mount multi-candela speaker/strobe shall be Wheelock E90-24MCW, four-wire, white in color.
- I. Line-Voltage Isolation Relay
- 1. Line-Voltage Isolation Relay shall be System Sensor PR-1, Air Products PAM-1, MR101C or RIC-1.
 - a. All relays shall be California State Fire Marshal (CSFM) listed.
- J. System Wire/Cable
- 1. All Fire Alarm System Wire and Cable shall be installed in conduit, unless noted otherwise.
 - a. Interior
 - 1) SLC cable shall be #16AWG, 2-conductor, unshielded, FPL, red jacket by Falcon Fine Wire #450216R or comparable product.
 - b. SLC cable shall be California State Fire Marshal (CSFM) listed.
 - 1) NAC Wire shall be #12 AWG THHN/THWN, stranded color red and black.
 - 2) S-bus cable shall be #16AWG, 4-conductor, unshielded, FPL, red or black jacket by Falcon Fine Wire #450416R or comparable product.
 - a) S-Bus cable shall be California State Fire Marshal (CSFM) listed.
 - 3) Speaker cable shall be #16AWG, 2-conductor, shielded, FPL, red jacket by Falcon Fine Wire #460216R or comparable product.
 - a) Speaker cable shall be California State Fire Marshal (CSFM) listed.
 - 4) Network Fiber Optic Cable shall be 6-strand 62.5/125 micron multimode loose tube Indoor/Outdoor AMP 1-1664234-5 or comparable product.
 - c. Exterior
 - 1) SLC cable shall be #16AWG, 2-conductor, unshielded, FPL, water-blocked, black jacket by Falcon Fine Wire #400216H2O or comparable product.
 - a) SLC cable shall be California State Fire Marshal (CSFM) listed.
 - 2) NAC Wire shall be #12 AWG THHN/THWN, stranded color red and black.
 - 3) S-bus cable shall be #16AWG, 4-conductor, unshielded, FPL, water-blocked, black jacket by Falcon Fine Wire #400416H2O or comparable product.
 - a) S-Bus cable shall be California State Fire Marshal (CSFM) listed.
 - 4) Speaker cable shall be #16AWG, 2-conductor, shielded, FPL, water-blocked, black jacket by Falcon Fine Wire #410216H2O-00 or comparable product.
 - a) Speaker cable shall be California State Fire Marshal (CSFM) listed.
 - 5) Network Fiber Optic Cable shall be 6-strand 62.5/125 micron multimode

loose tube OSP Belden #B9B510T or comparable product with ST connectors.

PART 3 EXECUTION

3.1 DIVISION OF WORK

- A. While all work included under this specification is the complete responsibility of the Electrical Contractor, the division of actual work listed following shall occur.
 - 1. All conduits with pull cords, all electrical pull boxes, grounding rods, all outlet boxes, terminal cabinets, backboards, etc., which form part of the rough-in work shall be provided and installed completely by the Electrical Contractor. Coordinate as necessary for proper installation.
 - a. Equipment specific boxes provided by the system manufacturer shall be provided by System Supplier/Installer and installed by the Electrical Contractor.
 - 2. The balance of the system, including installation of initiating devices, notification appliances and equipment, making all connections, etc., shall be performed by the System Supplier/Installer.
 - 3. All 120VAC power conductors and conduits associated with power circuits to all fire alarm system equipment locations shall be provided and installed by the Electrical Contractor.
 - 4. An insulated stranded copper ground wire shall be provided from each control unit to the building grounding system, in compliance with CEC Article 250, by the Electrical Contractor.
 - 5. Labeling of pullboxes and terminal cabinets shall be provided and installed by the Electrical Contractor.
 - 6. HVAC Unit Shut-down
 - a. Conduit for code required HVAC unit shut-down shall be provided and installed by the Electrical Contractor.
 - b. Conductors for code required HVAC unit shut-down shall be provided, installed and terminated by the Mechanical Contractor.
 - c. Addressable Relay Modules for code required HVAC unit shut-down shall be provided and installed by the Fire Alarm System Supplier/Installer.

3.2 INSTALLATION

- A. All work shall be completed in strict accordance with all applicable codes and ordinances, by a Silent Knight Select Farenhyt Engineered Systems Distributor.
- B. Cable/Wire
 - 1. All cable/wire for the system specified herein shall be new, unless otherwise noted on plans.
 - 2. System cable/wire and equipment installation shall be in accordance with good engineering practices as established by the California Electrical Code (CEC). Wiring shall meet all applicable electrical codes. All cable/wire shall test free from all grounds and shorts.
 - a. All cable/wire shall be continuous between terminals with no splices.
 - 3. All cable/wire shall be labeled at all points of termination. All labeling shall be based on the room numbers as provided by the District/Owner or his representative.
 - 4. Underground cables
 - a. Any cable/wire pulled through manholes or pullboxes located below grade, shall be continuous between terminals with no splices underground. The cable/wire shall be intact with no cuts in the protective outer jacket.
 - b. All cable/wire in underground vaults/boxes shall be neatly dressed with service loops attached to the sides of the vault/box. Cable/wire shall not come in contact

with the ground.

3.3 SYSTEM START-UP

- A. All start-up programming and system commissioning shall be performed by a manufacturer's trained and certified technician currently employed by the System Supplier/Installer.

3.4 SYSTEM VERIFICATION

- A. Subsequent to system start-up the system installer shall perform a 100% system pre-test to verify that the following features are functioning properly.
 - 1. All notification appliances
 - 2. All initiation devices
 - 3. All control modules
 - 4. All monitor modules
 - 5. Communication link to monitoring service

3.5 ACCEPTANCE TESTING

- A. The system installer shall, in the presence of the Inspector of Record (IOR), perform 100% testing as noted in System Verification above.

3.6 IN SERVICE TRAINING

- A. The Contractor shall instruct personnel designated by the District/Owner in the proper use, basic care and maintenance of the system beyond the warranty period. Contractor shall provide up to eight hours of in-service training with this system.

3.7 FACTORY TRAINING AND CERTIFICATION

- A. When requested by Owner, provide Factory Training for a maximum of two District Technicians.

3.8 RECORD DRAWINGS AND CLOSE-OUT DOCUMENTATION

- A. System supplier/installer shall periodically update the General Contractor's master set of record drawings kept on site.
- B. Contractor shall provide the following at close-out.
 - 1. Three (3) hard copies of manufacturer's maintenance and operation manuals.
 - 2. Three (3) wet signed copies of system warranty.

3.9 WARRANTY

- A. The Contractor shall warrant the equipment and/or materials to be new and free from defects in material and workmanship, and will, within three (3) years from the date of final acceptance, repair or replace any equipment and/or materials found to be defective. This warranty shall not apply to any equipment or materials that have been subject to misuse, abuse, negligence or modification by owner or contractors other than the original installer that provided this warranty.

END OF SECTION 28 30 00

DSA 103-22: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS, 2022 CBC

General

Application Number: 02-123006	School Name: Madison Elementary School	School District: Madera Unified School District
DSA File Number: 20-30	Increment Number:	Date Created: 2024-12-19 08:51:00

IMPORTANT: This form is only a summary list of structural tests and some of the special inspections required for the project. Generally, the structural tests and special inspections noted on this form are those that will be performed by the Geotechnical Engineer of Record, Laboratory of Record, or Special Inspector. The actual complete test and inspection program must be performed as detailed on the DSA approved documents. The appendix at the bottom of this form identifies work NOT subject to DSA requirements for special inspection or structural testing. The project inspector is responsible for providing inspection of all facets of construction, including but not limited to, special inspections not listed on this form such as structural wood framing, high-load wood diaphragms, cold-formed steel framing, anchorage of non-structural components, etc., per Title 24, Part 2, Chapter 17A (2022 CBC).

****NOTE:** Undefined section and table references found in this document are from the CBC, or California Building Code.

KEY TO COLUMNS

1. TYPE	2. PERFORMED BY
Continuous – Indicates that a continuous special inspection is required	GE (Geotechnical Engineer) – Indicates that the special inspection shall be performed by a registered geotechnical engineer or his or her authorized representative.
Periodic – Indicates that a periodic special inspection is required	LOR (Laboratory of Record) – Indicates that the test or special inspection shall be performed by a testing laboratory accepted in the DSA Laboratory Evaluation and Acceptance (LEA) Program. See CAC Section 4-335.
Test – Indicates that a test is required	PI (Project Inspector) – Indicates that the special inspection may be performed by a project inspector when specifically approved by DSA.
	SI (Special Inspection) – Indicates that the special inspection shall be performed by an appropriately qualified/approved special inspector.

DSA 103-22: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS (SOILS), 2022 CBC

Table 1705A.6, Table 1705A.7, Table 1705A.8

Application Number: 02-123006	School Name: Madison Elementary School	School District: Madera Unified School District
DSA File Number: 20-30	Increment Number:	Date Created: 2024-12-19 08:51:00

Geotechnical Reports: Project does NOT have and does NOT require a geotechnical report

S1. GENERAL:				
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input checked="" type="checkbox"/>	a. Verify that: <ul style="list-style-type: none">• Site has been prepared properly prior to placement of controlled fill and/or excavations for foundations.• Foundation excavations are extended to proper depth and have reached proper material.• Materials below footings must not contain loose material, mud, organic silt, organic clays, or peat.	See Notes	PI	Refer to specific items identified in the Appendix listing exemptions for limitations. Placement of controlled fill exceeding 12" depth under foundations and/or within the building envelope is not permitted without a geotechnical report.

S2. SOIL COMPACTION AND FILL:				
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input checked="" type="checkbox"/>	a. Perform classification and testing of fill materials.	Test	LOR*	* Under the supervision of the geotechnical engineer.
<input checked="" type="checkbox"/>	b. Verify use of proper materials, densities and inspect lift thicknesses, placement and compaction during placement of fill.	Continuous	LOR*	* Under the supervision of a geotechnical engineer or LOR's engineering manager. Refer to specific items identified in the Appendix listing exemptions for limitations.
<input checked="" type="checkbox"/>	c. Compaction testing.	Test	LOR*	* Under the supervision of a geotechnical engineer or LOR's engineering manager. Refer to specific items identified in the Appendix listing exemptions for limitations.

S3. DRIVEN DEEP FOUNDATIONS (PILES):				
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	a. Verify pile materials, sizes and lengths comply with the requirements.	Continuous	GE*	* By geotechnical engineer or his or her qualified representative.

DSA 103-22: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS (SOILS), 2022 CBC

Table 1705A.6, Table 1705A.7, Table 1705A.8

Application Number: 02-123006	School Name: Madison Elementary School	School District: Madera Unified School District
DSA File Number: 20-30	Increment Number:	Date Created: 2024-12-19 08:51:00

	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	b. Determine capacities of test piles and conduct additional load tests as required.	Test	LOR*	* Under the supervision of the geotechnical engineer.
<input type="checkbox"/>	c. Inspect driving operations and maintain complete and accurate records for each pile.	Continuous	GE*	* By geotechnical engineer or his or her qualified representative.
<input type="checkbox"/>	d. Verify locations of piles and their plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and record any pile damage.	Continuous	GE*	* By geotechnical engineer or his or her qualified representative.
<input type="checkbox"/>	e. Steel piles.	Provide tests and inspections per STEEL section below.		
<input type="checkbox"/>	f. Concrete piles and concrete filled piles.	Provide tests and inspections per CONCRETE section below.		
<input type="checkbox"/>	g. For specialty piles, perform additional inspections as determined by the registered design professional in responsible charge.	*	*	* As defined on drawings or specifications.

	S4. CAST-IN-PLACE DEEP FOUNDATIONS (PIERS):			
	Test or Special Inspection	Type	Performed By	Code References and Note
<input type="checkbox"/>	a. Inspect drilling operations and maintain complete and accurate records for each pier.	Continuous	PI	Continuous inspection to be provided by project inspector. Refer to specific items identified in the Appendix listing exemptions for limitations.
<input type="checkbox"/>	b. Verify pier locations, diameters, plumbness and lengths. Record concrete or grout volumes.	Continuous	PI	Continuous inspection to be provided by project inspector. Refer to specific items identified in the Appendix listing exemptions for limitations.
<input type="checkbox"/>	c. Concrete piers.	Provide tests and inspections per CONCRETE section below.		

DSA 103-22: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS (SOILS), 2022 CBC

Table 1705A.6, Table 1705A.7, Table 1705A.8

Application Number: 02-123006	School Name: Madison Elementary School	School District: Madera Unified School District
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	Test or Special Inspection	Type	Performed By	Code References and Notes
	S5. RETAINING WALLS:			
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	a. Placement, compaction and inspection of backfill.	Continuous	GE*	1705A.6.1. * By geotechnical engineer or his or her qualified representative. (See section S2 above).
<input type="checkbox"/>	b. Placement of soil reinforcement and/or drainage devices.	Continuous	GE*	* By geotechnical engineer or his or her qualified representative.
<input type="checkbox"/>	c. Segmental retaining walls; inspect placement of units, dowels, connectors, etc.	Continuous	GE*	* By geotechnical engineer or his or her qualified representative. See DSA IR 18-2.
<input type="checkbox"/>	d. Concrete retaining walls.	Provide tests and inspections per CONCRETE section below.		
<input type="checkbox"/>	e. Masonry retaining walls.	Provide tests and inspections per MASONRY section below.		

	S6. OTHER SOILS:			
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	a. Soil Improvements	Test	GE*	Submit a comprehensive report documenting final soil improvements constructed, construction observation and the results of the confirmation testing and analysis to CGS (California Geological Survey) for final acceptance. * By geotechnical engineer or his or her qualified representative.
<input type="checkbox"/>	b. Inspection of Soil Improvements	Continuous	GE*	* By geotechnical engineer or his or her qualified representative.
<input type="checkbox"/>	c.			

DSA 103-22: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS (CONCRETE), 2022 CBC

Table 1705A.3; ACI 318-19 Sections 26.12 & 26.13

Application Number: 02-123006	School Name: Madison Elementary School	School District: Madera Unified School District
DSA File Number: 20-30	Increment Number:	Date Created: 2024-12-19 08:51:00

C1. CAST-IN-PLACE CONCRETE				
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	a. Verify use of required design mix.	Continuous	SI	Table 1705A.3 Item 5, 1910A.1.
<input type="checkbox"/>	b. Identify, sample, and test reinforcing steel.	Test	LOR	1910A.2; ACI 318-19 Ch.20 and Section 26.6.1.2; DSA IR 17-10. (See Appendix (end of this form) for exemptions.)
<input type="checkbox"/>	c. During concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	Test	LOR	Table 1705A.3 Item 6; ACI 318-19 Sections 26.5 & 26.12.
<input type="checkbox"/>	d. Test concrete (f'c).	Test	LOR	1905A.1.17; ACI 318-19 Section 26.12.
<input type="checkbox"/>	e. Batch plant inspection:	See Notes	SI	Default of 'Continuous' per 1705A.3.3. If approved by DSA, batch plant inspection may be reduced to 'Periodic' subject to requirements in Section 1705A.3.3.1, or not required per 1705A.3.3.2. See IR 17-13. (See Appendix (end of this form) for exemptions.)
<input type="checkbox"/>	f. Welding of reinforcing steel.	Provide special inspection per STEEL, Category S/A4(d) & (e) and/or S/A5(g) & (h) below.		

C2. PRESTRESSED / POST-TENSIONED CONCRETE (IN ADDITION TO SECTION C1):				
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	a. Sample and test prestressing tendons and anchorages.	Test	LOR	1705A.3.4, 1910A.3
<input type="checkbox"/>	b. Inspect placement of prestressing tendons.	Periodic	SI	1705A.3.4, Table 1705A.3 Items 1 & 9.

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Table 1705A.3; ACI 318-19 Sections 26.12 & 26.13

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	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	c. Verify in-situ concrete strength prior to stressing of post-tensioning tendons.	Periodic	SI	Table 1705A.3 Item 13. Special inspector to verify specified concrete strength test prior to stressing.
<input type="checkbox"/>	d. Inspect application of post-tensioning or prestressing forces and grouting of bonded prestressing tendons.	Continuous	SI	1705A.3.4, Table 1705A.3 Item 9; ACI 318-19 Section 26.13

	C3. PRECAST CONCRETE (IN ADDITION TO SECTION C1):			
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	a. Inspect fabrication of precast concrete members.	Continuous	SI	ACI 318-19 Section 26.13, and PCI MNL-128 and -130.
<input type="checkbox"/>	b. Inspect erection of precast concrete members.	Periodic	SI*	Table 1705A.3 Item 10. * May be performed by PI when specifically approved by DSA.
<input type="checkbox"/>	c. For precast concrete diaphragm connections or reinforcement at joints classified as moderate or high deformability elements (MDE or HDE) in structures assigned to Seismic Design Category D, E or F, inspect such connections and reinforcement in the field for: 1. Installation of the embedded parts 2. Completion of the continuity of reinforcement across joints. 3. Completion of connections in the field.	Continuous	SI	Table 1705A.3; ACI 318-19 Section 26.13.1.3; ACI 550.5
<input type="checkbox"/>	d. Inspect installation tolerances of precast concrete diaphragm connections for compliance with ACI 550.5.	Periodic	SI	Table 1705A.3; ACI 318-19 Section 26.13.1.3; ACI 550.5

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Table 1705A.3; ACI 318-19 Sections 26.12 & 26.13

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C4. SHOTCRETE (IN ADDITION TO SECTION C1):				
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	a. Inspect shotcrete placement for proper application techniques.	Continuous	SI	1705A.3.9, Table 1705A.3 Item 7, 1908A.1, 1908A.2, 1908A.3. See ACI 506.2-13 Section 3.4, ACI 506R-16.
<input type="checkbox"/>	b. Sample and test shotcrete (f'_c).	Test	LOR	1908A.2, 1705A.3.9

C5. POST-INSTALLED ANCHORS:				
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	a. Inspect installation of post-installed anchors	See Notes	SI*	1617A.1.19, Table 1705A.3 Item 4a (Continuous) & 4b (Periodic), 1705A.3.8 (See Appendix (end of this form) for exemptions). ACI 318-19 Section 26.13. * May be performed by the project inspector when specifically approved by DSA.
<input type="checkbox"/>	b. Test post-installed anchors.	Test	LOR	1910A.5. (See Appendix (end of this form) for exemptions.)

C6. OTHER CONCRETE:				
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	a.			

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1705A.2.1, Table 1705A.2.1; AISC 303-16, AISC 341-16, AISC 358-16, AISC 360-16; AISI S100-20; RCSC 2014; AWS D1.1, AWS D1.2, AWS D1.3, AWS D1.4, AWS D1.8

Application Number:

02-123006

School Name:

Madison Elementary School

School District:

Madera Unified School District

DSA File Number:

20-30

Increment Number:

Date Created:

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S/A1. STRUCTURAL STEEL, COLD-FORMED STEEL AND ALUMINUM USED FOR STRUCTURAL PURPOSES				
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	a. Verify identification of all materials and: • Mill certificates indicate material properties that comply with requirements. • Material sizes, types and grades comply with requirements.	Periodic	*	Table 1705A.2.1 Item 3a 3c. 2202A.1; AISI S100-20 Section A3.1 & A3.2, AISI S240-20 Section A3 & A5, AISI S220-20 Sections A4 & A6. * By special inspector or qualified technician when performed off-site.
<input type="checkbox"/>	b. Test unidentified materials	Test	LOR	2202A.1.
<input type="checkbox"/>	c. Examine seam welds of HSS shapes	Periodic	SI	DSA IR 17-3.
<input type="checkbox"/>	d. Verify and document steel fabrication per DSA-approved construction documents.	Periodic	SI	Not applicable to cold-formed steel light-frame construction, except for trusses (1705A.2.4).
<input type="checkbox"/>	e. Buckling restrained braces.	Test	LOR	Testing and special inspections in accordance with IR 22-4.

S/A2. HIGH-STRENGTH BOLTS:				
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	a. Verify identification markings and manufacturer's certificates of compliance conform to ASTM standards specified in the DSA-approved documents.	Periodic	SI	Table 1705A.2.1 Items 1a & 1b, 2202A.1; AISC 360-16 Section A3.3, J3.1, and N3.2; RCSC 2014 Section 1.5 & 2.1; DSA IR 17-8 & DSA IR 17-9.
<input type="checkbox"/>	b. Test high-strength bolts, nuts and washers.	Test	LOR	Table 1705A.2.1 Item 1c, 2213A.1; RCSC 2014 Section 7.2; DSA IR 17-8.
<input type="checkbox"/>	c. Bearing-type ("snug tight") connections.	Periodic	SI	Table 1705A.2.1 Item 2a, 1705A.2.6, 2204A.2; AISC 360-16 J3.1, J3.2, M2.5 & N5.6; RCSC 2014 Section 9.1; DSA IR 17-9.
<input type="checkbox"/>	d. Pretensioned and slip-critical connections.	*	SI	Table 1705A.2.1 Items 2b & 2c, 1705A.2.6, 2204A.2; AISC 360-16 J3.1, J3.2, M2.5 & N5.6; RCSC 2014 Sections 9.2 & 9.3; DSA IR 17-9. **"Continuous" or "Periodic" depends on the tightening method used.

DSA 103-22: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS (STEEL AND ALUMNINUM), 2022 CBC

1705A.2.1, Table 1705A.2.1; AISC 303-16, AISC 341-16, AISC 358-16, AISC 360-16; AISI S100-20; RCSC 2014; AWS D1.1, AWS D1.2, AWS D1.3, AWS D1.4, AWS D1.8

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S/A3. WELDING:				
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	a. Verify weld filler material identification markings per AWS designation listed on the DSA-approved documents and the WPS.	Periodic	SI	1705A.2.5, Table 1705A.2.1 Items 4 & 5; AWS D1.1 and AWS D1.8 for structural steel; AWS D1.2 for Aluminum; AWS D1.3 for cold-formed steel; AWS D1.4 for reinforcing steel; DSA IR 17-3.
<input type="checkbox"/>	b. Verify weld filler material manufacturer's certificate of compliance.	Periodic	SI	DSA IR 17-3.
<input type="checkbox"/>	c. Verify WPS, welder qualifications and equipment.	Periodic	SI	DSA IR 17-3.

S/A4. SHOP WELDING (IN ADDITION TO SECTION S/A3):				
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	a. Inspect groove welds, multi-pass fillet welds, single pass fillet welds > 5/16", plug and slot welds.	Continuous	SI	Table 1705A.2.1 Items 5a.1 4; AISC 360-16 (and AISC 341-16 as applicable); DSA IR 17-3.
<input type="checkbox"/>	b. Inspect single-pass fillet welds ≤ 5/16", floor and roof deck welds.	Periodic	SI	1705A.2.2, Table 1705A.2.1 Items 5a.5 & 5a.6; AISC 360-16 (and AISC 341-16 as applicable); DSA IR 17-3.
<input type="checkbox"/>	c. Inspect welding of stairs and railing systems.	Periodic	SI	1705A.2.1; AISC 360-16 (and AISC 341-16 as applicable); AWS D1.1 & D1.3; DSA IR 17-3.
<input type="checkbox"/>	d. Verification of reinforcing steel weldability other than ASTM A706.	Periodic	SI	1705A.3.1; AWS D1.4; DSA IR 17-3. Verify carbon equivalent reported on mill certificates.
<input type="checkbox"/>	e. Inspect welding of reinforcing steel.	Continuous	SI	Table 1705A.2.1 Item 5b, 1705A.3.1, Table 1705A.3 Item 2, 1903A.8; AWS D1.4; DSA IR 17-3.

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1705A.2.1, Table 1705A.2.1; AISC 303-16, AISC 341-16, AISC 358-16, AISC 360-16; AISI S100-20; RCSC 2014; AWS D1.1, AWS D1.2, AWS D1.3, AWS D1.4, AWS D1.8

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	Test or Special Inspection	Type	Performed By	Code References and Notes
	S/A5. FIELD WELDING (IN ADDITION TO SECTION S/A3):			
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	a. Inspect groove welds, multi-pass fillet welds, single pass fillet welds > 5/16", plug and slot welds.	Continuous	SI	Table 1705A.2.1 Items 5a.1 4; AISC 360-16 (AISC 341-16 as applicable); DSA IR 17-3.
<input type="checkbox"/>	b. Inspect single-pass fillet welds ≤ 5/16".	Periodic	SI	Table 1705A.2.1 Item 5a.5; AISC 360-16 (AISC 341-16 as applicable); DSA IR 17-3.
<input type="checkbox"/>	c. Inspect end-welded studs (ASTM A-108) installation (including bend test).	Periodic	SI	2213A.2; AISC 360-16 (AISC 341-16 as applicable); AWS D1.1; DSA IR 17-3.
<input type="checkbox"/>	d. Inspect floor and roof deck welds.	Periodic	SI	1705A.2.2, Table 1705A.2.1 Item 5a.6; AISC 360-16 (AISC 341-16 as applicable); AWS D1.3; DSA IR 17-3.
<input type="checkbox"/>	e. Inspect welding of structural cold-formed steel.	Periodic	SI*	1705A.2.5; AWS D1.3; DSA IR 17-3. The quality control provisions of AISI S240-20 Chapter D shall also apply. * May be performed by the project inspector when specifically approved by DSA.
<input type="checkbox"/>	f. Inspect welding of stairs and railing systems.	Periodic	SI*	1705A.2.1; AISC 360-16 (AISC 341-16 as applicable); AWS D1.1 & D1.3; DSA IR 17-3. * May be performed by the project inspector when specifically approved by DSA.
<input type="checkbox"/>	g. Verification of reinforcing steel weldability.	Periodic	SI	1705A.3.1; AWS D1.4; DSA IR 17-3. Verify carbon equivalent reported on mill certificates.
<input type="checkbox"/>	h. Inspect welding of reinforcing steel.	Continuous	SI	Table 1705A.2.1 Item 5b, 1705A.3.1, Table 1705A.3 Item 2, 1903A.8; AWS D1.4; DSA IR 17-3.

DSA 103-22: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS (STEEL AND ALUMNINUM), 2022 CBC

1705A.2.1, Table 1705A.2.1; AISC 303-16, AISC 341-16, AISC 358-16, AISC 360-16; AISI S100-20; RCSC 2014; AWS D1.1, AWS D1.2, AWS D1.3, AWS D1.4, AWS D1.8

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	Test or Special Inspection	Type	Performed By	Code References and Notes
	S/A6. NONDESTRUCTIVE TESTING:			
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	a. Ultrasonic	Test	LOR	1705A.2.1, 1705A.2.5; AISC 341-16 J6.2, AISC 360-16 N5.5; AWS D1.1, AWS D1.8; DSA IR 17-2.
<input type="checkbox"/>	b. Magnetic Particle	Test	LOR	1705A.2.1, 1705A.2.5; AISC 341-16 J6.2, AISC 360-16 N5.5; AWS D1.1, AWS D1.8; DSA IR 17-2.
<input type="checkbox"/>	c.	Test	LOR	

	S/A7. STEEL JOISTS AND TRUSSES:			
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	a. Verify size, type and grade for all chord and web members as well as connectors and weld filler material; verify joist profile, dimensions and camber (if applicable); verify all weld locations, lengths and profiles; mark or tag each joist.	Continuous	SI	1705A.2.3, Table 1705A.2.3; AWS D1.1; DSA IR 22-3 for steel joists only. 1705A.2.4; AWS D1.3 for cold-formed steel trusses.

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1705A.2.1, Table 1705A.2.1; AISC 303-16, AISC 341-16, AISC 358-16, AISC 360-16; AISI S100-20; RCSC 2014; AWS D1.1, AWS D1.2, AWS D1.3, AWS D1.4, AWS D1.8

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	Test or Special Inspection	Type	Performed By	Code References and Notes
	S/A8. SPRAYED FIRE-RESISTANT MATERIALS:			
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	a. Examine structural steel surface conditions, inspect application, take samples, measure thickness and verify compliance of all aspects of application with DSA-approved documents.	Periodic	SI	1705A.15, 1705A.15.1, 1705A.15.2, 1705A.15.3, 1705A.15.4, 1705A.15.5, 1705A.15.6.
<input type="checkbox"/>	b. Test density.	Test	LOR	1705A.15.1, 1705A.15.5, ASTM E605
<input type="checkbox"/>	c. Bond strength adhesion/cohesion.	Test	LOR	1705A.15.1, 1705A.15.6, ASTM E736

	S/A9. ANCHOR BOLTS AND ANCHOR RODS:			
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	a. Anchor Bolts and Anchor Rods	Test	LOR	Identify, sample and test anchor bolts and anchor rods not meeting exemptions identified in Section 1 of IR 17-11.
<input type="checkbox"/>	b. Threaded rod not used for foundation anchorage.	Test	LOR	Identify, sample and test threaded rods not meeting exemptions identified in Section 1 of IR 17-11.

	S/A10. STORAGE RACK SYSTEMS:			
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	a. Materials used, to verify compliance with one or more of the material test reports in accordance with the approved construction documents.	Periodic	SI	Table 1705A.13.7
<input type="checkbox"/>	b. Fabricated storage rack elements.	Periodic	SI	1704A.2.5; Table 1705A.13.7

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1705A.2.1, Table 1705A.2.1; AISC 303-16, AISC 341-16, AISC 358-16, AISC 360-16; AISI S100-20; RCSC 2014; AWS D1.1, AWS D1.2, AWS D1.3, AWS D1.4, AWS D1.8

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	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	c. Storage rack anchorage installation.	Periodic	SI	ANSI/MH16.1 Section 7.3.2; Table 1705A.13.7
<input type="checkbox"/>	d. Completed storage rack system to indicate compliance with the approved construction documents.	Periodic	SI*	Table 1705A.13.7; * May be preformed by the project inspector when specifically approved by DSA.

	S/A11. Other Steel			
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	a.			

DSA 103-22: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS (WOOD), 2022 CBC

1705A.5, Table 1705A.5.7

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W1. PREFABRICATED WOOD TRUSSES:				
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	a. Inspect fabrication of manufactured open-web trusses.	Continuous	SI	1705A.5.6; DSA IR 23-8.
<input type="checkbox"/>	b. Inspect fabrication of manufactured metal-plate-connected trusses.	Continuous	SI	1705A.5.6, 1705A.5.7; DSA IR 23-4.

W2. MANUFACTURED WOOD STRUCTURAL ELEMENTS:				
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input type="checkbox"/>	a. Inspect fabrication of structural glued-laminated timber.*	Continuous	SI	* See 1705A.5.5 for exceptions
<input type="checkbox"/>	b. Inspect fabrication of cross-laminated timber.	Continuous	SI	1705A.5.5
<input type="checkbox"/>	c. Inspect erection of mass timber.	Periodic	SI	Table 1705A.5.3, Item 2
<input type="checkbox"/>	d. Inspect mass timber connections with threaded fasteners, bolts, and/or adhesive anchors other than described in item e below. Inspect concealed mass timber connections.	Periodic	SI	Table 1705A.5.3, Items 3.1, 3.3, 3.4, 3.5. For threaded fasteners: Verify use of proper installation equipment. Verify use of pre-drilled holes where required. Inspect screws, including diameter, length, head type, spacing, installation angle, and depth.
<input type="checkbox"/>	e. Inspect mass timber connections with adhesive anchors installed in a horizontal or upward orientation.	Continuous	SI	Table 1705A.5.3, Item 3.2
<input type="checkbox"/>	f. Inspect application of sealants or adhesives applied to mass timber elements.	Periodic	SI	1705A.20

DSA 103-22: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS (WOOD), 2022 CBC

1705A.5, Table 1705A.5.7

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	W3. OTHER Wood:			
	Test or Special Inspection	Type	Performed By	Code References and Notes
<input checked="" type="checkbox"/>	a. Pressure treated wood with verified certificate	Periodic	SI	

Appendix: Work Exempt from DSA Requirements for Structural Tests / Special Inspections

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Exempt items given in DSA IR A-22 or the 2022 CBC (including DSA amendments) and those items identified below with a check mark by the design professional are NOT subject to DSA requirements for the structural tests / special inspections noted. **Items marked as exempt shall be identified on the approved construction documents.** The project inspector shall verify all construction complies with the approved construction documents.

	SOILS:
<input type="checkbox"/>	1. Deep foundations acting as a cantilever footing with a design based on minimum allowable pressures per CBC Table 1806A.2 and without a geotechnical report for the following cases: A) free standing sign or scoreboard, B) cell or antenna towers and poles less than 35'-0" tall (e.g., lighting poles, flag poles, poles supporting open mesh fences, etc.), C) single-story structure with dead load less than 5 psf (e.g., open fabric shade structure), or D) covered walkway structure with an apex height less than 10'-0" above adjacent grade.
<input type="checkbox"/>	2. Shallow foundations, etc. are exempt from special inspections and testing by a Geotechnical Engineer for the following cases: A) buildings without a geotechnical report and meeting the exception item #1 criteria in CBC Section 1803A.2 supported by native soil (any excavation depth) or fill soil (not exceeding 12" depth per CBC Section 1804A.6), B) soil scarification/recompaction not exceeding 12" depth, C) native or fill soil supporting exterior non-structural flatwork (e.g., sidewalks, site concrete ramps, site stairs, parking lots, driveways, etc.), D) unpaved landscaping and playground areas, or E) utility trench backfill with depth not exceeding 12".

	CONCRETE/MASONRY:
<input type="checkbox"/>	1. Post-installed anchors for the following: A) exempt non-structural components (e.g., mechanical, electrical, plumbing equipment - see item 7 for "Welding" in the Appendix below) given in CBC Section 1617A.1.18 (which replaces ASCE 7-16, Section 13.1.4) or B) interior nonstructural wall partitions meeting criteria listed in exempt item 3 for "Welding" in the Appendix below
<input checked="" type="checkbox"/>	2. Concrete batch plant inspection is not required for items given in CBC Section 1705A.3.3.2 subject to the requirements and limitations in that section.
<input type="checkbox"/>	3. Non-bearing non-shear masonry walls may be exempt from certain DSA masonry testing and special inspection items as allowed per DSA IR 21-1. Refer to construction documents for specific exemptions accordingly for each applicable wall condition shown in Appendix A of IR 21-1.
<input type="checkbox"/>	4. Epoxy shear dowels in site flatwork and/or other non-structural concrete.

Appendix: Work Exempt from DSA Requirements for Structural Tests / Special Inspections

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	CONCRETE/MASONRY:
<input type="checkbox"/>	5. Testing of reinforcing bars is not required for items given in CBC Section 1910A.2 subject to the requirements and limitations in that section.

	WELDING:
<input checked="" type="checkbox"/>	1. Solid-clad and open-mesh fences, gates with maximum leaf span of 10', and gates with a maximum rolling section of 10' all having an apex height less than 8'-0" above lowest adjacent grade. When located above circulation or occupied space below, these gates/fences are not located within 1.5x gate/fence height (max 8'-0") to the edge of floor or roof.
<input type="checkbox"/>	2. Handrails, guardrails, and modular or relocatable ramps associated with walking surfaces less than 30" above adjacent grade (excluding post base connections per the 'Exception' language in Section 1705A.2.1); fillet welds shall not be ground flush.
<input type="checkbox"/>	3. Non-structural interior cold-formed steel framing spanning less than 15'-0", such as in interior partitions, interior soffits, etc. supporting only self weight and light-weight finishes or adhered tile, masonry, stone, or terra cotta veneer no more than 5/8" thickness and apex less than 20'-0" in height and not over an exit way. Maximum tributary load to a member shall not exceed the equivalent of that occurring from a 10'x10' opening in a 15' tall wall for a header or king stud.
<input type="checkbox"/>	4. Manufactured support frames and curbs using hot rolled or cold-formed steel (i.e., light gauge) for mechanical, electrical, or plumbing equipment weighing less than 2000# (equipment only) (connections of such frames to superstructure elements using welding will require special inspection as noted in selected item(s) for Sections S/A3, S/A4 and/or S/A5 of listing above).
<input type="checkbox"/>	5. Manufactured components (e.g., Tolco, B-Line, Afcon, etc.) for mechanical, electrical, or plumbing hanger support and bracing (connections of such components to superstructure elements using welding will require special inspection as noted in selected item(s) for Sections S/A3, S/A4 and/or S/A5 of listing above).
<input type="checkbox"/>	6. TV Brackets, projector mounts with a valid listing (see DSA IR A-5) and recreational equipment (e.g., playground structures, basketball backstops, etc.) (connections of such elements to superstructure elements using welding will require special inspection as noted in selected item(s) for sections S/A3, S/A4 and/or S/A5 located in the Steel/Aluminum category of listing above).

Appendix: Work Exempt from DSA Requirements for Structural Tests / Special Inspections

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	WELDING:
<input type="checkbox"/>	7. Any support for exempt non-structural components given in CBC Section 1617A.1.18 (which replaces ASCE 7-16, Section 13.1.4) meeting the following: A) when supported on a floor/roof, <400# and resulting composite center of mass (including component's center of mass) ≤4' above supporting floor/roof, B) when hung from a wall or roof/floor, <20# for discrete units or <5 plf for distributed systems.

DSA 103-22: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS(SIGNATURE), 2022 CBC

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Name of Architect or Engineer in general responsible charge:

Michael Schoen

Name of Structural Engineer (When structural design has been delegated):

Signature of Architect or Structural Engineer:



Date:

12.19.24

Note: To facilitate DSA electronic mark-ups and identification stamp application, DSA recommends against using secured electronic or digital signatures.

DSA STAMP

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-123006 INC:
REVIEWED FOR
SS ☒ FLS ☒ ACS ☒
DATE: 12/20/2024

DSA 103-22: LIST OF REQUIRED VERIFIED REPORTS, CBC 2022

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1. Structural Testing and Inspection: Laboratory Verified Report Form DSA 291

