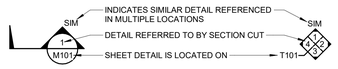
VIEW KEY

NAME — LEVEL NAME
10'-0" — HEIGHT ABOVE PROJECT 0'-0"

1 — KEYNOTE: INDICATES NOTE USED TO DESCRIBE ADDITIONAL INFORMATION ABOUT WORK REQUIRED, SPECIFIC TO THE SHEET AND/OR DETAIL



LINE TYPE AND TAG KEY:

NEW WORK BY THIS CONTRACTOR (WIDE LINE)
——— NEW
- - - - - - - - - EXISTING TO BE REMOVED (SHORT DASHED PATTERN)
— — — — NEW UNDERFLOOR OR UNDERGROUND (LONG DASHED PATTERN)

EXISTING TO REMAIN OR WORK BY OTHERS (NARROW LINE)
——— EXISTING
- - - - - - - - - EXISTING TO BE REMOVED BY OTHERS (SHORT DASHED PATTERN)
— — — — EXISTING UNDERFLOOR OR UNDERGROUND (LONG DASHED PATTERN)

HALFTONING DOES NOT MODIFY SCOPE.

'TAG'-E — TAGS WITH DASH 'E' INDICATES THE REFERENCED OBJECT IS EXISTING

TAG-1 — UNDERLINED TAG INDICATES OBJECT IS IN-SCOPE. IF NEW, ADDITIONAL INFORMATION IS AVAILABLE IN A SCHEDULE, MATERIAL LIST, OR SYMBOL LIST

INDICATES AN EXISTING SYSTEM'S POINT OF CONNECTION/REMOVAL

FIRE / SMOKE BARRIER DESIGNATIONS

FIRE AND SMOKE SEPARATIONS ARE NOT SHOWN ON THESE DOCUMENTS. CONTRACTOR SHALL REVIEW THE ARCHITECTURAL PLANS AND DETERMINE THE LOCATIONS OF ALL FIRE AND SMOKE PARTITIONS, BARRIERS, AND WALLS. THIS INCLUDES FLOOR RATINGS. PRICING SHALL INCLUDE ALL MATERIALS AND LABOR REQUIRED TO MAINTAIN THE RATINGS OF ALL RATED SEPARATIONS, WHETHER SHOWN ON THE ENGINEERING PLANS OR NOT.

APPLICABLE CODES

CONTRACTOR SHALL COMPLY WITH APPLICABLE CODES AND LOCAL AMENDMENTS INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING:

BUILDING CODE:	CBC 2025 EDITION
FIRE CODE:	IFC 2025 EDITION
PLUMBING CODE:	CPC 2025 EDITION
MECHANICAL CODE:	CMC 2025 EDITION
ELECTRICAL CODE:	NFPA 70 (NEC) 2025 EDITION
LIFE SAFETY CODE:	NFPA 101 2022 EDITION
ENERGY CONSERVATION CODE:	IECC 2022 EDITION
HEALTH DEPARTMENT CODE:	CURRENT EDITION
LOCAL BUILDING CODE:	CURRENT EDITION

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

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

MECHANICAL SYSTEM ACCEPTANCE TESTS MUST BE PERFORMED BY A CERTIFIED MACHANICAL ATT FOR PROJECTS SUBMITTED ON OR AFTER OCTOBER 1, 2021.

ENVELOPE AND PROCESS EQUIPMENT ACCEPTANCE TESTS SHALL BE PERFORMED BY THE INSTALLING CONTRACTOR, ENGINEER/ARCHITECT OF RECORD OR OWNERS AGENT.

A LISTING OF CERTIFID ATT CAN BE FOUND AT:
HTTPS://WWW.ENERGY.CA.GOV/PROGRAMS-AND-TOPICS/PROGRAMS/ACCEPTANCE-TEST-TECHNICIAN-CERTIFICATION-PROVIDER-PROGRAM/ACCEPTANCE.

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

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

ELECTRICAL EQUIPMENT TAGS

TAG:	DESCRIPTION:	RELATED SPECIFICATION
EVCS-#	ELECTRICAL VEHICLE CHARGING STATION	26 27 29
SB-#	SWITCHBOARD	26 24 13

ELECTRICAL ABBREVIATION KEY

ABBR:	DESCRIPTION:
ABV	ABOVE
AFC	ABOVE FINISHED CEILING
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
ASR	ARCHITECTURAL SURFACE RACEWAY
BC	BELOW COUNTER
C	CONDUIT (BRANCH CIRCUIT OR FEEDER CONTEXT)
CO	CONDUIT AND BOX ROUGH-IN ONLY (ROUGH-IN ONLY)
EG	EQUIPMENT GROUND
EGC	EQUIPMENT GROUNDING CONDUCTOR
EOL	END OF LINE
EPO	EMERGENCY POWER OFF
GFR	GROUND FAULT REMOTE
HOA	HAND/OFF/AUTO
ITR	IT RACK MOUNTED RECEPTACLE
NC	NORMALLY CLOSED
NEMA #	NEMA RATING
NIC	NOT IN CONTRACTED SCOPE
NO	NORMALLY OPEN
ROOF	EQUIPMENT LOCATED ON ROOF ABOVE
SM	SURFACE MOUNTED
TYP	TYPICAL
UG	UNDERGROUND
UON	UNLESS OTHERWISE NOTED

CALIFORNIA DSA MECHANICAL, ELECTRICAL, AND PLUMBING COMPONENT ANCHORAGE NOTES:

1. EQUIPMENT ANCHORAGE NOTE:
   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 2019 CBC, SECTION 1617A.18 THROUGH 1617A.1.26 AND ASCE 7-16 CHAPTERS 13,26, AND 30.
   1. ALL PERMANENT EQUIPMENT AND COMPONENTS.
   2. TEMPORARY, MOVABLE OR MOBILE EQUIPMENT THAT IS PERMANENTLY ATTACHED (E.G. HARD WIRED) TO THE BUILDING UTILITY SERVICES SUCH AS ELECTRICITY, GAS OR WATER. "PERMANENTLY ATTACHED" SHALL INCLUDE ALL ELECTRICAL CONNECTION EXCEPT PLUGS FOR 110/220 VOLT RECEPTACLES HAVING A FLEXIBLE CABLE.
   3. TEMPORARY, MOVABLE OR MOBILE EQUIPMENT WHICH IS HEAVIER THAN 400 POUNDS OR HAS A CENTER MASS LOCATED 4 FEET OR MORE ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT IS REQUIRED TO BE RESTRAINED IN A MANNER APPROVED BY DSA.

   THE FOLLOWING MECHANICAL AND ELECTRICAL COMPONENTS SHALL BE POSITIVELY ATTACHED TO THE STRUCTURE BUT NEED NOT 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.
   - A. 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.
   - B. COMPONENTS WEIGHING LESS THAN 20 POUNDS, OR IN THE CASE OF DISTRIBUTED SYSTEMS, LESS THAN 5 POUNDS PER FOOT, WHICH ARE SUSPENDED FROM A ROOF OR FLOOR OR HUNG FROM A WALL.

   THE ANCHORAGE OF ALL MECHANICAL, ELECTRICAL, AND PLUMBING COMPONENTS SHALL BE SUBJECT TO THE APPROVAL OF THE STRUCTURAL ENGINEER OF RECORD AND ACCEPTANCE BY DSA. THE PROJECT INSPECTOR WILL VERIFY THAT ALL COMPONENTS AND EQUIPMENT HAVE BEEN ANCHORED IN ACCORDANCE WITH THE ABOVE REQUIREMENTS.
2. PIPING, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEMS BRACING NOTE.

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

   THE METHOD OF SHOWING BRACING AND ATTACHMENTS TO THE STRUCTURE FOR THE IDENTIFIED DISTRIBUTION SYSTEM ARE AS NOTED BELOW. WHEN BRACING AND ATTACHMENTS ARE BASED ON A PREAPPROVED INSTALLATION GUIDE (E.G. HCAI OPM FOR 2013 CBC OR LATER), COPIES OF THE BRACING SYSTEM INSTALLATION GUIDE OR MANUAL SHALL BE AVAILABLE ON THE JOBSITE PRIOR TO THE START OF AND DURING THE HANGING AND BRACING OF THE DISTRIBUTION SYSTEMS. THE STRUCTURAL ENGINEER OF RECORD SHALL VERIFY THE ADEQUACY OF THE STRUCTURE TO SUPPORT THE HANGER AND BRACE LOADS.

   MECHANICAL PIPING (MP), MECHANICAL DUCTS (MD), PLUMBING PIPING (PP)M ELECTRICAL DISTRIBUTION SYSTEMS (E):

   MP [] MD [] PP [] E [x] OPTION 1: DETAILED ON THE APPROVED DRAWINGS WITH PROJECT SPECIFIC NOTES AND DETAILS.

   MP [] MD [] PP [] OPTION 2: SHALL COMPLY WITH THE APPLICABLE HCAI PRE-APPROVAL (OPM#) #_____.

ELECTRICAL RENOVATION NOTES:

THESE NOTES APPLY TO ALL ELECTRICAL SHEETS AND TRADES, INCLUDING BUT NOT LIMITED TO, LIGHTING, POWER, FIRE ALARM, AND OTHER LOW VOLTAGE SYSTEMS.

1. EXISTING CONDITIONS ARE SHOWN BASED ON INFORMATION OBTAINED FROM FIELD SURVEYS, EXISTING BUILDING DOCUMENTS. CONTRACTOR SHALL REVIEW EXISTING CONDITIONS AND REPORT CONFLICTS.
2. NOT ALL EXISTING EQUIPMENT, LUMINAIRES, AND CONDUIT ARE SHOWN. CONTRACTOR SHALL REVIEW EXISTING CONDITIONS AND REPORT CONFLICTS.
3. CONTRACTOR SHALL REVIEW EXISTING CONDITIONS PRIOR TO FABRICATION OF CABLE TRAY, BUSWAY, CONDUIT RACKS, AND OTHER SYSTEMS. RISES AND DROPS MAY BE NECESSARY BECAUSE OF EXISTING FIELD CONDITIONS.
4. ELECTRICAL CONTRACTOR SHALL REVIEW EXISTING CONDITIONS TO VERIFY ACCESSIBILITY TO THE AREAS OF THEIR WORK INCLUDING WALLS, FLOOR, CEILINGS, CEILING TILES/GRID, AND ROOF. ELECTRICAL CONTRACTOR IS RESPONSIBLE TO PROVIDE CUTTING, REMOVAL, PATCHING, AND REINSTALLATION OF AFFECTED AREAS ASSOCIATED WITH THEIR WORK BY COORDINATING WITH THE GENERAL CONTRACTOR OR QUALIFIED CONTRACTOR.
5. WHERE EXISTING ELECTRICAL SYSTEMS ARE LOCATED IN AREAS THAT CONFLICT WITH NEW EQUIPMENT, PIPING, OR DUCTWORK TO BE INSTALLED, EACH CONTRACTOR SHALL EITHER ARRANGE NEW EQUIPMENT, CONDUIT, OR DUCTWORK IN SUCH A FASHION THAT IT DOES NOT CONFLICT WITH EXISTING SYSTEMS, OR REWORK EXISTING ELECTRICAL SYSTEMS TO ALLOW FOR INSTALLATION OF NEW EQUIPMENT, PIPING, OR DUCTWORK.

ELECTRICAL PHASING NOTES:

THESE NOTES APPLY TO ALL ELECTRICAL SHEETS AND TRADES, INCLUDING BUT NOT LIMITED TO, LIGHTING, POWER, FIRE ALARM, AND OTHER LOW VOLTAGE SYSTEMS.

1. REFER TO **ARCHITECTURAL** DRAWINGS FOR GENERAL DESCRIPTION OF PHASES.
2. REFER TO **ARCHITECT'S** INSTRUCTIONS FOR MORE DETAILS AND PHASING SCHEDULES AND FOR CONCURRENT WORK. MECHANICAL, ELECTRICAL AND TECHNOLOGY DRAWINGS DEPICT THE INTENT OF THE FINAL DESIGN. THE MECHANICAL, ELECTRICAL, AND TECHNOLOGY DRAWINGS DO NOT DEPICT THE MEANS AND METHODS TO MEET THE REQUIREMENTS OF THE PHASING CRITERIA.
3. REVIEW PROJECT PHASING PLANS TO COORDINATE DEMOLITION WORK, OUTAGES, ETC. WITH AFFECTED ADJACENT AREAS.
4. PROVIDE TEMPORARY LIGHTING, POWER, FIRE ALARM, AND OTHER LOW VOLTAGE SYSTEMS, ETC. AS NEEDED TO MAINTAIN SERVICE TO ALL AREAS DURING ALL PHASES OF PROJECT.

SCOPE OF WORK NOTES:

1. OUTDOOR LIGHTING SYSTEM WITH TIME CLOCK CONTROLS.
2. POWER CONNECTION TO SOLAR PV CANOPY.
3. POWER CONNECTION TO EV CHARGER IN PARKING LOT.
4. THE CALIFORNIA ENERGY CODE SECTION 10-103 REQUIRES ACCEPTANCE TESTING ON ALL NEWLY INSTALLED LIGHTING CONTROLS, MECHANICAL SYSTEMS, ENVELOPES, AND PROCESS EQUIPMENT AFTER INSTALLATION AND BEFORE PROJECT COMPLETION. AN ACCEPTANCE TEST IS A FUNCTIONAL PERFORMANCE TEST TO HELP ENSURE THAT NEWLY INSTALLED EQUIPMENT IS OPERATING AND IN COMPLIANCE WITH THE ENERGY CODE.
5. LIGHTING CONTROLS ACCEPTANCE TESTS MUST BE PERFORMED BY A CERTIFIED LIGHTING CONTROLS ACCEPTANCE TEST TECHNICIAN (ATT).
6. MECHANICAL SYSTEM ACCEPTANCE TESTS MUST BE PERFORMED BY A CERTIFIED MECHANICAL ATT FOR PROJECTS SUBMITTED ON OR AFTER OCTOBER 1, 2021.
7. ENVELOPE AND PROCESS EQUIPMENT ACCEPTANCE TESTS SHALL BE PERFORMED BY THE INSTALLING CONTRACTOR, ENGINEER/ARCHITECT OF RECORD OR THE OWNER'S AGENT.
8. A LISTING OF CERTIFIED ATT CAN BE FOUND AT: HTTPS://WWW.ENERGY.CA.GOV/PROGRAMS-AND-TOPICS/PROGRAMS/ACCEPTANCE-TEST-TECHNICIAN-CERTIFICATION-PROVIDER-PROGRAM/ACCEPTANCE.
9. THE ACCEPTANCE TESTING PROCEDURES MUST BE REPEATED, AND DEFICIENCIES MUST BE CORRECTED BY THE BUILDER OR INSTALLING CONTRACTOR UNTIL THE CONSTRUCTION/INSTALLATION OF THE SPECIFIED SYSTEMS CONFORM AND PASS THE REQUIRED ACCEPTANCE CRITERIA.
10. PROJECT INSPECTORS WILL COLLECT THE FORMS TO CONFIRM THAT THE REQUIRED ACCEPTANCE TESTS HAVE BEEN COMPLETED.

ELECTRICAL INSTALLATION NOTES:

1. **THE COMPLETE INSTALLATION SHALL BE IN ACCORDANCE WITH THE CALIFORNIA ACCESSIBILITY CODE REQUIREMENTS. REFER TO THE ARCHITECTURAL DRAWINGS ACCESSIBILITY STANDARDS.**
2. CIRCUIT NUMBERS ARE SHOWN FOR CIRCUIT IDENTIFICATION. CIRCUITING SHALL AGREE WITH NUMBERING ON THE PANEL PROVIDED. COMMON NEUTRALS MAY NOT BE USED FOR BRANCH CIRCUITS. BALANCE THE LOAD ON PANEL AS EVENLY AS POSSIBLE BETWEEN EACH PHASE.
3. BRANCH WIRING FOR FEEDERS AND BRANCH CIRCUITS SHALL BE ROUTED IN SEPARATE RACEWAY, JUNCTION BOXES, PULL BOXES, AND CABINETS. WIRING FOR EACH BRANCH SHALL BE INDEPENDENT FROM OTHER BRANCHES, INCLUDING THE NORMAL BRANCH.
4. FLUSH MOUNT ALL LIGHTING CONTROL DEVICES AT +42" FROM FLOOR (CENTERLINE DIMENSION), EXCEPT WHERE OTHERWISE NOTED.
5. FLUSH MOUNT ALL DUPLEX RECEPTACLES AND TECHNOLOGY OUTLETS AT +18" FROM FLOOR (CENTERLINE DIMENSION), EXCEPT WHERE OTHERWISE NOTED. RECEPTACLES AND OUTLETS MAY BE SURFACE MOUNTED WHEN CONDUIT IS SPECIFIED EXPOSED. MOUNT EXTERIOR LOCATED RECEPTACLES WITH WHILE-IN-USE COVERS AT +20" FROM FINISHED GRADE (CENTER DIMENSIONS) TO MAINTAIN INSTALLATION ADA COMPLIANCE.
6. ALL MATERIALS USED TO SEAL PENETRATIONS OF FIRE RATED WALLS AND FLOORS SHALL BE TESTED AND CERTIFIED AS A SYSTEM PER ASTM E814 STANDARDS FOR FIRE TESTS OF THROUGH-PENETRATION FIRESTOPS. REFER TO **DIVISION 7** FOR ADDITIONAL INFORMATION AND REQUIREMENTS SPECIFIC TO FIRESTOPPING.
7. CONNECTION FOR ELECTRIC WATER COOLERS (EWC) SHALL BE A JUNCTION BOX CONCEALED BEHIND WATER COOLER ACCESS PLATE OR BE A GFI RECEPTACLE LOCATED DIRECTLY BELOW AND CENTERED ON EWC. CONTRACTOR SHALL VERIFY TYPE OF EWC TO BE INSTALLED.
8. MOUNT ALL FIRE ALARM PULL STATIONS AT +42" FROM FLOOR (CENTERLINE DIMENSION) EXCEPT WHERE OTHERWISE NOTED.
9. INSTALL ALL WALL MOUNTED FIRE ALARM NOTIFICATION DEVICES AT 90" ABOVE FINISHED FLOOR OR 6" BELOW THE CEILING, WHICHEVER IS LOWER, EXCEPT WHERE OTHERWISE NOTED. HEIGHT SHALL BE MEASURED TO THE TOP OF THE DEVICE.
10. CONTRACTOR SHALL COORDINATE THE LOCATION OF ALL CEILING MOUNTED DEVICES AND EQUIPMENT WITH LUMINAIRES, SPRINKLER, AND CEILING DIFFUSERS. CENTER ALL DEVICES IN CEILING TILE PATTERN. SMOKE DETECTORS,CARBON MONOXIDE DETECTORS, AND OCCUPANCY/VACANCY SENSORS SHALL BE LOCATED NO CLOSER THAN 3 FEET TO AN AIR SUPPLY DIFFUSER OR RETURN GRILLE. CARBON MONOXIDE DETECTORS SHALL BE LOCATED 10 PLUS FT FROM FIRE PLACES, COOKING, AND SIMILAR FUEL-BURNING APPLIANCES.
11. CONTRACTOR SHALL VERIFY ALL FURNITURE, MODULAR FURNITURE, AND EQUIPMENT LOCATIONS WITH ARCHITECTURAL PLANS, ELEVATIONS, AND REVIEWED SHOP DRAWINGS. PRIOR TO MAKING THE ACTUAL ELECTRICAL INSTALLATION, THIS CONTRACTOR SHALL ADJUST RECEPTACLES, OUTLETS, OR CONNECTION LOCATIONS TO ACCOMMODATE FURNITURE AND/OR EQUIPMENT.
12. ELECTRICAL AND TECHNOLOGY EQUIPMENT SHALL BE MOUNTED TO AVOID IMPEDANCE OF, OPERATION OF, AND/OR ACCESS TO ELECTRICAL AND MECHANICAL EQUIPMENT. ALL MOUNTING OF ELECTRICAL AND TELECOMMUNICATIONS EQUIPMENT, ON EQUIPMENT SUPPLIED BY ANOTHER CONTRACTOR, SHALL BE APPROVED IN ADVANCE BY THE OTHER CONTRACTOR.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL OPENINGS REQUIRED IN WALLS. ALL OPENINGS SHALL BE REPAIRED TO MATCH EXISTING BY A QUALIFIED CONTRACTOR AT THE EXPENSE OF THIS CONTRACTOR. ALL CONDUITS THROUGH WALLS SHALL BE GROUTED OR SEALED INTO OPENINGS.
14. EACH CONTRACTOR IS RESPONSIBLE FOR DAMAGE CAUSED BY THEIR ACTIONS TO THE WALLS, FLOORS, CEILINGS, AND ROOFS. THE CONTRACTOR WHOSE WORK CAUSES DAMAGE IS RESPONSIBLE FOR PATCHING TO MATCH ORIGINAL CONSTRUCTION, FIRE RATING, AND FINISH.
15. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN. ELECTRICAL, TECHNOLOGY, AUDIO/VISUAL, AND OTHER ELECTRICAL PLANS FOR EXACT LOCATIONS OF ALL CEILING MOUNTED DEVICES, OTHER THAN SPRINKLERS.
16. ELECTRICAL IDENTIFICATION. REFER TO SPECIFICATION SECTION 26 05 53 FOR COLOR/LABEL REQUIREMENTS FOR CONDUIT, BOX, CABLE/WIRE, AND EQUIPMENT.

RECEPTACLE SUBSCRIPT KEY:

DEVICE KEY:

DEVICE — # = MOUNTING (IF APPLICABLE)
1 = CIRCUIT NUMBER

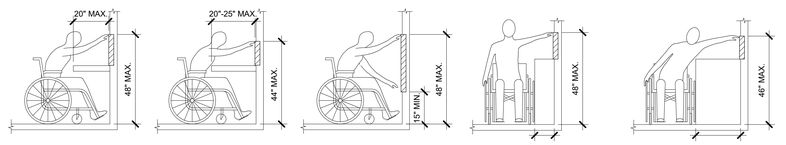
*IF LABEL IS ORIENTED HORIZONTALLY A SLASH WILL SEPARATE THIS INFORMATION. EX. A / 1

ELECTRICAL MOUNTING SUBSCRIPT KEY:

A	MOUNT AT +6" TO CENTERLINE ABOVE COUNTER OR BACKSPLASH
C	MOUNT AT CEILING (DEVICE OR ROUGH-IN CONTEXT)
H	MOUNT ORIENTED HORIZONTALLY
L	MOUNT IN CASEWORK
M	MOUNT IN MODULAR FURNITURE
R	MOUNT IN SURFACE RACEWAY
SM	SURFACE MOUNTED
WG	WIRE GUARD
+#"	MOUNT AT #" TO CENTERLINE ABOVE FINISHED FLOOR

SHADED DEVICE INDICATES DEVICE IS CONNECTED TO AN EMERGENCY CIRCUIT.
DEVICE — E

ELECTRICAL SHEET INDEX



CBC STANDARDS FOR ACCESSIBLE DESIGN

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 03-125900 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 03/18/2026

LPA
ARCHITECTURE ENGINEERING INTERIOR DESIGN LANDSCAPE ARCHITECTURE PLANNING
949-261-1001 Office
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REGISTERED PROFESSIONAL ENGINEER
NESTOR C. IGNACIO JR.
Lic. E16934
Exp. 6-30-2027
ELECTRICAL
STATE OF CALIFORNIA

IMEG
www.imegcorp.com
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P: 626.463.2800 F: 626.463.2801
PROJECT #25007252.00

ALTADENA ELEMENTARY SCHOOL
743 E Calaveras St,
Altadena, CA 91001
ALTADENA ELEMENTARY SCHOOL

	33366
	Checker
	As indicated

E000

ELECTRICAL COVERSHEET

CERTIFICATE OF COMPLIANCE		NRCC-LTO-E
Project Name: ALTADENA ELEMENTARY SCHOOL	Report Page:	(Page 1 of 8)
Project Address: 743 E Calaveras St,	Date Prepared:	1/28/2026

This document is used to demonstrate compliance with requirements in 110.9, 130.0, 130.2, 140.7, and 141.0(b)2I for outdoor lighting scopes using the prescriptive path for nonresidential and hotel/motel occupancies. It is also used to document compliance with requirements in 160.5, 170.2(e)6, 180.1(a) and 180.2(b)4Bv for outdoor lighting scopes using the prescriptive path for multifamily and mixed-use occupancies. Multifamily includes dormitory and senior living facilities.

A. GENERAL INFORMATION

01	Project Location (city)	Altadena	04	Total Illuminated Hardscape Area (ft²)	0
02	Climate Zone	9			
03	Outdoor Lighting Zone per Title 24 Part 1 10.114 or as designated by Authority Having Jurisdiction (AHJ):				
☐	LZ-0: Very Low - Undeveloped Parkland	☒ LZ-2: Moderate - Urban Clusters	☐	LZ-4: High - Must be reviewed by CA Energy Commission for Approval	
☐	LZ-1: Low - Rural Areas	☐ LZ-3: Moderately High - Urban Areas			
05	Occupancy Types within Project				
● All Other Occupancies					

B. PROJECT SCOPE

This table includes outdoor lighting systems that are within the scope of the permit application and are demonstrating compliance using the prescriptive path outlined in 140.7 / 170.2(e)6 or 141.0(b)2L / 180.2(b)4Bv for alterations.

My Project Consists of:

01	02	
☒ New Lighting System	Must Comply with Allowances from 140.7 / 170.2(e)6	
☐ Altered Lighting System	Is your alteration increasing the connected lighting load (Watts)?	○ Yes ○ No
03	04	05
% of Existing Luminaires Being Altered[1]	Sum Total of Luminaires Being Added or Altered	Calculation Method
☐ < 10% ☐ >= 10% and < 50% ☐ >= 50%		

Please proceed to Table F. Outdoor Lighting Fixture Schedule to define the project's luminaires.

[1] FOOTNOTES: % of Existing Luminaires Being Altered = (Sum Total of Luminaires Being Added or Altered / Existing Luminaires within the Scope of the Permit Application) x 100.

CERTIFICATE OF COMPLIANCE		NRCC-LTO-E
Project Name: ALTADENA ELEMENTARY SCHOOL	Report Page:	(Page 2 of 8)
	Date Prepared:	1/28/2026

C. COMPLIANCE RESULTS

Results in this table are automatically calculated from data input and calculations in Tables F through N. Note: If any cell on this table says "COMPLIES with Exceptional Conditions" refer to Table D. Exceptional Conditions for guidance or see applicable Table referenced below.

Calculations of Total Allowed Lighting Power (Watts) 140.7 / 170.2(e)6 or 141.0(b)2L / 180.2(b)4Bv											Compliance Results		
01		02		03		04		05	06		07	08	09
General Hardscape Allowance 140.7(d)1 / 170.2(e)6 (See Table I)	+	Per Application 140.7(d)2 / 170.2(e)6 (See Table J)	+	Sales Frontage 140.7(d)2 (See Table K)	+	Ornamental 140.7(d)2 / 170.2(e)6 (See Table L)	+	Per Specific Area 140.7(d)2 / 170.2(e)6 (See Table M)	OR	Existing Power Allowance 141.0(b)2L / 180.2(b)4Bv (See Table N)	=	**Total Allowed** (Watts)	≥	**Total Actual** (Watts)	**07 must be >= 08**
0	+	---	+	---	+	---	+	1,416	OR	---	=	1,416	≥	1,416	COMPLIES
Shielding Compliance (See Table G for Details)															N/A
Controls Compliance (See Table H for Details)															Not applicable

D. EXCEPTIONAL CONDITIONS

This table is auto-filled with uneditable comments because of selections made or data entered in tables throughout the form.

E. ADDITIONAL REMARKS

This table includes remarks made by the permit applicant to the Authority Having Jurisdiction.

CERTIFICATE OF COMPLIANCE		NRCC-LTO-E
Project Name: ALTADENA ELEMENTARY SCHOOL	Report Page:	(Page 3 of 8)
	Date Prepared:	1/28/2026

F. OUTDOOR LIGHTING FIXTURE SCHEDULE

For new or altered lighting systems demonstrating compliance with 140.7 / 170.2(e)6 all new luminaires being installed and any existing luminaires remaining or being moved within the spaces covered by the permit application are included in the Table below. For altered lighting systems using the Existing Power method per 141.0(b)2L only new luminaires being installed and replacement luminaires being installed as part of the project scope are included (ie, existing luminaires remaining or existing luminaires being moved are not included). Outdoor lighting attached to multifamily buildings and controlled from the inside of a dwelling unit are included in Table H. and are not included here. All other multifamily outdoor lighting is included here.

Designed Wattage:

01	02		03	04	05	06	07	08	09	10	
Name or Item Tag	Complete Luminaire Description		Watts per luminaire[1, 2]	How is Wattage determined	Total Number Luminaires[2]	Luminaire Status[3]	Excluded per 140.7(a) / 170.2(e)6A	Design Watts	Cutoff Req. > 6,200 initial lumen output 130.2(b) / 160.5(c)1[4]	Field Inspector	
										Pass	Fail
ZN1-2	ZN1-2	☐ Linear	82	Mfr. Spec	5	New	☐	410	NA: < 6200 lumens	☐	☐
ZN1-4	ZN1-4	☐ Linear	82	Mfr. Spec	2	New	☐	164	NA: < 6200 lumens	☐	☐
ZN1-4C	ZN1-4C	☐ Linear	82	Mfr. Spec	2	New	☐	164	NA: < 6200 lumens	☐	☐
ZN1-4H	ZN1-4H	☐ Linear	82	Mfr. Spec	5	New	☐	410	NA: < 6200 lumens	☐	☐
ZN2	ZN2	☐ Linear	82	Mfr. Spec	1	New	☐	82	NA: < 6200 lumens	☐	☐
ZN3-3	ZN3-3	☐ Linear	31	Mfr. Spec	2	New	☐	62	NA: < 6200 lumens	☐	☐
ZN3-4	ZN3-4	☐ Linear	31	Mfr. Spec	2	New	☐	62	NA: < 6200 lumens	☐	☐
ZN3-5	ZN3-5	☐ Linear	31	Mfr. Spec	2	New	☐	62	NA: < 6200 lumens	☐	☐
							Total Design Watts:	1416			

* NOTES: Selections with a * require a note in the space below explaining how compliance is achieved.
EX: Luminaire is lighting a statue; EXCEPTION 2 to 130.2(b)

CERTIFICATE OF COMPLIANCE		NRCC-LTO-E
Project Name: ALTADENA ELEMENTARY SCHOOL	Report Page:	(Page 4 of 8)
	Date Prepared:	1/28/2026

F. OUTDOOR LIGHTING FIXTURE SCHEDULE

For new or altered lighting systems demonstrating compliance with 140.7 / 170.2(e)6 all new luminaires being installed and any existing luminaires remaining or being moved within the spaces covered by the permit application are included in the Table below. For altered lighting systems using the Existing Power method per 141.0(b)2L only new luminaires being installed and replacement luminaires being installed as part of the project scope are included (ie, existing luminaires remaining or existing luminaires being moved are not included). Outdoor lighting attached to multifamily buildings and controlled from the inside of a dwelling unit are included in Table H. and are not included here. All other multifamily outdoor lighting is included here.

Designed Wattage:

01	02	03	04	05	06	07	08	09	10

[1] FOOTNOTES: Authority Having Jurisdiction may ask for Luminaire cut sheets to confirm wattage used for compliance per 130.0(c) / 160.5(b)
[2] For linear luminaires, wattage should be indicated as W/lf instead of Watts/luminaire. Total linear feet should be indicated in column 05 instead of number of luminaires.
[3] Select "New" for new luminaires in a new outdoor lighting project, or for added luminaires in an alteration. Select "Altered" for replacement luminaires in an alteration. Select "Existing to Remain" for existing luminaires within the project scope that are not being altered and are remaining. Select "Existing Reinstalled" for existing luminaires which are being removed and reinstalled as part of the project scope.
[4] Compliance with mandatory shielding requirements is required for luminaires with initial lumen output >= 6,200 unless exempted by 130.2(b)/ 160.5(c)

G. SHIELDING REQUIREMENTS (BUG)

This section does not apply to this project.

CERTIFICATE OF COMPLIANCE		NRCC-LTO-E
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L. LIGHTING ALLOWANCE: ORNAMENTAL

This section does not apply to this project.

M. LIGHTING ALLOWANCE: PER SPECIFIC AREA

This table includes areas using the wattage allowance per specific area from Table 140.7-B /Table 170.2-S. More than one specific area allowance may be taken in a single project, if applicable. However, multiple specific area allowances may not be taken for the exact same area on the site.

01	02	03	04	05	06	07	08	09	10
Area Description	Specific Area Type per Table 140.7-B	CALCULATED ALLOWANCE (Watts)			DESIGN WATTS				Additional Allowance (Watts)
		Specific Area (ft²)[1]	Allowed Density (W/ft²)	Extra Allowance (Watts)	Luminaire Name or Item Tag	Watts per Luminaire	# of Luminaires	Design Watts	
EXTERIOR AREA	StudentDropOffPlace	32100	0.1	1797.6	ZN3-4	31	2	62	1416
					ZN1-4	82	2	164	
					ZN2	82	1	82	
					ZN1-4H	82	5	410	
					ZN1-4C	82	2	164	
					ZN1-2	82	5	410	
					ZN3-3	31	2	62	
					ZN3-5	31	2	62	
					Total Design Watts for this Area:			1416	
					Total Allowance (Watts) All Areas:			1416	

[1] FOOTNOTES: See Table 140.7-B /Table 170.2-S for rules for calculating the specific areas (ft²) for these additional lighting allowances.

CERTIFICATE OF COMPLIANCE		NRCC-LTO-E
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	Date Prepared:	1/28/2026

L. LIGHTING ALLOWANCE: ORNAMENTAL

This section does not apply to this project.

M. LIGHTING ALLOWANCE: PER SPECIFIC AREA

This table includes areas using the wattage allowance per specific area from Table 140.7-B /Table 170.2-S. More than one specific area allowance may be taken in a single project, if applicable. However, multiple specific area allowances may not be taken for the exact same area on the site.

01	02	03	04	05	06	07	08	09	10
Area Description	Specific Area Type per Table 140.7-B	CALCULATED ALLOWANCE (Watts)			DESIGN WATTS				Additional Allowance (Watts)
		Specific Area (ft²)[1]	Allowed Density (W/ft²)	Extra Allowance (Watts)	Luminaire Name or Item Tag	Watts per Luminaire	# of Luminaires	Design Watts	
EXTERIOR AREA	StudentDropOffPlace	32100	0.1	1797.6	ZN3-4	31	2	62	1416
					ZN1-4	82	2	164	
					ZN2	82	1	82	
					ZN1-4H	82	5	410	
					ZN1-4C	82	2	164	
					ZN1-2	82	5	410	
					ZN3-3	31	2	62	
					ZN3-5	31	2	62	
					Total Design Watts for this Area:			1416	
					Total Allowance (Watts) All Areas:			1416	

[1] FOOTNOTES: See Table 140.7-B /Table 170.2-S for rules for calculating the specific areas (ft²) for these additional lighting allowances.

CERTIFICATE OF COMPLIANCE		NRCC-LTO-E
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M. LIGHTING ALLOWANCE: PER SPECIFIC AREA

[2] For luminaires indicated in Table F as linear, wattage in column 07 is W/lf instead of Watts/luminaire. Total linear feet should be indicated in column 08 instead of number of luminaires.

N. EXISTING CONDITIONS POWER ALLOWANCE (alterations only)

This section does not apply to this project.

O. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION

Selections have been made based on information provided in this document. If any selection has been changed by permit applicant, an explanation should be included in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and can be found online

Form/Title
NRCI-LTO-E - Must be submitted for all buildings

P. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

There are no NRCA forms required for this project.

CERTIFICATE OF COMPLIANCE		NRCC-LTO-E
Project Name: ALTADENA ELEMENTARY SCHOOL	Report Page:	(Page 8 of 8)
Project Address: 743 E Calaveras St,	Date Prepared:	1/28/2026

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name:	Documentation Author Signature:
Mohammad Assaf	Mohammad Assaf
Company: IMEG Corp	Signature Date: 2026-01-28
Address: 901 Via Piemonte Suite 400	CEA/ HERS Certification Identification (if applicable): 901 VIA PIEMONTE
City/State/Zip: ONTARIO CA 91764	Phone: (909)942-554

RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer)
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name:	Responsible Designer Signature:
Nestor Ignacio	
Company: IMEG	Date Signed: 2026-01-28
Address: 901 Via Piemonte Suite 400	License: E16934
City/State/Zip: ONTARIO CA 91764	Phone: (909)942-554

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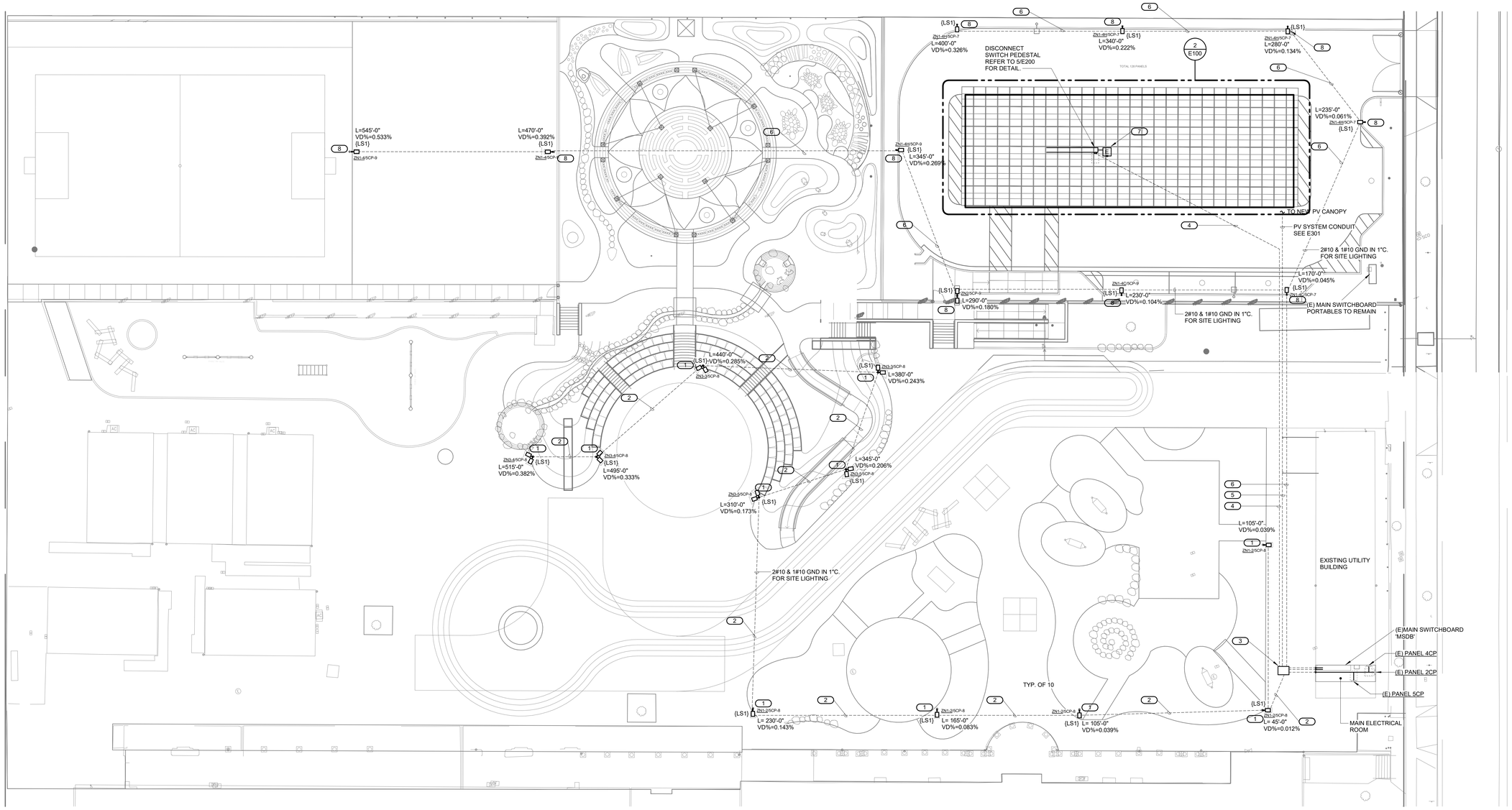
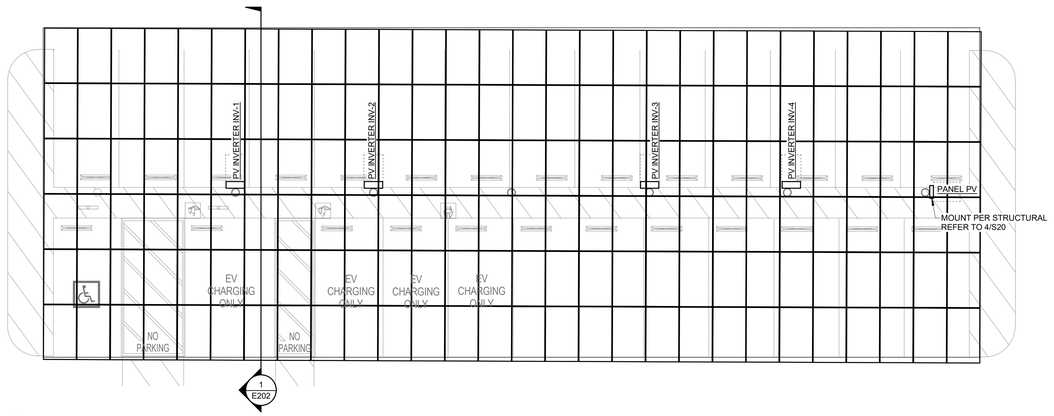
E001

OUTDOOR TITLE 24



1 SITE PLAN - ELECTRICAL

1/16" = 1'-0"



2 SITE PLAN - PV SYSTEM LAYOUT

1/8" = 1'-0"

GENERAL NOTES:

1. THE EXISTING BUILDING INCLUDING PORTIONS OF THE RENOVATED AREA SHALL REMAIN IN SERVICE DURING THE CONSTRUCTION PHASE OF THIS PROJECT. ANY MODIFICATIONS TO THE EXISTING ELECTRICAL SYSTEMS THAT MAY REQUIRE TEMPORARY INTERRUPTION OF EXISTING SERVICES SHALL BE COORDINATED AND PRE-SCHEDULED WITH THE OWNER'S REPRESENTATIVE PRIOR TO STARTING ANY WORK.
2. ELECTRICAL ENGINEERING FOR THIS PROJECT IS BASED ON EXISTING DRAWINGS AND A FIELD VISIT OF THE ELECTRICAL SYSTEM. IN CASE OF ANY DISCREPANCIES WITH THE EXISTING FIELD CONDITIONS, ELECTRICAL CONTRACTOR SHALL VERIFY THE EXACT DIFFERENCE AND NOTIFY THE ELECTRICAL ENGINEER FOR POSSIBLE REVISIONS TO THESE DOCUMENTS.

KEY NOTES: (##)

1. NEW LED LIGHT POLES WITH INTEGRAL MOTION SENSOR AND PHOTOCELL WITH GFCI RECEPTACLE ATTACHED. SEE LIGHTING FIXTURE SCHEDULE FOR ADDITIONAL INFORMATION. ALL GFCI RECEPTACLES CONNECTED TO CIRCUITS '2CP-5'.
2. PROVIDE THE FOLLOWING CONDUITS:
   (2) 2#10 & 1#10 GND IN 1"C
   (1) WILL BE USED FOR 277V SITE LIGHTING CIRCUITRY CONNECTED TO PANEL '5CP'
   (1) WILL BE USED FOR 120V POWER RECEPTACLE CIRCUITRY CONNECTED TO PANEL '2CP'
3. NEW 16" X 16" PRECAST CONCRETE PULLBOX WITH METAL COVER. CONTRACTOR TO FIELD VERIFY EXACT LOCATION ON SITE.
4. PROVIDE NEW 2#2/0 & 1#6 GND IN 2"C FOR NEW ELECTRIC VEHICLE CHARGING STATION (EVCS-1).
5. PROVIDE NEW 4"C FOR NEW PV SOLAR CANOPY.
6. PROVIDE NEW (2) 2#10 & 1#10 GND IN 1"C..
7. EVCS-1
   100AF/80AT
   CHARGEPOINT PEDESTAL, INSTALL PEDESTAL 12"BEHIND CONCRETE CURB/PAVING LIMITS OR AS DIRECTED BY MANUFACTURER. GROUND ROD: PROVIDE 5/8 X 10'-0 COPPER CLAD STEEL GROUND ROD. INSTALL 12" BELOW FINISH GRADE. PROVIDE BARE #6GROUND WIRE WITH EXOTHERMIC WELD FOR BONDING TO EVCS PEDESTAL.
8. NEW LED LIGHT POLES WITH INTEGRAL MOTION SENSOR AND PHOTOCELL. SEE LIGHTING FIXTURE SCHEDULE FOR ADDITIONAL INFORMATION.

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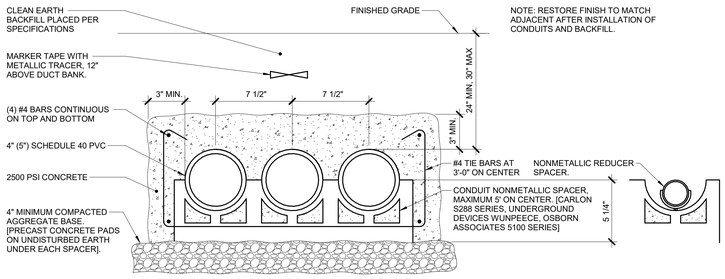
	As indicated

E100

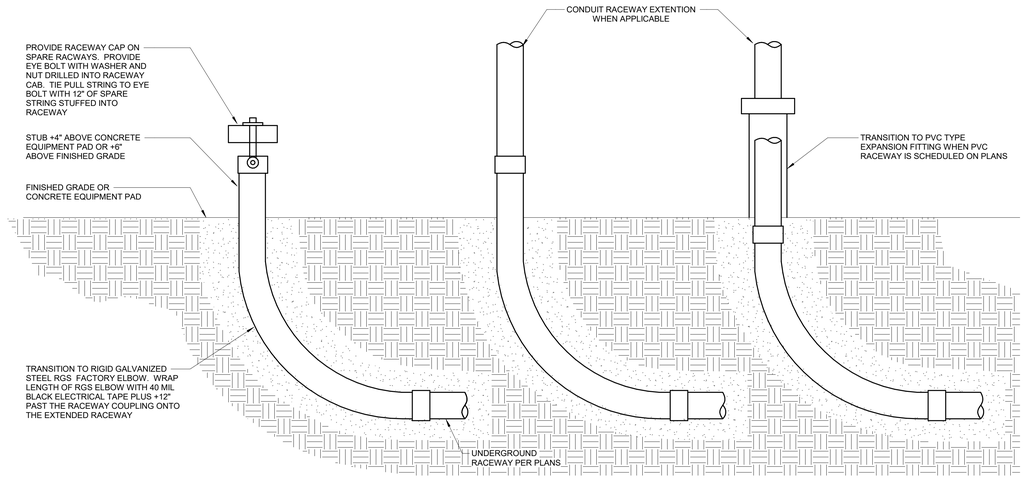
SITE PLAN - ELECTRICAL



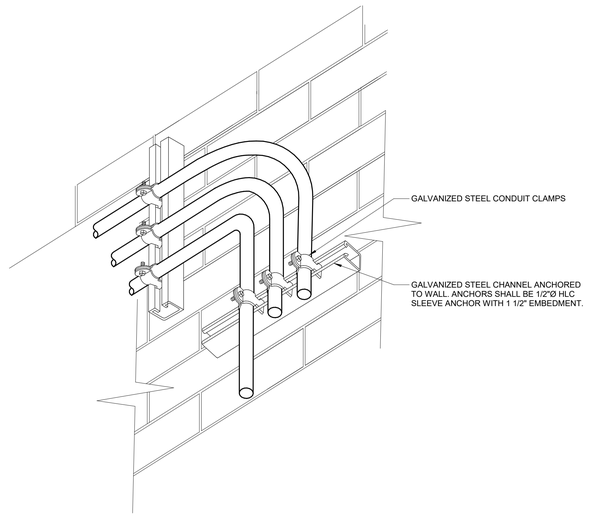
NOTES:

1. INSTALL 2000 lb TENSILE STRENGTH BRAIDED POLYPROPYLENE PULL CORD IN ALL CONDUITS.
2. TRENCHING AND BACKFILL ACCORDING TO SPECIFICATIONS.
3. MINIMUM OF 4'-0" CLEAR BETWEEN ADJACENT DUCTBANKS.
4. DOWEL ENDS OF DUCTBANK TO FOUNDATION OR MANHOLE WITH A MINIMUM OF (4) #4 DOWELS.

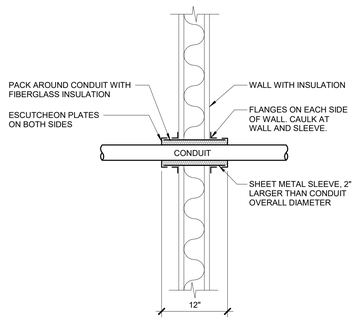
1 DUCT BANK DETAIL (3x1)
12" = 1'-0"



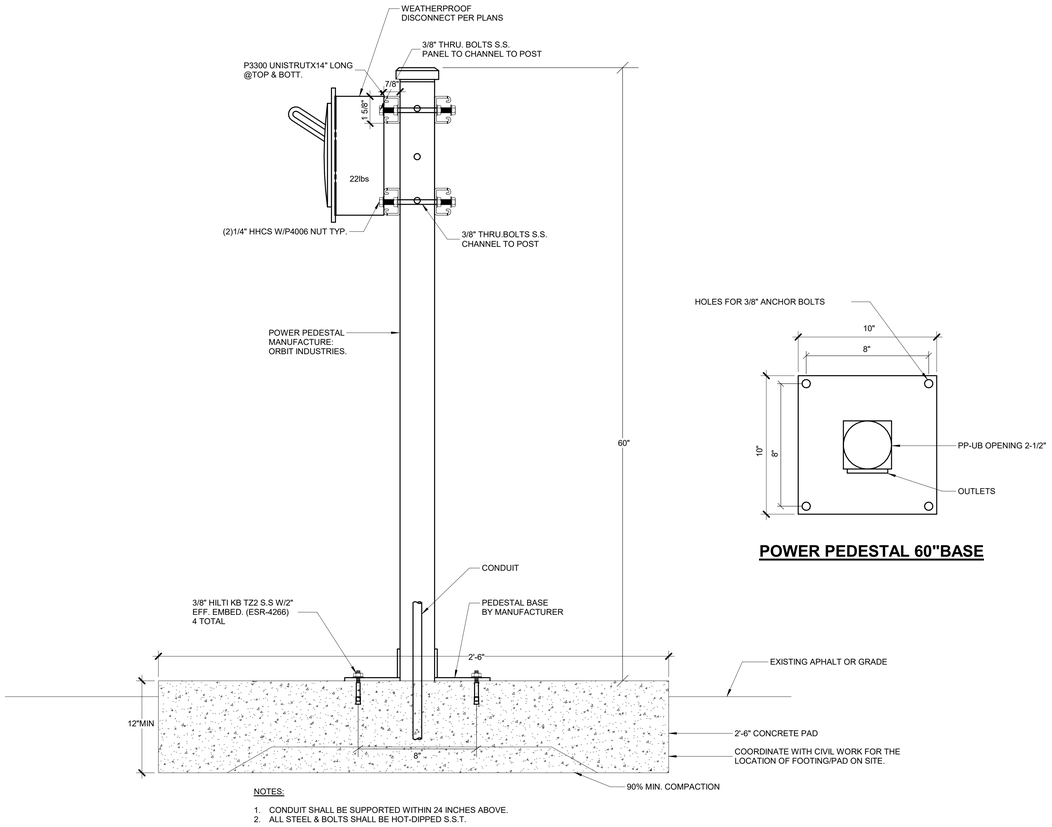
2 TYPICAL CONDUIT STUB UP DETAIL
12" = 1'-0"



3 CONDUIT WALL SUPPORT
12" = 1'-0"



4 CONDUIT WALL PENETRATION
12" = 1'-0"



POWER PEDESTAL 60"BASE

NOTES:

1. CONDUIT SHALL BE SUPPORTED WITHIN 24 INCHES ABOVE.
2. ALL STEEL & BOLTS SHALL BE HOT-DIPPED S.S.T.

5 DISCONNECT SWITCH MOUNTED PEDESTAIL DETAIL
12" = 1'-0"

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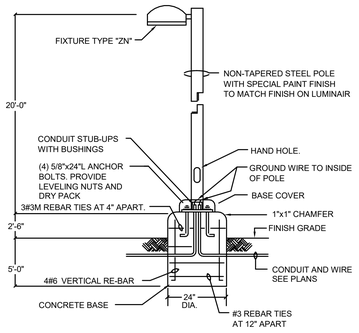
	12" = 1'-0"

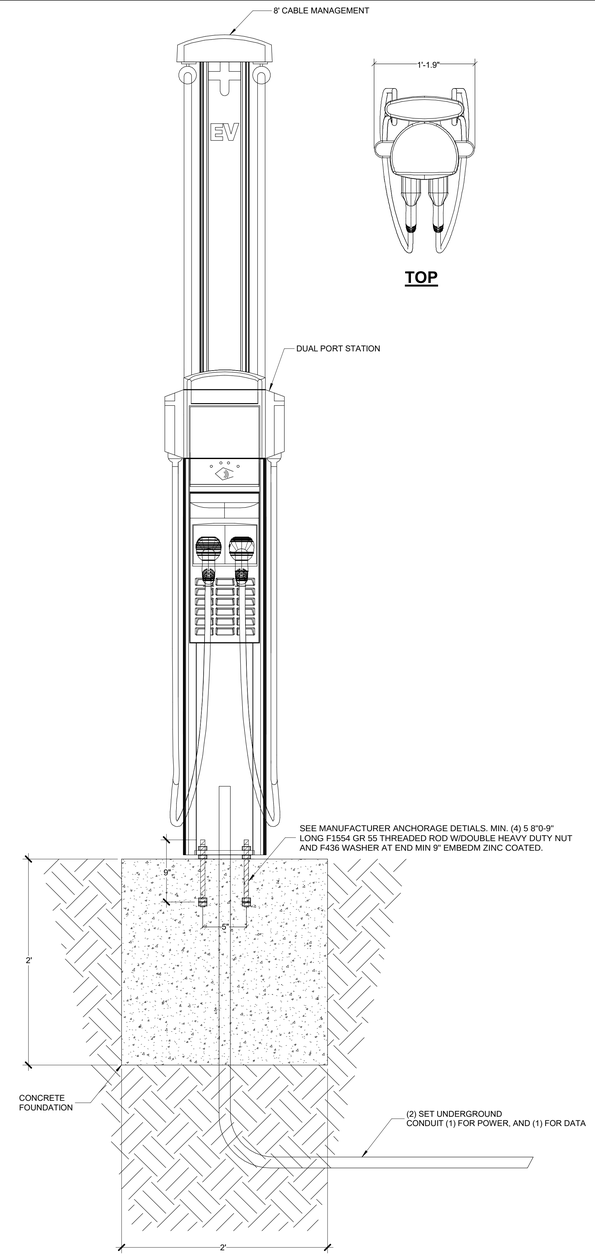
E200

ELECTRICAL DETAILS



20' POLE BASE DETAIL

1 POLE BASE DETAIL
NO SCALE



TOP

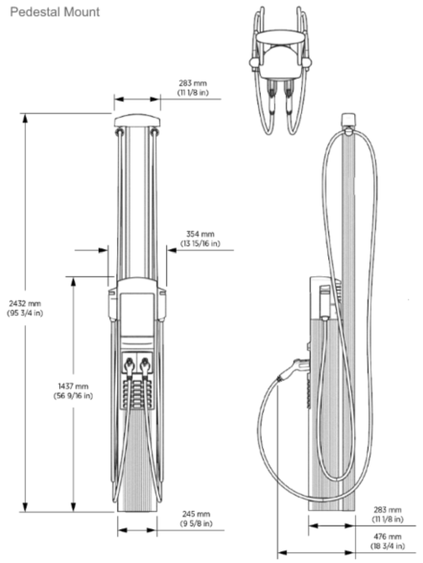
FRONT

2 ELECTRICAL VEHICLE PEDESTAIL CHARGING STATION DETAIL
NO SCALE

ChargePoint ® CP6000 Series — Fleet

Architectural Drawings and Dimensions

Pedestal Mount



Electrical Input	Single Port (AC Voltage 208 / 240V AC)			Dual Port (AC Voltage 208 / 240V AC)		
	Input Current	Input Power Connection	Required Service Panel Breaker	Input Current	Input Power Connection	Required Service Panel Breaker
Maximum 80A (Standard)	80A	One 100A branch circuit	100A dual pole (non-GFCI)	80A x 2	Two independent 100A branch circuits	100A dual pole (non GFCI) x 2
Maximum 80A (Power Share*)	N/A	N/A	N/A	80A	One 100A branch circuit	100A dual pole (non GFCI)
Power Select** 40A - 64A (Standard)	40A - 64A	One branch circuit rated 125% of input current (50A - 80A)	Dual pole (non-GFCI) rated 125% of input current (50A-80A)	40A - 64A x 2	Two independent branch circuits rated 125% of input current (50A - 80A)	Dual pole (non-GFCI) rated 125% of input current x 2
Power Select 40A - 64A (Power Share)	N/A	N/A	N/A	40A - 64A	One branch circuit rated 125% of input current (50A - 80A)	Dual pole (non-GFCI) rated 125% of input current (50A - 80A)
Service Panel/Breaker GFCI	Do not provide external GFCI as it may conflict with internal GFCI (CCID)					
Wiring – Standard	3-wire (L1, L2, Earth) No neutral			5-wire (L1, L1, L2, L2, Earth)		
Wiring – Power Share	N/A			3-wire (L1, L2, Earth)		
Line to Ground Voltage	120V +/- 10%					

Electrical Output

Electrical Output	Single Port (AC Voltage 208 / 240V AC)	Dual Port (AC Voltage 208 / 240V AC)
Maximum 80A (Standard)	19.2 kW (240V AC @ 80A)	19.2 kW (240V AC @ 80A)
Maximum 80A (Power Share)	N/A	19.2 kW (240V AC @ 80A) x 1 or 9.6 kW (240V AC @ 40A) x 2
Power Select 40A - 64A (Standard)	9.6 kW – 15.4 kW (240V AC @ 40A - 64A)	9.6 kW - 15.4 kW (240V AC @ 40A - 64A) x 2
Power Select 40A - 64A (Power Share)	N/A	9.6 kW - 15.4 kW (240V AC @ 40A - 64A) x 1 or 4.8 kW – 7.7 kW (240V AC @ 20A - 32A) x 2

Mounting and Functional Interfaces

Connector Type	SAE J1772™
Number of Ports	Single, dual
Mounting	Pedestal, wall
Cable Length	23 ft (7 m)
Cable Management	Yes
Authentication	RFID: ISO 15693, ISO 14443, NEMA EVSE 1.2-2015 (UR) NFC (Tap to Charge) Remote: mobile and in vehicle (if supported by vehicle)
Locking Holster	Yes
ISO 15118	Supported by hardware

Safety and Connectivity Features

Ground Fault Detection	20 mA CCID with auto retry
Open Safety Ground Detection	Continuously monitors presence of safety (green wire) ground connection
Plug-Out Detection	Power terminated per SAE J1772™ specifications

Power Measurement Accuracy	+/- 2% from 2% to full scale
Power Report/Store Interval	15-minute interval aligned to hour. Responsive to load management signals.
Local Area Network	Wi-Fi 2.4 GHz and 5GHz (802.11 a/n/b/g)
Wide Area Network	LTE Category 4
Network Communication Protocol	OCPP 2.0.1
Ethernet connection	Capable with accessory

Safety and Operational Ratings

Station Enclosure Rating	Type 3R
Safety and Compliance	UL and cUL listed; complies with UL 2594, UL 2231-1, UL 2231-2, and NEC Article 625
Station Surge Protection	6 kV @ 3,000A. In geographic areas subject to frequent thunderstorms, supplemental surge protection at the service panel is recommended.
EMC Compliance	FCC Part 15 Class B
Operating Temperature	-40°C to 50°C (-40°F to 122°F)
Non-Operating Temperature	-40°C to 60°C (-40°F to 140°F)
Terminal Block Temperature Rating	105°C (221°F)
Operating Humidity	Up to 85% @ 50°C (122°F) non-condensing
Non-Operating Humidity	Up to 95% @ 50°C (122°F) non-condensing

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	33366
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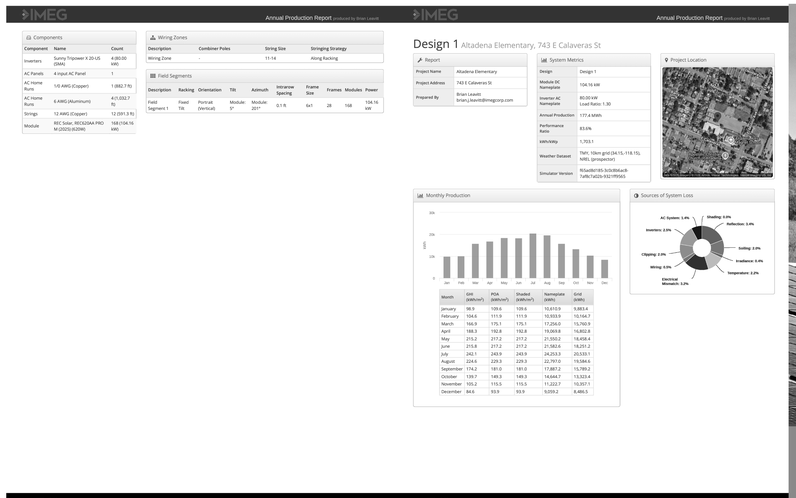
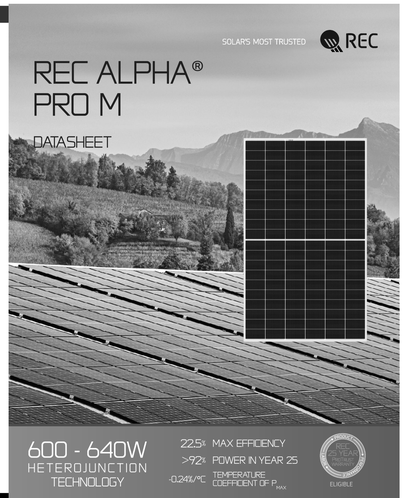
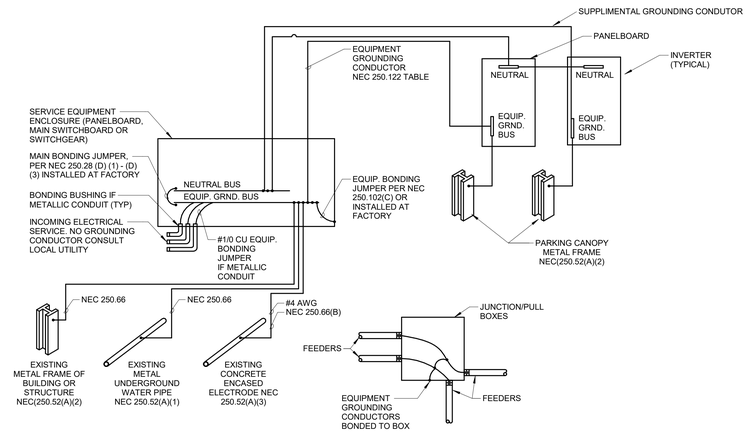
	12" = 1'-0"

E201

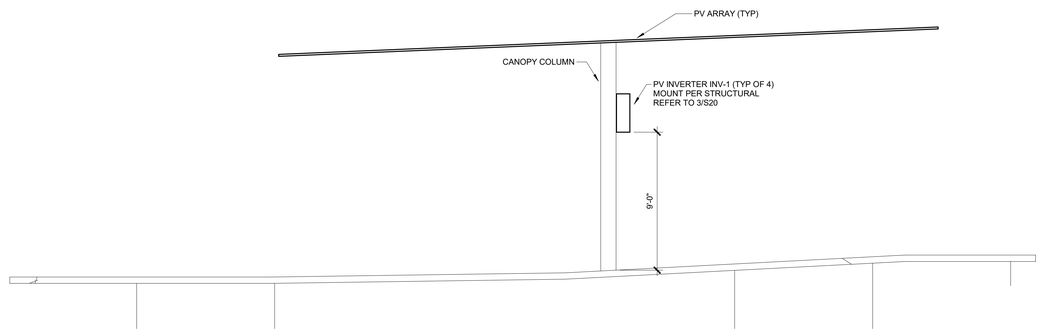
ELECTRICAL DETAILS







2 ELECTRICAL SYSTEM GROUNDING DETAIL
NO SCALE



1 PV Canopy Elevation
1/4" = 1'-0"

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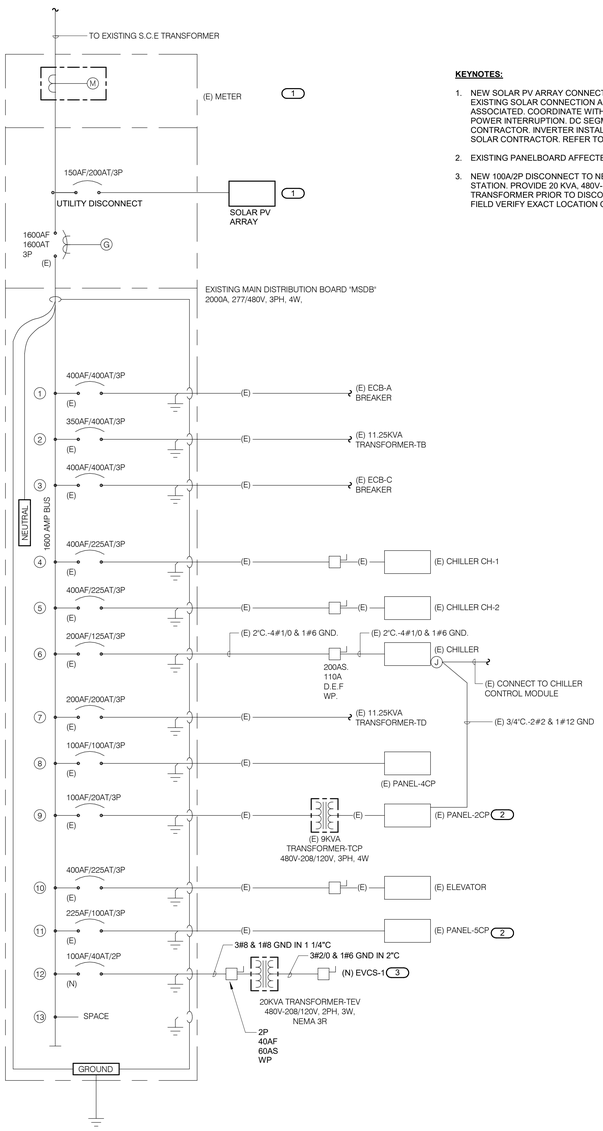
	As indicated

E202
ELECTRICAL DETAILS



KEYNOTES:

1. NEW SOLAR PV ARRAY CONNECTION AT EXISTING 'MSDB', DEMOLISH EXISTING SOLAR CONNECTION AND ALL FEEDERS/ CONTROLS ASSOCIATED. COORDINATE WITH UTILITY TO INSTALL SOLAR PV FOR POWER INTERRUPTION. DC SEGMENT TO BE CONFIRMED BY SOLAR CONTRACTOR. INVERTER INSTALLATION TO BE COORDINATED BY SOLAR CONTRACTOR. REFER TO E301 FOR ADDITIONAL DETAILS.
2. EXISTING PANELBOARD AFFECTED BY NEW SCOPE OF WORK.
3. NEW 100A/2P DISCONNECT TO NEW ELECTRIC VEHICLE CHARGING STATION. PROVIDE 20 KVA, 480V-120/208V STEP DOWN TRANSFORMER PRIOR TO DISCONNECT SWITCH. CONTRACTOR TO FIELD VERIFY EXACT LOCATION ON SITE.

1 PARTIAL SINGLE LINE DIAGRAM

12" = 1'-0"

(E) PANEL 2CP

MOUNTING: SURFACE
ENCLOSURE: NEMA 1
FED FROM: 0/0P @
LOCATION:

SINGLE TUB
SOLID NEUTRAL
GROUND BUS

MAIN: 100 MCB
VOLTS: 120/208 Wye
PHASE: 3
WIRE: 4
SCCR: 65 kA
ISC UNKNOWN 0.00 kA

NOTES:

KEY	CKT NO.	LOAD DESCRIPTION	OCPD AMPS	P	WIRE SIZE H	WIRE SIZE N	WIRE SIZE G	VD %	A	B	C	VD %	WIRE SIZE G	WIRE SIZE N	WIRE SIZE H	P	OCPD AMPS	LOAD DESCRIPTION	CKT NO.	KEY
2	1	(E) ELECTRICAL ROOM	20	1					0	0						1	20	(E) D.D.C CONTROL	2	2
2	3	(E) ELECTRICAL ROOM	20	1							0	0				1	20	(E) STARTER CONTROL	4	2
1	5	POWER POLE RECEPT.	20	1	4	4	2.52				1.8	0				1	20	(E) HEATER CONTROL	6	2
2	7	(E) KILM	20	1					0	0						1	20	(E) SP #1 & SP #2	8	2
2	9	(E) KILM	20	1							0	0				1	20	SPARE	10	
	11	SPARE	20	1									0	0		1	20	SPARE	12	
	13	SPARE	20	1					0	0						1	20	(E) CHILLER CH-1	14	2
	15	SPARE	20	1							0	0				1	20	SPARE	16	
	17	SPARE	20	1									0	0		1	20	SPARE	18	
	19	SPARE	20	1					0	0						1	20	SPARE	20	
	21	SPARE	20	1							0	0				1	20	SPARE	22	
	23	SPARE	20	1									0	0		1	20	SPARE	24	
	25	SPARE	20	1					0	0						1	20	SPARE	26	
	27	SPARE	20	1							0	0				1	20	SPARE	28	
	29	SPARE	20	1									0	0		1	20	SPARE	30	
	31	SPARE	20	1					0	0						1	20	SPARE	32	
	33	SPARE	20	1							0	0				1	20	SPARE	34	
	35	SPARE	20	1									0	0		1	20	SPARE	36	
	37	SPARE	20	1					0	0						1	20	SPARE	38	
	39	SPARE	20	1							0	0				1	20	SPARE	40	
	41	SPARE	20	1									0	0		1	20	SPARE	42	
								Total Load:	0.00 kVA	0.00 kVA	1.80 kVA									
								Total Amps:	0.00	0.00	15.00									

LOAD SUMMARY

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	TOTALS*	
Power	1.800 kVA	100%	1.800 kVA		
				TOTAL CONNECTED LOAD:	1.80 kVA
				TOTAL ESTIMATED DEMAND LOAD:	1.800 kVA
				TOTAL CONNECTED AMPS:	5.00 A
				TOTAL ESTIMATED DEMAND AMPS:	5

*TOTAL DEMAND CALCS SUBTRACT ANY REDUNDANT LOAD AND THE SMALLER OF ANY NONCOINCIDENT HVAC LOADS. THIS CALC IS DONE AT EACH PANEL.

CIRCUIT KEY NOTES: 1. UTILIZE EXISTING 20A CIRCUIT BREAKER FOR NEW LOAD
2. EXISTING CIRCUIT TO REMAIN AND PROTECT IN PLACE DURING CONSTRUCTION. 3. DISCONNECT EXISTING CIRCUIT BREAKER FOR NEW...

(E) PANEL 5CP

MOUNTING: SURFACE
ENCLOSURE: NEMA 1
FED FROM: 0/0P @
LOCATION:

SINGLE TUB
SOLID NEUTRAL
GROUND BUS

MAIN: 225 MCB
VOLTS: 480/277 Wye
PHASE: 3
WIRE: 4
SCCR: 65 kA
ISC UNKNOWN 0.00 kA

NOTES:

KEY	CKT NO.	LOAD DESCRIPTION	OCPD AMPS	P	WIRE SIZE H	WIRE SIZE N	WIRE SIZE G	VD %	A	B	C	VD %	WIRE SIZE G	WIRE SIZE N	WIRE SIZE H	P	OCPD AMPS	LOAD DESCRIPTION	CKT NO.	KEY
	1								0	0									2	
2	3	(E) VFD PUMP #1	50	3							0	0				3	50	(E) VFD PUMP #2	4	
	5											0	0						6	
1	7	PARKING AREA LIGHTS	20	1	12	12	0.72	0.46	0.66					1.05	12	12	12	1	20	PARKING AREA LIGHTS	8	1
1	9	PARKING AREA LIGHTS	20	1	12	12	0.87			0.46	--							1	--	SPACE	10	
	11	SPACE	--	1							--	--						1	--	SPACE	12	
	13	SPACE	--	1					--	--								1	--	SPACE	14	
	15	SPACE	--	1						--	--							1	--	SPACE	16	
	17	SPACE	--	1							--	--						1	--	SPACE	18	
	19	SPACE	--	1					--	--								1	--	SPACE	20	
	21	SPACE	--	1						--	--							1	--	SPACE	22	
	23	SPACE	--	1							--	--						1	--	SPACE	24	
	25	SPACE	--	1					--	--								1	--	SPACE	26	
	27	SPACE	--	1						--	--							1	--	SPACE	28	
	29	SPACE	--	1							--	--						1	--	SPACE	30	
	31	SPACE	--	1					--	--								1	--	SPACE	32	
	33	SPACE	--	1						--	--							1	--	SPACE	34	
	35	SPACE	--	1							--	--						1	--	SPACE	36	
	37	SPACE	--	1					--	--								1	--	SPACE	38	
	39	SPACE	--	1							--	--						1	--	SPACE	40	
	41	SPACE	--	1								--	--					1	--	SPACE	42	
								Total Load:	1.12 kVA	0.46 kVA	0.00 kVA									
								Total Amps:	4.29	1.90	0.00									

LOAD SUMMARY

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	TOTALS*	
Lighting	1.573 kVA	100%	1.573 kVA		
				TOTAL CONNECTED LOAD:	1.57 kVA
				TOTAL ESTIMATED DEMAND LOAD:	1.573 kVA
				TOTAL CONNECTED AMPS:	1.89 A
				TOTAL ESTIMATED DEMAND AMPS:	1.9

*TOTAL DEMAND CALCS SUBTRACT ANY REDUNDANT LOAD AND THE SMALLER OF ANY NONCOINCIDENT HVAC LOADS. THIS CALC IS DONE AT EACH PANEL.

CIRCUIT KEY NOTES: 1. PROVIDE NEW 20A CIRCUIT BREAKER.
2. EXISTING CIRCUIT TO REMAIN AND PROTECT IN PLACE DURING CONSTRUCTION.

LUMINAIRE SCHEDULE

TAG	DESCRIPTION	MTG	WATTS	ANSI WATTS	PER	POWER SUPPLY	VOLTAGE	MANUFACTURER - SERIES
ZN1-2	"Galeon" series, 20' pole with type 2R optics, size 16 light squares with 4 light squares, level 3 output, single head with integral occ sensor with dimming to 50% and photocell, include round straight aluminum pole, 4" diameter pole with 3 bolts with base cover single head mounting template	PL	82 / FIX	82	FIX	277	277	#GALN-SA-4C-830-U-T2R-{finish}-DIM-PR-MS/ DIM-L20 + RSA-4-T-20-N-{finish}-2-1 with base cover
ZN1-4	"Galeon" series, 20' pole with type 4FT optics, size 16 light squares with 4 light squares, level 3 output, single head with integral occ sensor with dimming to 50% and photocell, include round straight aluminum pole, 4" diameter 20' pole with 3 bolts with base cover single head mounting template	PL	82 / FIX	82	FIX	277	277	#GALN-SA-4C-830-U-T2R-{finish}-DIM-PR-MS/ DIM-L20 + RSA-4-T-20-N-{finish}-2-1 with base cover
ZN1-4C	"Galeon" series, 17.5' pole with type 4FT optics, size 16 light squares with 4 light squares, level 3 output, single head with integral occ sensor with dimming to 50% and photocell, include round straight aluminum pole, 4" diameter pole with 3 bolts with base cover single head mounting template, on 30" concrete base, custom cut pole to 17'-6"	PL	82 / FIX	82	FIX	277	277	#GALN-SA-4C-830-U-T2R-{finish}-DIM-PR-MS/ DIM-L20 + RSA-4-T-20-N-{finish}-2-1 with base cover
ZN1-4H	"Galeon" series, 17.5' pole with type 4FT optics with house side shield, size 16 light squares with 4 light squares, level 3 output, single head with integral occ sensor with dimming to 50% and photocell, include round straight aluminum pole, 4" diameter pole with 3 bolts with base cover single head mounting template, on 30" concrete base, custom cut pole to 17'-6"	PL	82 / FIX	82	FIX	277	277	#GALN-SA-4C-830-U-T2R-{finish}-DIM-PR-MS/ DIM-L20 + RSA-4-T-20-N-{finish}-2-1 with base cover
ZN2	"Galeon" series, 17.5' pole with type 4FT optics for parking lot side and T2R optics on pedestrian side, size 16 light squares with 4 light squares, level 3 output, double head at 180 degrees with integral occ sensor with dimming to 50% and photocell, include round straight aluminum pole, 4" diameter pole with 3 bolts with base cover single head mounting template, on 30" concrete base, custom cut pole to 17'-6"	PL	82 / FIX	82	FIX	277	277	#GALN-SA-4C-830-U-T4FT and T2R head-{finish}-DIM-PR-MS/DIM-L20 + RSA-4-T-17.5-N-{finish}-2-2 with base cover
ZN3-3	"Olivia medio" series, 20' event pole with 3 adjustable heads, 80 degree flood optics, 31watts per fixture head, dark skyies tilt option, include standard base cover, refer to detail sheet for diagram of aiming and for locations of heads on the pole, include occ sensor and photocell	PL	31 / FIX	31	FIX	277	277	OLML-F80-X{refer to details}-2G700-30-{finish}-UNV-DS-DM
ZN3-4	"Olivia medio" series, 20' event pole with 4 adjustable heads, 80 degree flood optics, 31watts per fixture head, dark skyies tilt option, include standard base cover, refer to detail sheet for diagram of aiming and for locations of heads on the pole, include occ sensor and photocell	PL	31 / FIX	31	FIX	277	277	OLML-F80-X{refer to details}-2G700-30-{finish}-UNV-DS-DM
ZN3-5	"Olivia medio" series, 20' event pole with 5 adjustable heads, 80 degree flood optics, 31watts per fixture head, dark skyies tilt option, include standard base cover, refer to detail sheet for diagram of aiming and for locations of heads on the pole, include occ sensor and photocell	PL	31 / FIX	31	FIX	277	277	OLML-F80-X{refer to details}-2G700-30-{finish}-UNV-DS-DM

LIGHTING SEQUENCE OF OPERATION

NOTES:
1. {L##} DENOTES THE LIGHTING SEQUENCE OF OPERATIONS FOR THIS SPACE.
2. [#B] PUSH BUTTON REFERS TO SCENE QUANTITY. CONTROL STATION SHALL BE CAPABLE OF [RAISE/LOWER AND] SWITCHING ON/OFF FOR MULTIPLE SCENES AS INDICATED ON SHEETS AND THE LIGHTING SEQUENCE OF OPERATIONS (L##). COORDINATE QUANTITIES OF BUTTONS FOR CONTROL STATIONS WITH LIGHTING CONTROL MANUFACTURER.
3. [ZM] DENOTES LIGHTING CONTROL ZONE. PROVIDE SEPARATE CONTROL OF EACH CONTROLLED ZONE. LUMINAIRES ASSOCIATED WITH THE SAME ZONE SHALL OPERATE TOGETHER WITHIN THE SAME PROGRAMMED SCENE.
4. a = SWITCH DESIGNATION FOR LIGHTING CONTROL.
5. VERIFY AND COORDINATE ALL TIME CLOCK SETTINGS WITH OWNER PRIOR TO FINAL PROGRAMMING.
6. VERIFY AND COORDINATE ALL PUSH BUTTON WALL DEVICES AND QUANTITIES OF INDIVIDUAL BUTTONS WITH SCENES AND ZONES PER LOCATION.
7. VERIFY AND COORDINATE ALL PUSH BUTTON QUANTITIES AND SCENE NAMES WITH OWNER PRIOR TO SUBMITTING ENGRAVING TEMPLATE TO MANUFACTURER.

PLAN ID	LIGHTING SWITCHED
{LS1}	LIGHTING OPERATION: SEQUENCE(LS1): MOTION SENSORS, AND PHOTOCELLS BUILT-IN CONTROL PROVIDED IN THIS SPACE. ON: LIGHT TURN ON BY MOTION SENSORS, OR PHOTOCELLS. ADJUST: AUTOMATIC SCHEDULING CONTROL SHALL BE CAPABLE OF REDUCING OUTDOOR LIGHTING POWER BY AT LEAST 50% AND MORE THAN 90%, AND SEPERATELY CAPABLE OF TURN THE LIGHT OFF, DURING SCHEDULE UNOCCUPIED PERIODS. OFF: LIGHT TURN OFF BY MOTION SENSORS, OR PHOTOCELLS.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 03-125900 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 03/18/2026

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REGISTERED PROFESSIONAL ENGINEER NESTOR C. IGNACIO JR. Lic. E16934 Exp. 6-30-2027 ELECTRICAL STATE OF CALIFORNIA

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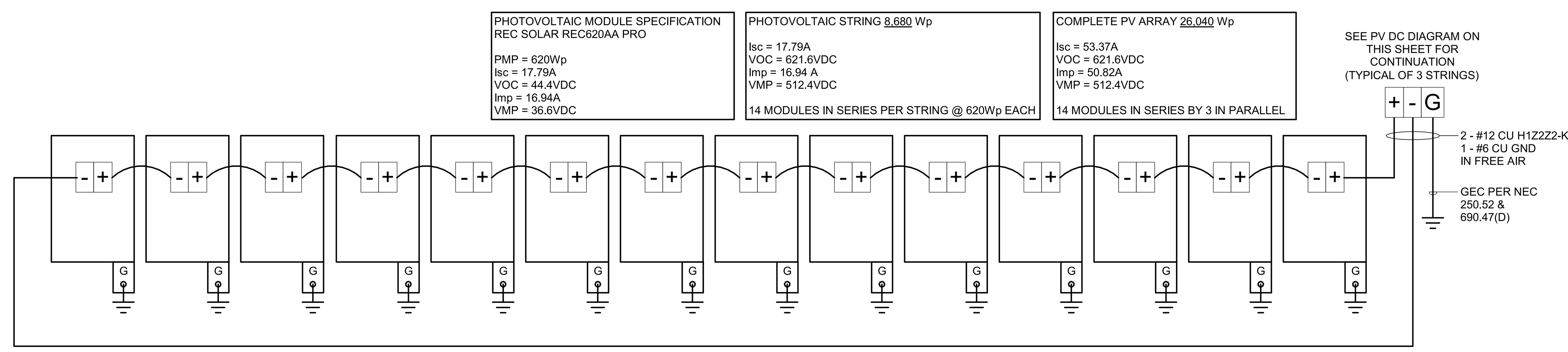
ALTADENA ELEMENTARY SCHOOL

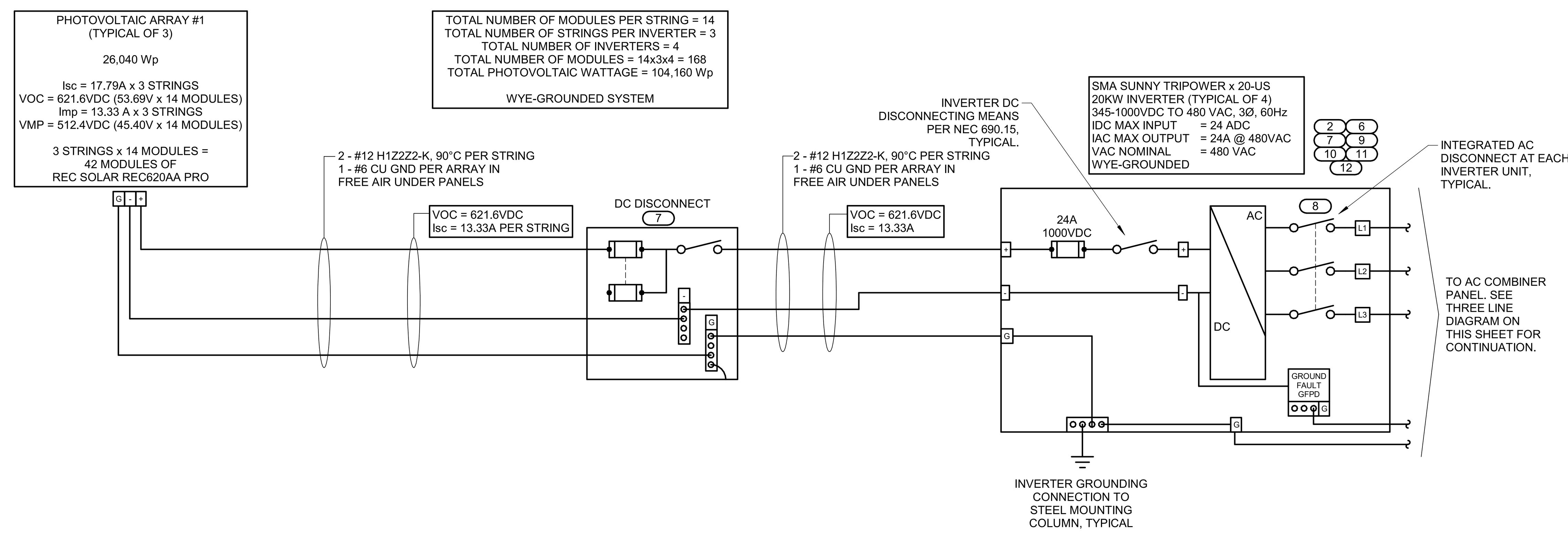
	33366
	Checker
	12" = 1'-0"

E300

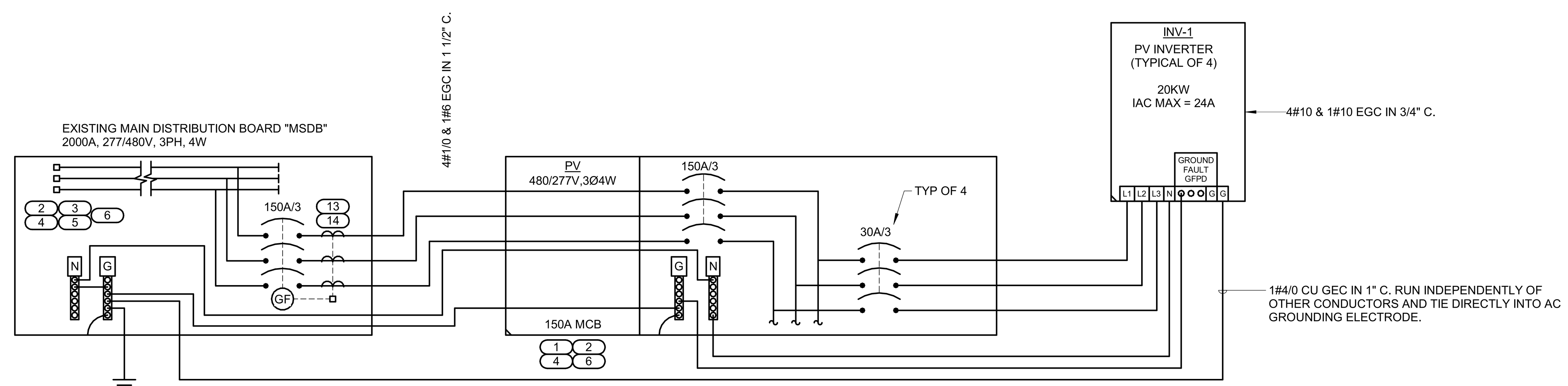
ELECTRICAL DIAGRAMS & SCHEDULES



1 ARRAY WIRING DIAGRAM
NO SCALE



2 ELECTRICAL THREE LINE DC DIAGRAM
NO SCALE



3 ELECTRICAL THREE LINE AC DIAGRAM
NO SCALE

PANEL PV

MOUNTING: SURFACE	**SINGLE TUB**	**MAIN:**	150 MCB
ENCLOSURE: NEMA 3R	**SOLID NEUTRAL**	**VOLTS:**	480/277 Wye
FED FROM: 150/3P @ MSDB	**GROUND BUS**	**PHASE:**	3
LOCATION:		**WIRE:**	4
		SCCR:	65 kA
		ISC UNKNOWN	0.00 kA

NOTES:

KEY	CKT NO.	LOAD DESCRIPTION	OCPD AMPS	P	WIRE SIZE H	N	G	VD %	A	A	B	B	C	C	VD %	WIRE SIZE G	N	H	OCPD P	AMPS	LOAD DESCRIPTION	CKT NO.	KEY
	1								0	0												2	
	3	INV-1	30	3	10	10	10	1.25			0	0			0.88	10	10	10	3	30	INV-2	4	
	5												0	0								6	
	7								0	0												8	
	9	INV-3	30	3	10	10	10	0.6			0	0			0.27	10	10	10	3	30	INV-4	10	
	11												0	0								12	
	13																					14	
	15																					16	
	17																					18	
	19																					20	
	21																					22	
	23																					24	
								Total Load:	0.00 kVA		0.00 kVA		0.00 kVA										
								Total Amps:	0.00		0.00		0.00										

LOAD SUMMARY

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	TOTALS*	
Power	0.000 kVA	0%	0.000 kVA		
				TOTAL CONNECTED LOAD:	0.00 kVA
				TOTAL ESTIMATED DEMAND LOAD:	0.000 kVA
				TOTAL CONNECTED AMPS:	0.00 A
				TOTAL ESTIMATED DEMAND AMPS:	0

*TOTAL DEMAND CALCS SUBTRACT ANY REDUNDANT LOAD AND THE SMALLER OF ANY NONCOINCIDENT HVAC LOADS. THIS CALC IS DONE AT EACH PANEL.

CIRCUIT KEY NOTES:

KEYNOTES:

1. PROVIDE LABEL ON PV-AC PANELS "DEDICATED PV SYSTEM AC COLLECTION PANEL. ADDITION OF NEW CIRCUITS IS PROHIBITED".
2. PROVIDE WARNING SIGN PER CEC 690.17 READING "WARNING - ELECTRICAL SHOCK HAZARD - DO NOT TOUCH TERMINALS - TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION".
3. PV SYSTEM DISCONNECT PER CEC 690.13.
4. LABEL OVERCURRENT DEVICE "PHOTOVOLTAIC ELECTRIC POWER SOURCE" PER CEC 705.10, AND "DEVICES ARE BACKFED" PER CEC 690.64(B)(5). LABEL WITH MAXIMUM AC OUTPUT OPERATING CURRENT AND THE OPERATING VOLTAGE PER 690.54. OVERCURRENT DEVICES SHALL BE BACK FEED RATED.
5. LABEL "WARNING - THIS EQUIPMENT FED BY MULTIPLE SOURCES. TOTAL RATING OF ALL OVERCURRENT DEVICES, EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE, SHALL NOT EXCEED AMPACITY OF BUS BAR."
6. LABEL "PHOTOVOLTAIC SYSTEM DISCONNECT SWITCH". SWITCH TO BE ACCESSIBLE AND CONFORM TO CEC 705.22.
7. LABEL "DO NOT OPEN FUSES UNDER LOAD".
8. PV SYSTEM DISCONNECT PER CEC 690.13.
9. LISTING AGENCY NAMES AND NUMBERS TO BE INDICATED ON POWER INVERTER AND SOLAR MODULES PER CEC 110.3(B).
10. LABEL "PHOTOVOLTAIC ARRAY DC DISCONNECT DEVICE" PER CEC 690.14(C)(2). LABEL WITH OPERATING CURRENT, OPERATING VOLTAGE, MAXIMUM SYSTEM VOLTAGE, AND SHORT CIRCUIT CURRENT PER CEC 690.53. SWITCH TO BE LOCKED PER CEC 690.7(D).
11. USE FERRAZ SHAWMUT MERSEN 1500VDC PHOTOVOLTAIC FUSES OR APPROVED EQUAL.
12. LABEL "CAUTION OPEN PHOTOVOLTAIC ARRAY DC DISCONNECT PRIOR TO OPENING/CLOSING ANY FUSE BLOCK".
13. LABEL "WARNING, INVERTER OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE". LOCATE BREAKER AT OPPOSITE END OF LUGS PER CEC 690.64(B)(7).
14. BREAKER WITH GROUND FAULT PROTECTION HAS BEEN IDENTIFIED AND LISTED AS SUITABLE FOR BACKFEED PER CEC 690.64(B)(5).

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ALTADENA ELEMENTARY SCHOOL

	33366
	Checker
	12" = 1'-0"

E301

PV SYSTEM DIAGRAMS

SECTION 26 05 00 - BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. REQUIREMENTS APPLICABLE TO ALL DIVISION 26 SECTIONS. ALSO REFER TO DIVISION 1 - GENERAL REQUIREMENTS.

B. ALL MATERIALS AND INSTALLATION METHODS SHALL CONFORM TO THE APPLICABLE STANDARDS, GUIDELINES AND CODES REFERENCED HEREIN AND WITHIN EACH SPECIFICATION SECTION.

1.02 REFERENCES

A. NFPA 70 - NATIONAL ELECTRICAL CODE (NEC)

B. CEC CALIFORNIA ELECTRICAL CODE

C. CCR CALIFORNIA CODE OF REGULATION

D. CBC CALIFORNIA BUILDING CODE

E. CFC CALIFORNIA FIRE CODE

F. CALIFORNIA TITLE 24 - BUILDING ENERGY EFFICIENCY STANDARDS

1.03 SCOPE OF WORK

A. THIS SPECIFICATION AND THE ASSOCIATED DRAWINGS GOVERN FURNISHING, INSTALLING, TESTING AND PLACING INTO SATISFACTORY OPERATION THE ELECTRICAL SYSTEMS.

B. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL NEW MATERIALS AS INDICATED ON THE DRAWINGS, AND/OR IN THESE SPECIFICATIONS, AND ALL ITEMS REQUIRED TO MAKE THE PORTION OF THE ELECTRICAL WORK A FINISHED AND WORKING SYSTEM.

C. SEPARATE CONTRACTS WILL BE AWARDED FOR THE FOLLOWING WORK.

D. DESCRIPTION OF SYSTEMS SHALL BE AS FOLLOWS:

1. ELECTRICAL POWER SYSTEM TO EV CHARGER STATION.
2. GROUNDING SYSTEM.
3. FURNISH AND INSTALL FIRESTOPPING SYSTEMS FOR PENETRATIONS OF FIRE-RATED CONSTRUCTION ASSOCIATED WITH THIS CONTRACTOR'S WORK.

E. WORK NOT INCLUDED:

1. TELECOMMUNICATIONS CABLING WILL BE BY DIVISION 27, IN RACEWAYS AND CONDUITS FURNISHED AND INSTALLED AS PART OF THE ELECTRICAL WORK.

1.04 OWNER FURNISHED PRODUCTS

A. THE OWNER WILL SUPPLY THE FOLLOWING ITEMS FOR INSTALLATION AND/OR CONNECTION BY THIS CONTRACTOR:

B. THE OWNER WILL SUPPLY MANUFACTURER'S INSTALLATION DATA FOR OWNER-PURCHASED EQUIPMENT FOR THIS PROJECT.

C. THIS CONTRACTOR SHALL MAKE ALL ELECTRICAL SYSTEM CONNECTIONS SHOWN ON THE DRAWINGS OR REQUIRED FOR FULLY FUNCTIONAL UNITS.

D. THIS CONTRACTOR IS RESPONSIBLE FOR ALL DAMAGE TO OWNER FURNISHED EQUIPMENT CAUSED DURING INSTALLATION.

1.05 WORK SEQUENCE

A. ALL WORK THAT WILL PRODUCE EXCESSIVE NOISE OR INTERFERENCE WITH NORMAL BUILDING OPERATIONS, AS DETERMINED BY THE OWNER, SHALL BE SCHEDULED WITH THE OWNER. IT MAY BE NECESSARY TO SCHEDULE SUCH WORK DURING UNOCCUPIED HOURS. THE OWNER RESERVES THE RIGHT TO DETERMINE WHEN RESTRICTED CONSTRUCTION HOURS ARE REQUIRED.

B. ITEMIZE ALL WORK AND LIST ASSOCIATED HOURS AND PAY SCALE FOR EACH ITEM.

1.06 COORDINATION DRAWINGS

A. DEFINITIONS:

1. COORDINATION DRAWINGS: A COMPILATION OF THE PERTINENT LAYOUT AND SYSTEM DRAWINGS THAT SHOW THE SIZES AND LOCATIONS, INCLUDING ELEVATIONS, OF SYSTEM COMPONENTS AND REQUIRED ACCESS AREAS TO ENSURE THAT NO TWO OBJECTS WILL OCCUPY THE SAME SPACE.
   a. ELECTRICAL TRADES SHALL INCLUDE, BUT ARE NOT LIMITED TO, ELECTRICAL EQUIPMENT, CONDUIT 1.5" AND LARGER, CONDUIT RACKS, CABLE TRAYS, PULL BOXES, TRANSFORMERS, RACEWAY, BUSWAY, LIGHTING, CEILING-MOUNTED DEVICES, AND ANY ITEM THAT MAY IMPACT COORDINATION WITH OTHER DISCIPLINES.
   b. MAINTENANCE CLEARANCES AND CODE-REQUIRED DEDICATED SPACE SHALL BE INCLUDED.

B. PARTICIPATION:

1. THE CONTRACTORS AND SUBCONTRACTORS RESPONSIBLE FOR WORK DEFINED ABOVE SHALL PARTICIPATE IN THE COORDINATION DRAWING PROCESS.
2. ONE CONTRACTOR SHALL BE DESIGNATED AS THE COORDINATING CONTRACTOR FOR PURPOSES OF PREPARING A COMPLETE SET OF COMPOSITE ELECTRONIC CAD COORDINATION DRAWINGS THAT INCLUDE ALL APPLICABLE TRADES, AND FOR COORDINATING THE ACTIVITIES RELATED TO THIS PROCESS. THE COORDINATING CONTRACTOR FOR THIS PROJECT SHALL BE:
   a. THE COORDINATING CONTRACTOR SHALL UTILIZE PERSONNEL FAMILIAR WITH REQUIREMENTS OF THIS PROJECT AND SKILLED AS DRAFTSPERSONS/CAD OPERATORS, COMPETENT TO PREPARE THE REQUIRED COORDINATION DRAWINGS.
3. ELECTRONIC CAD DRAWINGS SHALL BE SUBMITTED TO THE COORDINATING CONTRACTOR FOR ADDITION OF WORK BY OTHER TRADES. IMEG WILL PROVIDE ELECTRONIC FILE COPIES OF VENTILATION DRAWINGS FOR CONTRACTOR'S USE IF THE CONTRACTOR SIGNS AND RETURNS AN "ELECTRONIC FILE TRANSFER" WAIVER PROVIDED BY IMEG. IMEG WILL NOT CONSIDER BLATANT REPRODUCTIONS OF ORIGINAL FILE COPIES AN ACCEPTABLE ALTERNATIVE FOR COORDINATION DRAWINGS.

C. DRAWING REQUIREMENTS:

1. THE FILE FORMAT AND FILE NAMING CONVENTION SHALL BE COORDINATED WITH AND AGREED TO BY ALL CONTRACTORS PARTICIPATING IN THE COORDINATION PROCESS AND THE OWNER.
   a. SCALE OF DRAWINGS:
      1) GENERAL PLANS: 1/4 INCH = 1'-0" (MINIMUM).
      2) MECHANICAL, ELECTRICAL, COMMUNICATION ROOMS, AND INCLUDING THE SURROUNDING AREAS WITHIN 10 FEET: 1/2 INCH = 1'-0" (MINIMUM).
      3) SHAFTS AND RISERS: 1/2 INCH = 1'-0" (MINIMUM).
      4) SECTIONS OF SHAFTS AND MECHANICAL AND ELECTRICAL EQUIPMENT ROOMS: 1/4 INCH = 1'-0" (MINIMUM).
      5) SECTIONS OF CONGESTED AREAS: 1/2 INCH = 1'-0" (MINIMUM).
2. DUCTWORK LAYOUT DRAWINGS SHALL BE THE BASELINE SYSTEM FOR OTHER COMPONENTS. DUCTWORK LAYOUT DRAWINGS SHALL BE MODIFIED TO ACCOMMODATE OTHER COMPONENTS AS THE COORDINATION PROCESS PROGRESSES.
3. THERE MAY BE MORE DRAWINGS REQUIRED FOR RISERS, TOP AND BOTTOM LEVELS OF MECHANICAL ROOMS, AND SHAFTS.
4. THE MINIMUM QUANTITY OF DRAWINGS WILL BE ESTABLISHED AT THE FIRST COORDINATION MEETING AND SENT TO THE ARCHITECT/ENGINEER FOR REVIEW. ADDITIONAL DRAWINGS MAY BE REQUIRED IF OTHER AREAS OF CONGESTION ARE DISCOVERED DURING THE COORDINATION PROCESS.

D. GENERAL:

1. A PLOTTED SET OF COORDINATION DRAWINGS SHALL BE AVAILABLE AT THE PROJECT SITE.
2. COORDINATION DRAWINGS ARE NOT SHOP DRAWINGS AND SHALL NOT BE SUBMITTED AS SUCH.
3. THE CONTRACT DRAWINGS ARE SCHEMATIC IN NATURE AND DO NOT SHOW EVERY FITTING AND APPURTENANCE FOR EACH UTILITY. EACH CONTRACTOR IS EXPECTED TO HAVE INCLUDED IN THE BID SUFFICIENT FITTINGS, MATERIAL, AND LABOR TO ALLOW FOR ADJUSTMENTS IN ROUTING OF UTILITIES MADE NECESSARY BY THE COORDINATION PROCESS AND TO PROVIDE A COMPLETE AND FUNCTIONAL SYSTEM.
4. THE CONTRACTORS WILL NOT BE ALLOWED ADDITIONAL COSTS OR TIME EXTENSIONS DUE TO PARTICIPATION IN THE COORDINATION PROCESS.
5. THE CONTRACTORS WILL NOT BE ALLOWED ADDITIONAL COSTS OR TIME EXTENSIONS FOR ADDITIONAL FITTINGS, REROUTINGS OR CHANGES OF DUCT SIZE, THAT ARE ESSENTIALLY EQUIVALENT SIZES TO THOSE SHOWN ON THE DRAWINGS AND DETERMINED NECESSARY THROUGH THE COORDINATION PROCESS.
6. ENGINEER RESERVES THE RIGHT TO DETERMINE SPACE PRIORITY OF EQUIPMENT IN THE EVENT OF SPATIAL CONFLICTS OR INTERFERENCE BETWEEN EQUIPMENT, PIPING, CONDUIT, DUCTS, AND EQUIPMENT PROVIDED BY THE TRADES.
7. CHANGES TO THE CONTRACT DOCUMENTS THAT ARE NECESSARY FOR SYSTEMS INSTALLATION AND COORDINATION SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
8. ACCESS PANELS SHALL PREFERABLY OCCUR ONLY IN GYPSUM BOARD WALLS OR PLASTER CEILINGS WHERE INDICATED ON THE DRAWINGS.
   a. ACCESS TO MECHANICAL, ELECTRICAL, TECHNOLOGY, AND OTHER ITEMS LOCATED ABOVE THE CEILING SHALL BE THROUGH ACCESSIBLE LAY-IN CEILING TILE AREAS.
   b. POTENTIAL LAYOUT CHANGES SHALL BE MADE TO AVOID ADDITIONAL ACCESS PANELS.
   c. ADDITIONAL ACCESS PANELS SHALL NOT BE ALLOWED WITHOUT WRITTEN APPROVAL FROM THE ENGINEER AT THE COORDINATION DRAWING STAGE.
   d. PROVIDING ADDITIONAL ACCESS PANELS SHALL BE CONSIDERED AFTER OTHER ALTERNATIVES ARE REVIEWED AND DISCARDED BY THE ENGINEER AND THE OWNER'S REPRESENTATIVE.
   e. WHEN ADDITIONAL ACCESS PANELS ARE REQUIRED, THEY SHALL BE PROVIDED WITHOUT ADDITIONAL COST TO THE OWNER.
9. COMPLETE THE COORDINATION DRAWING PROCESS AND OBTAIN SIGN-OFF OF THE DRAWINGS BY ALL CONTRACTORS PRIOR TO INSTALLING ANY OF THE COMPONENTS.
10. CONFLICTS THAT RESULT AFTER THE COORDINATION DRAWINGS ARE SIGNED OFF SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR OR SUBCONTRACTOR WHO DID NOT PROPERLY IDENTIFY THEIR WORK REQUIREMENTS, OR INSTALLED THEIR WORK WITHOUT PROPER COORDINATION.
11. UPDATED COORDINATION DRAWINGS THAT REFLECT AS-BUILT CONDITIONS MAY BE USED AS RECORD DOCUMENTS.

1.07 QUALITY ASSURANCE

A. CONTRACTOR'S RESPONSIBILITY PRIOR TO SUBMITTING PRICING/BID DATA:

1. THE CONTRACTOR IS RESPONSIBLE FOR CONSTRUCTING COMPLETE AND OPERATING SYSTEMS. THE CONTRACTOR ACKNOWLEDGES AND UNDERSTANDS THAT THE CONTRACT DOCUMENTS ARE A TWO-DIMENSIONAL REPRESENTATION OF A THREE-DIMENSIONAL OBJECT, SUBJECT TO HUMAN INTERPRETATION. THIS REPRESENTATION MAY INCLUDE IMPERFECT DATA, INTERPRETED CODES, UTILITY GUIDES, THREE-DIMENSIONAL CONFLICTS, AND REQUIRED FIELD COORDINATION ITEMS. SUCH DEFICIENCIES CAN BE CORRECTED WHEN IDENTIFIED PRIOR TO ORDERING MATERIAL AND STARTING INSTALLATION. THE CONTRACTOR AGREES TO CAREFULLY STUDY AND COMPARE THE INDIVIDUAL CONTRACT DOCUMENTS AND REPORT AT ONCE IN WRITING TO THE ARCHITECT/ENGINEER ANY DEFICIENCIES THE CONTRACTOR MAY DISCOVER. THE CONTRACTOR FURTHER AGREES TO REQUIRE EACH SUBCONTRACTOR TO LIKEWISE STUDY THE DOCUMENTS AND REPORT AT ONCE ANY DEFICIENCIES DISCOVERED.
2. THE CONTRACTOR SHALL RESOLVE ALL REPORTED DEFICIENCIES WITH THE ENGINEER PRIOR TO AWARDING ANY SUBCONTRACTS, ORDERING MATERIAL, OR STARTING ANY WORK WITH THE CONTRACTOR'S OWN EMPLOYEES. ANY WORK PERFORMED PRIOR TO RECEIPT OF INSTRUCTIONS FROM THE ENGINEER WILL BE DONE AT THE CONTRACTOR'S RISK.

B. QUALIFICATIONS:

1. ONLY PRODUCTS OF REPUTABLE MANUFACTURERS AS DETERMINED BY THE ENGINEER ARE ACCEPTABLE.
2. ALL CONTRACTORS AND SUBCONTRACTORS SHALL EMPLOY ONLY WORKMEN WHO ARE SKILLED IN THEIR TRADES. AT ALL TIMES, THE NUMBER OF APPRENTICES AT THE JOB SITE SHALL BE LESS THAN OR EQUAL TO THE NUMBER OF JOURNEYMEN AT THE JOB SITE.

C. COMPLIANCE WITH CODES, LAWS, ORDINANCES:

1. CONFORM TO ALL REQUIREMENTS OF THE CITY OF RIVERSIDE CODES, LAWS, ORDINANCES AND OTHER REGULATIONS HAVING JURISDICTION.
2. IF THERE IS A DISCREPANCY BETWEEN THE CODES AND REGULATIONS AND THESE SPECIFICATIONS, THE ENGINEER SHALL DETERMINE THE METHOD OR EQUIPMENT USED.
3. IF THE CONTRACTOR NOTES, AT THE TIME OF BIDDING, THAT ANY PARTS OF THE DRAWINGS OR SPECIFICATIONS DO NOT COMPLY WITH THE CODES OR REGULATIONS, CONTRACTOR SHALL INFORM THE ENGINEER IN WRITING, REQUESTING A CLARIFICATION. IF THERE IS INSUFFICIENT TIME FOR THIS PROCEDURE, CONTRACTOR SHALL SUBMIT WITH THE PROPOSAL A SEPARATE PRICE TO MAKE THE SYSTEM COMPLY WITH THE CODES AND REGULATIONS.
4. ALL CHANGES TO THE SYSTEM MADE AFTER THE LETTING OF THE CONTRACT TO COMPLY WITH CODES OR THE REQUIREMENTS OF THE INSPECTOR, SHALL BE MADE BY THE CONTRACTOR WITHOUT COST TO THE OWNER.
5. IF THERE IS A DISCREPANCY BETWEEN MANUFACTURER'S RECOMMENDATIONS AND THESE SPECIFICATIONS, THE MANUFACTURER'S RECOMMENDATIONS SHALL GOVERN.
6. IF THERE ARE NO LOCAL CODES HAVING JURISDICTION, THE CURRENT ISSUE OF THE NATIONAL ELECTRICAL CODE SHALL BE FOLLOWED.

D. PERMITS, FEES, TAXES, INSPECTIONS:

1. PROCURE ALL APPLICABLE PERMITS AND LICENSES.
2. ABIDE BY ALL LAWS, REGULATIONS, ORDINANCES, AND OTHER RULES OF THE STATE OR POLITICAL SUBDIVISION WHERE THE WORK IS DONE, OR AS REQUIRED BY ANY DULY CONSTITUTED PUBLIC AUTHORITY.
3. PAY ALL CHARGES FOR PERMITS OR LICENSES.
4. PAY ALL FEES AND TAXES IMPOSED BY STATE, MUNICIPAL, AND OTHER REGULATORY BODIES.
5. PAY ALL CHARGES ARISING OUT OF REQUIRED INSPECTIONS BY AN AUTHORIZED BODY.
6. PAY ALL CHARGES ARISING OUT OF REQUIRED CONTRACT DOCUMENT REVIEWS ASSOCIATED WITH THE PROJECT AND AS INITIATED BY THE OWNER OR AUTHORIZED AGENCY/CONSULTANT.
7. WHERE APPLICABLE, ALL FIXTURES, EQUIPMENT AND MATERIALS SHALL BE LISTED BY UNDERWRITER'S LABORATORIES, INC. OR A NATIONALLY RECOGNIZED TESTING ORGANIZATION.
8. PAY ALL TELEPHONE COMPANY CHARGES RELATED TO THE SERVICE OR CHANGE IN SERVICE.

E. EXAMINATION OF DRAWINGS:

1. THE DRAWINGS FOR THE ELECTRICAL WORK ARE COMPLETELY DIAGRAMMATIC, INTENDED TO CONVEY THE SCOPE OF THE WORK AND TO INDICATE THE GENERAL ARRANGEMENTS AND LOCATIONS OF EQUIPMENT, OUTLETS, ETC., AND THE APPROXIMATE SIZES OF EQUIPMENT.
2. CONTRACTOR SHALL DETERMINE THE EXACT LOCATIONS OF EQUIPMENT AND ROUGH-INS, AND THE EXACT ROUTING OF RACEWAYS TO BEST FIT THE LAYOUT OF THE JOB. CONDUIT ENTRY POINTS FOR ELECTRICAL EQUIPMENT INCLUDING, BUT NOT LIMITED TO, PANELBOARDS, SWITCHBOARDS, SWITCHGEAR AND UNIT SUBSTATIONS, SHALL BE DETERMINED BY THE CONTRACTOR UNLESS NOTED IN THE CONTRACT DOCUMENTS.
3. SCALING OF THE DRAWINGS WILL NOT BE SUFFICIENT OR ACCURATE FOR DETERMINING THESE LOCATIONS.
4. WHERE JOB CONDITIONS REQUIRE REASONABLE CHANGES IN ARRANGEMENTS AND LOCATIONS, SUCH CHANGES SHALL BE MADE BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
5. BECAUSE OF THE SCALE OF THE DRAWINGS, CERTAIN BASIC ITEMS, SUCH AS JUNCTION BOXES, PULL BOXES, CONDUIT FITTINGS, ETC., MAY NOT BE SHOWN, BUT WHERE REQUIRED BY OTHER SECTIONS OF THE SPECIFICATIONS OR REQUIRED FOR PROPER INSTALLATION OF THE WORK, SUCH ITEMS SHALL BE FURNISHED AND INSTALLED.
6. IF AN ITEM IS EITHER SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS, IT SHALL BE INCLUDED IN THIS CONTRACT.
7. THE CONTRACTOR SHALL DETERMINE QUANTITIES AND QUALITY OF MATERIAL AND EQUIPMENT REQUIRED FROM THE DOCUMENTS. WHERE DISCREPANCIES ARISE BETWEEN DRAWINGS, SCHEDULES AND/OR SPECIFICATIONS, THE GREATER AND BETTER-QUALITY NUMBER SHALL GOVERN.
8. WHERE USED IN ELECTRICAL DOCUMENTS THE WORD "FURNISH" SHALL MEAN SUPPLY FOR USE, THE WORD "INSTALL" SHALL MEAN CONNECT UP COMPLETE AND READY FOR OPERATION, AND THE WORD "PROVIDE" SHALL MEAN TO SUPPLY FOR USE AND CONNECT UP COMPLETE AND READY FOR OPERATION.
9. ANY ITEM LISTED AS FURNISHED SHALL ALSO BE INSTALLED UNLESS OTHERWISE NOTED.
10. ANY ITEM LISTED AS INSTALLED SHALL ALSO BE FURNISHED UNLESS OTHERWISE NOTED.

F. ELECTRONIC MEDIA/FILES:

1. CONSTRUCTION DRAWINGS FOR THIS PROJECT HAVE BEEN PREPARED UTILIZING REVIT.
2. CONTRACTORS AND SUBCONTRACTORS MAY REQUEST ELECTRONIC MEDIA FILES OF THE CONTRACT DRAWINGS AND/OR COPIES OF THE SPECIFICATIONS. SPECIFICATIONS WILL BE PROVIDED IN PDF FORMAT.
3. UPON REQUEST FOR ELECTRONIC MEDIA, THE CONTRACTOR SHALL COMPLETE AND RETURN A SIGNED "ELECTRONIC FILE TRANSMITTAL" FORM PROVIDED BY IMEG.
4. IF THE INFORMATION REQUESTED INCLUDES FLOOR PLANS PREPARED BY OTHERS, THE CONTRACTOR WILL BE RESPONSIBLE FOR OBTAINING APPROVAL FROM THE APPROPRIATE DESIGN PROFESSIONAL FOR USE OF THAT PART OF THE DOCUMENT.
5. THE ELECTRONIC CONTRACT DOCUMENTS CAN BE USED FOR PREPARATION OF SHOP DRAWINGS AND AS-BUILT DRAWINGS ONLY. THE INFORMATION MAY NOT BE USED IN WHOLE OR IN PART FOR ANY OTHER PROJECT.
6. THE DRAWINGS PREPARED BY IMEG FOR BIDDING PURPOSES MAY NOT BE USED DIRECTLY FOR DUCTWORK LAYOUT DRAWINGS OR COORDINATION DRAWINGS.
7. THE USE OF THESE CAD DOCUMENTS BY THE CONTRACTOR DOES NOT RELIEVE THEM FROM THEIR RESPONSIBILITY FOR COORDINATION OF WORK WITH OTHER TRADES AND VERIFICATION OF SPACE AVAILABLE FOR THE INSTALLATION.
8. THE INFORMATION IS PROVIDED TO EXPEDITE THE PROJECT AND ASSIST THE CONTRACTOR WITH NO GUARANTEE BY IMEG AS TO THE ACCURACY OR CORRECTNESS OF THE INFORMATION PROVIDED. IMEG ACCEPTS NO RESPONSIBILITY OR LIABILITY FOR THE CONTRACTOR'S USE OF THESE DOCUMENTS.

G. FIELD MEASUREMENTS:

1. VERIFY ALL PERTINENT DIMENSIONS AT THE JOB SITE BEFORE ORDERING ANY CONDUIT, CONDUCTORS, WIREWAYS, BUS DUCT, FITTINGS, ETC.

1.08 WEB-BASED PROJECT SOFTWARE

A. THE GENERAL CONTRACTOR SHALL PROVIDE A WEB-BASED PROJECT SOFTWARE SITE FOR THE PURPOSE OF HOSTING AND MANAGING PROJECT COMMUNICATION AND DOCUMENTATION UNTIL COMPLETION OF THE WARRANTY PHASE.

B. THE WEB-BASED PROJECT SOFTWARE SHALL INCLUDE, AT A MINIMUM, THE FOLLOWING FEATURES: CONSTRUCTION SCHEDULE, SUBMITTALS, RFIS, ASIS, CONSTRUCTION CHANGE DIRECTIVES, CHANGE ORDERS, DRAWING MANAGEMENT, SPECIFICATION MANAGEMENT, PAYMENT APPLICATIONS, CONTRACT MODIFICATIONS, MEETING MINUTES, CONSTRUCTION PROGRESS PHOTOS.

C. PROVIDE WEB-BASED PROJECT SOFTWARE USER LICENSES FOR USE BY THE ARCHITECT/ENGINEER. ACCESS WILL BE PROVIDED FROM THE START OF THE PROJECT THROUGH THE COMPLETION OF THE WARRANTY PHASE.

D. AT PROJECT COMPLETION, PROVIDE DIGITAL ARCHIVE OF ENTIRE PROJECT IN FORMAT THAT IS READABLE BY COMMON DESKTOP SOFTWARE APPLICATIONS IN FORMAT ACCEPTABLE TO ARCHITECT/ENGINEER. PROVIDE DATA IN LOCKED FORMAT TO PREVENT FURTHER CHANGES.

1.09 SUBMITTALS

A. SUBMITTALS SHALL BE REQUIRED FOR THE FOLLOWING ITEMS, AND FOR ADDITIONAL ITEMS WHERE REQUIRED ELSEWHERE IN THE SPECIFICATIONS OR ON THE DRAWINGS.

1. SUBMITTALS LIST:

REFERENCED SPECIFICATION SECTION	SUBMITTAL ITEM	COORDINATION DRAWING
26 05 00	BASIC ELECTRICAL REQUIREMENTS	
26 05 03	THROUGH PENETRATION FIRESTOPPING	
26 05 13	WIRE AND CABLE	
26 05 26	GROUNDING AND BONDING	
26 05 27	SUPPORTING DEVICES	
26 05 33	CONDUIT AND BOXES	+> 1.5"
26 05 35	SURFACE RACEWAYS	
26 05 73	POWER SYSTEM STUDY	
26 08 01	COMMISSIONING OF ELECTRICAL	
26 22 00	DRY TYPE TRANSFORMERS	YES
26 24 16	PANELBOARDS	YES
26 27 29	ELECTRIC VEHICLE CHARGING STATION	
26 28 13	FUSES	
26 28 16	DISCONNECT SWITCHES	YES

ADDRESSES

   a. SUPPLIER AND MANUFACTURER'S NAMES AND ADDRESSES
   b. DESCRIPTION OF ITEM SUBMITTED (USING PROJECT NOMENCLATURE) AND RELEVANT SPECIFICATION NUMBER
   c. NOTATIONS OF DEVIATIONS FROM THE CONTRACT DOCUMENTS
   d. OTHER PERTINENT DATA
   e. PROVIDE SPACE FOR CONTRACTOR'S REVIEW STAMPS
2. COMPOSITION:
   a. SUBMITTALS SHALL BE SUBMITTED USING SPECIFICATION SECTIONS AND THE PROJECT NOMENCLATURE FOR EACH ITEM.
   b. INDIVIDUAL SUBMITTAL PACKAGES SHALL BE PREPARED FOR ITEMS IN EACH SPECIFICATION SECTION. ALL ITEMS WITHIN A SINGLE SPECIFICATION SECTION SHALL BE PACKAGED TOGETHER WHERE POSSIBLE. AN INDIVIDUAL SUBMITTAL MAY CONTAIN ITEMS FROM MULTIPLE SPECIFICATIONS SECTIONS IF THE ITEMS ARE INTIMATELY LINKED (E.G., PUMPS AND MOTORS).
   c. ALL SETS SHALL CONTAIN AN INDEX OF THE ITEMS ENCLOSED WITH A GENERAL TOPIC DESCRIPTION ON THE COVER.
3. CONTENT: SUBMITTALS SHALL INCLUDE ALL FABRICATION, ERECTION, LAYOUT, AND SETTING DRAWINGS; MANUFACTURERS' STANDARD DRAWINGS; SCHEDULES; DESCRIPTIVE LITERATURE, CATALOGS AND BROCHURES; PERFORMANCE AND TEST DATA; WIRING AND CONTROL DIAGRAMS; DIMENSIONS; SHIPPING AND OPERATING WEIGHTS; SHIPPING SPLITS; SERVICE CLEARANCES; AND ALL OTHER DRAWINGS AND DESCRIPTIVE DATA OF MATERIALS OF CONSTRUCTION AS MAY BE REQUIRED TO SHOW THAT THE MATERIALS, EQUIPMENT OR SYSTEMS AND THE LOCATION THEREOF CONFORM TO THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.
4. CONTRACTOR'S APPROVAL STAMP:
   a. THE CONTRACTOR SHALL THOROUGHLY REVIEW AND APPROVE ALL SHOP DRAWINGS BEFORE SUBMITTING THEM TO THE ARCHITECT/ENGINEER. THE CONTRACTOR SHALL STAMP, DATE AND SIGN EACH SUBMITTAL CERTIFYING IT HAS BEEN REVIEWED.
   b. UNSTAMPED SUBMITTALS WILL BE REJECTED.
   c. THE CONTRACTOR'S REVIEW SHALL INCLUDE, BUT NOT BE LIMITED TO, VERIFICATION OF THE FOLLOWING:
      1) ONLY APPROVED MANUFACTURERS ARE USED.
      2) ADDENDA ITEMS HAVE BEEN INCORPORATED.
      3) CATALOG NUMBERS AND OPTIONS MATCH THOSE SPECIFIED.
      4) PERFORMANCE DATA MATCHES THAT SPECIFIED.
      5) ELECTRICAL CHARACTERISTICS AND LOADS MATCH THOSE SPECIFIED.
      6) EQUIPMENT CONNECTION LOCATIONS, SIZES, CAPACITIES, ETC. HAVE BEEN COORDINATED WITH OTHER AFFECTED TRADES.
      7) DIMENSIONS AND SERVICE CLEARANCES ARE SUITABLE FOR THE INTENDED LOCATION.
      8) EQUIPMENT DIMENSIONS ARE COORDINATED WITH SUPPORT STEEL, HOUSEKEEPING PADS, OPENINGS, ETC.
      9) CONSTRUCTABILITY ISSUES ARE RESOLVED (E.G., WEIGHTS AND DIMENSIONS ARE SUITABLE FOR GETTING THE ITEM INTO THE BUILDING AND INTO PLACE, SINKS FIT INTO COUNTERTOPS, ETC.).
   d. THE CONTRACTOR SHALL REVIEW, STAMP AND APPROVE ALL SUBCONTRACTORS' SUBMITTALS AS DESCRIBED ABOVE.
   e. THE CONTRACTOR'S APPROVAL STAMP IS REQUIRED ON ALL SUBMITTALS. APPROVAL WILL INDICATE THE CONTRACTOR'S REVIEW OF ALL MATERIAL AND A COMPLETE UNDERSTANDING OF EXACTLY WHAT IS TO BE FURNISHED. CONTRACTOR SHALL CLEARLY MARK ALL DEVIATIONS FROM THE CONTRACT DOCUMENTS ON ALL SUBMITTALS. IF DEVIATIONS ARE NOT MARKED BY THE CONTRACTOR, THEN THE ITEM SHALL BE REQUIRED TO MEET ALL DRAWING AND SPECIFICATION REQUIREMENTS.
5. SUBMITTAL IDENTIFICATION AND MARKINGS:
   a. THE CONTRACTOR SHALL CLEARLY MARK EACH ITEM WITH THE SAME NOMENCLATURE APPLIED ON THE DRAWINGS OR IN THE SPECIFICATIONS.
   b. THE CONTRACTOR SHALL CLEARLY INDICATE THE SIZE, FINISH, MATERIAL, ETC.
   c. WHERE MORE THAN ONE MODEL IS SHOWN ON A MANUFACTURER'S SHEET, THE CONTRACTOR SHALL CLEARLY INDICATE EXACTLY WHICH ITEM AND WHICH DATA IS INTENDED.
   d. ALL MARKS AND IDENTIFICATIONS ON THE SUBMITTALS SHALL BE UNAMBIGUOUS.
6. SCHEDULE SUBMITTALS TO EXPEDITE THE PROJECT. COORDINATE SUBMISSION OF RELATED ITEMS.
7. IDENTIFY VARIATIONS FROM THE CONTRACT DOCUMENTS AND PRODUCT OR SYSTEM LIMITATIONS THAT MAY BE DETRIMENTAL TO THE SUCCESSFUL PERFORMANCE OF THE COMPLETED WORK.
8. REPRODUCTION OF CONTRACT DOCUMENTS ALONE IS NOT ACCEPTABLE FOR SUBMITTALS.
9. INCOMPLETE SUBMITTALS WILL BE REJECTED WITHOUT REVIEW. PARTIAL SUBMITTALS WILL ONLY BE REVIEWED WITH PRIOR APPROVAL FROM THE ENGINEER.
10. SUBMITTALS NOT REQUIRED BY THE CONTRACT DOCUMENTS MAY BE RETURNED WITHOUT REVIEW.
11. THE ENGINEER'S RESPONSIBILITY SHALL BE TO REVIEW ONE SET OF SHOP DRAWING SUBMITTALS FOR EACH PRODUCT. IF THE FIRST SUBMITTAL IS INCOMPLETE OR DOES NOT COMPLY WITH THE DRAWINGS AND/OR SPECIFICATIONS, THE CONTRACTOR SHALL BE RESPONSIBLE TO BEAR THE COST FOR THE ARCHITECT/ENGINEER TO RECHECK AND HANDLE THE ADDITIONAL SHOP DRAWING SUBMITTALS.
12. SUBMITTALS SHALL BE REVIEWED AND APPROVED BY THE ENGINEER BEFORE RELEASING ANY EQUIPMENT FOR MANUFACTURE OR SHIPMENT.
13. CONTRACTOR'S RESPONSIBILITY FOR ERRORS, OMISSIONS OR DEVIATION FROM THE CONTRACT DOCUMENTS IN SUBMITTALS IS NOT RELIEVED BY THE ARCHITECT/ENGINEER'S APPROVAL.
14. SCHEDULE SHALL ALLOW FOR ADEQUATE TIME TO PERFORM ORDERLY AND PROPER REVIEW OF SUBMITTALS, INCLUDING TIME FOR CONSULTANTS AND OWNER IF REQUIRED, AND RESUBMITTALS BY CONTRACTOR IF NECESSARY, AND TO CAUSE NO DELAY IN WORK OR IN ACTIVITIES OF OWNER OR OTHER CONTRACTORS.
   a. ALLOW AT LEAST TWO WEEKS FOR ARCHITECT™™S/ENGINEER'S REVIEW AND PROCESSING OF EACH SUBMITTAL, EXCLUDING MAILING.

B. ELECTRONIC SUBMITTAL PROCEDURES:

1. DISTRIBUTION: EMAIL SUBMITTALS AS ATTACHMENTS TO ALL PARTIES DESIGNATED BY THE ARCHITECT/ENGINEER, UNLESS A WEB-BASED SUBMITTAL PROGRAM IS USED.
2. TRANSMITTALS: EACH SUBMITTAL SHALL INCLUDE AN INDIVIDUAL ELECTRONIC LETTER OF TRANSMITTAL.
3. FORMAT: ELECTRONIC SUBMITTALS SHALL BE IN PDF FORMAT ONLY. SCANNED COPIES, IN PDF FORMAT, OF PAPER ORIGINALS ARE ACCEPTABLE. SUBMITTALS THAT ARE NOT LEGIBLE WILL BE REJECTED. DO NOT SET ANY PERMISSION RESTRICTIONS ON FILES; PROTECTED, LOCKED, OR SECURED DOCUMENTS WILL BE REJECTED.
4. FILE NAMES: ELECTRONIC SUBMITTAL FILE NAMES SHALL INCLUDE THE RELEVANT SPECIFICATION SECTION NUMBER FOLLOWED BY A DESCRIPTION OF THE ITEM SUBMITTED, AS FOLLOWS. WHERE POSSIBLE, INCLUDE THE TRANSMITTAL AS THE FIRST PAGE OF THE PDF INSTEAD OF USING MULTIPLE ELECTRONIC FILES.
   a. SUBMITTAL FILE NAME: 26 XX XX.DESCRIPTION.YYYYMMDD
   b. TRANSMITTAL FILE NAME: 26 XX XX.DESCRIPTION.YYYYMMDD
5. FILE SIZE: FILES SHALL BE TRANSMITTED VIA A PRE-APPROVED METHOD. LARGER FILES MAY REQUIRE AN ALTERNATIVE TRANSFER METHOD, WHICH SHALL ALSO BE PRE-APPROVED.

1.10 SCHEDULE OF VALUES

A. THE REQUIREMENTS HEREIN ARE IN ADDITION TO THE PROVISIONS OF DIVISION 1.

B. FORMAT:

1. USE AIA DOCUMENT CONTINUATION SHEETS G703 OR ANOTHER SIMILAR FORM APPROVED BY THE OWNER AND ARCHITECT/ENGINEER.
2. SUBMIT IN EXCEL FORMAT.
3. SUPPORT VALUES GIVEN WITH SUBSTANTIATING DATA.

C. PREPARATION:

1. ITEMIZE WORK REQUIRED BY EACH SPECIFICATION SECTION AND LIST ALL PROVIDERS. ALL WORK PROVIDED BY SUBCONTRACTORS AND MAJOR SUPPLIERS SHALL BE LISTED ON THE SCHEDULE OF VALUES. LIST EACH SUBCONTRACTOR AND SUPPLIER BY COMPANY NAME.
2. BREAK DOWN ALL COSTS INTO:
   a. MATERIAL: DELIVERED COST OF PRODUCT WITH TAXES PAID.
   b. LABOR: LABOR COST, EXCLUDING OVERHEAD AND PROFIT.
3. ITEMIZE THE COST FOR EACH OF THE FOLLOWING:
   a. OVERHEAD AND PROFIT.
   b. BONDS.
   c. INSURANCE.
   d. GENERAL REQUIREMENTS: ITEMIZE ALL REQUIREMENTS.
4. FOR EACH LINE ITEM HAVING AN INSTALLED COST OF MORE THAN $5,000, BREAK DOWN COSTS TO LIST MAJOR PRODUCTS OR OPERATIONS UNDER EACH ITEM. AT A MINIMUM, PROVIDE MATERIAL AND LABOR COST LINE ITEMS FOR THE FOLLOWING:
   a. EACH PIECE OF EQUIPMENT REQUIRING SHOP DRAWINGS. USE THE EQUIPMENT NOMENCLATURE (SB-1, PANEL P-1, ETC.) ON THE SCHEDULE OF VALUES.

1.11 CHANGE ORDERS

A. A DETAILED MATERIAL AND LABOR TAKEOFF SHALL BE PREPARED FOR EACH CHANGE ORDER, ALONG WITH LABOR RATES AND MARKUP PERCENTAGES. CHANGE ORDERS SHALL BE BROKEN DOWN BY SHEET OR ASSOCIATED INDIVIDUAL LINE ITEM INDICATED IN THE CHANGE ASSOCIATED NARRATIVE, WHICHEVER PROVIDES THE MOST DETAILED BREAKDOWN. CHANGE ORDERS WITH INADEQUATE BREAKDOWN WILL BE REJECTED.

B. ITEMIZED PRICING WITH UNIT COST SHALL BE PROVIDED FROM ALL DISTRIBUTORS AND ASSOCIATED SUBCONTRACTORS.

C. CHANGE ORDER WORK SHALL NOT PROCEED UNTIL AUTHORIZED.

1.12 PRODUCT DELIVERY, STORAGE, HANDLING AND MAINTENANCE

A. EXERCISE CARE IN TRANSPORTING AND HANDLING TO AVOID DAMAGE TO MATERIALS. STORE MATERIALS ON THE SITE TO PREVENT DAMAGE.

B. PROTECT EQUIPMENT, COMPONENTS, AND OPENINGS WITH AIRTIGHT COVERS AND EXERCISE CARE AT EVERY STAGE OF STORAGE, HANDLING, AND INSTALLATION OF EQUIPMENT TO PREVENT AIRBORNE DUST AND DIRT FROM ENTERING OR FOULING EQUIPMENT TO INCLUDE, BUT NOT LIMITED TO:

1. TRANSFORMERS, VENTILATED.

C. EQUIPMENT AND COMPONENTS THAT ARE VISIBLY DAMAGED OR HAVE BEEN SUBJECT TO ENVIRONMENTAL CONDITIONS PRIOR TO BUILDING TURNOVER TO OWNER THAT COULD SHORTEN THE LIFE OF THE COMPONENT (FOR EXAMPLE, WATER DAMAGE, HUMIDITY, DUST AND DEBRIS, EXCESSIVE HOT OR COLD STORAGE LOCATION, ETC.) SHALL BE REPAIRED OR REPLACED WITH NEW EQUIPMENT OR COMPONENTS WITHOUT ADDITIONAL COST TO THE BUILDING OWNER.

D. KEEP ALL MATERIALS CLEAN, DRY AND FREE FROM DAMAGING ENVIRONMENTS.

E. COORDINATE THE INSTALLATION OF HEAVY AND LARGE EQUIPMENT WITH THE GENERAL CONTRACTOR AND/OR OWNER. IF THE ELECTRICAL CONTRACTOR DOES NOT HAVE PRIOR DOCUMENTED EXPERIENCE IN RIGGING AND LIFTING SIMILAR EQUIPMENT, THEY SHALL CONTRACT WITH A QUALIFIED LIFTING AND RIGGING SERVICE THAT HAS SIMILAR DOCUMENTED EXPERIENCE. FOLLOW ALL EQUIPMENT LIFTING AND SUPPORT GUIDELINES FOR HANDLING AND MOVING.

F. CONTRACTOR IS RESPONSIBLE FOR MOVING EQUIPMENT INTO THE BUILDING AND/OR SITE. CONTRACTOR SHALL REVIEW SITE PRIOR TO BID FOR PATH LOCATIONS AND ANY REQUIRED BUILDING MODIFICATIONS TO ALLOW MOVEMENT OF EQUIPMENT. CONTRACTOR SHALL COORDINATE THE WORK WITH OTHER TRADES.

1.13 WARRANTY

A. PROVIDE ONE-YEAR WARRANTY FOR ALL FIXTURES, EQUIPMENT, MATERIALS, AND WORKMANSHIP.

B. THE WARRANTY PERIOD FOR ALL WORK IN THIS SPECIFICATION DIVISION SHALL COMMENCE ON THE DATE OF SUBSTANTIAL COMPLETION OR SUCCESSFUL SYSTEM PERFORMANCE WHICHEVER OCCURS LATER. THE WARRANTY MAY ALSO COMMENCE IF A WHOLE OR PARTIAL SYSTEM OR ANY SEPARATE PIECE OF EQUIPMENT OR COMPONENT IS PUT INTO USE FOR THE BENEFIT OF ANY PARTY OTHER THAN THE INSTALLING CONTRACTOR WITH PRIOR WRITTEN AUTHORIZATION OF THE OWNER. IN THIS INSTANCE, THE WARRANTY PERIOD SHALL COMMENCE ON THE DATE WHEN SUCH WHOLE SYSTEM, PARTIAL SYSTEM OR SEPARATE PIECE OF EQUIPMENT OR COMPONENT IS PLACED IN OPERATION AND ACCEPTED IN WRITING BY THE OWNER.

C. WARRANTY REQUIREMENTS EXTEND TO CORRECTION, WITHOUT COST TO THE OWNER, OF ALL WORK FOUND TO BE DEFECTIVE OR NONCONFORMING TO THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL BEAR THE COST OF CORRECTING ALL DAMAGE DUE TO DEFECTS OR NONCONFORMANCE WITH CONTRACT DOCUMENTS EXCLUDING REPAIRS REQUIRED AS A RESULT OF IMPROPER MAINTENANCE OR OPERATION, OR OF NORMAL WEAR AS DETERMINED BY THE ENGINEER.

1.14 INSURANCE

A. THIS CONTRACTOR SHALL MAINTAIN INSURANCE COVERAGE AS SET FORTH IN DIVISION 1 OF THESE SPECIFICATIONS.

1.15 MATERIAL SUBSTITUTION

A. WHERE SEVERAL MANUFACTURERS' NAMES ARE GIVEN, THE MANUFACTURER FOR WHICH A CATALOG NUMBER IS GIVEN IS THE BASIS FOR JOB DESIGN AND ESTABLISHES THE QUALITY.

B. EQUIVALENT EQUIPMENT MANUFACTURED BY THE OTHER LISTED MANUFACTURERS MAY BE USED. CONTRACTOR SHALL ENSURE THAT ALL ITEMS SUBMITTED BY THESE OTHER MANUFACTURERS MEET ALL REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS AND FITS IN THE ALLOCATED SPACE. WHEN USING OTHER LISTED MANUFACTURERS, THE CONTRACTOR SHALL ASSUME RESPONSIBILITY FOR ANY AND ALL MODIFICATIONS NECESSARY (INCLUDING, BUT NOT LIMITED TO STRUCTURAL SUPPORTS, ELECTRICAL CONNECTIONS AND ROUGH-IN, AND REGULATORY AGENCY APPROVAL, ETC.) AND COORDINATE SUCH WITH OTHER CONTRACTORS. THE ARCHITECT/ENGINEER SHALL MAKE THE FINAL DETERMINATION OF WHETHER A PRODUCT IS EQUIVALENT.

C. ANY MATERIAL, ARTICLE OR EQUIPMENT OF OTHER UNNAMED MANUFACTURERS WHICH WILL ADEQUATELY PERFORM THE SERVICES AND DUTIES IMPOSED BY THE DESIGN AND IS OF A QUALITY EQUAL TO OR BETTER THAN THE MATERIAL, ARTICLE OR EQUIPMENT IDENTIFIED BY THE DRAWINGS AND SPECIFICATIONS MAY BE USED IF APPROVAL IS SECURED IN WRITING FROM THE ARCHITECT/ENGINEER VIA ADDENDUM. THE CONTRACTOR ASSUMES ALL COSTS INCURRED AS A RESULT OF USING THE OFFERED MATERIAL, ARTICLE OR EQUIPMENT, ON THE CONTRACTORS PART OR ON THE PART OF OTHER CONTRACTORS WHOSE WORK IS AFFECTED.

D. VOLUNTARY ADD OR DEDUCT PRICES FOR ALTERNATE MATERIALS MAY BE LISTED ON THE BID FORM. THESE ITEMS WILL NOT BE USED IN DETERMINING THE LOW BIDDER. THIS CONTRACTOR ASSUMES ALL COSTS INCURRED AS A RESULT OF USING THE OFFERED MATERIAL OR EQUIPMENT ON THE CONTRACTORS PART OR ON THE PART OF OTHER CONTRACTORS WHOSE WORK IS AFFECTED.

E. ALL MATERIAL SUBSTITUTIONS REQUESTED AFTER THE FINAL ADDENDUM MUST BE LISTED AS VOLUNTARY CHANGES ON THE BID FORM.

1.16 PROJECT COMMISSIONING

A. THE CONTRACTOR SHALL WORK WITH THE COMMISSIONING AGENT (CXA) AS DESCRIBED IN SECTION26 08 00 AND PROVIDE ALL SERVICES AS DESCRIBED IN THE COMMISSIONING PLAN.

PART 2 - PRODUCTS

2.01 GENERAL

A. ALL ITEMS OF MATERIAL HAVING A SIMILAR FUNCTION (E.G., SAFETY SWITCHES, PANELBOARDS, SWITCHBOARDS, CONTACTORS, MOTOR STARTERS, DRY TYPE TRANSFORMERS) SHALL BE OF THE SAME MANUFACTURER UNLESS SPECIFICALLY STATED OTHERWISE ON DRAWINGS OR ELSEWHERE IN SPECIFICATIONS.

PART 3 - EXECUTION

3.01 JOBSITE SAFETY

A. NEITHER THE PROFESSIONAL ACTIVITIES OF THE ENGINEER, NOR THE PRESENCE OF THE ARCHITECT/ENGINEER OR THE EMPLOYEES AND SUBCONSULTANTS AT A CONSTRUCTION SITE, SHALL RELIEVE THE CONTRACTOR AND ANY OTHER ENTITY OF THEIR OBLIGATIONS, DUTIES AND RESPONSIBILITIES INCLUDING, BUT NOT LIMITED TO, CONSTRUCTION MEANS, METHODS, SEQUENCE, TECHNIQUES OR PROCEDURES NECESSARY FOR PERFORMING, SUPERINTENDING OR COORDINATING ALL PORTIONS OF THE WORK OF CONSTRUCTION IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND ANY HEALTH OR SAFETY PRECAUTIONS REQUIRED BY ANY REGULATORY AGENCIES. THE ENGINEER AND PERSONNEL HAVE NO AUTHORITY TO EXERCISE ANY CONTROL OVER ANY CONSTRUCTION CONTRACTOR OR OTHER ENTITY OR THEIR EMPLOYEES IN CONNECTION WITH THEIR WORK OR ANY HEALTH OR SAFETY PRECAUTIONS. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR JOBSITE SAFETY. THE ENGINEER AND THE ARCHITECT/ENGINEER'S CONSULTANTS SHALL BE INDEMNIFIED AND SHALL BE MADE ADDITIONAL INSUREDS UNDER THE CONTRACTOR'S GENERAL LIABILITY INSURANCE POLICY.

3.02 EXCAVATION, FILL, BACKFILL, COMPACTION

A. GENERAL:

1. PRIOR TO THE COMMENCEMENT OF ANY EXCAVATION OR DIGGING, THE CONTRACTOR SHALL VERIFY ALL UNDERGROUND UTILITIES WITH THE REGIONAL UTILITY LOCATOR. PROVIDE PRIOR NOTICE TO THE LOCATOR BEFORE EXCAVATIONS. CONTACT INFORMATION FOR MOST REGIONAL UTILITY LOCATERS CAN BE FOUND BY CALLING 811.
2. THE CONTRACTOR SHALL DO ALL EXCAVATING, FILLING, BACKFILLING, COMPACTING, AND RESTORATION IN CONNECTION WITH THE WORK.

B. EXCAVATION:

1. MAKE ALL EXCAVATIONS TO ACCURATE, SOLID, UNDISTURBED EARTH, AND TO PROPER DIMENSIONS.
2. IF EXCAVATIONS ARE CARRIED IN ERROR BELOW INDICATED LEVELS, CONCRETE OF SAME STRENGTH AS SPECIFIED FOR THE FOUNDATIONS OR THOROUGHLY COMPACTED SAND-GRAVEL FILL, AS DETERMINED BY THE ARCHITECT/ENGINEER SHALL BE PLACED IN SUCH EXCESS EXCAVATIONS UNDER THE FOUNDATION. PLACE THOROUGHLY COMPACTED, CLEAN, STABLE FILL IN EXCESS EXCAVATIONS UNDER SLABS ON GRADE, AT THE CONTRACTOR'S EXPENSE.
3. TRIM BOTTOM AND SIDES OF EXCAVATIONS TO GRADES REQUIRED FOR FOUNDATIONS.
4. PROTECT EXCAVATIONS AGAINST FROST AND FREEZING.
5. TAKE CARE IN EXCAVATING NOT TO DAMAGE SURROUNDING STRUCTURES, EQUIPMENT OR BURIED PIPE. DO NOT UNDERMINE FOOTING OR FOUNDATION.
6. PERFORM ALL TRENCHING IN A MANNER TO PREVENT CAVE-INS AND RISK TO WORKMEN.
7. WHERE ORIGINAL SURFACE IS PAVEMENT OR CONCRETE, THE SURFACE SHALL BE SAW CUT TO PROVIDE CLEAN EDGES AND ASSIST IN THE SURFACE RESTORATION.
8. IF SATISFACTORY BEARING SOIL IS NOT FOUND AT THE INDICATED LEVELS, IMMEDIATELY NOTIFY THE ARCHITECT/ENGINEER OR THEIR REPRESENTATIVE, AND DO NO FURTHER WORK UNTIL THE ARCHITECT/ENGINEER OR THEIR REPRESENTATIVE GIVES FURTHER INSTRUCTIONS.
9. EXCAVATION SHALL BE PERFORMED IN ALL GROUND CONDITIONS, INCLUDING ROCK, IF ENCOUNTERED. BIDDERS SHALL VISIT THE PREMISES AND DETERMINE THE SOIL CONDITIONS BY ACTUAL OBSERVATIONS, BORINGS, OR OTHER MEANS. THE COST OF ALL SUCH INSPECTIONS, BORINGS, ETC., SHALL BE BORNE BY THE BIDDER.
10. IF A TRENCH IS EXCAVATED IN ROCK, A COMPACTED BED WITH A DEPTH OF 3" (MINIMUM) OF SAND AND GRAVEL SHALL BE USED TO SUPPORT THE CONDUIT UNLESS MASONRY CRADLES OR ENCASEMENTS ARE USED.
11. MECHANICAL EXCAVATION OF THE TRENCH TO LINE AND GRADE OF THE CONDUIT OR TO THE BOTTOM LEVEL OF MASONRY CRADLES OR ENCASEMENTS IS PERMITTED, UNLESS OTHERWISE INDICATED ON THE ELECTRICAL DRAWINGS.
12. MECHANICAL EXCAVATION OF THE TRENCH TO LINE AND GRADE WHERE DIRECT BURIAL CABLES ARE TO BE INSTALLED IS PERMITTED PROVIDED THE EXCAVATION IS MADE TO A DEPTH TO PERMIT INSTALLATION OF THE CABLE ON A FINE SAND BED AT LEAST 3 INCHES DEEP.

C. DEWATERING:

1. FURNISH, INSTALL, OPERATE AND REMOVE ALL DEWATERING PUMPS AND PIPES NEEDED TO KEEP TRENCHES AND PITS FREE OF WATER.

D. UNDERGROUND OBSTRUCTIONS:

1. KNOWN UNDERGROUND PIPING, CONDUIT, FEEDERS, FOUNDATIONS, AND OTHER OBSTRUCTIONS IN THE VICINITY OF CONSTRUCTION ARE SHOWN ON THE DRAWINGS. REVIEW ALL BID DOCUMENTS FOR ALL TRADES ON THE PROJECT TO DETERMINE OBSTRUCTIONS INDICATED. TAKE GREAT CARE IN MAKING INSTALLATIONS NEAR UNDERGROUND OBSTRUCTIONS.
2. IF OBJECTS NOT SHOWN ON THE DRAWINGS ARE ENCOUNTERED, REMOVE, RELOCATE, OR PERFORM EXTRA WORK AS DIRECTED BY THE ARCHITECT/ENGINEER.

E. FILL AND BACKFILLING:

1. NO RUBBISH OR WASTE MATERIAL IS PERMITTED FOR FILL OR BACKFILL.
2. PROVIDE ALL NECESSARY SAND AND/OR CA6 FOR BACKFILLING.
3. NATIVE SOIL MATERIALS MAY BE USED AS BACKFILL IF APPROVED BY THE GEOTECHNICAL ENGINEER.
4. DISPOSE OF THE EXCESS EXCAVATED EARTH AS DIRECTED.
5. BACKFILL MATERIALS (NATIVE SOIL MATERIAL, SAND, AND/OR CA6) SHALL BE SUITABLE FOR REQUIRED COMPACTION, CLEAN AND FREE OF PERISHABLE MATERIALS, FROZEN EARTH, DEBRIS, EARTH WITH A HIGH VOID CONTENT, AND STONES GREATER THAN 4 INCHES IN DIAMETER. WATER IS NOT PERMITTED TO RISE IN UNBACKFILLED TRENCHES.
6. BACKFILL ALL TRENCHES AND EXCAVATIONS IMMEDIATELY AFTER INSTALLING OF CONDUIT, OR REMOVING FORMS, UNLESS OTHER PROTECTION IS DIRECTED.
7. AROUND PIERS AND ISOLATED FOUNDATIONS AND STRUCTURES, BACKFILL AND FILL SHALL BE PLACED AND CONSOLIDATED SIMULTANEOUSLY ON ALL SIDES TO PREVENT WEDGE ACTION AND DISPLACEMENT. SPREAD FILL AND BACKFILL MATERIALS IN 6" UNIFORM HORIZONTAL LAYERS WITH EACH LAYER COMPACTED SEPARATELY TO REQUIRED DENSITY.
8. FOR CONDUITS THAT ARE NOT CONCRETE ENCASED, LAY ALL CONDUITS ON A COMPACTED BED OF SAND AT LEAST 3" DEEP. BACKFILL AROUND CONDUITS WITH SAND, IN 6" LAYERS AND COMPACT EACH LAYER.
9. CONDUITS THAT ARE CONCRETE ENCASED OR IN A DUCTBANK, CONDUIT SPACERS, AND CRADLES SHALL BE INSTALLED ON A BED OF COMPACTED CA-6 GRAVEL. REFER TO CONDUIT SECTION FOR BACKFILLING AND DUCTBANK REQUIREMENTS.
10. BACKFILL WITH NATIVE SOIL MATERIAL (IF APPROVED) OR SAND UP TO GRADE FOR ALL CONDUITS UNDER SLABS OR PAVED AREAS. ALL OTHER CONDUITS SHALL HAVE SAND BACKFILL TO 6" ABOVE THE TOP OF THE CONDUIT.
11. PLACE ALL BACKFILL ABOVE THE SAND IN UNIFORM LAYERS NOT EXCEEDING 6" DEEP. PLACE THEN CAREFULLY AND UNIFORMLY TAMP EACH LAYER TO ELIMINATE LATERAL OR VERTICAL DISPLACEMENT.
12. WHERE THE FILL AND BACKFILL WILL ULTIMATELY BE UNDER A BUILDING, FLOOR OR PAVING, EACH LAYER OF FILL SHALL BE COMPACTED TO 95% OF THE MAXIMUM DENSITY AS DETERMINED BY AASHTO DESIGNATION T-99 OR ASTM DESIGNATION D-698. MOISTURE CONTENT OF SOIL AT TIME OF COMPACTION SHALL NOT EXCEED PLUS OR MINUS 2% OF OPTIMUM MOISTURE CONTENT AS DETERMINED BY AASHTO T-99 OR ASTM D-698 TEST.
13. AFTER BACKFILLING OF TRENCHES, NO SUPERFICIAL LOADS SHALL BE PLACED ON THE EXPOSED SURFACE OF THE BACKFILL UNTIL A PERIOD OF 48 HOURS HAS ELAPSED.

F. SURFACE RESTORATION:

1. WHERE TRENCHES ARE CUT THROUGH GRADED, PLANTED OR LANDSCAPED AREAS, THE AREAS SHALL BE RESTORED TO THE ORIGINAL CONDITION. REPLACE ALL PLANTING AND LANDSCAPING FEATURES REMOVED OR DAMAGED TO ITS ORIGINAL CONDITION. AT LEAST 6" OF TOPSOIL SHALL BE APPLIED WHERE DISTURBED AREAS ARE TO BE SEEDED OR SODDED. ALL LAWN AREAS SHALL BE SODDED UNLESS SEEDING IS CALLED OUT IN THE DRAWINGS OR SPECIFICATIONS.
2. CONCRETE OR ASPHALT TYPE PAVEMENT, SEAL COAT, ROCK, GRAVEL OR EARTH SURFACES REMOVED OR DAMAGED SHALL BE REPLACED WITH COMPARABLE MATERIALS AND RESTORED TO ORIGINAL CONDITION. BROKEN EDGES SHALL BE SAW CUT AND REPAIRED AS DIRECTED BY ARCHITECT/ENGINEER.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
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REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 03/18/2026

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ELECTRICAL SPECIFICATIONS

3.03 ENGINEER OBSERVATION OF WORK

A. THE CONTRACTOR SHALL PROVIDE SEVEN (7) CALENDAR DAYS' NOTICE TO THE ENGINEER PRIOR TO:

1. PLACING FILL OVER UNDERGROUND AND UNDERSLAB UTILITIES.
2. COVERING EXTERIOR WALLS, INTERIOR PARTITIONS AND CHASES.
3. INSTALLING HARD OR SUSPENDED CEILINGS AND SOFFITS.

B. THE ENGINEER WILL REVIEW THE INSTALLATION AND PROVIDE A WRITTEN REPORT NOTING DEFICIENCIES REQUIRING CORRECTION. THE CONTRACTOR'S SCHEDULE SHALL ACCOUNT FOR THESE REVIEWS AND SHOW THEM AS LINE ITEMS IN THE APPROVED SCHEDULE.

C. ABOVE-CEILING FINAL OBSERVATION:

1. ALL WORK ABOVE THE CEILINGS MUST BE COMPLETE PRIOR TO THE ARCHITECT/ENGINEER'S REVIEW. THIS INCLUDES, BUT IS NOT LIMITED TO:
   a. ALL JUNCTION BOXES ARE CLOSED AND IDENTIFIED IN ACCORDANCE WITH SECTION 26 05 53 ELECTRICAL IDENTIFICATION.
   b. LUMINAIRES, INCLUDING CEILING-MOUNTED EXIT AND EMERGENCY LIGHTS, ARE INSTALLED AND OPERATIONAL.
   c. LUMINAIRE WHIPS ARE SUPPORTED ABOVE THE CEILING.
   d. CONDUIT IDENTIFICATION IS INSTALLED IN ACCORDANCE WITH SECTION 26 05 53 ELECTRICAL IDENTIFICATION.
   e. LUMINAIRES ARE SUSPENDED INDEPENDENTLY OF THE CEILING SYSTEM WHEN REQUIRED BY THESE CONTRACT DOCUMENTS.
   f. ALL WALL PENETRATIONS HAVE BEEN SEALED.
2. TO PREVENT THE ABOVE-CEILING FINAL OBSERVATION FROM OCCURRING TOO EARLY, THE CONTRACTOR SHALL REVIEW THE STATUS OF THE WORK AND CERTIFY, IN WRITING, THAT THE WORK IS READY FOR THE ABOVE-CEILING FINAL OBSERVATION.
3. IT IS UNDERSTOOD THAT IF THE ARCHITECT/ENGINEER FINDS THE CEILINGS HAVE BEEN INSTALLED PRIOR TO THIS REVIEW AND PRIOR TO SEVEN DAYS ELAPSING, THE ARCHITECT/ENGINEER MAY NOT RECOMMEND FURTHER PAYMENTS TO THE CONTRACTOR UNTIL FULL ACCESS HAS BEEN PROVIDED.

3.04 PROJECT CLOSEOUT

A. THE FOLLOWING PARAGRAPHS SUPPLEMENT THE REQUIREMENTS OF DIVISION 1.

B. IDPH PRE-OCCUPANCY REQUIREMENTS:

1. EACH CONTRACTOR MUST SUBMIT ALL FORMS AND CERTIFICATIONS REQUIRED BY IDPH RELATING TO THEIR WORK AT 85% COMPLETION OF THE PROJECT OR WHEN DIRECTED BY THE OWNER/ENGINEER.

C. FINAL JOBSITE OBSERVATION:

1. TO PREVENT THE FINAL JOBSITE OBSERVATION FROM OCCURRING TOO EARLY, THE CONTRACTOR SHALL REVIEW THE COMPLETION STATUS OF THE PROJECT AND CERTIFY THAT THE JOB IS READY FOR THE FINAL JOBSITE OBSERVATION.
2. ATTACHED TO THE END OF THIS SECTION IS A TYPICAL LIST OF ITEMS THAT REPRESENT THE DEGREE OF JOB COMPLETENESS EXPECTED PRIOR TO REQUESTING A REVIEW. THE CONTRACTOR SHALL SIGN THE ATTACHED CERTIFICATION AND RETURN IT TO THE ARCHITECT/ENGINEER SO THAT THE FINAL OBSERVATION CAN BE SCHEDULED.
3. IT IS UNDERSTOOD THAT IF THE ARCHITECT/ENGINEER FINDS THE JOB NOT READY FOR THE FINAL OBSERVATION AND ADDITIONAL TRIPS AND OBSERVATIONS ARE REQUIRED TO BRING THE PROJECT TO COMPLETION, THE COST OF THE ADDITIONAL TIME AND EXPENSES INCURRED BY THE ARCHITECT/ENGINEER WILL BE DEDUCTED FROM THE CONTRACTOR'S FINAL PAYMENT.
4. CONTRACTOR SHALL NOTIFY ARCHITECT/ENGINEER 48 HOURS PRIOR TO INSTALLATION OF CEILINGS OR LAY-IN CEILING TILES.

D. THE FOLLOWING MUST BE SUBMITTED BEFORE ARCHITECT/ENGINEER RECOMMENDS FINAL PAYMENT:

1. OPERATION AND MAINTENANCE MANUALS WITH COPIES OF APPROVED SHOP DRAWINGS.
2. RECORD DOCUMENTS INCLUDING MARKED-UP DRAWINGS AND SPECIFICATIONS.
3. A REPORT DOCUMENTING THE INSTRUCTIONS GIVEN TO THE OWNER'S REPRESENTATIVES COMPLETE WITH THE NUMBER OF HOURS SPENT IN THE INSTRUCTION. THE REPORT SHALL BEAR THE SIGNATURE OF AN AUTHORIZED AGENT OF THIS CONTRACTOR AND SHALL BE SIGNED BY THE OWNER'S REPRESENTATIVES.
4. PROVIDE SPARE PARTS, MAINTENANCE, AND EXTRA MATERIALS IN QUANTITIES SPECIFIED IN INDIVIDUAL SPECIFICATION SECTIONS. DELIVER TO PROJECT SITE AND SUBMIT RECEIPT TO ARCHITECT/ENGINEER.
5. INSPECTION AND TESTING REPORT BY THE FIRE ALARM SYSTEM MANUFACTURER.
6. START-UP REPORTS ON ALL EQUIPMENT REQUIRING A FACTORY INSTALLATION OR START-UP.

E. CIRCUIT DIRECTORIES:

1. PROVIDE CUSTOM TYPED CIRCUIT DIRECTORY FOR EACH BRANCH CIRCUIT PANELBOARD. PROVIDE UPDATED CUSTOM TYPED CIRCUIT DIRECTORY FOR EACH EXISTING BRANCH CIRCUIT PANELBOARD WITH NEW OR REVISED CIRCUITS PER THE SCOPE OF WORK. LABEL SHALL INCLUDE EQUIPMENT NAME OR FINAL APPROVED ROOM NAME, ROOM NUMBER, AND LOAD TYPE FOR EACH CIRCUIT (EXAMPLES: SUMP SP-1 OR ROOM 101 RECEPT). REVISE DIRECTORY TO REFLECT CIRCUIT CHANGES REQUIRED TO BALANCE PHASE LOADS. PRINTED COPIES OF THE BID DOCUMENT PANEL SCHEDULES ARE NOT ACCEPTABLE AS CIRCUIT DIRECTORIES.

3.05 OPERATION AND MAINTENANCE MANUALS

A. GENERAL:

1. PROVIDE AN ELECTRONIC COPY OF THE O&M MANUALS AS DESCRIBED BELOW FOR ARCHITECT/ENGINEER'S REVIEW AND APPROVAL. THE ELECTRONIC COPY SHALL BE CORRECTED AS REQUIRED TO ADDRESS THE ARCHITECT/ENGINEER'S COMMENTS. ONCE CORRECTED, ELECTRONIC COPIES AND PAPER COPIES SHALL BE DISTRIBUTED AS DIRECTED BY THE ARCHITECT/ENGINEER.
2. APPROVED O&M MANUALS SHALL BE COMPLETED AND IN THE OWNER'S POSSESSION PRIOR TO OWNER'S ACCEPTANCE AND AT LEAST 10 DAYS PRIOR TO INSTRUCTION OF OPERATING PERSONNEL.

B. OPERATION AND MAINTENANCE INSTRUCTIONS SHALL INCLUDE:

1. TITLE PAGE: INCLUDE TITLE PAGE WITH PROJECT TITLE, ARCHITECT, ENGINEER, CONTRACTOR, ALL SUBCONTRACTORS, AND MAJOR EQUIPMENT SUPPLIERS, WITH ADDRESSES, TELEPHONE NUMBERS, WEBSITE ADDRESSES, EMAIL ADDRESSES AND POINT OF CONTACTS. WEBSITE URLS AND EMAIL ADDRESSES SHALL BE ACTIVE LINKS IN THE ELECTRONIC SUBMITTAL.
2. TABLE OF CONTENTS: INCLUDE A TABLE OF CONTENTS DESCRIBING SPECIFICATION SECTION, SYSTEMS, MAJOR EQUIPMENT, AND INDIVIDUAL ITEMS.
3. COPIES OF ALL FINAL APPROVED SHOP DRAWINGS AND SUBMITTALS. INCLUDE ARCHITECT'S/ENGINEER'S SHOP DRAWING REVIEW COMMENTS. INSERT THE INDIVIDUAL SHOP DRAWING DIRECTLY AFTER THE OPERATION AND MAINTENANCE INFORMATION FOR THE ITEM(S) IN THE REVIEW FORM.
4. COPIES OF ALL FACTORY INSPECTIONS AND/OR EQUIPMENT STARTUP REPORTS.
5. COPIES OF WARRANTIES.
6. SCHEMATIC WIRING DIAGRAMS OF THE EQUIPMENT THAT HAVE BEEN UPDATED FOR FIELD CONDITIONS. FIELD WIRING SHALL HAVE LABEL NUMBERS TO MATCH DRAWINGS.
7. DIMENSIONAL DRAWINGS OF EQUIPMENT.
8. DETAILED PARTS LISTS WITH LISTS OF SUPPLIERS.
9. OPERATING PROCEDURES FOR EACH SYSTEM.
10. MAINTENANCE SCHEDULE AND PROCEDURES. INCLUDE A CHART LISTING MAINTENANCE REQUIREMENTS AND FREQUENCY.
11. REPAIR PROCEDURES FOR MAJOR COMPONENTS.
12. REPLACEMENT PARTS AND SERVICE MATERIAL REQUIREMENTS FOR EACH SYSTEM AND THE FREQUENCY OF SERVICE REQUIRED.
13. INSTRUCTION BOOKS, CARDS, AND MANUALS FURNISHED WITH THE EQUIPMENT.
14. INCLUDE RECORD DRAWINGS OF THE ONE-LINE DIAGRAMS FOR EACH MAJOR SYSTEM. THE GRAPHIC FOR EACH PIECE OF EQUIPMENT SHOWN ON THE ONE-LINE DIAGRAM SHALL BE AN ACTIVE LINK TO ITS ASSOCIATED OPERATION & MAINTENANCE DATA.
15. COPIES OF ALL PANEL SCHEDULES IN ELECTRONIC MICROSOFT EXCEL SPREADSHEET (.XLSX) FILE. EACH PANELBOARD SHALL BE A SEPARATE TAB IN THE WORKBOOK.

3.06 INSTRUCTING THE OWNER'S REPRESENTATIVE

A. ADEQUATELY INSTRUCT THE OWNER'S DESIGNATED REPRESENTATIVES IN THE MAINTENANCE, CARE, AND OPERATION OF THE COMPLETE SYSTEMS INSTALLED UNDER THIS CONTRACT.

B. PROVIDE VERBAL AND WRITTEN INSTRUCTIONS TO THE OWNER'S REPRESENTATIVES BY FACTORY PERSONNEL IN THE CARE, MAINTENANCE, AND OPERATION OF THE EQUIPMENT AND SYSTEMS.

C. CONTRACTOR SHALL MAKE A DVD VIDEO RECORDING OF INSTRUCTIONS TO THE OWNER WHILE EXPLAINING THE SYSTEM SO ADDITIONAL PERSONNEL MAY VIEW THE INSTRUCTIONS AT A LATER DATE. THE VIDEO RECORDING SHALL BE THE PROPERTY OF THE OWNER.

D. THE OWNER HAS THE OPTION TO MAKE A VIDEO RECORDING OF ALL INSTRUCTIONS. COORDINATE SCHEDULE OF INSTRUCTIONS TO FACILITATE THIS RECORDING.

E. THE INSTRUCTIONS SHALL INCLUDE:

1. MAINTENANCE OF EQUIPMENT.
2. START-UP PROCEDURES FOR ALL MAJOR EQUIPMENT.
3. DESCRIPTION OF EMERGENCY SYSTEM OPERATION.

F. NOTIFY THE ARCHITECT/ENGINEER OF THE TIME AND PLACE FOR THE VERBAL INSTRUCTIONS TO BE GIVEN TO THE OWNER'S REPRESENTATIVE SO A REPRESENTATIVE CAN BE PRESENT IF DESIRED.

G. MINIMUM HOURS OF INSTRUCTION TIME FOR EACH ITEM AND/OR SYSTEM SHALL BE AS INDICATED IN EACH INDIVIDUAL SPECIFICATION SECTION.

H. OPERATING INSTRUCTIONS:

1. CONTRACTOR IS RESPONSIBLE FOR ALL INSTRUCTIONS TO THE OWNER'S REPRESENTATIVES FOR THE ELECTRICAL AND SPECIALIZED SYSTEMS.
2. IF THE CONTRACTOR DOES NOT HAVE STAFF THAT CAN ADEQUATELY PROVIDE THE REQUIRED INSTRUCTIONS, THE CONTRACTOR SHALL INCLUDE IN THE BID AN ADEQUATE AMOUNT TO REIMBURSE THE OWNER FOR THE ARCHITECT/ENGINEER TO PERFORM THESE SERVICES.

3.07 RECORD DOCUMENTS

A. THE FOLLOWING PARAGRAPHS SUPPLEMENT DIVISION 1 REQUIREMENTS.

B. MAINTAIN AT THE JOB SITE A SEPARATE AND COMPLETE SET OF ELECTRICAL DRAWINGS AND SPECIFICATIONS WITH ALL CHANGES MADE TO THE SYSTEMS CLEARLY AND PERMANENTLY MARKED IN COMPLETE DETAIL.

C. MARK DRAWINGS AND SPECIFICATIONS TO INDICATE APPROVED SUBSTITUTIONS; CHANGE ORDERS, AND ACTUAL EQUIPMENT AND MATERIALS USED. ALL CHANGE ORDERS, RFI RESPONSES, CLARIFICATIONS AND OTHER SUPPLEMENTAL INSTRUCTIONS SHALL BE MARKED ON THE DOCUMENTS. RECORD DOCUMENTS THAT MERELY REFERENCE THE EXISTENCE OF THE ABOVE ITEMS ARE NOT ACCEPTABLE. SHOULD THIS CONTRACTOR FAIL TO COMPLETE RECORD DOCUMENTS AS REQUIRED BY THIS CONTRACT, THIS CONTRACTOR SHALL REIMBURSE ENGINEER FOR ALL COSTS TO DEVELOP RECORD DOCUMENTS THAT COMPLY WITH THIS REQUIREMENT. REIMBURSEMENT SHALL BE MADE AT THE ENGINEER'S HOURLY RATES IN EFFECT AT THE TIME OF WORK.

D. RECORD CHANGES DAILY AND KEEP THE MARKED DRAWINGS AVAILABLE FOR THE ENGINEER'S EXAMINATION AT ANY NORMAL WORK TIME.

E. UPON COMPLETING THE JOB, AND BEFORE FINAL PAYMENT IS MADE, GIVE THE MARKED-UP DRAWINGS TO THE ENGINEER.

F. RECORD ACTUAL ROUTING OF CONDUITS EXCEEDING 2 INCHES.

3.08 PAINTING

A. PAINT ALL EQUIPMENT THAT IS MARRED OR DAMAGED PRIOR TO THE OWNER'S ACCEPTANCE. PAINT AND COLOR SHALL MATCH ORIGINAL EQUIPMENT PAINT AND SHALL BE OBTAINED FROM THE EQUIPMENT SUPPLIER IF AVAILABLE. ALL EQUIPMENT SHALL HAVE A FINISHED COAT OF PAINT APPLIED UNLESS SPECIFICALLY ALLOWED TO BE PROVIDED WITH A PRIME COAT ONLY.

B. EQUIPMENT IN FINISHED AREAS THAT WILL BE PAINTED TO MATCH THE ROOM DECOR WILL BE PAINTED BY OTHERS. SHOULD THIS CONTRACTOR INSTALL EQUIPMENT IN A FINISHED AREA AFTER THE AREA HAS BEEN PAINTED, THE CONTRACTOR SHALL HAVE THE EQUIPMENT AND ALL ITS SUPPORTS, HANGERS, ETC., PAINTED TO MATCH THE ROOM DECOR. PAINTING SHALL BE PERFORMED AS DESCRIBED IN PROJECT SPECIFICATIONS.

C. EQUIPMENT CABINETS, CASINGS, COVERS, METAL JACKETS, ETC., LOCATED IN EQUIPMENT ROOMS OR CONCEALED SPACES, SHALL BE FURNISHED IN STANDARD FINISH, FREE FROM SCRATCHES, ABRASIONS, CHIPPINGS, ETC.

D. EQUIPMENT IN OCCUPIED SPACES, OR IF STANDARD TO THE UNIT, SHALL HAVE A BAKED PRIMER WITH BAKED ENAMEL FINISH COAT FREE FROM SCRATCHES, ABRASIONS, CHIPPING, ETC. IF COLOR OPTION IS SPECIFIED OR IS STANDARD TO THE UNIT, VERIFY WITH THE ARCHITECT THE COLOR PREFERENCE BEFORE ORDERING.

E. PAINT ALL EQUIPMENT IN UNFINISHED AREAS SUCH AS BOILER ROOM, MECHANICAL SPACES, AND STORAGE ROOMS. EQUIPMENT FURNISHED WITH A SUITABLE FACTORY FINISH NEED NOT BE PAINTED; PROVIDED THE FACTORY APPLIED FINISH IS NOT MARRED OR SPATTERED. IF SO, EQUIPMENT SHALL BE REFINISHED WITH THE SAME PAINT AS WAS FACTORY APPLIED.

F. ALL ELECTRICAL CONDUIT AND EQUIPMENT, FITTINGS, HANGERS, STRUCTURAL SUPPORTS, ETC., IN UNFINISHED AREAS, SUCH AS EQUIPMENT AND STORAGE ROOM AREA, SHALL BE PAINTED TWO (2) COATS OF OIL PAINT OF COLORS SELECTED BY THE ARCHITECT.

G. DO NOT PAINT ELECTRIC CONDUITS IN CRAWL SPACES, TUNNELS, OR SPACES ABOVE SUSPENDED CEILINGS EXCEPT THAT WHERE CONDUIT IS IN A DAMP LOCATION GIVE EXPOSED THREADS AT JOINTS TWO COATS OF SEALER AFTER JOINT IS MADE UP.

H. AFTER SURFACES HAVE BEEN THOROUGHLY CLEANED AND ARE FREE OF OIL, DIRT OR OTHER FOREIGN MATTER, PAINT ALL RACEWAY AND EQUIPMENT WITH THE FOLLOWING:

1. BARE METAL SURFACES - APPLY ONE COAT OF METAL PRIMER SUITABLE FOR THE METAL BEING PAINTED. FINISH WITH TWO COATS OF ALKYD BASE ENAMEL PAINT.
2. PLASTIC SURFACES - PAINT PLASTIC SURFACES WITH TWO COATS OF SEMI-GLOSS ACRYLIC LATEX PAINT.

3.09 ADJUST AND CLEAN

A. THOROUGHLY CLEAN ALL EQUIPMENT AND SYSTEMS PRIOR TO THE OWNER'S FINAL ACCEPTANCE OF THE PROJECT.

B. CLEAN ALL FOREIGN PAINT, GREASE, OIL, DIRT, LABELS, STICKERS, ETC. FROM ALL EQUIPMENT.

C. REMOVE ALL RUBBISH, DEBRIS, ETC., ACCUMULATED DURING CONSTRUCTION FROM THE PREMISES.

3.10 SPECIAL REQUIREMENTS

A. COORDINATE THE INSTALLATION OF ALL EQUIPMENT, CONTROLS, DEVICES, ETC., WITH OTHER TRADES TO MAINTAIN CLEAR ACCESS AREA FOR SERVICING.

B. INSTALL ALL EQUIPMENT TO MAXIMIZE ACCESS TO PARTS NEEDING SERVICE OR MAINTENANCE. REVIEW THE FINAL LOCATION, PLACEMENT, AND ORIENTATION OF EQUIPMENT WITH THE OWNER'S REPRESENTATIVE PRIOR TO SETTING EQUIPMENT.

C. INSTALLATION OF EQUIPMENT OR DEVICES WITHOUT REGARD TO COORDINATION OF ACCESS REQUIREMENTS AND CONFIRMATION WITH THE OWNER'S REPRESENTATIVE WILL RESULT IN REMOVAL AND REINSTALLATION OF THE EQUIPMENT AT THE CONTRACTOR'S EXPENSE.

D. RACEWAY AND CABLE ROUTING RESTRICTIONS: RACEWAYS AND CABLE ARE RESTRICTED FROM BEING ROUTED IN THE FOLLOWING LOCATIONS, UNLESS SERVING THE SPACE OR PERMITTED BY THE AUTHORITY HAVING JURISDICTION.

1. CDPH STANDARD METHOD V1.1-2010 - STANDARD METHOD FOR THE TESTING AND EVALUATION OF VOLATILE ORGANIC CHEMICAL EMISSIONS VOC FROM INDOOR SOURCES USING ENVIRONMENTAL CHAMBERS VERSION 1.1.
2. SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT RULE 1168 - ADHESIVE AND SEALANT APPLICATIONS. ALL ADHESIVES AND SEALANTS WET-APPLIED ON SITE SHALL COMPLY WITH THE APPLICABLE CHEMICAL CONTENT REQUIREMENTS OF SCAQMD RULE 1168.
3. SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT RULE SCAQMD 1113 - WET APPLIED PAINTS AND COATINGS. ALL PAINTS AND COATINGS WET-APPLIED ON SITE MUST MEET THE APPLICABLE VOC LIMITS OF SCAQMD RULE 1113.

3.11 INDOOR AIR QUALITY (IAQ) MAINTENANCE FOR OCCUPIED FACILITIES UNDER CONSTRUCTION

A. WITHIN THE LIMITS OF CONSTRUCTION:

1. THE ELECTRICAL CONTRACTOR SHALL COORDINATE ALL WORK WITH THE CONTRACTOR RESPONSIBLE FOR IAQ.
2. THE MEANS, METHODS AND MATERIALS USED BY THE ELECTRICAL CONTRACTOR SHALL BE COORDINATED WITH THE CONTRACTOR RESPONSIBLE FOR IAQ AND SHALL COMPLY WITH THE IAQ REQUIREMENTS SET FORTH IN DIVISION 1 AND DIVISION 21/22/23 OF THESE SPECIFICATIONS.

B. OUTSIDE THE LIMITS OF CONSTRUCTION:

1. IAQ SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR FOR WORK THAT IS REQUIRED OUTSIDE THE LIMITS OF CONSTRUCTION.
2. THE ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR THE IAQ SET FORTH IN DIVISION 1 AND DIVISION 21/22/23 OF THESE SPECIFICATIONS.
3. THE ELECTRICAL CONTRACTOR SHALL REVIEW AND COORDINATE ALL IAQ PLANS AND PROCEDURES WITH THE OWNER'S IAQ REPRESENTATIVE.

C. CONTRACTORS SHALL MAKE ALL REASONABLE EFFORTS TO PREVENT CONSTRUCTION ACTIVITIES FROM AFFECTING THE AIR QUALITY OF THE OCCUPIED AREAS OF THE BUILDING OR OUTDOOR AREAS NEAR THE BUILDING. THESE MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO:

1. GENERAL CONTRACTOR SHALL ERECT AND MAINTAIN DUST BARRIERS THROUGHOUT THE CONSTRUCTION WORK. THESE BARRIERS SHALL BE REASONABLY AIRTIGHT AND SHALL PREVENT ENTRY INTO THE CONSTRUCTION ZONE BY UNAUTHORIZED PERSONS. REASONABLY AIRTIGHT MEANS CONSTRUCTION EQUIVALENT TO FULL-HEIGHT TEMPORARY OR PERMANENT WALLS WITH JOINTS TAPED OR SEALED, AND SHAFTS AND OTHER PENETRATIONS SEALED AS WELL AS POSSIBLE. FIRE RESISTANT POLYETHYLENE IS ACCEPTABLE; IF FLAME SPREAD/SMOKE DEVELOPED RATINGS ARE DEMONSTRATED TO CONFORM TO THE APPLICABLE BUILDING CODES AND LICENSING ACTS.
2. THE CONTRACTOR SHALL CONTINUOUSLY MAINTAIN THE CONSTRUCTION ZONE UNDER A NEGATIVE PRESSURE OF AT LEAST 0.01" W.G. MINIMUM RELATIVE TO ALL ADJACENT AREAS OF THE BUILDING.
   a. EXHAUST FANS USED FOR THIS PURPOSE SHALL FILTER AIR AND DISCHARGE IT OUTDOORS OR TO THE LEAST POPULATED AREA ADJACENT TO THE CONSTRUCTION WORK USING NEGATIVE AIR MACHINES DESIGNED SPECIFICALLY FOR THIS PURPOSE. ALL FILTRATION FOR AIR RECIRCULATED BACK INTO THE BUILDING SHALL BE HEPA (99.97% DOP EFFICIENCY) FOR WORK ADJACENT TO HEALTHCARE OR ELDERLY FACILITIES. IF NO WORK IS ADJACENT TO THESE AREAS, 95% FILTRATION IS ACCEPTABLE. FILTERING AIR DISCHARGED TO OUTDOORS SHALL BE ACCOMPLISHED WITH 30% FILTERS.
   b. IF AIR IS DISCHARGED OUTDOORS, MAINTAIN ALL REQUIRED DISTANCES TO DOORS, WINDOWS, AIR INTAKES, ETC.
   c. IF HIGH LEVELS OF VOLATILE ORGANIC COMPOUNDS (VOC'S) OR ODORS ARE RELEASED, ACTIVATED CARBON OR EQUIVALENT FILTRATION SHALL ALSO BE EMPLOYED. EXHAUST SHALL NOT DISCHARGE NEAR DOORS, AIR INTAKES, PEDESTRIANS, GATHERING AREAS, OR OPERABLE WINDOWS.
   d. ADJUSTING EXISTING AIR HANDLING EQUIPMENT TO ASSIST IN PRESSURE CONTROL IS ACCEPTABLE, IF APPROVED BY THE OWNER AND THE AUTHORITY HAVING JURISDICTION.
   e. SEAL RETURN, EXHAUST, AND SUPPLY AIR OPENINGS IN OR NEAR THE CONSTRUCTION ZONE THAT SERVE EXISTING AIR HANDLING SYSTEMS, AND REBALANCE THE SYSTEMS FOR PROPER OPERATION. IF THIS IS IMPRACTICAL, ADD FILTERS AT THE INTAKES OF SUFFICIENT CROSS SECTIONAL AREA TO MINIMIZE THE PRESSURE DROP AND AVOID THE NEED FOR REBALANCING.
   f. MAINTAIN PRESSURE CONTROL ONE HOUR BEFORE AND AFTER ALL CONSTRUCTION PERIODS, AND 24 HOURS PER DAY IN HEALTHCARE OR ELDERLY FACILITIES.
3. ALL CONTRACTORS SHALL ENDEAVOR TO MINIMIZE THE AMOUNT OF CONTAMINANTS GENERATED DURING CONSTRUCTION. METHODS TO BE EMPLOYED SHALL INCLUDE, BUT NOT BE LIMITED TO:
   a. MINIMIZING THE AMOUNT OF DUST GENERATED.
   b. REDUCING SOLVENT FUMES AND VOC EMISSIONS.
   c. MAINTAIN GOOD HOUSEKEEPING PRACTICES, INCLUDING SWEEPING AND PERIODIC DUST AND DEBRIS REMOVAL. THERE SHOULD BE NO VISIBLE HAZE IN THE AIR.
4. REQUEST THAT THE OWNER DESIGNATE AN IAQ REPRESENTATIVE.
5. REVIEW AND RECEIVE APPROVAL FROM THE OWNER'S IAQ REPRESENTATIVE FOR ALL IAQ-RELATED CONSTRUCTION ACTIVITIES AND NEGATIVE PRESSURE CONTAINMENT PLANS.
6. INFORM THE IAQ REPRESENTATIVE OF ALL CONDITIONS THAT COULD ADVERSELY IMPACT IAQ, INCLUDING OPERATIONS THAT WILL PRODUCE HIGHER THAN NORMAL DUST PRODUCTION OR ODORS.
7. SCHEDULE ACTIVITIES THAT MAY CAUSE IAQ CONDITIONS THAT ARE NOT ACCEPTABLE TO THE OWNER'S IAQ REPRESENTATIVE DURING UNOCCUPIED PERIODS.
8. REQUEST COPIES OF AND FOLLOW ALL OWNER'S IAQ AND INFECTION CONTROL POLICIES.
9. UNLESS NO OTHER ACCESS IS POSSIBLE, THE ENTRANCE TO CONSTRUCTION SITE SHALL NOT BE THROUGH THE EXISTING FACILITY.
10. TO MINIMIZE GROWTH OF INFECTIOUS ORGANISMS, DO NOT PERMIT DAMP AREAS IN OR NEAR THE CONSTRUCTION AREA TO REMAIN FOR OVER 24 HOURS.
11. IN ADDITION TO THE CRITERIA ABOVE, PROVIDE MEASURES AS RECOMMENDED IN THE SMACNA "IAQ GUIDELINES FOR OCCUPIED BUILDINGS UNDER CONSTRUCTION".

3.12 SYSTEM STARTING AND ADJUSTING

A. THE ELECTRICAL SYSTEMS SHALL BE COMPLETE AND OPERATING. SYSTEM STARTUP, TESTING, ADJUSTING, AND BALANCING TO OBTAIN SATISFACTORY SYSTEM PERFORMANCE IS THE RESPONSIBILITY OF THE CONTRACTOR. THIS INCLUDES ALL CALIBRATION AND ADJUSTMENT OF ELECTRICAL CONTROLS, BALANCING OF LOADS, TROUBLESHOOTING AND VERIFICATION OF SOFTWARE, AND FINAL ADJUSTMENTS THAT MAY BE NEEDED.

B. COMPLETE ALL MANUFACTURER-RECOMMENDED STARTUP PROCEDURES AND CHECKLISTS TO VERIFY PROPER EQUIPMENT OPERATION AND DOES NOT POSE A DANGER TO PERSONNEL OR PROPERTY.

C. ALL OPERATING CONDITIONS AND CONTROL SEQUENCES SHALL BE TESTED DURING THE START-UP PERIOD. TESTING ALL INTERLOCKS, SAFETY SHUT-DOWNS, CONTROLS, AND ALARMS.

D. THE CONTRACTOR, SUBCONTRACTORS, AND EQUIPMENT SUPPLIERS SHALL HAVE SKILLED TECHNICIANS TO ENSURE THAT ALL SYSTEMS PERFORM PROPERLY. IF THE ARCHITECT/ENGINEER IS REQUESTED TO VISIT THE JOB SITE FOR TROUBLE SHOOTING, ASSISTING IN START-UP, OBTAINING SATISFACTORY EQUIPMENT OPERATION, RESOLVING INSTALLATION AND/OR WORKMANSHIP PROBLEMS, EQUIPMENT SUBSTITUTION ISSUES OR UNSATISFACTORY SYSTEM PERFORMANCE, INCLUDING CALL BACKS DURING THE WARRANTY PERIOD, THROUGH NO FAULT OF THE DESIGN; THE CONTRACTOR SHALL REIMBURSE THE OWNER ON A TIME AND MATERIALS BASIS FOR SERVICES RENDERED AT THE ARCHITECT/ENGINEER'S STANDARD HOURLY RATES IN EFFECT WHEN THE SERVICES ARE REQUESTED. THE CONTRACTOR SHALL PAY THE OWNER FOR SERVICES REQUIRED THAT ARE PRODUCT, INSTALLATION OR WORKMANSHIP RELATED. PAYMENT IS DUE WITHIN 30 DAYS AFTER SERVICES ARE RENDERED.

3.13 FIELD QUALITY CONTROL

A. GENERAL:

1. CONDUCT ALL TESTS REQUIRED DURING AND AFTER CONSTRUCTION. SUBMIT TEST RESULTS IN NETA FORMAT, OR EQUIVALENT FORM, THAT SHOWS THE TEST EQUIPMENT USED, CALIBRATION DATE, TESTER'S NAME, AMBIENT TEST CONDITIONS, HUMIDITY, CONDUCTOR LENGTH, AND RESULTS CORRECTED TO 40°C.
2. SUPPLY NECESSARY INSTRUMENTS, METERS, ETC., FOR THE TESTS. SUPPLY COMPETENT TECHNICIANS WITH TRAINING IN THE PROPER TESTING TECHNIQUES.
3. ALL CABLES AND WIRES SHALL BE TESTED FOR SHORTS AND GROUNDS FOLLOWING INSTALLATION AND CONNECTION TO DEVICES. REPLACE SHORTED OR GROUNDED WIRES AND CABLES.
4. ANY WIRING DEVICE, ELECTRICAL APPARATUS OR LUMINAIRE, IF GROUNDED OR SHORTED ON ANY INTEGRAL "LIVE" PART, SHALL HAVE ALL DEFECTIVE PARTS OR MATERIALS REPLACED.
5. TEST CABLE INSULATION OF SERVICE AND PANEL FEEDER CONDUCTORS FOR PROPER INSULATION VALUES. TESTS SHALL INCLUDE THE CABLE, ALL SPLICES, AND ALL TERMINATIONS. EACH CONDUCTOR SHALL BE TESTED AND SHALL TEST FREE OF SHORT CIRCUITS AND GROUNDS AND HAVE AN INSULATION VALUE NOT LESS THAN ELECTRICAL CODE STANDARDS. TAKE READINGS BETWEEN CONDUCTORS, AND BETWEEN CONDUCTORS AND GROUND.
6. IF THE RESULTS OBTAINED IN THE TESTS ARE NOT SATISFACTORY, MAKE ADJUSTMENTS, REPLACEMENTS, AND CHANGES AS NEEDED. THEN REPEAT THE TESTS, AND MAKE ADDITIONAL TESTS, AS THE ARCHITECT/ENGINEER OR AUTHORITY HAVING JURISDICTION DEEMS NECESSARY.

B. GROUND RESISTANCE:

1. CONDUCT SERVICE GROUND RESISTANCE TESTS USING AN APPROVED MANUFACTURED GROUND RESISTANCE METER. SUBMIT TO THE ARCHITECT/ENGINEER A PROPOSED TEST PROCEDURE INCLUDING TYPE OF EQUIPMENT TO BE USED. (THE CONVENTIONAL OHMMETER IS NOT AN ACCEPTABLE DEVICE.)
2. MAKE GROUND RESISTANCE MEASUREMENTS DURING NORMAL DRY WEATHER AND NOT LESS THAN 48 HOURS AFTER A RAIN. GROUND RESISTANCE VALUES SHALL BE VERIFIED BY THE ARCHITECT/ENGINEER AT THE TIME THE READINGS ARE TAKEN.
3. IF THE GROUND RESISTANCE VALUE OBTAINED IS MORE THAN THE VALUE SET FORTH IN SECTION 26 05 26, THE FOLLOWING SHALL BE DONE TO OBTAIN THE VALUE GIVEN:
   a. VERIFY THAT ALL CONNECTIONS IN THE SERVICE GROUND SYSTEM ARE SECURE.
   b. INCREASE THE DEPTH TO WHICH GROUND RODS ARE DRIVEN BY ADDING SECTION LENGTHS TO THE RODS AND RETEST. IF THE RESISTANCE IS STILL EXCESSIVE INCREASE THE DEPTH BY ADDING AN ADDITIONAL ROD SECTION AND RETEST.
   c. IF THE RESISTANCE IS STILL EXCESSIVE, FURNISH AND INSTALL ADDITIONAL GROUND RODS, SPACED NOT LESS THAN 20 FEET FROM OTHER GROUND RODS UNLESS OTHERWISE NOTED ON PLANS, AND CONNECT INTO THE GROUND ELECTRODE SYSTEM. RETEST.
   d. REVIEW RESULTS WITH THE ARCHITECT/ENGINEER.
4. BEFORE FINAL PAYMENT IS MADE TO THE CONTRACTOR SUBMIT A WRITTEN REPORT TO THE ARCHITECT/ENGINEER INCLUDING THE FOLLOWING:
   a. DATE OF TEST.
   b. NUMBER OF HOURS SINCE THE LAST RAIN.
   c. SOIL CONDITION AT THE TIME OF THE TEST IN THE GROUND ELECTRODE LOCATION. THAT IS: DRY, WET, MOIST, SAND, CLAY, ETC.
   d. DIAGRAM OF THE TEST SET-UP SHOWING DISTANCES BETWEEN TEST EQUIPMENT, GROUND ELECTRODE, AUXILIARY ELECTRODES, ETC.
   e. MAKE, MODEL, AND CALIBRATION DATE OF TEST EQUIPMENT.
   f. TABULATION OF MEASUREMENTS TAKEN AND CALCULATIONS MADE.

C. GROUND-FAULT EQUIPMENT PERFORMANCE TESTING:

1. TEST: PERFORM GROUND-FAULT PERFORMANCE TESTING WHEN SYSTEM IS INSTALLED. THE TEST PROCESS SHALL USE PRIMARY CURRENT INJECTION PER MANUFACTURER INSTRUCTION AND PROCEDURES. PERFORM TEST FOR THE FOLLOWING:
   a. SERVICE DISCONNECTS
   b. SOLID STATE MOLDED CASE CIRCUIT BREAKERS AND SOLID-STATE INSULATED CASE CIRCUIT BREAKERS EQUIPPED WITH GROUND FAULT PROTECTION.
   c. FUSIBLE SWITCHES WITH GROUND FAULT RELAY PROTECTION.
   d. OUTSIDE BRANCH CIRCUITS AND FEEDERS.
   e. CODE REQUIRED.
2. REPORT: PROVIDE COPY OF TEST RESULT REPORT WITH OPERATION AND MAINTENANCE MANUALS. PROVIDE REPORT TO AUTHORITY HAVING JURISDICTION WHEN REQUESTED.

D. ARC ENERGY REDUCTION EQUIPMENT PERFORMANCE TESTING:

1. TEST: PERFORM ARC ENERGY PROTECTION PERFORMANCE TESTING WHEN SYSTEM IS INSTALLED. THE TEST PROCESS SHALL USE PRIMARY CURRENT INJECTION OR APPROVED METHOD PER MANUFACTURER INSTRUCTIONS AND PROCEDURES. PERFORM TEST FOR THE FOLLOWING:
   a. ALL ARC ENERGY REDUCTION SYSTEMS INSTALLED.
2. REPORT: PROVIDE COPY OF TEST RESULT REPORT WITH OPERATION AND MAINTENANCE MANUALS. PROVIDE REPORT TO AUTHORITY HAVING JURISDICTION WHEN REQUESTED.

E. IF ANY TEST RESULTS ARE NOT SATISFACTORY, MAKE ADJUSTMENTS, REPLACEMENTS AND CHANGES AS NEEDED AND REPEAT THE TESTS AND MAKE ADDITIONAL TESTS AS THE ARCHITECT/ENGINEER OR AUTHORITY HAVING JURISDICTION DEEM NECESSARY.

F. CONTRACTOR SHALL THERMOGRAPHIC STUDY ALL ELECTRICAL GEAR, SWITCHBOARD, PANELBOARDS, ETC. AT THE END OF CONSTRUCTION TO IDENTIFY ANY UNUSUAL CONDITIONS/HEATING WITHIN THE EQUIPMENT. COORDINATE WITH OWNER/ARCHITECT/ENGINEER TO HAVE AN OWNER/ARCHITECT/ENGINEER REPRESENTATIVE PRESENT DURING TESTING.

G. REPORT SHALL INCLUDE COLOR PRINTOUTS, IN BINDER, OF PICTURES TAKEN TO USE AS A BASELINE READING AFTER BUILDING IS OCCUPIED.

H. UPON COMPLETION OF THE PROJECT, THE CONTRACTOR SHALL PROVIDE AMPERAGE READINGS FOR ALL PANELBOARDS AND SWITCHBOARDS AND TURN THE RESULTS OVER TO THE OWNER FOR "BENCHMARK" AMPERAGES.

3.14 UTILITY REBATE

A. SUBMIT UTILITY REBATE FORMS, WHERE OFFERED AT PROJECT LOCATION, WITH REBATE ITEMS COMPLETED. REBATE MAY INCLUDE LIGHTING, LIGHTING CONTROLS, VARIABLE SPEED DRIVES, HEAT PUMPS, PACKAGE TERMINAL A/C, AIR CONDITIONERS, CHILLERS, WATER HEATERS, PROGRAMMABLE THERMOSTATS, AND MOTORS.

B. CONTRACTOR MUST SUBMIT NOTIFICATION OF ANY VALUE ENGINEERING OR PRODUCT SUBSTITUTION THAT WILL AFFECT THE UTILITY REBATE AMOUNT PRIOR TO APPROVAL.

READINESS CERTIFICATION PRIOR TO FINAL JOBSITE OBSERVATION

TO PREVENT THE FINAL JOB OBSERVATION FROM OCCURRING TOO EARLY, WE REQUIRE THAT THE CONTRACTOR REVIEW THE COMPLETION STATUS OF THE PROJECT AND, BY COPY OF THIS DOCUMENT, CERTIFY THAT THE JOB IS INDEED READY FOR THE FINAL JOB OBSERVATION. THE FOLLOWING IS A TYPICAL LIST OF ITEMS THAT REPRESENT THE DEGREE OF JOB COMPLETENESS EXPECTED PRIOR TO REQUESTING A FINAL JOB OBSERVATION.

1. PENETRATIONS OF FIRE-RATED CONSTRUCTION FIRE SEALED IN ACCORDANCE WITH SPECIFICATIONS.

2. ELECTRICAL PANELS HAVE TYPED CIRCUIT IDENTIFICATION.

3. SMOKE AND FIRE/SMOKE DAMPERS ARE WIRED AND HAVE BEEN TESTED.

4. PER SECTION 26 05 00, CABLE INSULATION TEST RESULTS HAVE BEEN SUBMITTED.

5. PER SECTION 26 05 00, MEDIUM VOLTAGE TESTING REPORT HAS BEEN SUBMITTED.

6. PER SECTION 26 05 00, GROUND RESISTANCE TEST RESULTS HAVE BEEN SUBMITTED.

7. OPERATION AND MAINTENANCE MANUALS HAVE BEEN SUBMITTED AS PER SECTION 26 05 00.

8. BOUND COPIES OF APPROVED SHOP DRAWINGS HAVE BEEN SUBMITTED AS PER SECTION 26 05 00.

9. REPORT OF INSTRUCTION OF OWNER'S REPRESENTATIVE HAS BEEN SUBMITTED AS PER SECTION 26 05 00.

10. FIRE ALARM INSPECTION AND TESTING REPORT HAS BEEN SUBMITTED AS PER SECTIONS 26 05 00 AND 28 31 00.

11. START-UP REPORTS FROM FACTORY REPRESENTATIVE HAVE BEEN SUBMITTED AS PER SECTION 26 05 00.

ACCEPTED BY:

PRIME CONTRACTOR ______________________________

BY ______________________________ DATE ________________

UPON CONTRACTOR CERTIFICATION THAT THE PROJECT IS COMPLETE AND READY FOR A FINAL JOB OBSERVATION, WE REQUIRE THE CONTRACTOR TO SIGN THIS AGREEMENT AND RETURN IT TO THE ARCHITECT/ENGINEER SO THAT THE FINAL OBSERVATION CAN BE SCHEDULED.

IT IS UNDERSTOOD THAT IF THE ARCHITECT/ENGINEER FINDS THE JOB NOT READY FOR THE FINAL OBSERVATION AND THAT ADDITIONAL TRIPS AND OBSERVATIONS ARE REQUIRED TO BRING THE PROJECT TO COMPLETION, THE COSTS INCURRED BY THE ARCHITECT/ENGINEERS FOR ADDITIONAL TIME AND EXPENSES WILL BE DEDUCTED FROM THE CONTRACTOR'S CONTRACT RETAINAGE PRIOR TO FINAL PAYMENT AT THE COMPLETION OF THE JOB.

END OF SECTION 26 05 00

SECTION 26 05 03 - THROUGH PENETRATION FIRESTOPPING

PART 4 - GENERAL

4.01 SECTION INCLUDES

A. THROUGH-PENETRATION FIRESTOPPING.

4.02 QUALITY ASSURANCE

A. MANUFACTURER: COMPANY SPECIALIZING IN MANUFACTURING PRODUCTS SPECIFIED IN THIS SECTION.

B. INSTALLER: INDIVIDUALS PERFORMING WORK SHALL BE CERTIFIED BY THE MANUFACTURER OF THE SYSTEM SELECTED FOR INSTALLATION.

4.03 REFERENCES

A. UL 263 - FIRE TESTS OF BUILDING CONSTRUCTION AND MATERIALS
B. UL 723 - SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS
C. ANSI/UL 1479 - FIRE TESTS OF THROUGH PENETRATION FIRESTOPS
D. UL 2079 - TESTS FOR FIRE RESISTANCE OF BUILDING JOINT SYSTEMS
E. UL FIRE RESISTANCE DIRECTORY THROUGH PENETRATION FIRESTOP SYSTEMS (XHEZ)
F. INTERTEK / WARNOCK HERSEY - DIRECTORY OF LISTED PRODUCTS
G. ASTM E84 - STANDARD TEST METHOD FOR SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS
H. ASTM E814 - STANDARD TEST METHOD FOR FIRE TESTS OF THROUGH-PENETRATION FIRESTOPS
I. 2021 INTERNATIONAL BUILDING CODE
J. NFPA 5000 - BUILDING CONSTRUCTION SAFETY CODE
K. CBC CALIFORNIA BUILDING CODE

4.04 SUBMITTALS

A. SUBMIT UNDER PROVISIONS OF SECTION 26 05 00.

B. SUBMIT FIRESTOPPING INSTALLERS CERTIFICATION FOR ALL INSTALLERS ON THE PROJECT.

C. SHOP DRAWINGS: SUBMIT FOR EACH CONDITION REQUIRING FIRESTOPPING. INCLUDE DESCRIPTIONS OF THE SPECIFIC PENETRATING ITEM, ACTUAL WALL/FLOOR CONSTRUCTION, MANUFACTURER'S INSTALLATION INSTRUCTIONS, AND UL OR INTEREK / WARNOCK HERSEY ASSEMBLY NUMBER.

D. THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE: INDICATE LOCATIONS OF EACH THROUGH-PENETRATION FIRESTOP SYSTEM, ALONG WITH THE FOLLOWING INFORMATION:

1. TYPES OF PENETRATING ITEMS.
2. TYPES OF CONSTRUCTIONS PENETRATED, INCLUDING FIRE-RESISTANCE RATINGS AND, WHERE APPLICABLE, THICKNESSES OF CONSTRUCTION PENETRATED.
3. THROUGH-PENETRATION FIRESTOP SYSTEMS FOR EACH LOCATION IDENTIFIED BY FIRESTOP DESIGN DESIGNATION OF QUALIFIED TESTING AND INSPECTING AGENCY.
4. F RATINGS FOR EACH FIRESTOP SYSTEM.

E. MAINTAIN A NOTEBOOK ON THE JOB SITE AT ALL TIMES THAT CONTAINS COPIES OF APPROVED SUBMITTALS FOR ALL THROUGH PENETRATION FIRESTOPPING TO BE INSTALLED. NOTEBOOK SHALL BE MADE AVAILABLE TO THE AUTHORITY HAVING JURISDICTION AT THEIR REQUEST AND TURNED OVER TO THE OWNER AT THE END OF CONSTRUCTION AS PART OF THE O&M MANUALS.

F. SUBMIT VOC RATING OF FIRESTOPPING MATERIAL IN G/L (LESS WATER) WITH DOCUMENTATION THAT IT MEETS THE LIMITS SET FORTH IN SCAQMD RULE 1168.

4.05 DELIVERY, STORAGE, AND HANDLING

A. STORE, PROTECT AND HANDLE PRODUCTS ON SITE. ACCEPT MATERIAL ON SITE IN FACTORY CONTAINERS AND PACKING. INSPECT FOR DAMAGE. PROTECT FROM DETERIORATION OR DAMAGE DUE TO MOISTURE, TEMPERATURE CHANGES, CONTAMINANTS, OR OTHER CAUSES. FOLLOW MANUFACTURER'S INSTRUCTIONS FOR STORAGE.

B. INSTALL MATERIAL PRIOR TO EXPIRATION OF PRODUCT SHELF LIFE.

4.06 PERFORMANCE REQUIREMENTS

A. GENERAL: FOR PENETRATIONS THROUGH THE FOLLOWING FIRE-RESISTANCE-RATED CONSTRUCTIONS, INCLUDING BOTH EMPTY OPENINGS AND OPENINGS CONTAINING PENETRATING ITEMS, PROVIDE THROUGH-PENETRATION FIRESTOP SYSTEMS THAT ARE PRODUCED AND INSTALLED TO RESIST SPREAD OF FIRE ACCORDING TO REQUIREMENTS INDICATED, RESIST PASSAGE OF SMOKE AND OTHER GASES, AND MAINTAIN ORIGINAL FIRE-RESISTANCE RATING OF CONSTRUCTION PENETRATED.

1. FIRE-RESISTANCE-RATED WALLS INCLUDING FIRE PARTITIONS, FIRE BARRIERS, AND SMOKE BARRIERS.
2. FIRE-RESISTANCE-RATED HORIZONTAL ASSEMBLIES INCLUDING FLOORS, FLOOR/CEILING ASSEMBLIES, AND CEILING MEMBRANES OF ROOF/CEILING ASSEMBLIES.

B. RATED SYSTEMS: PROVIDE THROUGH-PENETRATION FIRESTOP SYSTEMS WITH THE FOLLOWING RATINGS DETERMINED PER UL 1479:

1. F-RATED SYSTEMS: PROVIDE THROUGH-PENETRATION FIRESTOP SYSTEMS WITH F-RATINGS INDICATED, BUT NOT LESS THAN THAT EQUALING OR EXCEEDING FIRE-RESISTANCE RATING OF CONSTRUCTIONS PENETRATED.
2. L-RATED SYSTEMS: PROVIDE THROUGH-PENETRATION FIRESTOP SYSTEMS WITH L-RATINGS OF NOT MORE THAN 5.0 CFM/SQ. FT. AT BOTH AMBIENT TEMPERATURE AND 400F.

C. FOR THROUGH-PENETRATION FIRESTOP SYSTEMS EXPOSED TO LIGHT, TRAFFIC, MOISTURE, OR PHYSICAL DAMAGE, PROVIDE PRODUCTS THAT, AFTER CURING, DO NOT DETERIORATE WHEN EXPOSED TO THESE CONDITIONS BOTH DURING AND AFTER CONSTRUCTION.

D. FOR THROUGH-PENETRATION FIRESTOP SYSTEMS EXPOSED TO VIEW, PROVIDE PRODUCTS WITH FLAME-SPREAD AND SMOKE-DEVELOPED INDEXES OF LESS THAN 25 AND 450, RESPECTIVELY, AS DETERMINED PER ASTM E 84.

E. FOR THROUGH-PENETRATION FIRESTOP SYSTEMS IN AIR PLENUMS, PROVIDE PRODUCTS WITH FLAME-SPREAD AND SMOKE-DEVELOPED INDEXES OF LESS THAN 25 AND 50, RESPECTIVELY, AS DETERMINED PER ASTM E 84.

1. CDPH STANDARD METHOD V1.1-2010 - STANDARD METHOD FOR THE TESTING AND EVALUATION OF VOLATILE ORGANIC CHEMICAL EMISSIONS VOC FROM INDOOR SOURCES USING ENVIRONMENTAL CHAMBERS VERSION 1.1.
2. SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT RULE 1168 - ADHESIVE AND SEALANT APPLICATIONS. ALL ADHESIVES AND SEALANTS WET-APPLIED ON SITE SHALL COMPLY WITH THE APPLICABLE CHEMICAL CONTENT REQUIREMENTS OF SCAQMD RULE 1168.
3. SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT RULE SCAQMD 1113 - WET APPLIED PAINTS AND COATINGS. ALL PAINTS AND COATINGS WET-APPLIED ON SITE MUST MEET THE APPLICABLE VOC LIMITS OF SCAQMD RULE 1113.

4.07 MEETINGS

A. PRE-INSTALLATION MEETING: A PRE-INSTALLATION MEETING SHALL BE SCHEDULED AND SHALL INCLUDE THE CONSTRUCTION MANAGER, GENERAL CONTRACTOR, ALL SUBCONTRACTORS ASSOCIATED WITH THE INSTALLATION OF SYSTEMS PENETRATING FIRE BARRIERS, FIRESTOPPING MANUFACTURER'S REPRESENTATIVE, AND THE OWNER.

1. REVIEW FORESEEABLE METHODS RELATED TO FIRESTOPPING WORK.
2. TOUR REPRESENTATIVE AREAS WHERE FIRESTOPPING IS TO BE INSTALLED; INSPECT AND DISCUSS EACH TYPE OF CONDITION AND EACH TYPE OF SUBSTRATE THAT WILL BE ENCOUNTERED, AND PREPARATION TO BE PERFORMED BY OTHER TRADES.

4.08 WARRANTY

A. PROVIDE ONE YEAR WARRANTY ON PARTS AND LABOR.

B. WARRANTY SHALL COVER REPAIR OR REPLACEMENT OF FIRESTOP SYSTEMS WHICH FAIL IN JOINT ADHESION, COHESION, ABRASION RESISTANCE, WEATHER RESISTANCE, EXTRUSION RESISTANCE, MIGRATION RESISTANCE, STAIN RESISTANCE, GENERAL DURABILITY, OR APPEAR TO DETERIORATE IN ANY MANNER NOT CLEARLY SPECIFIED BY THE MANUFACTURER AS AN INHERENT QUALITY OF THE MATERIAL.

PART 5 - PRODUCTS

5.01 MANUFACTURERS

A. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE THROUGH-PENETRATION FIRESTOP SYSTEMS INDICATED FOR EACH APPLICATION THAT ARE PRODUCED BY ONE OF THE FOLLOWING MANUFACTURERS. ALL FIRESTOPPING SYSTEMS INSTALLED SHALL BE PROVIDED BY A SINGLE MANUFACTURER.

1. 3M; FIRE PROTECTION PRODUCTS DIVISION
2. HILTI, INC.

5.02 THROUGH PENETRATION FIRESTOP SYSTEMS

A. PROVIDE MATERIALS AND SYSTEMS CLASSIFIED BY OR LISTED BY INTERTEK / WARNOCK HERSEY TO PROVIDE FIRESTOPPING EQUAL TO TIME RATING OF CONSTRUCTION BEING PENETRATED.

B. ALL FIRESTOPPING MATERIALS SHALL BE FREE OF ASBESTOS, LEAD, PCB'S, AND OTHER MATERIALS THAT WOULD REQUIRE HAZARDOUS WASTE REMOVAL.

C. FIRESTOPPING SHALL BE FLEXIBLE TO ALLOW FOR NORMAL PENETRATING ITEM MOVEMENT DUE TO EXPANSION AND CONTRACTION.

D. PROVIDE FIRESTOPPING SYSTEMS CAPABLE OF SUPPORTING FLOOR LOADS WHERE SYSTEMS ARE EXPOSED TO POSSIBLE FLOOR LOADING OR TRAFFIC.

E. PROVIDE FIRESTOPPING SYSTEMS ALLOWING CONTINUOUS INSULATION FOR ALL INSULATED PIPES.

PENETRATING ITEM	UL SYSTEM NO.
NO PENETRATING ITEM	FC 0000-0999*
METALLIC PIPE OR CONDUIT	FC 1000-1999
NON-METALLIC PIPE OR CONDUIT	FC 2000-2999
ELECTRICAL CABLES	FC 3000-3999
CABLE TRAYS	FC 4000-4999
INSULATED PIPES	FC 5000-5999
BUS DUCT AND MISC. ELECTRICAL	FC 6000-6999
DUCT WITHOUT DAMPER AND MISC. MECHANICAL	FC 7000-7999
MULTIPLE PENETRATIONS	FC 8000-8999

*ALTERNATE METHOD OF FIRESTOPPING IS PATCHING OPENING TO MATCH ORIGINAL RATED CONSTRUCTION.

PENETRATING ITEM	UL SYSTEM NO.
NO PENETRATING ITEM	WL 0000-0999*
METALLIC PIPE OR CONDUIT	WL 1000-1999
NON-METALLIC PIPE OR CONDUIT	WL 2000-2999
ELECTRICAL CABLES	WL 3000-3999
CABLE TRAYS	WL 4000-4999
INSULATED PIPES	WL 5000-5999
BUS DUCT AND MISC. ELECTRICAL	WL 6000-6999
DUCT WITHOUT DAMPER AND MISC. MECHANICAL	WL 7000-7999
MULTIPLE PENETRATIONS	WL 8000-8999

*ALTERNATE METHOD OF FIRESTOPPING IS PATCHING OPENING TO MATCH ORIGINAL RATED CONSTRUCTION.

F. ANY OPENING IN WALLS OR FLOORS NOT COVERED BY THE LISTED SERIES OF NUMBERS SHALL BE COORDINATED WITH THE FIRESTOPPING MANUFACTURER.

G. ANY OPENINGS IN FLOORS OR WALLS NOT DESCRIBED IN THE UL OR LISTED BY INTERTEK / WARNOCK HERSEY FIRE RESISTANCE DIRECTORY, OR OUTLINED IN MANUFACTURER'S INFORMATION SHALL BE SEALED IN A MANNER AGREED UPON BY THE FIRESTOPPING MANUFACTURER, OWNER, AND THE AUTHORITY HAVING JURISDICTION.

PART 6 - EXECUTION

6.01 EXAMINATION

A. ENSURE ALL SURFACES THAT CONTACT SEAL MATERIALS ARE FREE OF DIRT, DUST, GREASE, OIL, RUST, OR LOOSE MATERIALS. CLEAN AND REPAIR SURFACES AS REQUIRED. REMOVE LAITANCE AND FORM-RELEASE AGENTS FROM CONCRETE.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 03-125900 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 03/18/2026

LPA

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ELECTRICAL SPECIFICATIONS

B. ENSURE SUBSTRATE AND PENETRATING ITEMS HAVE BEEN PERMANENTLY INSTALLED PRIOR TO INSTALLING FIRESTOPPING SYSTEMS. ENSURE PENETRATING ITEMS HAVE BEEN PROPERLY SPACED AND HAVE PROPER CLEARANCE PRIOR TO INSTALLING FIRESTOPPING SYSTEMS.

C. SURFACES TO WHICH SEALING MATERIALS ARE TO BE INSTALLED MUST MEET THE SELECTED UL OR INTERTEK / WARNOCK HERSEY SYSTEM SUBSTRATE CRITERIA.

D. PRIME SUBSTRATES WHERE RECOMMENDED IN WRITING BY THROUGH-PENETRATION FIRESTOP SYSTEM MANUFACTURER. CONFINE PRIMER TO AREA OF BOND.

6.02 INSTALLATION

A. IN EXISTING CONSTRUCTION, PROVIDE FIRESTOPPING OF OPENINGS PRIOR TO AND AFTER INSTALLATION OF PENETRATING ITEMS. REMOVE ANY EXISTING COATINGS ON SURFACES PRIOR TO FIRESTOPPING INSTALLATION. TEMPORARY FIRESTOPPING SHALL CONSIST OF PACKING OPENINGS WITH FIRE RESISTANT MINERAL WOOL FOR THE FULL THICKNESS OF SUBSTRATE, OR AN ALTERNATE METHOD APPROVED BY THE AUTHORITY HAVING JURISDICTION. ALL OPENINGS SHALL BE TEMPORARILY FIRESTOPPED IMMEDIATELY UPON THEIR INSTALLATION AND SHALL REMAIN SO UNTIL THE PERMANENT UL OR LISTED BY INTERTEK / WARNOCK HERSEY LISTED FIRESTOPPING SYSTEM IS INSTALLED.

B. INSTALL PENETRATION SEAL MATERIALS IN ACCORDANCE WITH PRINTED INSTRUCTIONS OF THE UL OR INTERTEK / WARNOCK HERSEY FIRE RESISTANCE DIRECTORY AND WITH THE MANUFACTURER'S PRINTED APPLICATION INSTRUCTIONS.

C. INSTALL DAMS AS REQUIRED TO PROPERLY CONTAIN FIRESTOPPING MATERIALS WITHIN OPENINGS AND AS REQUIRED TO ACHIEVE REQUIRED FIRE RESISTANCE RATING. REMOVE COMBUSTIBLE DAMMING AFTER APPROPRIATE CURING.

6.03 CLEANING AND PROTECTING

A. CLEAN EXCESS FILL MATERIALS ADJACENT TO OPENINGS AS WORK PROGRESSES BY METHODS AND WITH CLEANING MATERIALS THAT ARE APPROVED IN WRITING BY THROUGH-PENETRATION FIRESTOP SYSTEM MANUFACTURERS AND THAT DO NOT CAUSE DAMAGE.

B. PROVIDE FINAL PROTECTION AND MAINTAIN CONDITIONS DURING AND AFTER INSTALLATION THAT ENSURE THAT THROUGH-PENETRATION FIRESTOP SYSTEMS ARE WITHOUT DAMAGE OR DETERIORATION AT TIME OF SUBSTANTIAL COMPLETION. IF, DESPITE SUCH PROTECTION, DAMAGE OR DETERIORATION OCCURS, REMOVE DAMAGED OR DETERIORATED THROUGH-PENETRATION FIRESTOP SYSTEMS IMMEDIATELY AND INSTALL NEW MATERIALS TO PRODUCE SYSTEMS COMPLYING WITH SPECIFIED REQUIREMENTS.

6.04 INSPECTION

A. ALL PENETRATIONS SHALL BE INSPECTED BY THE MANUFACTURER'S REPRESENTATIVE TO ENSURE PROPER INSTALLATION.

B. ACCESS TO FIRESTOP SYSTEMS SHALL BE MAINTAINED FOR EXAMINATION BY THE AUTHORITY HAVING JURISDICTION AT THEIR REQUEST.

C. PROCEED WITH ENCLOSING THROUGH-PENETRATION FIRESTOP SYSTEM WITH OTHER CONSTRUCTION ONLY AFTER INSPECTION REPORTS ARE ISSUED AND FIRESTOP INSTALLATIONS COMPLY WITH REQUIREMENTS.

D. THE CONTRACTOR SHALL ALLOW FOR VISUAL DESTRUCTIVE REVIEW OF 5% OF INSTALLED FIRESTOP SYSTEMS (MINIMUM OF ONE) TO PROVE COMPLIANCE WITH SPECIFICATIONS AND MANUFACTURER'S INSTRUCTIONS AND DETAILS. DESTRUCTIVE SYSTEM REMOVAL SHALL BE PERFORMED BY THE CONTRACTOR AND WITNESSED BY THE ARCHITECT/ENGINEER AND MANUFACTURER'S FACTORY REPRESENTATIVE. THE ARCHITECT/ENGINEER SHALL HAVE SOLE DISCRETION OF WHICH FIRESTOP SYSTEM INSTALLATIONS WILL BE REVIEWED. THE CONTRACTOR IS RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH THIS REQUIREMENT INCLUDING LABOR AND MATERIAL FOR REMOVING AND REPLACING THE INSTALLED FIRESTOP SYSTEM. IF ANY FIRESTOP SYSTEM IS FOUND TO NOT BE INSTALLED PER MANUFACTURER'S SPECIFIC INSTRUCTIONS AND DETAILS, ALL FIRESTOP SYSTEMS ARE SUBJECT TO DESTRUCTIVE REVIEW AND REPLACEMENT AT THE ARCHITECT/ENGINEER'S DISCRETION AND THE CONTRACTOR'S EXPENSE.

END OF SECTION 26 05 03

SECTION 26 05 13 - WIRE AND CABLE

PART 7 - GENERAL

7.01 SECTION INCLUDES

A. BUILDING WIRE

B. CABLING FOR REMOTE CONTROL, SIGNAL, AND POWER LIMITED CIRCUITS

7.02 RELATED WORK

A. SECTION 26 05 53 - ELECTRICAL IDENTIFICATION: REFER TO ELECTRICAL IDENTIFICATION FOR COLOR AND IDENTIFICATION LABELING REQUIREMENTS.

7.03 REFERENCES

A. ASTM B801-07 - STANDARD SPECIFICATION FOR CONCENTRIC-LAY-STRANDED CONDUCTORS OF 8000 SERIES ALUMINUM ALLOY FOR SUBSEQUENT COVERING OR INSULATION

B. NEMA WC 70 - POWER CABLES RATED 2,000V OR LESS FOR THE DISTRIBUTION OF ELECTRICAL ENERGY

C. NFPA 70 - NATIONAL ELECTRICAL CODE (NEC)

D. CEC CALIFORNIA ELECTRICAL CODE

E. UL 44 - THERMOSET-INSULATED WIRES AND CABLES

F. UL 83 - THERMOPLASTIC-INSULATED WIRES AND CABLES

G. UL 854 - SERVICE-ENTRANCE CABLES

H. UL 1581 - STANDARD FOR ELECTRICAL WIRES, CABLES, AND FLEXIBLE CORDS

I. UL 2196 - FIRE RESISTIVE, FIRE RESISTANT AND CIRCUIT INTEGRITY CABLES

PART 8 - PRODUCTS

8.01 BUILDING WIRE

A. FEEDERS AND BRANCH CIRCUITS 8 AWG AND LARGER: COPPER, STRANDED CONDUCTOR, 600-VOLT INSULATION, THHN/THWN OR XHHW-2.

B. FEEDERS AND BRANCH CIRCUITS 8 AWG AND LARGER IN UNDERGROUND CONDUIT: COPPER, STRANDED CONDUCTOR, 600-VOLT INSULATION, THWN.

C. FEEDERS AND BRANCH CIRCUITS 10 AWG AND SMALLER: COPPER, SOLID OR STRANDED CONDUCTOR, 600-VOLT INSULATION, THHN/THWN, UNLESS OTHERWISE NOTED ON THE DRAWINGS.

D. CONTROL CIRCUITS: COPPER, STRANDED CONDUCTOR 600-VOLT INSULATION, THHN/THWN.

E. ALUMINUM CONDUCTORS ARE NOT TO BE USED FOR FEEDS TO MOTOR LOADS.

F. EACH 120 AND 277-VOLT BRANCH CIRCUIT SHALL HAVE A DEDICATED NEUTRAL CONDUCTOR. NEUTRAL CONDUCTORS SHALL BE CONSIDERED CURRENT-CARRYING CONDUCTORS FOR WIRE DERATING.

PART 9 - EXECUTION

9.01 WIRE AND CABLE INSTALLATION SCHEDULE

A. ABOVE ACCESSIBLE CEILINGS:

1. BUILDING WIRE SHALL BE INSTALLED IN RACEWAY.

B. ALL OTHER LOCATIONS: BUILDING WIRE IN RACEWAY.

C. ABOVE GRADE: ALL CONDUCTORS INSTALLED ABOVE GRADE SHALL BE TYPE "THHN".

D. UNDERGROUND OR IN SLAB: ALL CONDUCTORS SHALL BE TYPE "THWN".

9.02 CONTRACTOR CHANGES

A. THE BASIS OF DESIGN IS COPPER CONDUCTORS INSTALLED IN RACEWAY BASED ON AMBIENT TEMPERATURE OF 30°C, CEC CALIFORNIA ELECTRICAL CODE EDITION TABLE 310.15(B)(16). SERVICE ENTRANCE CONDUCTORS ARE BASED ON COPPER CONDUCTOR INSTALLED IN UNDERGROUND ELECTRICAL DUCTS, CEC CALIFORNIA ELECTRICAL CODE TABLE B310.15(B)(2)(7).

B. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DERATING AND SIZING CONDUCTORS AND CONDUITS TO EQUAL OR EXCEED THE AMPACITY OF THE BASIS OF DESIGN CIRCUITS, IF THEY CHOOSE TO USE METHODS OR MATERIALS OTHER THAN THE BASIS OF DESIGN.

C. UNDERGROUND ELECTRICAL DUCT AMPACITY RATING SHALL BE IN ACCORDANCE WITH NEC TABLE 310.16 (2011 - 2017 EDITION 310.15(B)(16)) OR CALCULATED IN ACCORDANCE WITH ANNEX B APPLICATION INFORMATION FOR AMPACITY CALCULATION PER CEC CALIFORNIA ELECTRICAL CODE TABLE B310.15(B)(2)(7). THE CALCULATIONS AND A SKETCH OF THE PROPOSED INSTALLATION SHALL BE SUBMITTED PRIOR TO ANY CONDUIT BEING INSTALLED.

D. CONDUCTOR LENGTH(S) LISTED ON PLANS AND SCHEDULES. THE DRAWINGS ARE DIAGRAMMATIC WITH INTENT TO CONVEY THE COMPONENTS OF THE ELECTRICAL DISTRIBUTION SYSTEM. CONDUCTOR LENGTH(S) WHEN LISTED ON PLANS AND SCHEDULES ARE FOR ENGINEERING CALCULATION PURPOSES. CONDUCTOR LENGTH(S) SHALL NOT BE USED FOR BIDDING PURPOSES.

E. RECORD DRAWING SHALL INCLUDE THE CALCULATIONS AND SKETCHES.

9.03 GENERAL WIRING METHODS

A. USE NO WIRE SMALLER THAN 12 AWG FOR POWER AND LIGHTING CIRCUITS, AND NO SMALLER THAN 14 AWG FOR CONTROL WIRING.

B. USE NO WIRE SMALLER THAN 18 AWG FOR LOW VOLTAGE CONTROL WIRING BELOW 100 VOLTS.

C. USE 10 AWG CONDUCTOR FOR 20 AMPERE, 120-VOLT BRANCH CIRCUIT HOME RUNS LONGER THAN 75 FEET, AND FOR 20 AMPERE, 277-VOLT BRANCH CIRCUIT HOME RUNS LONGER THAN 200 FEET.

D. USE NO WIRE SMALLER THAN 8 AWG FOR OUTDOOR LIGHTING CIRCUITS.

E. THE AMPACITY OF MULTIPLE CONDUCTORS IN ONE CONDUIT SHALL BE DERATED PER THE ELECTRICAL CODE. IN NO CASE SHALL MORE THAN 4 CONDUCTORS BE INSTALLED IN ONE CONDUIT TO SUCH LOADS AS MOTORS LARGER THAN 1/4 HP, PANELBOARDS, MOTOR CONTROL CENTERS, ETC.

F. WHERE INSTALLING PARALLEL FEEDERS, PLACE AN EQUAL NUMBER OF CONDUCTORS FOR EACH PHASE OF A CIRCUIT IN SAME RACEWAY OR CABLE.

G. SPLICE ONLY IN JUNCTION OR OUTLET BOXES.

H. NEATLY TRAIN AND LACE WIRING INSIDE BOXES, EQUIPMENT, AND PANELBOARDS.

I. MAKE CONDUCTOR LENGTHS FOR PARALLEL CIRCUITS EQUAL.

J. ALL CONDUCTORS SHALL BE CONTINUOUS IN CONDUIT FROM LAST OUTLET TO THEIR TERMINATION.

K. TERMINATE ALL SPARE CONDUCTORS ON TERMINAL BLOCKS, AND LABEL THE SPARE CONDUCTORS.

L. CABLES OR WIRES SHALL NOT BE LAID OUT ON THE GROUND BEFORE PULLING.

M. CABLES OR WIRES SHALL NOT BE DRAGGED OVER EARTH OR PAVING.

N. CARE SHALL BE TAKEN SO AS NOT TO SUBJECT THE CABLE OR WIRE TO HIGH MECHANICAL STRESSES THAT WOULD CAUSE DAMAGE TO THE WIRE AND CABLE.

O. AT LEAST SIX (6)-INCH LOOPS OR ENDS SHALL BE LEFT AT EACH OUTLET FOR INSTALLATION CONNECTION OF LUMINAIRES OR OTHER DEVICES.

P. ALL WIRES IN OUTLET BOXES NOT CONNECTED TO FIXTURES OR OTHER DEVICES SHALL BE ROLLED UP, SPLICED IF CONTINUITY OF CIRCUIT IS REQUIRED, AND INSULATED.

9.04 WIRING INSTALLATION IN RACEWAYS

A. PULL ALL CONDUCTORS INTO A RACEWAY AT THE SAME TIME. USE UL LISTED WIRE PULLING LUBRICANT FOR PULLING 4 AWG AND LARGER WIRES. DO NOT USE WIRE PULLING LUBRICANT FOR ISOLATED (UNGROUNDED) POWER SYSTEM WIRING.

B. INSTALL WIRE IN RACEWAY AFTER INTERIOR OF BUILDING HAS BEEN PHYSICALLY PROTECTED FROM THE WEATHER AND ALL MECHANICAL WORK LIKELY TO INJURE CONDUCTORS HAS BEEN COMPLETED.

C. PULLING SHALL BE CONTINUOUS WITHOUT UNNECESSARY STOPS AND STARTS WITH WIRE OR CABLE ONLY PARTIALLY THROUGH RACEWAY.

D. WHERE REELS OF CABLE OR WIRE ARE USED, THEY SHALL BE SET UP ON JACKS CLOSE TO THE POINT WHERE THE WIRE OR CABLE ENTERS THE CONDUIT OR DUCT SO THAT THE CABLE OR WIRE MAY BE UNREELED AND RUN INTO THE CONDUIT OR DUCT WITH A MINIMUM OF CHANGE IN THE DIRECTION OF THE BEND.

E. CONDUCTORS SHALL NOT BE PULLED THROUGH CONDUITS UNTIL PLASTERING OR MASONRY WORK IS COMPLETED AND CONDUITS ARE FREE FROM MOISTURE. CARE SHALL BE TAKEN SO THAT LONG PULLS OF WIRE OR PULLS AROUND SEVERAL BENDS ARE NOT MADE WHERE THE WIRE MAY BE PERMANENTLY STRETCHED AND THE INSULATION DAMAGED.

F. ONLY NYLON ROPE SHALL BE PERMITTED TO PULL CABLES INTO CONDUIT AND DUCTS.

G. COMPLETELY AND THOROUGHLY SWAB RACEWAY SYSTEM BEFORE INSTALLING CONDUCTORS.

H. CONDUCTOR SUPPORTS IN VERTICAL RACEWAYS:

1. SUPPORT CONDUCTORS IN VERTICAL RACEWAYS IN ACCORDANCE WITH THE ELECTRICAL CODE SPACING OF CONDUCTORS SUPPORTS.

2. SUPPORTS SHALL BE OF INSULATED WEDGE TYPE (OZ GEDNEY TYPE S, OR EQUAL) AND INSTALLED IN A TAPERED INSULATED BUSHING FITTING OR A METAL WOVEN MESH WITH A SUPPORT RING THAT FITS INSIDE CONDUIT FITTING INSTALLED IN AN ACCESSIBLE JUNCTION BOX (HUBBELL KELLEMS SUPPORT GRIP OR EQUAL).

9.05 CABLE INSTALLATION

A. PROVIDE PROTECTION FOR EXPOSED CABLES WHERE SUBJECT TO DAMAGE.

B. USE SUITABLE CABLE FITTINGS AND CONNECTORS.

C. RUN ALL OPEN CABLE PARALLEL OR PERPENDICULAR TO WALLS, CEILINGS, AND EXPOSED STRUCTURAL MEMBERS. FOLLOW THE ROUTING AS ILLUSTRATED ON THE DRAWINGS AS CLOSELY AS POSSIBLE. CABLE ROUTING ON DRAWINGS SCALED 1/4"=1'-0" OR LESS SHALL BE CONSIDERED DIAGRAMMATICAL, UNLESS NOTED OTHERWISE. THE CORRECT ROUTING, WHEN SHOWN DIAGRAMMATICALLY, SHALL BE CHOSEN BY THE CONTRACTOR BASED ON INFORMATION IN THE CONTRACT DOCUMENTS; IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS, APPLICABLE CODES, THE NECA'S "STANDARD OF INSTALLATION", RECOGNIZED INDUSTRY STANDARDS; AND COORDINATED WITH OTHER CONTRACTORS.

D. OPEN CABLE SHALL BE SUPPORTED BY THE APPROPRIATE SIZE J-HOOKS OR OTHER MEANS IF CALLED FOR ON THE DRAWINGS. WIRE AND CABLE FROM DIFFERENT SYSTEMS SHALL NOT BE INSTALLED IN THE SAME J-HOOK. J-HOOKS SHALL BE SIZED WITH 20% SPARE CAPACITY. J-HOOKS SHALL PROVIDE PROPER BEND RADIUS SUPPORT FOR DATA CABLE AND FIBER CABLES.

E. OPEN CABLE INSTALLED ABOVE SUSPENDED CEILINGS SHALL NOT REST ON THE SUSPENDED CEILING CONSTRUCTION, NOR UTILIZE THE CEILING SUPPORT SYSTEM FOR WIRE AND CABLE SUPPORT.

F. J-HOOK SUPPORT SPANS SHALL BE BASED ON THE SMALLER OF THE MANUFACTURER'S LOAD RATINGS AND CODE REQUIREMENTS. IN NO CASE SHALL HORIZONTAL SPANS EXCEED 5 FEET AND VERTICAL SPANS EXCEED 4 FEET. ALL J-HOOKS SHALL BE INSTALLED WHERE COMPLETELY ACCESSIBLE AND NOT BLOCKED BY PIPING, DUCTWORK, INACCESSIBLE CEILINGS, ETC. J-HOOKS SHALL BE INDEPENDENTLY RIGIDLY ATTACHED TO A STRUCTURAL ELEMENT. J-HOOKS SHALL BE INSTALLED TO PROVIDE 2" HORIZONTAL SEPARATION AND 6" VERTICAL SEPARATION BETWEEN SYSTEMS.

G. OPEN CABLE SHALL ONLY BE INSTALLED WHERE SPECIFICALLY SHOWN ON THE DRAWINGS, OR PERMITTED IN THESE SPECIFICATIONS.

9.06 WIRING CONNECTIONS AND TERMINATIONS

A. SPLICE AND TAP ONLY IN ACCESSIBLE JUNCTION BOXES.

B. USE SOLDERLESS, TIN-PLATED COPPER, COMPRESSION TERMINALS (LUGS) APPLIED WITH CIRCUMFERENTIAL CRIMP FOR CONDUCTOR TERMINATIONS, 8 AWG AND LARGER.

C. USE SOLDERLESS, TIN-PLATED, COMPRESSION TERMINALS (LUGS) APPLIED WITH INDENTER CRIMP FOR COPPER-CONDUCTOR TERMINATIONS, 10 AWG AND SMALLER.

D. USE SOLDERLESS PRESSURE CONNECTORS WITH INSULATING COVERS FOR COPPER WIRE SPLICES AND TAPS, 8 AWG AND SMALLER. FOR 10 AWG AND SMALLER, USE INSULATED SPRING WIRE CONNECTORS WITH PLASTIC CAPS.

E. USE COMPRESSION CONNECTORS APPLIED WITH CIRCUMFERENTIAL CRIMP FOR CONDUCTOR SPLICES AND TAPS, 6 AWG AND LARGER. TAPE UNINSULATED CONDUCTORS AND CONNECTORS WITH ELECTRICAL TAPE TO 150 PERCENT OF THE INSULATION VALUE OF CONDUCTOR.

F. THOROUGHLY CLEAN WIRES BEFORE INSTALLING LUGS AND CONNECTORS.

G. MAKE SPLICES, TAPS AND TERMINATIONS TO CARRY FULL AMPACITY OF CONDUCTORS WITHOUT PERCEPTIBLE TEMPERATURE RISE.

H. PHASE SEQUENCE: ALL APPARATUS SHALL BE CONNECTED TO OPERATE IN THE PHASE SEQUENCE A-B-C REPRESENTING THE TIME SEQUENCE IN WHICH THE PHASE CONDUCTORS SO IDENTIFIED REACH POSITIVE MAXIMUM VOLTAGE.

I. AS A GENERAL RULE, APPLICABLE TO SWITCHES, CIRCUIT BREAKERS, STARTERS, PANELBOARDS, SWITCHGEAR AND THE LIKE, THE CONNECTIONS TO PHASE CONDUCTORS ARE INTENDED THUS:

1. FACING THE FRONT AND OPERATING SIDE OF THE EQUIPMENT, THE PHASE IDENTIFICATION SHALL BE:

a. LEFT TO RIGHT - A-B-C

b. TOP TO BOTTOM - A-B-C

J. CONNECTION REVISIONS AS REQUIRED TO ACHIEVE CORRECT ROTATION OF MOTORS SHALL BE MADE AT THE LOAD TERMINALS OF THE STARTERS OR DISCONNECT SWITCHES.

K. USE ANTIOXIDANT JOINT COMPOUND ON ALL ALUMINUM CONDUCTOR TERMINATIONS. APPLY ANTIOXIDANT JOINT COMPOUND PER MANUFACTURER'S RECOMMENDATIONS.

9.07 FIELD QUALITY CONTROL

A. FIELD INSPECTION AND TESTING WILL BE PERFORMED UNDER PROVISIONS OF DIVISION 1.

B. BUILDING WIRE AND POWER CABLE TESTING: PERFORM AN INSULATION-RESISTANCE TEST ON EACH CONDUCTOR WITH RESPECT TO GROUND AND ADJACENT CONDUCTORS. TEST SHALL BE MADE BY MEANS OF A LOW-RESISTANCE OHMMETER, SUCH AS A "MEGGER". THE APPLIED POTENTIAL SHALL BE 500 VOLTS DC FOR 300 VOLT RATED CABLE AND 1000 VOLTS DC FOR 600 VOLT RATED CABLE. THE TEST DURATION SHALL BE ONE MINUTE. INSULATION RESISTANCE MUST BE GREATER THAN 100 MEGA-OHM FOR 600 VOLT AND 25 MEGA-OHM FOR 300 VOLT RATED CABLES PER NETA ACCEPTANCE TESTING STANDARD. VERIFY UNIFORM RESISTANCE OF PARALLEL CONDUCTORS.

C. INSPECT WIRE AND CABLE FOR PHYSICAL DAMAGE AND PROPER CONNECTION.

D. TORQUE TEST CONDUCTOR CONNECTIONS AND TERMINATIONS TO MANUFACTURER'S RECOMMENDED VALUES.

E. PERFORM CONTINUITY TEST ON ALL POWER AND EQUIPMENT BRANCH CIRCUIT CONDUCTORS. VERIFY PROPER PHASING CONNECTIONS.

F. PROTECTION OF WIRE AND CABLE FROM FOREIGN MATERIALS:

1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE ADEQUATE PHYSICAL PROTECTION TO PREVENT FOREIGN MATERIAL APPLICATION OR CONTACT WITH ANY WIRE OR CABLE TYPE. FOREIGN MATERIAL IS DEFINED AS ANY MATERIAL THAT WOULD NEGATIVELY IMPACT THE VALIDITY OF THE MANUFACTURER'S PERFORMANCE WARRANTY. THIS INCLUDES, BUT IS NOT LIMITED TO, OVERSPRAY OF PAINT (ACCIDENTAL OR OTHERWISE), DRYWALL COMPOUND, OR ANY OTHER SURFACE CHEMICAL, LIQUID, OR COMPOUND THAT COULD COME IN CONTACT WITH THE CABLE, CABLE JACKET, OR CABLE TERMINATION COMPONENTS.

G. OVERSPRAY OF PAINT ON ANY WIRE OR CABLE WILL NOT BE ACCEPTED. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPLACE ANY COMPONENT CONTAINING OVERSPRAY, IN ITS ENTIRETY, AT NO ADDITIONAL COST TO THE PROJECT. CLEANING OF THE CABLES WITH HARSH CHEMICALS IS NOT ALLOWED.

END OF SECTION 26 05 13

SECTION 26 05 26 - GROUNDING AND BONDING

PART 10 - GENERAL

10.01 SECTION INCLUDES

A. EQUIPMENT GROUNDING SYSTEM

B. BONDING SYSTEM

C. GROUNDING ELECTRODE SYSTEM

10.02 QUALITY ASSURANCE

A. TESTING AGENCY QUALIFICATIONS: TESTING AGENCY AS DEFINED BY OSHA IN 29 CFR 1910.7 OR A MEMBER COMPANY OF THE INTERNATIONAL ELECTRICAL TESTING ASSOCIATION AND THAT IS ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.

B. TESTING AGENCY'S FIELD SUPERVISOR: PERSON CURRENTLY CERTIFIED BY THE INTERNATIONAL ELECTRICAL TESTING ASSOCIATION TO SUPERVISE ON-SITE TESTING SPECIFIED IN PART 3.

C. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN ELECTRICAL CODE, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.

D. COMPLY WITH UL 467 GROUNDING AND BONDING EQUIPMENT.

E. COMPLY WITH NFPA 780 AND UL 96 WHEN INTERCONNECTING WITH LIGHTNING PROTECTION SYSTEM.

F. COMPLY WITH ELECTRICAL CODE; FOR OVERHEAD-LINE CONSTRUCTION AND MEDIUM-VOLTAGE UNDERGROUND CONSTRUCTION, COMPLY WITH IEEE/ANSI C2 NATIONAL ELECTRICAL SAFETY CODE (NESC).

10.03 REFERENCES

A. NFPA 70 - NATIONAL ELECTRICAL CODE (NEC)

B. CEC CALIFORNIA ELECTRICAL CODE

10.04 SUBMITTALS

A. PRODUCT DATA: FOR THE FOLLOWING:

1. GROUND RODS.

B. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.

C. FIELD TEST REPORTS: SUBMIT WRITTEN TEST REPORTS TO INCLUDE THE FOLLOWING:

1. TEST PROCEDURES USED.

2. TEST RESULTS THAT COMPLY WITH REQUIREMENTS.

3. RESULTS OF FAILED TESTS AND CORRECTIVE ACTION TAKEN TO ACHIEVE TEST RESULTS THAT COMPLY WITH REQUIREMENTS.

D. INDICATE LAYOUT OF GROUND FIELD, LOCATION OF SYSTEM GROUNDING ELECTRODE CONNECTIONS, AND ROUTING OF GROUNDING ELECTRODE CONDUCTOR AND GROUND RING.

10.05 SUMMARY

A. THIS SECTION INCLUDES GROUNDING OF ELECTRICAL SYSTEMS AND EQUIPMENT. GROUNDING REQUIREMENTS SPECIFIED IN THIS SECTION MAY BE SUPPLEMENTED BY SPECIAL REQUIREMENTS OF SYSTEMS DESCRIBED IN OTHER SECTIONS.

PART 11 - PRODUCTS

11.01 GROUNDING CONDUCTORS

A. FOR INSULATED CONDUCTORS, COMPLY WITH DIVISION 26 SECTION 26 05 13 "WIRE AND CABLE".

B. MATERIAL: COPPER.

C. EQUIPMENT GROUNDING CONDUCTORS: INSULATED. REFER TO SECTION 26 05 53 FOR INSULATION COLOR.

D. GROUNDING ELECTRODE CONDUCTORS: STRANDED CABLE.

E. COPPER BONDING CONDUCTORS: AS FOLLOWS:

1. BONDING CONDUCTOR: NO. 4 OR NO. 6 AWG, STRANDED COPPER CONDUCTOR.

2. BONDING JUMPER: BARE COPPER TAPE, BRAIDED BARE COPPER CONDUCTORS, TERMINATED WITH COPPER FERRULES; 1-5/8 INCHES WIDE AND 1/16 INCH THICK.

11.02 CONNECTOR PRODUCTS

A. COMPLY WITH UL 467; LISTED FOR USE FOR SPECIFIC TYPES, SIZES, AND COMBINATIONS OF CONDUCTORS AND CONNECTED ITEMS.

B. CONNECTORS: HYDRAULIC COMPRESSION TYPE, IN KIT FORM, AND SELECTED PER MANUFACTURER'S WRITTEN INSTRUCTIONS.

11.03 GROUNDING ELECTRODES

A. GROUND RODS.

B. GROUND RODS: SECTIONAL TYPE; COPPER-CLAD STEEL.

1. SIZE: 3/4" IN DIAMETER BY 120 INCHES PER SECTION.

C. TEST WELLS: PROVIDE HANDHOLES AS SHOWN ON DRAWINGS OR AS SPECIFIED IN DIVISION 2 SECTION "UNDERGROUND DUCTS AND UTILITY STRUCTURES."

PART 12 - EXECUTION

12.01 CONNECTIONS

A. GENERAL: MAKE CONNECTIONS SO GALVANIC ACTION OR ELECTROLYSIS POSSIBILITY IS MINIMIZED. SELECT CONNECTORS, CONNECTION HARDWARE, CONDUCTORS, AND CONNECTION METHODS SO METALS IN DIRECT CONTACT WILL BE GALVANICALLY COMPATIBLE.

1. USE ELECTROPLATED OR HOT-TIN-COATED MATERIALS TO ENSURE HIGH CONDUCTIVITY AND TO MAKE CONTACT POINTS CLOSER TO ORDER OF GALVANIC SERIES.

2. MAKE CONNECTIONS WITH CLEAN, BARE METAL AT POINTS OF CONTACT.

3. COAT AND SEAL CONNECTIONS HAVING DISSIMILAR METALS WITH INERT MATERIAL TO PREVENT FUTURE PENETRATION OF MOISTURE TO CONTACT SURFACES.

B. COMPRESSION-TYPE CONNECTIONS: USE HYDRAULIC COMPRESSION TOOLS TO PROVIDE CORRECT CIRCUMFERENTIAL PRESSURE FOR COMPRESSION CONNECTORS. USE TOOLS AND DIES RECOMMENDED BY CONNECTOR MANUFACTURER. PROVIDE EMBOSSING DIE CODE OR OTHER STANDARD METHOD TO MAKE A VISIBLE INDICATION THAT A CONNECTOR HAS BEEN ADEQUATELY COMPRESSED ON GROUNDING CONDUCTOR.

C. EQUIPMENT GROUNDING CONDUCTOR TERMINATIONS: FOR NO. 8 AWG AND LARGER, USE PRESSURE-TYPE GROUNDING LUGS. NO. 10 AWG AND SMALLER GROUNDING CONDUCTORS MAY BE TERMINATED WITH WINGED PRESSURE-TYPE CONNECTORS.

D. NONCONTACT METAL RACEWAY TERMINATIONS: IF METALLIC RACEWAYS TERMINATE AT METAL HOUSINGS WITHOUT MECHANICAL AND ELECTRICAL CONNECTION TO HOUSING, TERMINATE EACH CONDUIT WITH A GROUNDING BUSHING. CONNECT GROUNDING BUSHINGS WITH A BARE GROUNDING CONDUCTOR TO GROUNDING BUS OR TERMINAL IN HOUSING. BOND ELECTRICALLY NON-CONTINUOUS CONDUITS AT ENTRANCES AND EXITS WITH GROUNDING BUSHINGS AND BARE GROUNDING CONDUCTORS, UNLESS OTHERWISE INDICATED.

E. UNDERGROUND CONNECTIONS: USE FOR UNDERGROUND CONNECTIONS, EXCEPT THOSE AT TEST WELLS.

F. CONNECTIONS AT TEST WELLS: USE COMPRESSION-TYPE CONNECTORS ON CONDUCTORS AND MAKE TWO BOLTED- AND CLAMPED-TYPE CONNECTIONS BETWEEN CONDUCTORS AND GROUND RODS.

G. CONNECTIONS AT BACK BOXES, JUNCTION BOXES, PULL BOXES, AND EQUIPMENT TERMINATIONS: THE EQUIPMENT GROUNDING CONDUCTOR(S) ASSOCIATED WITH ALL CIRCUITS IN THE BOX SHALL BE CONNECTED TOGETHER AND TO THE BOX USING A SUITABLE GROUNDING SCREW. THE REMOVAL OF THE RESPECTIVE RECEPTACLE, LUMINAIRE, OR OTHER DEVICE SERVED BY THE BOX SHALL NOT INTERRUPT THE GROUNDING CONTINUITY.

H. TIGHTEN SCREWS AND BOLTS FOR GROUNDING AND BONDING CONNECTORS AND TERMINALS ACCORDING TO MANUFACTURER'S PUBLISHED TORQUE-TIGHTENING VALUES. IF MANUFACTURER'S TORQUE VALUES ARE NOT INDICATED, USE THOSE SPECIFIED IN UL 486A AND UL 486B.

I. MOISTURE PROTECTION: IF INSULATED GROUNDING CONDUCTORS ARE CONNECTED TO GROUND RODS OR GROUNDING BUSES, INSULATE ENTIRE AREA OF CONNECTION AND SEAL AGAINST MOISTURE PENETRATION OF INSULATION AND CABLE.

12.02 INSTALLATION

A. USE ONLY COPPER CONDUCTORS FOR BOTH INSULATED AND BARE GROUNDING CONDUCTORS IN DIRECT CONTACT WITH EARTH, CONCRETE, MASONRY, CRUSHED STONE, AND SIMILAR MATERIALS.

B. GROUNDING CONDUCTORS: ROUTE ALONG SHORTEST AND STRAIGHTEST PATHS POSSIBLE, UNLESS OTHERWISE INDICATED. AVOID OBSTRUCTING ACCESS OR PLACING CONDUCTORS WHERE THEY MAY BE SUBJECTED TO STRAIN, IMPACT, OR DAMAGE. EACH GROUNDING CONDUCTOR THAT PASSES THROUGH A BELOW GRADE WALL MUST BE PROVIDED WITH A WATER STOP.

C. GROUNDING ELECTRODE CONDUCTOR (GEC) SHALL BE PROTECTED FROM PHYSICAL DAMAGE BY RIGID POLYVINYL CHLORIDE CONDUIT (PVC) IN EXPOSED LOCATIONS.

D. IN RACEWAYS, USE INSULATED EQUIPMENT GROUNDING CONDUCTORS.

12.03 EQUIPMENT GROUNDING SYSTEM

A. COMPLY WITH ELECTRICAL CODE, FOR TYPES, SIZES, AND QUANTITIES OF EQUIPMENT GROUNDING CONDUCTORS, UNLESS SPECIFIC TYPES, LARGER SIZES, OR MORE CONDUCTORS THAN REQUIRED BY ELECTRICAL CODE ARE INDICATED.

B. INSTALL EQUIPMENT GROUNDING CONDUCTORS IN ALL FEEDERS AND CIRCUITS. TERMINATE EACH END ON A GROUNDING LUG OR BUS.

12.04 BONDING SYSTEM

A. AT BUILDING EXPANSION JOINTS, PROVIDE FLEXIBLE BONDING JUMPERS TO CONNECT TO COLUMNS OR BEAMS ON EACH SIDE OF THE EXPANSION JOINT.

B. EXTERIOR METALLIC PULL AND JUNCTION BOX COVERS, METALLIC HAND RAILS: BOND TO GROUNDING SYSTEM USING FLEXIBLE GROUNDING CONDUCTORS.

C. BOND METAL DUCTS OF DUST COLLECTORS, PARTICULATE CONVEYING, FUME HOODS, AND OTHER HAZARDOUS MATERIALS TO THE EQUIPMENT GROUNDING CONDUCTORS OF ASSOCIATED PUMPS, FANS, OR BLOWERS. USE BRAIDED-TYPE BONDING STRAPS. PROVIDE BRAIDED BARE COPPER BONDING CONDUCTOR IN NONMETALLIC DUST COLLECTOR DUCTWORK TO EACH EQUIPMENT INLET LOCATION, AND BOND TO EQUIPMENT.

D. WATER HEATER, HEAT-TRACING, METAL WELL CASING, AND HEATING CABLES: INSTALL A SEPARATE EQUIPMENT GROUNDING CONDUCTOR TO EACH ELECTRIC WATER HEATER, HEAT-TRACING, AND ANTI-FROST HEATING CABLE. BOND CONDUCTOR TO HEATER UNITS, PIPING, WELL CASING, CONNECTED EQUIPMENT, AND COMPONENTS.

E. CONNECT BONDING CONDUCTORS TO METAL WATER PIPE USING A SUITABLE GROUND CLAMP. MAKE CONNECTIONS TO FLANGED PIPING AT STREET SIDE OF FLANGE. PROVIDE BONDING JUMPER AROUND WATER METER.

F. SIGNAL AND COMMUNICATION SYSTEMS: FOR TELEPHONE, ALARM, VOICE AND DATA, AND OTHER COMMUNICATION SYSTEMS, PROVIDE NO. 6 AWG MINIMUM INSULATED BONDING CONDUCTOR IN RACEWAY FROM GROUNDING ELECTRODE SYSTEM TO EACH SERVICE LOCATION, TERMINAL CABINET, WIRING CLOSET, AND CENTRAL EQUIPMENT LOCATION. LEAVE 10 FEET OF SLACK CONDUCTOR AT TERMINAL BOARD.

G. TELECOM SERVICE AND CENTRAL EQUIPMENT LOCATIONS AND WIRING CLOSETS: TERMINATE GROUNDING CONDUCTOR ON A 1/4-BY-2-BY-12-INCH GROUNDING BAR.

H. EQUIPMENT GROUND CONDUCTOR CONTINUITY: ALL SPLICED EQUIPMENT GROUNDING CONDUCTORS IN JUNCTION BOXES, CABINETS, AND DISTRIBUTION EQUIPMENT SHALL BE CONNECTED TOGETHER AND BONDED TO THE METAL ENCLOSURE.

I. REMOTE CONTROL, SIGNALING, AND FIRE ALARM CIRCUITS SHALL BE BONDED IN ACCORDANCE WITH THE MOST RECENT VERSION OF THE NATIONAL ELECTRIC CODE.

J. METAL POLES SUPPORTING OUTDOOR LIGHTING FIXTURES > 15 FEET: PROVIDE A GROUNDING ELECTRODE IN ADDITION TO INSTALLING A SEPARATE EQUIPMENT GROUNDING CONDUCTOR WITH SUPPLY BRANCH-CIRCUIT CONDUCTORS.

K. COMMON GROUND BONDING WITH LIGHTNING PROTECTION SYSTEM: BOND ELECTRICAL POWER SYSTEM GROUND DIRECTLY TO LIGHTNING PROTECTION SYSTEM GROUNDING CONDUCTOR AT CLOSEST POINT TO ELECTRICAL SERVICE GROUNDING ELECTRODE. USE BONDING CONDUCTOR SIZED SAME AS SYSTEM GROUNDING ELECTRODE CONDUCTOR AND INSTALL IN CONDUIT.

12.05 EQUIPOTENTIAL (MULTI-POINT) GROUNDING SYSTEM

A. PROVIDE AN EQUIPOTENTIAL GROUNDING SYSTEM IN THE FOLLOWING LOCATIONS:

12.06 FIELD QUALITY CONTROL

A. INSPECT GROUNDING AND BONDING SYSTEM CONDUCTORS AND CONNECTIONS FOR TIGHTNESS AND PROPER INSTALLATION.

1. MEASURE GROUND RESISTANCE FROM SYSTEM NEUTRAL CONNECTION AT SERVICE ENTRANCE TO CONVENIENT GROUND REFERENCE POINTS USING SUITABLE GROUND TESTING EQUIPMENT. RESISTANCE SHALL NOT EXCEED 5 OHMS.

2. TESTING: OWNER WILL ENGAGE A QUALIFIED TESTING AGENCY TO PERFORM THE FOLLOWING FIELD QUALITY-CONTROL TESTING:

3. TESTING: ENGAGE A QUALIFIED TESTING AGENCY TO PERFORM THE FOLLOWING FIELD QUALITY-CONTROL TESTING:

4. TESTING: PERFORM THE FOLLOWING FIELD QUALITY-CONTROL TESTING:

a. AFTER INSTALLING GROUNDING SYSTEM BUT BEFORE PERMANENT ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, TEST FOR COMPLIANCE WITH REQUIREMENTS.

b. TEST COMPLETED GROUNDING SYSTEM AT EACH LOCATION WHERE A MAXIMUM GROUND-RESISTANCE LEVEL IS SPECIFIED, AT SERVICE DISCONNECT ENCLOSURE GROUNDING TERMINAL, AND AT GROUND TEST WELLS. MEASURE GROUND RESISTANCE NOT LESS THAN TWO FULL DAYS AFTER THE LAST TRACE OF PRECIPITATION, AND WITHOUT THE SOIL BEING MOISTENED BY ANY MEANS OTHER THAN NATURAL DRAINAGE OR SEEPAGE AND WITHOUT CHEMICAL TREATMENT OR OTHER ARTIFICIAL MEANS OF REDUCING NATURAL GROUND RESISTANCE. PERFORM TESTS, BY THE FALL-OF-POTENTIAL METHOD ACCORDING TO IEEE 81.

c. EXCESSIVE GROUND RESISTANCE: IF RESISTANCE TO GROUND EXCEEDS SPECIFIED VALUES, NOTIFY ARCHITECT/ENGINEER PROMPTLY AND INCLUDE RECOMMENDATIONS TO REDUCE GROUND RESISTANCE.

12.07 GRADING AND PLANTING

A. RESTORE SURFACE FEATURES, INCLUDING VEGETATION, AT AREAS DISTURBED BY WORK OF THIS SECTION. REESTABLISH ORIGINAL GRADES, UNLESS OTHERWISE INDICATED. IF SOD HAS BEEN REMOVED, REPLACE IT AS SOON AS POSSIBLE AFTER BACKFILLING IS COMPLETED. RESTORE AREAS DISTURBED BY TRENCHING, STORING OF DIRT, CABLE LAYING, AND OTHER ACTIVITIES TO THEIR ORIGINAL CONDITION. INCLUDE APPLICATION OF TOPSOIL, FERTILIZER, LIME, SEED, SOD, SPRIG, AND MULCH. COMPLY WITH DIVISION 2. MAINTAIN RESTORED SURFACES. RESTORE DISTURBED PAVING.

END OF SECTION 26 05 26

SECTION 26 05 27 - SUPPORTING DEVICES

PART 13 - GENERAL

13.01 SECTION INCLUDES

A. CONDUIT AND EQUIPMENT SUPPORTS

B. FASTENING HARDWARE

13.02 QUALITY ASSURANCE

A. SUPPORT SYSTEMS SHALL BE ADEQUATE FOR WEIGHT OF EQUIPMENT AND CONDUIT, INCLUDING WIRING, WHICH THEY CARRY.

13.03 COORDINATION

A. COORDINATE SIZE, SHAPE AND LOCATION OF CONCRETE PADS WITH SECTION ON CAST-IN-PLACE CONCRETE OR CONCRETE TOPPING.

PART 14 - PRODUCTS

14.01 MANUFACTURERS

A. ALLIED SUPPORT SYSTEMS

B. COOPER B-LINE

C. ERICO, INC.

D. HILTI

E. POWER FASTENERS

F. ORBIT INDUSTRIES

14.02 MATERIAL

A. SUPPORT CHANNEL: HOT-DIP GALVANIZED; PAINTED STEEL.

B. HARDWARE: CORROSION RESISTANT.

C. ROOFTOP SUPPORT SYSTEM:

1. PROVIDE PRE-FABRICATED ROOF SUPPORTS FOR ALL CONDUIT AND EQUIPMENT INSTALLED ABOVE THE ROOF. SUPPORT ALL CONDUIT AND EQUIPMENT A MINIMUM OF 4" ABOVE ROOF.

2. SUPPORT SYSTEM SHALL BE COMPATIBLE WITH SINGLE PLY, BITUMINOUS, METAL, AND SPRAY FOAM ROOF SYSTEMS. THE BASE SHALL BE ROUNDED TO PREVENT DAMAGE TO THE ROOF, AND DRAINAGE HOLES SHALL PREVENT PONDING OF WATER IN THE SUPPORT.

3. ALL METAL COMPONENTS SHALL BE HOT DIPPED GALVANIZED. MOUNTING HARDWARE SHALL BE STAINLESS STEEL OR HOT DIPPED GALVANIZED. SUPPORT SHALL BE UV, CORROSION, AND FREEZE/THAW RESISTANT. SUPPORT SHALL INCLUDE ORANGE PAINT, REFLECTIVE SAFETY ORANGE ACCENTS, OR SIMILAR MARKINGS FOR INCREASED VISIBILITY.

4. PRODUCTS:

a. ANVIL INTERNATIONAL HBS-BASE SERIES

b. COOPER B-LINE DURA-BLOK

c. ERICO CADDY PYRAMID 50, 150, 300, OR 600 (TO MATCH LOAD).

D. TRUSS AND JOIST SUPPORT SYSTEM: PROVIDED THE INSTALLATION COMPLIES WITH ALL LOADING REQUIREMENTS OF TRUSS AND JOIST MANUFACTURERS, THE FOLLOWING PRACTICES ARE ACCEPTABLE:

1. LOADS OF 100 LBS. OR LESS MAY BE ATTACHED ANYWHERE ALONG THE TOP OR BOTTOM CHORDS OF TRUSSES OR JOISTS WITH A MINIMUM 3' SPACING BETWEEN LOADS.

2. LOADS GREATER THAN 100 LBS. MUST BE HUNG CONCENTRICALLY AND MAY BE HUNG FROM TOP OR BOTTOM CHORD, PROVIDED ONE OF THE FOLLOWING CONDITIONS IS MET:

a. THE HANGER IS ATTACHED WITHIN 6" FROM A WEB/CHORD JOINT.

b. ADDITIONAL L2X2X1/4 WEB REINFORCEMENT IS INSTALLED PER MANUFACTURER'S REQUIREMENTS.

3. IT IS PROHIBITED TO CANTILEVER A LOAD USING AN ANGLE OR OTHER STRUCTURAL COMPONENT THAT IS ATTACHED TO A TRUSS OR JOIST IN SUCH A FASHION THAT A TORSIONAL FORCE IS APPLIED TO THAT STRUCTURAL MEMBER.

4. IF CONDITIONS CANNOT BE MET, COORDINATE INSTALLATION WITH TRUSS OR JOIST MANUFACTURER AND CONTACT ARCHITECT/ENGINEER.

PART 15 - EXECUTION

15.01 INSTALLATION

A. FASTEN HANGER RODS, CONDUIT CLAMPS, AND OUTLET AND JUNCTION BOXES TO BUILDING STRUCTURE USING EXPANSION ANCHORS IN CONCRETE AND BEAM CLAMPS ON STRUCTURAL STEEL.

B. TRAPEZE SUPPORT INSTALLATION: CUT HANGER RODS BACK AT TRAPEZE SUPPORTS SO THEY DO NOT EXTEND MORE THAN 3/4" BELOW BOTTOM FACE OF LOWEST FASTENER AND BLUNT ANY SHARP EDGES.

C. USE TOGGLE BOLTS OR HOLLOW WALL FASTENERS IN HOLLOW MASONRY, PLASTER, OR GYPSUM BOARD PARTITIONS AND WALLS; EXPANSION ANCHORS OR PRESET INSERTS IN SOLID MASONRY WALLS; SELF-DRILLING ANCHORS OR EXPANSION ANCHOR ON CONCRETE SURFACES; SHEET METAL SCREWS IN SHEET METAL STUDS; AND WOOD SCREWS IN WOOD CONSTRUCTION.

D. DO NOT FASTEN SUPPORTS TO CEILING SYSTEMS, PIPING, DUCTWORK, MECHANICAL EQUIPMENT, OR CONDUIT, UNLESS OTHERWISE NOTED.

E. DO NOT USE POWDER-ACTUATED ANCHORS WITHOUT SPECIFIC PERMISSION.

F. DO NOT DRILL STRUCTURAL STEEL MEMBERS.

G. FABRICATE SUPPORTS FROM STRUCTURAL STEEL OR STEEL CHANNEL, RIGIDLY WELDED OR BOLTED TO PRESENT A NEAT APPEARANCE. USE HEXAGON HEAD BOLTS WITH SPRING LOCK WASHERS UNDER ALL NUTS.

H. IN WET LOCATIONS AND ON ALL BUILDING FLOORS BELOW EXTERIOR EARTH GRADE INSTALL FREE-STANDING ELECTRICAL EQUIPMENT ON CONCRETE PADS.

I. INSTALL CABINETS AND PANELBOARDS WITH MINIMUM OF FOUR ANCHORS. PROVIDE HORIZONTAL BACKING/SUPPORT FRAMING IN STUD WALLS FOR RIGID MOUNTING.

J. BRIDGE STUDS TOP AND BOTTOM WITH CHANNELS TO SUPPORT FLUSH-MOUNTED CABINETS AND PANELBOARDS IN STUD WALLS.

K. DO NOT EXCEED 25 LBS. PER HANGER AND A MINIMUM SPACING OF 2'-0" ON CENTER WHEN ATTACHING TO METAL ROOF DECKING (EXCLUDES CONCRETE ON METAL DECK). THIS 25 LBS. LOAD AND 2'-0" SPACING INCLUDE ADJACENT ELECTRICAL AND MECHANICAL ITEMS HANGING FROM DECK. IF THE HANGER RESTRICTIONS CANNOT BE ACHIEVED, SUPPLEMENTAL FRAMING OFF STEEL FRAMING WILL NEED TO BE ADDED.

L. REFER TO SECTION 26 05 33 FOR SPECIAL CONDUIT SUPPORTING REQUIREMENTS.

15.02 FINISH

A. PRIME COAT EXPOSED STEEL HANGERS AND SUPPORTS. HANGERS AND SUPPORTS IN CRAWL SPACES, PIPE SHAFTS, AND ABOVE SUSPENDED CEILING SPACES ARE NOT CONSIDERED EXPOSED.

B. TRIM ALL ENDS OF EXPOSED FIELD FABRICATED STEEL HANGERS, SLOTTED CHANNEL AND THREADED ROD TO WITHIN 1" OF SUPPORT OR FASTENER TO ELIMINATE POTENTIAL INJURY TO PERSONNEL UNLESS SHOWN OTHERWISE ON THE DRAWINGS. SMOOTH ENDS AND INSTALL ELASTOMERIC INSULATION WITH TWO COATS OF LATEX PAINT IF EXPOSED STEEL IS WITHIN 6'-6" OF FINISH FLOOR AND PRESENTS POTENTIAL INJURY TO PERSONNEL.

END OF SECTION 26 05 27

SECTION 26 05 33 - CONDUIT AND BOXES

PART 16 - GENERAL

16.01 SECTION INCLUDES

A. RIGID METALLIC CONDUIT AND FITTINGS (RMC)

B. INTERMEDIATE METALLIC CONDUIT AND FITTINGS (IMC)

C. ELECTRICAL METALLIC TUBING AND FITTINGS (EMT)

D. FLEXIBLE METALLIC CONDUIT AND FITTINGS (FMC)

E. LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT AND FITTINGS (LFMC)

F. RIGID POLYVINYL CHLORIDE CONDUIT AND FITTINGS (PVC)

G. WALL AND CEILING OUTLET BOXES

H. PULL AND JUNCTION BOXES

16.02 RELATED WORK

A. SECTION 26 05 53 - ELECTRICAL IDENTIFICATION: REFER TO ELECTRICAL IDENTIFICATION FOR COLOR AND IDENTIFICATION LABELING REQUIREMENTS.

16.03 REFERENCES

A. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI):

1. ANSI C80.1 - RIGID STEEL CONDUIT, ZINC-COATED

2. ANSI C80.3 - ELECTRICAL METALLIC TUBING, ZINC-COATED AND FITTINGS

3. ANSI C80.4 - FITTINGS FOR RIGID METAL CONDUIT AND ELECTRICAL METALLIC TUBING

4. ANSI C80.6 - INTERMEDIATE METAL CONDUIT, ZINC COATED

5. ANSI/NEMA OS 1 - SHEET-STEEL OUTLET BOXES, DEVICE BOXES, COVERS AND BOX SUPPORTS

6. ANSI/NEMA OS 2 - NONMETALLIC OUTLET BOXES, DEVICE BOXES, COVERS AND BOX SUPPORTS

B. FEDERAL SPECIFICATIONS (FS):

1. A-A-50553A - FITTINGS FOR CONDUIT, METAL, RIGID, (THICK-WALL AND THIN-WALL (EMT) TYPE

2. A-A-55810 - SPECIFICATION FOR FLEXIBLE METAL CONDUIT

C. NECA "STANDARDS OF INSTALLATION"

D. NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA):

1. ANSI/NEMA FB 1 - FITTINGS, CAST METAL BOXES, AND CONDUIT BODIES FOR CONDUIT, ELECTRICAL METALLIC TUBING AND CABLE

2. RN 1 - POLYVINYL CHLORIDE (PVC) EXTERNALLY COATED GALVANIZED RIGID STEEL CONDUIT, RIGID ALUMINUM CONDUIT, AND INTERMEDIATE METAL CONDUIT

3. TC 2 - ELECTRICAL POLYVINYL CHLORIDE (PVC) CONDUIT

4. TC 9 - FITTINGS FOR PVC PLASTIC UTILITIES DUCT FOR UNDERGROUND INSTALLATION

E. NFPA 70 - NATIONAL ELECTRICAL CODE (NEC)

F. CEC CALIFORNIA ELECTRICAL CODE

G. UNDERWRITERS LABORATORIES (UL): APPLICABLE LISTINGS

1. UL 1 - FLEXIBLE METAL CONDUIT

2. UL 6 - RIGID METAL CONDUIT

3. UL 360 - LIQUID TIGHT FLEXIBLE STEEL CONDUIT

4. UL514-B - CONDUIT TUBING AND CABLE FITTINGS

5. UL651-A - TYPE EB AND A PVC CONDUIT AND HDPE CONDUIT

6. UL651-B - CONTINUOUS LENGTH HDPE CONDUIT

7. UL746A - STANDARD FOR POLYMERIC MATERIALS - SHORT TERM PROPERTY EVALUATIONS

8. UL797 - ELECTRICAL METAL TUBING

9. UL1242 - INTERMEDIATE METAL CONDUIT

H. AMERICAN STANDARD OF TESTING AND MATERIALS (ASTM):

1. ASTM D 570 - STANDARD TEST METHOD FOR WATER ABSORPTION OF PLASTICS

2. ASTM D 638 - STANDARD TEST METHOD FOR TENSILE PROPERTIES OF PLASTICS

3. ASTM D 648 - STANDARD TEST METHOD FOR DEFLECTION TEMPERATURE OF PLASTICS UNDER FLEXURAL LOAD IN THE EDGE WISE POSITION

4. ASTM D 2412 - STANDARD TEST METHOD FOR DETERMINATION OF EXTERNAL LOADING CHARACTERISTICS OF PLASTIC PIPE BY PARALLEL-PLATE LOADING

5. ASTM D 2447 - STANDARD SPECIFICATION FOR POLYETHYLENE (PE) PLASTIC PIPE, SCHEDULES 40 AND 80, BASED ON OUTSIDE DIAMETER

6. ASTM D 3350 - STANDARD SPECIFICATION FOR POLYETHYLENE PLASTIC PIPE AND FITTINGS MATERIAL

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ELECTRICAL SPECIFICATIONS

I. DEFINITIONS:
1. FITTINGS: CONDUIT CONNECTION OR COUPLING.
2. BODY: ENLARGED FITTINGS WITH OPENING ALLOWING ACCESS TO THE CONDUCTORS FOR PULLING PURPOSES ONLY.
3. MECHANICAL SPACES: ENCLOSED AREAS, USUALLY KEPT SEPARATED FROM THE GENERAL PUBLIC, WHERE THE PRIMARY USE IS TO HOUSE SERVICE EQUIPMENT AND TO ROUTE SERVICES. THESE SPACES GENERALLY HAVE EXPOSED STRUCTURES, BARE CONCRETE AND NON-ARCHITECTURALLY EMPHASIZED FINISHES.
4. FINISHED SPACES: ENCLOSED AREAS WHERE THE PRIMARY USE IS TO HOUSE PERSONNEL AND THE GENERAL PUBLIC. THESE SPACES GENERALLY HAVE ARCHITECTURALLY EMPHASIZED FINISHES, CEILINGS AND/OR FLOORS.
5. CONCEALED: NOT VISIBLE BY THE GENERAL PUBLIC. OFTEN INDICATES A LOCATION EITHER ABOVE THE CEILING, IN THE WALLS, IN OR BENEATH THE FLOOR SLAB, IN COLUMN COVERINGS, OR IN THE CEILING CONSTRUCTION.
6. ABOVE GRADE: NOT DIRECTLY IN CONTACT WITH THE EARTH. FOR EXAMPLE, AN INTERIOR WALL LOCATED AT AN ELEVATION BELOW THE FINISHED GRADE SHALL BE CONSIDERED ABOVE GRADE BUT A WALL RETAINING EARTH SHALL BE CONSIDERED BELOW GRADE.
7. SLAB: HORIZONTAL POUR OF CONCRETE USED FOR A FLOOR OR SUB-FLOOR.

16.04 SUBMITTALS
A. INCLUDE FITTINGS AND CONDUITS 1.5" AND LARGER IN COORDINATION FILES. INCLUDE ALL IN--FLOOR AND UNDERFLOOR CONDUIT IN COORDINATION FILES. REFER TO SECTION 26 05 00 FOR COORDINATION DRAWING REQUIREMENTS.

PART 17 - PRODUCTS

17.01 RIGID METALLIC CONDUIT (RMC) AND FITTINGS
A. MANUFACTURERS:
1. ALLIED
2. LTV
3. STEELDUCT
4. CALBOND CALPIPE
5. WHEATLAND TUBE CO
6. O-Z GEDNEY
7. OR APPROVED EQUAL.
B. MANUFACTURERS OF RMC CONDUIT FITTINGS:
1. APPLETON ELECTRIC
2. O-Z/GEDNEY CO.
3. ELECTROLINE
4. RACO
5. BRIDGEPORT
6. MIDWEST
7. REGAL
8. THOMAS & BETTS
9. CROUSE-HINDS
10. KILLARK
11. ORBIT INDUSTRIES
12. OR APPROVED EQUAL.
C. MINIMUM SIZE GALVANIZED STEEL: 3/4 INCH, UNLESS OTHERWISE NOTED.
D. FITTINGS AND CONDUIT BODIES:
1. END BELL FITTINGS: MALLEABLE IRON, HOT DIP GALVANIZED, THREADED FLARE TYPE WITH PROVISIONS FOR MOUNTING TO FORM.
2. CONDUIT END BUSHINGS: MALLEABLE IRON TYPE WITH MOLDED-ON HIGH IMPACT PHENOLIC THERMOSETTING INSULATION. WHERE REQUIRED ELSEWHERE IN THE CONTRACT DOCUMENTS, BUSHING SHALL BE COMPLETE WITH GROUND CONDUCTOR SADDLE AND CLAMP. HIGH IMPACT PHENOLIC THREADED TYPE BUSHINGS ARE NOT ACCEPTABLE.
3. ALL OTHER FITTINGS AND CONDUIT BODIES SHALL BE OF MALLEABLE IRON CONSTRUCTION AND HOT DIP GALVANIZED.
E. PVC EXTERNALLY COATED CONDUIT: COMPLIANT WITH NEMA RN 1; RIGID GALVANIZED STEEL CONDUIT WITH EXTERNAL 40 MIL PVC COATING AND INTERNAL 2 MIL URETHANE COATING SURFACE. ALL FITTINGS AND CONDUIT BODIES SHALL BE COMPLETE WITH COATING. THE PVC COATED SYSTEM SHALL INCLUDE NECESSARY PVC COATED FITTINGS, BOXES AND COVERS TO FORM A COMPLETE ENCAPSULATED SYSTEM.
1. ACCEPTABLE MANUFACTURERS:
a. CALBOND CALPIPE
b. ROBROY
c. T&B OCAL
d. OR APPROVED EQUAL.

17.02 INTERMEDIATE METALLIC CONDUIT (IMC) AND FITTINGS
A. MINIMUM SIZE GALVANIZED STEEL: 3/4 INCH, UNLESS OTHERWISE NOTED.
B. MANUFACTURERS:
1. ALLIED
2. LTV
3. STEELDUCT
4. WHEATLAND TUBE CO
5. O-Z GEDNEY
6. OR APPROVED EQUAL.
C. FITTINGS AND CONDUIT BODIES:
1. END BELL FITTINGS: MALLEABLE IRON, HOT DIP GALVANIZED, THREADED FLARE TYPE WITH PROVISIONS FOR MOUNTING TO FORM.
2. CONDUIT END BUSHINGS: MALLEABLE IRON TYPE WITH MOLDED-ON HIGH IMPACT PHENOLIC THERMOSETTING INSULATION. WHERE REQUIRED ELSEWHERE IN THE CONTRACT DOCUMENTS, BUSHING SHALL BE COMPLETE WITH GROUND CONDUCTOR SADDLE AND CLAMP. HIGH IMPACT PHENOLIC THREADED TYPE BUSHINGS ARE NOT ACCEPTABLE.
3. ALL OTHER FITTINGS AND CONDUIT BODIES SHALL BE OF MALLEABLE IRON CONSTRUCTION AND HOT DIP GALVANIZED.

17.03 ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS
A. MINIMUM SIZE ELECTRICAL METALLIC TUBING: 3/4 INCH, UNLESS OTHERWISE NOTED.
B. MANUFACTURERS OF EMT CONDUIT:
1. ALLIED
2. CALBOND CALPIPE
3. LTV
4. STEELDUCT
5. WHEATLAND TUBE CO
6. OR APPROVED EQUAL.
C. FITTINGS AND CONDUIT BODIES:
1. 2" DIAMETER OR SMALLER: COMPRESSION TYPE OF STEEL DESIGNED FOR THEIR SPECIFIC APPLICATION.
2. 1/2" AND 3/4" CONDUIT: PUSH-ON CONNECTORS AND COUPLERS WITH LOCKING RING AND WASHER OF ZINC PLATED STEEL, LISTED FOR USE IN DRY LOCATIONS.
3. LARGER THAN 2": COMPRESSION TYPE OF STEEL DESIGNED FOR THEIR SPECIFIC APPLICATION.
4. MANUFACTURERS OF EMT CONDUIT FITTINGS:
a. APPLETON ELECTRIC
b. O-Z/GEDNEY CO.
c. ELECTROLINE
d. RACO
e. BRIDGEPORT
f. MIDEWEST
g. REGAL
h. THOMAS & BETTS
i. ORBIT INDUSTRIES
j. OR APPROVED EQUAL.

17.04 FLEXIBLE METALLIC CONDUIT (FMC) AND FITTINGS
A. MINIMUM SIZE GALVANIZED STEEL: 3/4 INCH, UNLESS OTHERWISE NOTED. LIGHTING BRANCH CIRCUIT WIRING TO AN INDIVIDUAL LUMINAIRE MAY BE A MANUFACTURED, UL LISTED 3/8" FLEXIBLE METAL CONDUIT AND FITTINGS WITH #14 AWG THHN CONDUCTORS AND AN INSULATED GROUND WIRE. MAXIMUM LENGTH OF 3/8" FMC SHALL BE SIX (6) FEET.
B. MANUFACTURERS:
1. AMERICAN FLEX
2. ALFLEX
3. ELECTRI-FLEX CO
4. OR APPROVED EQUAL.
C. CONSTRUCTION: FLEXIBLE STEEL, APPROVED FOR CONDUIT GROUND, ZINC COATED, THREADLESS TYPE FORMED FROM A CONTINUOUS LENGTH OF SPIRALLY WOUND, INTERLOCKED ZINC COATED STRIP STEEL. PROVIDE A SEPARATE EQUIPMENT GROUNDING CONDUCTOR WHEN USED FOR EQUIPMENT WHERE FLEXIBILITY IS REQUIRED.
D. FITTINGS AND CONDUIT BODIES:
1. THREADLESS HINGED CLAMP TYPE, GALVANIZED ZINC COATED CADMIUM PLATED MALLEABLE CAST IRON.
2. FITTINGS AND CONDUIT BODIES SHALL INCLUDE PLASTIC OR CAST METAL INSERTS SUPPLIED BY THE MANUFACTURER TO PROTECT CONDUCTORS FROM SHARP EDGES.
3. MANUFACTURERS:
a. O-Z/GEDNEY CO.
b. THOMAS & BETTS
c. APPLETON ELECTRIC
d. ELECTROLINE
e. BRIDGEPORT
f. MIDWEST
g. REGAL
h. ORBIT INDUSTRIES
i. OR APPROVED EQUAL.

17.05 LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT (LFMC) AND FITTINGS
A. MANUFACTURERS:
1. ANACONDA TYPE UA
2. ELECTRI-FLEX TYPE LA
3. ALFLEX
4. CARLON (LAMSON & SESSIONS)
5. OR APPROVED EQUAL.
B. CONSTRUCTION: FLEXIBLE STEEL, APPROVED FOR CONDUIT GROUND, ZINC COATED, THREADLESS TYPE FORMED FROM A CONTINUOUS LENGTH OF SPIRALLY WOUND, INTERLOCKED ZINC COATED STRIP STEEL AND AN EXTRUDED PVC COVER.
C. FITTINGS AND CONDUIT BODIES:
1. WATERTIGHT, COMPRESSION TYPE, GALVANIZED ZINC COATED CADMIUM PLATED MALLEABLE CAST IRON, UL LISTED.
2. FITTINGS AND CONDUIT BODIES SHALL INCLUDE PLASTIC OR CAST METAL INSERTS SUPPLIED BY THE MANUFACTURER TO PROTECT CONDUCTORS FROM SHARP EDGES.
3. MANUFACTURERS:
a. APPLETON ELECTRIC
b. O-Z/GEDNEY CO.
c. ELECTROLINE
d. BRIDGEPORT
e. THOMAS & BETTS
f. MIDWEST
g. REGAL
h. CARLON (LAMSON & SESSIONS)
i. ORBIT INDUSTRIES
j. OR APPROVED EQUAL.

17.06 RIGID NON-METALLIC CONDUIT (PVC) AND FITTINGS
A. MINIMUM SIZE RIGID SMOOTH-WALL NONMETALLIC CONDUIT: 3/4 INCH, UNLESS OTHERWISE NOTED.
B. ACCEPTABLE MANUFACTURERS:
1. CARLON (LAMSON & SESSIONS) TYPE 40
2. CANTEX, J.M. MFG.
3. OR APPROVED EQUAL.
C. FITTINGS AND CONDUIT BODIES: NEMA TC 3; SLEEVE TYPE SUITABLE FOR AND MANUFACTURED ESPECIALLY FOR USE WITH THE CONDUIT BY THE CONDUIT MANUFACTURER.
D. PLASTIC CEMENT FOR JOINING CONDUIT AND FITTINGS SHALL BE PROVIDED AS RECOMMENDED BY THE MANUFACTURER.

ASTM TEST	DESCRIPTION	VALUES HDPE
D-1505	DENSITY G/CM 3	LESS THAN 0.941
D-1238	MELT INDEX, G/10 MIN CONDITION E	GREATER THAN 0.55 GRAMS/10 MIN.
D-638	TENSILE STRENGTH AT YIELD (PSI)	3000 MIN.
D-1693	ENVIRONMENTAL STRESS CRACK RESISTANCE CONDITION B, F 20	96 HRS.
D-790	FLEXURAL MODULUS, MPA (PSI)	LESS THAN 80,000
D-746	BRITTLENESS TEMPERATURE	-75°C MAX

17.07 OUTLET BOXES
A. SHEET METAL OUTLET BOXES: ANSI/NEMA OS 1; GALVANIZED STEEL, 16 GAUGE (APPROXIMATELY 0.0625 INCHES), WITH 1/2-INCH MALE FIXTURE STUDS WHERE REQUIRED.
B. NONMETALLIC OUTLET BOXES: ANSI/NEMA OS 2.
C. CAST BOXES: NEMA FB1, TYPE FD, ALUMINUM, CAST FERALLOY, OR STAINLESS STEEL DEEP TYPE, GASKETED COVER, THREADED HUBS.
D. OUTLET BOXES FOR LUMINAIRES TO BE NOT LESS THAN 1-1/2" DEEP, DEEPER IF REQUIRED BY THE NUMBER OF WIRES OR CONSTRUCTION. THE BOX SHALL BE COORDINATED WITH SURFACE LUMINAIRES TO CONCEAL THE BOX FROM VIEW OR PROVIDE A FINISHED TRIM PLATE.
E. SWITCH OUTLET BOXES FOR LOCAL LIGHT CONTROL SWITCHES, DIMMERS AND OCCUPANCY SENSORS SHALL BE 4 INCHES SQUARE BY 2-1/8 INCHES DEEP, WITH RAISED COVER TO FIT FLUSH WITH FINISH WALL LINE. MULTIPLE GANG SWITCH OUTLETS SHALL CONSIST OF THE REQUIRED NUMBER OF GANG BOXES APPROPRIATE TO THE QUANTITY OF SWITCHES COMPRISING THE GANG. WHERE WALLS ARE PLASTERED, PROVIDE A PLASTER RAISED COVER. WHERE SWITCH OUTLET BOXES OCCUR IN EXPOSED CONCRETE BLOCK WALLS, BOXES SHALL BE INSTALLED IN THE BLOCK CAVITY WITH A RAISED SQUARE EDGE TILE COVER OF SUFFICIENT DEPTH TO EXTEND OUT TO FACE OF BLOCK OR MASONRY BOXES.
F. OUTLET BOXES FOR TELEPHONE SUBSTATIONS IN WALLS AND COLUMNS SHALL BE 4 INCHES SQUARE AND 2-1/8 INCHES DEEP WITH SINGLE GANG RAISED COVER TO FIT FLUSH WITH FINISHED WALL LINE EQUIPPED WITH FLUSH TELEPHONE PLATE.
G. WALL OR COLUMN RECEPTACLE OUTLET BOXES SHALL BE 4 INCHES SQUARE WITH RAISED COVER TO FIT FLUSH WITH FINISHED WALL LINE. BOXES IN CONCRETE BLOCK WALLS SHALL BE INSTALLED THE SAME AS FOR SWITCH BOXES IN BLOCK WALLS.

17.08 JB; PULL AND JUNCTION BOXES
A. SHEET METAL BOXES: ANSI/NEMA OS 1; GALVANIZED STEEL.
B. SHEET METAL BOXES LARGER THAN 12 INCHES IN ANY DIMENSION THAT CONTAIN TERMINATIONS OR COMPONENTS: CONTINUOUS HINGED ENCLOSURE WITH 1/4 TURN LATCH AND WHITE BACK PANEL FOR MOUNTING TERMINAL BLOCKS AND ELECTRICAL COMPONENTS.
C. CAST METAL BOXES FOR OUTDOOR AND WET LOCATION INSTALLATIONS: NEMA 250; TYPE 4 AND TYPE 6, FLAT-FLANGED, SURFACE-MOUNTED JUNCTION BOX, UL LISTED AS RAINTIGHT. GALVANIZED CAST IRON BOX AND COVER WITH GROUND FLANGE, NEOPRENE GASKET, AND STAINLESS STEEL COVER SCREWS.
D. CAST METAL BOXES FOR UNDERGROUND INSTALLATIONS: NEMA 250; TYPE 4, INSIDE FLANGED, RECESSED COVER BOX FOR FLUSH MOUNTING, UL LISTED AS RAINTIGHT. GALVANIZED CAST IRON BOX AND PLAIN COVER WITH NEOPRENE GASKET AND STAINLESS STEEL COVER SCREWS.
E. FLANGED TYPE BOXES SHALL BE USED WHERE INSTALLED FLUSH IN WALL.

PART 18 - EXECUTION

18.01 CONDUIT INSTALLATION SCHEDULE AND SIZING
A. IN THE EVENT THE LOCATION OF CONDUIT INSTALLATION REPRESENTS CONFLICTING INSTALLATION REQUIREMENTS AS SPECIFIED IN THE FOLLOWING SCHEDULE, A CLARIFICATION SHALL BE OBTAINED FROM THE ARCHITECT/ENGINEER. IF THIS CONTRACTOR IS UNABLE TO OBTAIN A CLARIFICATION AS OUTLINED ABOVE, CONCEALED RIGID GALVANIZED STEEL CONDUIT INSTALLED PER THESE SPECIFICATIONS AND THE ELECTRICAL CODE SHALL BE REQUIRED.
B. INSTALLATION SCHEDULE: REFER TO DRAWINGS.
C. SIZE CONDUIT AS SHOWN ON THE DRAWINGS AND SPECIFICATIONS. WHERE NOT INDICATED IN THE CONTRACT DOCUMENTS, CONDUIT SIZE SHALL BE ACCORDING TO THE ELECTRICAL CODE. CONDUIT AND CONDUCTOR SIZING SHALL BE COORDINATED TO LIMIT CONDUCTOR FILL TO LESS THAN 40%, MAINTAIN CONDUCTOR AMPERE CAPACITY AS REQUIRED BY THE ELECTRICAL CODE (TO INCLUDE ENLARGED CONDUCTORS DUE TO TEMPERATURE AND QUANTITY DERATING VALUES) AND TO PREVENT EXCESSIVE VOLTAGE DROP AND PULLING TENSION DUE TO LONG CONDUIT/CONDUCTOR LENGTHS.
D. MINIMUM CONDUIT SIZE (UNLESS NOTED OTHERWISE):
1. ABOVE GRADE: 3/4 INCH. (THE USE OF 1/2 INCH WOULD BE ALLOWED FOR INSTALLATION CONDUIT TO INDIVIDUAL LIGHT SWITCHES, INDIVIDUAL RECEPTACLES AND INDIVIDUAL FIXTURE WHIPS FROM JUNCTION BOX.)
2. BELOW GRADE 5' OR LESS FROM BUILDING FOUNDATION: 1 INCH.
3. BELOW GRADE MORE THAN 5' FROM BUILDING FOUNDATION: 1 INCH.
4. TELECOMMUNICATION CONDUIT: 1 INCH.
5. CONTROLS CONDUIT: 3/4 INCH.
E. CONDUIT EMBEDDED IN SLABS ABOVE GRADE:
1. EMBEDDED INSTALLATION NOT ALLOWED IN ELEVATED SLABS WITH METAL COMPOSITE DECKS NOR STRUCTURAL POUR IN PLACE SLABS LESS THAN 6 INCHES IN DEPTH UNLESS SPECIFICALLY NOTED OR SHOWN ON DRAWINGS OTHERWISE.
2. MAXIMUM SIZE 1 INCH FOR CONDUITS CROSSING EACH OTHER.
F. CONDUIT SIZES SHALL CHANGE ONLY AT THE ENTRANCE OR EXIT TO A JUNCTION BOX, UNLESS SPECIFICALLY NOTED ON THE DRAWINGS.

18.02 CONDUIT ARRANGEMENT
A. IN GENERAL, CONDUIT SHALL BE INSTALLED CONCEALED IN WALLS, IN FINISHED SPACES AND WHERE POSSIBLE OR PRACTICAL, OR AS NOTED OTHERWISE. CONDUIT SHALL BE INSTALLED PARALLEL OR PERPENDICULAR TO WALLS, CEILINGS, AND EXPOSED STRUCTURAL MEMBERS. IN UNFINISHED SPACES, MECHANICAL AND UTILITY AREAS, CONDUIT MAY RUN EITHER CONCEALED OR EXPOSED AS CONDITIONS DICTATE AND AS PRACTICAL UNLESS NOTED OTHERWISE ON DRAWINGS. INSTALLATION SHALL MAINTAIN HEADROOM IN EXPOSED VICINITIES OF PEDESTRIAN OR VEHICULAR TRAFFIC.
B. EXPOSED CONDUIT ON EXTERIOR WALLS OR ABOVE ROOF WILL NOT BE ALLOWED WITHOUT PRIOR WRITTEN APPROVAL OF ARCHITECT/ENGINEER. A DRAWING OF THE PROPOSED ROUTING AND A PHOTO OF THE LOCATION SHALL BE SUBMITTED 14 DAYS PRIOR TO START OF CONDUIT ROUGH-IN. ROUTING SHALL BE SHOWN ON COORDINATION DRAWINGS.
C. CONDUIT ARRANGEMENT IN ELEVATED SLABS (RESTRICTED TO APPLICATIONS SPECIFICALLY NOTED OR SHOWN ON DRAWINGS):
1. CONDUIT SIZE SHALL NOT EXCEED ONE-THIRD OF THE STRUCTURAL SLAB THICKNESS. PLACE CONDUIT BETWEEN THE TOP AND BOTTOM REINFORCING WITH A MINIMUM OF 3" CONCRETE COVER.
2. PARALLEL CONDUITS SHALL BE SPACED AT LEAST 8 INCHES APART. EXCEPTION: WITHIN 18 INCHES OF COMMONLY SERVED FLOOR BOXES, JUNCTION BOXES, OR SIMILAR FLOOR DEVICES. ARRANGE CONDUITS PARALLEL OR PERPENDICULAR TO BUILDING LINES AND WALLS.
D. CONDUIT SHALL NOT SHARE THE SAME CELL AS STRUCTURAL REINFORCEMENT IN MASONRY WALLS.
E. CONDUIT RUNS SHALL BE ROUTED AS SHOWN ON LARGE SCALE DRAWINGS. CONDUIT ROUTING ON DRAWINGS SCALED 1/4"=1'-0" OR LESS SHALL BE CONSIDERED DIAGRAMMATIC, UNLESS NOTED OTHERWISE. THE CORRECT ROUTING, WHEN SHOWN DIAGRAMMATICALLY SHALL BE CHOSEN BY THE CONTRACTOR BASED ON INFORMATION IN THE CONTRACT DOCUMENTS, IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS, APPLICABLE CODES, THE NECA'S "STANDARD OF INSTALLATION", IN ACCORDANCE WITH RECOGNIZED INDUSTRY STANDARDS, AND COORDINATED WITH OTHER CONTRACTORS.
F. CONTRACTOR SHALL ADAPT CONTRACTOR'S WORK TO THE JOB CONDITIONS AND MAKE SUCH CHANGES AS REQUIRED AND PERMITTED BY THE ARCHITECT/ENGINEER, SUCH AS MOVING TO CLEAR BEAMS AND JOISTS, ADJUSTING AT COLUMNS, AVOIDING INTERFERENCE WITH WINDOWS, ETC., TO PERMIT THE PROPER INSTALLATION OF OTHER MECHANICAL AND/OR ELECTRICAL EQUIPMENT.
G. CONTRACTOR SHALL COOPERATE WITH ALL CONTRACTORS ON THE PROJECT. CONTRACTOR SHALL OBTAIN DETAILS OF OTHER CONTRACTOR'S WORK TO ENSURE FIT AND AVOID CONFLICT. ANY EXPENSE DUE TO THE FAILURE OF THIS CONTRACTOR TO DO SO SHALL BE PAID FOR IN FULL BY CONTRACTOR. THE OTHER TRADES INVOLVED AS DIRECTED BY THE ARCHITECT/ENGINEER SHALL PERFORM THE REPAIR OF WORK DAMAGED AS A RESULT OF NEGLECT OR ERROR BY THIS CONTRACTOR. THE RESULTANT COSTS SHALL BE BORNE BY THIS CONTRACTOR.

18.03 CONDUIT SUPPORT
A. CONDUIT RUNS INSTALLED ABOVE A SUSPENDED CEILING SHALL BE PROPERLY SUPPORTED. IN NO CASE SHALL CONDUIT REST ON THE SUSPENDED CEILING CONSTRUCTION, NOR UTILIZE CEILING SUPPORT SYSTEM FOR CONDUIT SUPPORT.
1. SUPPORT WIRE USED TO INDEPENDENTLY SUPPORT RACEWAY AND WIRING SYSTEMS ABOVE SUSPENDING CEILINGS SHALL BE SUPPORTED ON BOTH ENDS, MINIMUM 12 GAUGE SUSPENDED CEILING SUPPORT WIRE, AND DISTINGUISHABLE FROM CEILING SUPPORT SYSTEMS BY COLOR (FIELD PAINT), TAGGING, OR EQUIVALENT MEANS.
B. CONDUIT SHALL NOT BE SUPPORTED FROM DUCTWORK, WATER, SPRINKLER PIPING, OR OTHER NON-STRUCTURAL MEMBERS, UNLESS APPROVED BY THE ARCHITECT/ENGINEER. ALL SUPPORTS SHALL BE FROM STRUCTURAL SLABS, WALLS, STRUCTURAL MEMBERS, AND BAR JOISTS, AND COORDINATED WITH ALL OTHER APPLICABLE CONTRACTORS, UNLESS NOTED OTHERWISE.
C. CONDUIT SHALL BE HELD IN PLACE BY THE CORRECT SIZE OF GALVANIZED ONE-HOLE CONDUIT CLAMPS, TWO-HOLE CONDUIT STRAPS, PATENTED SUPPORT DEVICES, CLAMP BACK CONDUIT HANGERS, OR BY OTHER MEANS IF CALLED FOR ON THE DRAWINGS.
D. SUPPORT INDIVIDUAL HORIZONTAL RACEWAYS WITH SEPARATE, MALLEABLE-IRON PIPE HANGERS OR CLAMPS.
E. SPRING-STEEL CONDUIT CLIPS SPECIFICALLY DESIGNED FOR SUPPORTING SINGLE CONDUITS OR TUBING MAY BE USED IN LIEU OF MALLEABLE-IRON HANGERS FOR 1-1/2" AND SMALLER RACEWAYS SERVING LIGHTING AND RECEPTACLE BRANCH CIRCUITS ABOVE ACCESSIBLE CEILINGS AND FOR SECURING RACEWAYS TO SLOTTED CHANNEL AND ANGLE SUPPORTS.
F. GROUP CONDUITS IN PARALLEL RUNS WHERE PRACTICAL AND USE CONDUIT RACKS OR TRAPEZE HANGERS CONSTRUCTED OF STEEL CHANNEL, SUSPENDED WITH THREADED SOLID RODS OR WALL MOUNTED FROM METAL CHANNELS WITH CONDUIT STRAPS OR CLAMPS. PROVIDE SPACE IN EACH RACK OR TRAPEZE FOR 25% ADDITIONAL CONDUITS.
G. DO NOT EXCEED 25 LBS. PER HANGER AND A MINIMUM SPACING OF 2'-0" ON CENTER WHEN ATTACHING TO METAL ROOF DECKING (EXCLUDES CONCRETE ON METAL DECK). THIS 25 LBS. LOAD AND 2'-0" SPACING INCLUDE ADJACENT ELECTRICAL AND MECHANICAL ITEMS HANGING FROM DECK. IF THE HANGER RESTRICTIONS CANNOT BE ACHIEVED, SUPPLEMENTAL FRAMING OFF STEEL FRAMING WILL NEED TO BE ADDED.
H. ARRANGE SUPPORTS IN VERTICAL RUNS SO THE WEIGHT OF RACEWAYS AND ENCLOSED CONDUCTORS IS CARRIED ENTIRELY BY RACEWAY SUPPORTS, WITH NO WEIGHT LOAD ON RACEWAY TERMINALS.
I. SUPPORTS FOR METALLIC CONDUIT SHALL BE NO GREATER THAN 10 FEET. A SMALLER INTERVAL MAY BE USED IF NECESSITATED BY BUILDING CONSTRUCTION, BUT IN NO EVENT SHALL SUPPORT SPANS EXCEED THE ELECTRICAL CODE REQUIREMENTS. CONDUIT SHALL BE SECURELY FASTENED WITHIN 3 FEET OF EACH OUTLET BOX, JUNCTION BOX, DEVICE BOX, CABINET, OR FITTING.
J. SUPPORTS OF FLEXIBLE CONDUIT SHALL BE WITHIN 12 INCHES OF EACH OUTLET BOX, JUNCTION BOX, DEVICE BOX, CABINET, OR FITTING AND AT INTERVALS NOT TO EXCEED 4.5 FEET.
K. SUPPORTS FOR NON-METALLIC CONDUIT SHALL BE AT SUFFICIENTLY CLOSE INTERVALS TO ELIMINATE ANY SAG IN THE CONDUIT. THE MANUFACTURER'S RECOMMENDATIONS SHALL BE FOLLOWED, BUT IN NO EVENT SHALL SUPPORT SPANS EXCEED THE ELECTRICAL CODE REQUIREMENTS.
L. WHERE CONDUIT IS TO BE INSTALLED IN POURED CONCRETE FLOORS OR WALLS, PROVIDE CONCRETE-TIGHT CONDUIT INSERTS SECURELY FASTENED TO FORMS TO PREVENT CONDUIT MISPLACEMENT.
M. FINISH:
1. PRIME COAT EXPOSED STEEL HANGERS AND SUPPORTS. HANGERS AND SUPPORTS IN CRAWL SPACES, PIPE SHAFTS, AND ABOVE SUSPENDED CEILING SPACES ARE NOT CONSIDERED EXPOSED.
2. TRIM ALL ENDS OF EXPOSED FIELD FABRICATED STEEL HANGERS, SLOTTED CHANNEL AND THREADED ROD TO WITHIN 1" OF SUPPORT OR FASTENER TO ELIMINATE POTENTIAL INJURY TO PERSONNEL UNLESS SHOWN OTHERWISE ON THE DRAWINGS. SMOOTH ENDS AND INSTALL ELASTOMERIC INSULATION WITH TWO COATS OF LATEX PAINT IF EXPOSED STEEL IS WITHIN 6'-6" OF FINISH FLOOR AND PRESENTS POTENTIAL INJURY TO PERSONNEL.

18.04 CONDUIT INSTALLATION
A. CONDUIT CONNECTIONS:
1. SHORTER THAN STANDARD CONDUIT LENGTHS SHALL BE CUT SQUARE USING INDUSTRY STANDARDS. THE ENDS OF ALL CONDUITS CUT SHALL BE REAMED OR OTHERWISE FINISHED TO REMOVE ALL ROUGH EDGES.
2. METALLIC CONDUIT CONNECTIONS IN SLAB ON GRADE INSTALLATION SHALL BE SEALED AND ONE COAT OF RUST INHIBITOR PRIMER APPLIED AFTER THE CONNECTION IS MADE.
3. WHERE CONDUITS WITH TAPERED THREADS CANNOT BE COUPLED WITH STANDARD COUPLINGS, THEN APPROVED SPLIT OR ERICKSON COUPLINGS SHALL BE USED. RUNNING THREADS WILL NOT BE PERMITTED.
4. INSTALL EXPANSION/DEFLECTION JOINTS WHERE CONDUIT CROSSES STRUCTURE EXPANSION/SEISMIC JOINTS.
B. CONDUIT TERMINATIONS FOR ALL LOW VOLTAGE WIRING SHALL HAVE NYLON BUSHINGS INSTALLED ON EACH END OF EVERY CONDUIT RUN.
C. CONDUIT BENDS:
1. USE A HYDRAULIC ONE-SHOT CONDUIT BENDER OR FACTORY ELBOWS FOR BENDS IN CONDUIT 2" IN SIZE OR LARGER. ALL STEEL CONDUIT BENDING SHALL BE DONE COLD; NO HEATING OF STEEL CONDUIT SHALL BE PERMITTED.
2. ALL BENDS OF RIGID POLYVINYL CHLORIDE CONDUIT (PVC) SHALL BE MADE WITH THE MANUFACTURER'S APPROVED BENDING EQUIPMENT. THE USE OF SPOT HEATING DEVICES WILL NOT BE PERMITTED (I.E. BLOW TORCHES).
3. A RUN OF CONDUIT SHALL NOT CONTAIN MORE THAN THE EQUIVALENT OF FOUR (4) QUARTER BENDS (360°), INCLUDING THOSE BENDS LOCATED IMMEDIATELY AT THE OUTLET OR BODY.
4. TELECOMMUNICATIONS CONDUITS SHALL HAVE NO MORE THAN TWO (2) 90-DEGREE BENDS BETWEEN PULL POINTS AND CONTAIN NO CONTINUOUS SECTIONS LONGER THAN 100 FEET. INSERT PULL POINTS OR PULL BOXES FOR CONDUITS EXCEEDING 100 FEET IN LENGTH.
a. A THIRD BEND IS ACCEPTABLE IF:
1) THE TOTAL RUN IS NOT LONGER THAN (33) FEET.
2) THE CONDUIT SIZE IS INCREASED TO THE NEXT TRADE SIZE.
5. TELECOMMUNICATIONS PULL BOXES SHALL NOT BE USED IN LIEU OF A BEND. ALIGN CONDUITS THAT ENTER THE PULL BOX FROM OPPOSITE ENDS WITH EACH OTHER. PULL BOX SIZE SHALL BE TWELVE (12) TIMES THE DIAMETER OF THE LARGEST CONDUIT. SLIP SLEEVES OR GUTTERS CAN BE USED IN PLACE OF A PULL BOX.
6. TELECOMMUNICATIONS CONDUIT(S): MAINTAIN APPROPRIATE CONDUIT BEND RADIUS AT ALL TIMES. FOR CONDUITS WITH AN INTERNAL DIAMETER OF LESS THAN 2", MAINTAIN A BEND RADIUS OF AT LEAST 6 TIMES THE INTERNAL DIAMETER. FOR CONDUITS WITH AN INTERNAL DIAMETER 2" OR GREATER, MAINTAIN A BEND RADIUS OF AT LEAST 10 TIMES THE INTERNAL DIAMETER.
7. RIGID POLYVINYL CHLORIDE CONDUIT (PVC) RUNS LONGER THAN 100 FEET OR RUNS WHICH HAVE MORE THAN TWO 90° EQUIVALENT BENDS (REGARDLESS OF LENGTH) SHALL USE RIGID METAL OR RTRC FACTORY ELBOWS FOR BENDS.
8. USE CONDUIT BODIES TO MAKE SHARP CHANGES IN DIRECTION (I.E. AROUND BEAMS).
D. CONDUIT PLACEMENT:
1. CONDUIT SHALL BE MECHANICALLY CONTINUOUS FROM SOURCE OF CURRENT TO ALL OUTLETS. CONDUIT SHALL BE ELECTRICALLY CONTINUOUS FROM SOURCE OF CURRENT TO ALL OUTLETS, UNLESS A PROPERLY SIZED GROUNDING CONDUCTOR IS ROUTED WITHIN THE CONDUIT. ALL METALLIC CONDUITS SHALL BE BONDED PER THE ELECTRICAL CODE.
2. ROUTE EXPOSED CONDUIT AND CONDUIT ABOVE SUSPENDED CEILINGS (ACCESSIBLE OR NOT) PARALLEL/PERPENDICULAR TO THE BUILDING STRUCTURAL LINES, AND AS CLOSE TO BUILDING STRUCTURE AS POSSIBLE. WHEREVER POSSIBLE, ROUTE HORIZONTAL CONDUIT RUNS ABOVE WATER AND STEAM PIPING.
3. ROUTE CONDUIT THROUGH ROOF OPENINGS PROVIDED FOR PIPING AND DUCTWORK WHERE POSSIBLE. IF NOT PROVIDED OR ROUTING THROUGH PROVIDED OPENINGS IS NOT POSSIBLE, ROUTE THROUGH ROOF JACK WITH PITCH POCKET. COORDINATE ROOF PENETRATIONS WITH OTHER TRADES.
4. CONDUITS, RACEWAY, AND BOXES SHALL NOT BE INSTALLED IN CONCEALED LOCATIONS IN METAL DECK ROOFING OR LESS THAN 1.5" BELOW BOTTOM OF ROOF DECKING.
5. AVOID MOISTURE TRAPS WHERE POSSIBLE. WHERE UNAVOIDABLE, PROVIDE A JUNCTION BOX WITH DRAIN FITTING AT CONDUIT LOW POINT.
6. ALL CONDUITS THROUGH WALLS SHALL BE GROUTED OR SEALED INTO OPENINGS. WHERE CONDUIT PENETRATES FIREWALLS AND FLOORS, SEAL WITH A UL LISTED SEALANT. SEAL PENETRATIONS WITH INTUMESCENT CAULK, PUTTY, OR SHEET INSTALLED PER MANUFACTURER'S RECOMMENDATIONS. ALL MATERIALS USED TO SEAL PENETRATIONS OF FIREWALLS AND FLOORS SHALL BE TESTED AND CERTIFIED AS A SYSTEM PER ASTM E814 STANDARD FOR FIRE TESTS OR THROUGH-PENETRATION FIRE STOPS AS MANUFACTURED BY 3M OR APPROVED EQUAL.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL OPENINGS REQUIRED IN MASONRY OR EXTERIOR WALLS UNDER THIS DIVISION. A QUALIFIED MASON AT THE EXPENSE OF THIS CONTRACTOR SHALL REPAIR ALL OPENINGS TO MATCH EXISTING CONDITIONS.
8. SEAL INTERIOR OF CONDUIT AT EXTERIOR ENTRIES, AIR HANDLING UNITS, COOLERS/FREEZERS, ETC., AND WHERE THE TEMPERATURE DIFFERENTIAL CAN POTENTIALLY BE GREATER THAN 20°F, TO PREVENT MOISTURE PENETRATION. SEAL SHALL BE PLACED WHERE CONDUIT ENTERS WARM SPACE. CONDUIT SEAL FITTING SHALL BE A DRAIN/SEAL, WITH SEALING COMPOUND, IDENTIFIED FOR USE WITH CABLE AND RACEWAY SYSTEM, EQUAL TO O-Z/GEDNEY TYPE EYD.
9. HORIZONTAL CONDUIT ROUTING THROUGH SLABS ABOVE GRADE
a. CONDUITS, IF RUN IN CONCRETE STRUCTURE, SHALL BE IN MIDDLE ONE-THIRD OF SLAB THICKNESS, AND LEAVE AT LEAST 3" MIN. CONCRETE COVER. CONDUITS SHALL RUN PARALLEL TO EACH OTHER AND SPACED AT LEAST 8" APART CENTERLINE TO CENTERLINE. SECURE RACEWAYS TO REINFORCING RODS TO PREVENT SAGGING OR SHIFTING DURING CONCRETE PLACEMENT. MAXIMUM CONDUIT OUTSIDE DIAMETER 1".
b. NO CONDUITS ARE ALLOWED IN CONCRETE ON METAL DECK UNLESS EXPRESSLY APPROVED IN WRITING BY THE STRUCTURAL ENGINEER.
c. NO CONDUITS ARE ALLOWED TO BE ROUTED HORIZONTALLY THROUGH SLABS ABOVE GRADE.
10. DO NOT ROUTE CONDUITS ACROSS EACH OTHER IN SLABS ON GRADE.
11. RIGID POLYVINYL CHLORIDE CONDUIT (PVC) SHALL BE INSTALLED WHEN MATERIAL SURFACE TEMPERATURES AND AMBIENT TEMPERATURE ARE GREATER THAN 40°F.
12. WHERE RIGID POLYVINYL CHLORIDE CONDUIT (PVC) IS USED BELOW GRADE, IN A SLAB, BELOW A SLAB, ETC., A TRANSITION TO OR PVC-COATED STEEL CONDUIT SHALL BE INSTALLED BEFORE CONDUIT EXITS EARTH. THE CONDUIT SHALL EXTEND A MINIMUM OF 6" INTO THE SURFACE CONCEALING THE NON-METALLIC CONDUIT.
13. CONTRACTOR SHALL PROVIDE SUITABLE MECHANICAL PROTECTION AROUND ALL CONDUITS STUBBED OUT FROM FLOORS, WALLS OR CEILINGS DURING CONSTRUCTION TO PREVENT BENDING OR DAMAGING OF STUBS DUE TO CARELESSNESS WITH CONSTRUCTION EQUIPMENT.
14. CONTRACTOR SHALL PROVIDE A POLYPROPYLENE PULL CORD WITH 2000 LBS. TENSILE STRENGTH IN EACH EMPTY CONDUIT (INDOOR AND OUTDOOR), EXCEPT IN SLEEVES AND NIPPLES.
15. TELECOMMUNICATIONS CONDUITS THAT PROTRUDE THROUGH THE STRUCTURAL FLOOR SHALL BE INSTALLED 1 TO 3" ABOVE FINISHED FLOOR (AFF).
16. TELECOMMUNICATIONS CONDUITS THAT ENTER INTO TELECOMMUNICATIONS ROOMS BELOW THE FINISHED CEILING SHALL TERMINATE A MINIMUM OF 4" BELOW CEILING AND AS CLOSE TO THE WALL AS POSSIBLE.
17. TELECOMMUNICATIONS CONDUITS THAT ARE BELOW GRADE AND ENTER INTO A BUILDING SHALL TERMINATE A MINIMUM OF 4" ABOVE FINISHED FLOOR (AFF) AND AS CLOSE TO THE WALL AS POSSIBLE.

18.05 CONDUIT TERMINATIONS
A. WHERE CONDUIT BONDING IS INDICATED OR REQUIRED IN THE CONTRACT DOCUMENTS, THE BUSHINGS SHALL BE A GROUNDING TYPE SIZED FOR THE CONDUIT AND GROUND BONDING CONDUCTOR AS MANUFACTURED BY O-Z/GEDNEY, APPLETON, THOMAS & BETTS, BURNDY, REGAL, ORBIT INDUSTRIES OR APPROVED EQUAL.
B. CONDUITS WITH TERMINATION FITTINGS SHALL BE THREADED FOR ONE (1) LOCK NUT ON THE OUTSIDE AND ONE (1) LOCK NUT AND BUSHING ON THE INSIDE OF EACH BOX.
C. WHERE CONDUITS TERMINATE IN BOXES WITH KNOCKOUTS, THEY SHALL BE SECURED TO THE BOXES WITH LOCK NUTS AND PROVIDED WITH APPROVED SCREW TYPE TINNED IRON BUSHINGS OR FITTINGS WITH PLASTIC INSERTS.
D. WHERE CONDUITS TERMINATE IN BOXES, FITTINGS, OR BODIES WITH THREADED OPENINGS, THEY SHALL BE TIGHTLY SCREWED AGAINST THE SHOULDER PORTION OF THE THREADED OPENINGS.
E. CONDUIT TERMINATIONS TO ALL MOTORS SHALL BE MADE WITH FLEXIBLE METALLIC CONDUIT (FMC), UNLESS NOTED OTHERWISE. FINAL CONNECTIONS TO ROOF EXHAUST FANS, OR OTHER EXTERIOR MOTORS AND MOTORS IN DAMP OR WET LOCATIONS SHALL BE MADE WITH LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT (LFMC). MOTORS IN HAZARDOUS AREAS, AS DEFINED IN THE ELECTRICAL CODE, SHALL BE CONNECTED USING FLEXIBLE CONDUIT RATED FOR THE ENVIRONMENT. FLEXIBLE CONDUIT SHALL NOT EXCEED 6' IN LENGTH. ROUTE EQUIPMENT GROUND CONDUCTORS FROM CIRCUIT GROUND TO MOTOR GROUND TERMINAL THROUGH FLEXIBLE CONDUIT.
F. RIGID POLYVINYL CHLORIDE CONDUIT (PVC) SHALL BE TERMINATED USING FITTINGS AND BODIES PRODUCED BY THE MANUFACTURER OF THE CONDUIT, UNLESS NOTED OTHERWISE. PREPARE CONDUIT AS PER MANUFACTURER'S RECOMMENDATIONS BEFORE JOINING. ALL JOINTS SHALL BE SOLVENT WELDED BY APPLYING FULL EVEN COAT OF PLASTIC CEMENT TO THE ENTIRE AREAS THAT WILL BE JOINED. TURN THE CONDUIT AT LEAST A QUARTER TO ONE HALF TURN IN THE FITTING AND LET THE JOINT CURE FOR 1-HOUR MINIMUM OR AS PER THE MANUFACTURER'S RECOMMENDATIONS.
G. ALL CONDUIT ENDS SHALL BE SEALED WITH PLASTIC IMMEDIATELY AFTER INSTALLATION TO PREVENT THE ENTRANCE OF ANY FOREIGN MATTER DURING CONSTRUCTION. THE SEALS SHALL BE REMOVED AND THE CONDUITS BLOWN CLEAR OF ALL FOREIGN MATTER PRIOR TO ANY WIRES OR PULL CORDS BEING INSTALLED.

18.06 RIGID POLYVINYL CHLORIDE CONDUIT (PVC) OVERHEAD CONDUIT INSTALLATION
A. CONDUIT SHALL BE INSTALLED AWAY FROM HIGH TEMPERATURE PIPING AND EQUIPMENT.
B. CONDUIT SHALL BE INSTALLED TO PREVENT EXPOSURE TO ULTRAVIOLET RADIATION.
C. PROPER ALLOWANCES SHALL BE MADE FOR EXPANSION AND/OR CONTRACTION OF THE CONDUIT DURING INSTALLATION.
D. EXPANSION FITTINGS SHALL BE INSTALLED IN ANY 100' CONTINUOUS RUN OF CONDUIT AND AT EACH 100' THEREAFTER.
E. SUPPORTS SHALL BE MADE FROM NON-CORRODING MATERIALS AND SPACING SHALL NOT BE GREATER THAN THE LISTING IN THE ELECTRICAL CODE, BUT ALSO SHALL NOT EXCEED THE MANUFACTURER'S RECOMMENDATIONS DEPENDING ON THE EXPECTED SURFACE TEMPERATURE.

18.07 UNDERGROUND CONDUIT INSTALLATION
A. CONDUIT CONNECTIONS:
1. CONDUIT JOINTS IN A MULTIPLE CONDUIT RUN SHALL BE STAGGERED AT LEAST ONE FOOT APART.
B. CONDUIT BENDS (LATERAL):
1. CONDUITS SHALL HAVE LONG SWEEP RADIUS ELBOWS INSTEAD OF STANDARD ELBOWS WHEREVER SPECIAL BENDS ARE INDICATED AND NOTED ON THE DRAWINGS, OR AS REQUIRED BY THE MANUFACTURER OF THE EQUIPMENT OR SYSTEM BEING SERVED.
2. TELECOMMUNICATIONS CONDUIT BEND RADIUS SHALL BE SIX TIMES THE DIAMETER FOR CONDUITS UNDER 2" AND TEN TIMES THE DIAMETER FOR CONDUITS OVER 2". WHERE LONG CABLE RUNS ARE INVOLVED, SIDEWALL PRESSURES MAY REQUIRE LARGER RADIUS BENDS. COORDINATE WITH ARCHITECT/ENGINEER PRIOR TO CONDUIT INSTALLATION TO DETERMINE BEND RADIUS.
C. CONDUIT ELBOWS (VERTICAL):
1. MINIMUM METAL OR RTRC ELBOW RADIUSES SHALL BE 30 INCHES FOR PRIMARY CONDUITS (GREATER THAN 600V) AND 18 INCHES FOR SECONDARY CONDUITS (LESS THAN 600V). INCREASE RADIUS, AS REQUIRED, BASED ON PULLING TENSION CALCULATION REQUIREMENTS.
D. EXPANSION FITTINGS AT FINISHED GRADE: PROVIDE UNDERGROUND RACEWAYS WITH AN EXPANSION FITTING AFTER EMERGING FROM FINISHED GRADE AND EXTERIOR EQUIPMENT PADS. FIELD LOCATE THE EXPANSION FITTING ABOVE AND WITHIN 24 INCHES OF FINISHED GRADE. RACEWAYS EXTENDING LESS THAN 12 INCHES ABOVE FINISHED GRADE, TRANSITIONING TO LFMC WITHIN 12 INCHES OF FINISHED GRADE, AND INTERIOR CONCRETE BUILDING SLABS DO NOT REQUIRE AN EXPANSION FITTING UNLESS REQUIRED BY CODE.
E. CONDUIT PLACEMENT:
1. CONDUIT RUNS SHALL BE PITCHED A MINIMUM OF 4" PER 100 FEET TO DRAIN TOWARD THE TERMINATIONS. DUCT RUNS SHALL BE INSTALLED DEEPER THAN THE MINIMUM WHEREVER REQUIRED TO AVOID ANY CONFLICTS WITH EXISTING OR NEW PIPING, TUNNELS, ETC.
2. FOR PARALLEL RUNS, USE SUITABLE SEPARATORS AND CHAIRS INSTALLED NOT GREATER THAN 4' ON CENTERS. BAND CONDUIT TOGETHER WITH SUITABLE BANDING DEVICES. SECURELY ANCHOR CONDUIT TO PREVENT MOVEMENT DURING CONCRETE PLACEMENT OR BACKFILLING.
3. WHERE CONCRETE IS REQUIRED, THE MATERIALS FOR CONCRETING SHALL BE THOROUGHLY MIXED TO A MINIMUM F'C = 2500 AND IMMEDIATELY PLACED IN THE TRENCH AROUND THE CONDUITS. NO CONCRETE THAT HAS BEEN ALLOWED TO PARTIALLY SET SHALL BE USED.
4. BEFORE THE CONTRACTOR PULLS ANY CABLES INTO THE CONDUIT, CONTRACTOR SHALL HAVE A MANDREL 1/4" SMALLER THAN THE CONDUIT INSIDE DIAMETER PULLED THROUGH EACH CONDUIT AND IF ANY CONCRETE OR OBSTRUCTIONS ARE FOUND, THE CONTRACTOR SHALL REMOVE THEM AND CLEAR THE CONDUIT. SPARE CONDUIT SHALL ALSO BE CLEARED OF ALL OBSTRUCTIONS.
5. CONDUIT TERMINATIONS IN MANHOLES, MASONRY PULL BOXES, OR MASONRY WALLS SHALL BE WITH MALLEABLE IRON END BELL FITTINGS.
6. ALL SPARE CONDUITS NOT TERMINATED IN A COVERED ENCLOSURE SHALL HAVE ITS TERMINATIONS PLUGGED AS DESCRIBED ABOVE.
7. DUCTBANKS AND CONDUIT SHALL BE INSTALLED A MINIMUM OF 24" BELOW FINISHED GRADE, UNLESS OTHERWISE NOTED ON THE DRAWINGS OR ELSEWHERE IN THESE SPECIFICATIONS.
8. ALL NON-METALLIC CONDUIT INSTALLED UNDERGROUND OUTSIDE OF A SLAB SHALL BE RIGID.
F. HORIZONTAL DIRECTIONAL DRILLING:
1. ENTIRE DRILL PATH SHALL BE ACCURATELY SURVEYED, WITH ENTRY AND EXIT STAKES PLACED AND COORDINATED WITH OTHER CONTRACTORS. IF USING A MAGNETIC GUIDANCE SYSTEM, ENTIRE DRILL PATH SHALL BE SURVEYED FOR ANY SURFACE GEO-MAGNETIC VARIATIONS OR ANOMALIES.
2. ANY UTILITY LOCATES WITHIN 20 FEET OF THE BORE PATH SHALL HAVE THE EXACT LOCATION PHYSICALLY VERIFIED BY HAND DIGGING OR VACUUM EXCAVATION. RESTORE INSPECTION HOLES TO ORIGINAL CONDITION AFTER VERIFICATION.
G. RACEWAY SEAL:
1. WHERE A RACEWAY ENTERS A BUILDING OR STRUCTURE, IT SHALL BE SCALED WITH A SEALING BUSHING OR DUCT SEAL TO PREVENT THE ENTRY OF LIQUIDS OR GASES. SEAL MUST BE COMPATIBLE WITH CONDUCTORS AND RACEWAY SYSTEM. SPARE OR UNUSED RACEWAY SHALL BE SEALED.
2. ALL TELECOMMUNICATIONS CONDUITS AND INNERDUCTS, INCLUDING THOSE CONTAINING CABLES, SHALL BE PLUGGED AT THE BUILDING AND VAULT WITH "JACKMOON" OR EQUIVALENT DUCT SEAL, CAPABLE OF WITHSTANDING A 10-FOOT HEAD OF WATER (5 PSI).
3. DUCT SEAL ALTERNATIVE OPTION: INFLATABLE DUCT SEAL SYSTEM. CAPABLE OF WITHSTANDING A 10-FOOT HEAD OF WATER (5 PSEI).
a. MANUFACTURERS:
1) RAYCHEM RAYFLATE DUCT SEALING SYSTEMS RDSS
2) APPROVED EQUAL

18.08 BOX INSTALLATION SCHEDULE
A. GALVANIZED STEEL BOXES MAY BE USED IN:
1. CONCEALED INTERIOR LOCATIONS ABOVE CEILINGS AND IN HOLLOW STUDDED PARTITIONS.
2. EXPOSED INTERIOR LOCATIONS IN MECHANICAL ROOMS AND IN ROOMS WITHOUT CEILINGS; HIGHER THAN 8' ABOVE THE HIGHEST PLATFORM LEVEL.
3. DIRECT CONTACT WITH CONCRETE EXCEPT SLAB ON GRADE.
4. RECESSED IN STUD WALL OF KITCHENS AND LAUNDRIES.
B. CAST BOXES SHALL BE USED IN:
1. EXTERIOR LOCATIONS.
2. HAZARDOUS LOCATIONS.
3. EXPOSED INTERIOR LOCATIONS WITHIN 8' OF THE HIGHEST PLATFORM LEVEL.
4. DIRECT CONTACT WITH EARTH.
5. DIRECT CONTACT WITH CONCRETE IN SLAB ON GRADE.
6. WET LOCATIONS.
7. KITCHENS AND LAUNDRIES WHEN EXPOSED ON WALL SURFACE.

18.09 COORDINATION OF BOX LOCATIONS
A. PROVIDE ELECTRICAL BOXES AS SHOWN ON THE DRAWINGS, AND AS REQUIRED FOR SPLICES, TAPS, WIRE PULLING, EQUIPMENT CONNECTIONS, AND CODE COMPLIANCE.
B. ELECTRICAL BOX LOCATIONS SHOWN ON THE CONTRACT DRAWINGS ARE APPROXIMATE, UNLESS DIMENSIONED. VERIFY LOCATION OF FLOOR BOXES AND OUTLETS IN OFFICES AND WORK AREAS PRIOR TO ROUGH-IN.
C. LOCATE AND INSTALL BOXES TO ALLOW ACCESS. AVOID INTERFERENCES WITH DUCTWORK, PIPING, STRUCTURE, EQUIPMENT, ETC. RECESSED LUMINAIRES SHALL NOT BE USED AS ACCESS TO OUTLET, PULL, AND JUNCTION BOXES. WHERE INSTALLATION IS INACCESSIBLE, PROVIDE ACCESS DOORS. COORDINATE LOCATIONS AND SIZES OF REQUIRED ACCESS DOORS WITH THE ARCHITECT/ENGINEER AND GENERAL CONTRACTOR.
D. LOCATE AND INSTALL TO MAINTAIN HEADROOM AND TO PRESENT A NEAT APPEARANCE.
E. COORDINATE LOCATIONS WITH HEATING CONTRACTOR TO AVOID BASEBOARD RADIATION CABINETS.

18.10 OUTLET BOX INSTALLATION
A. DO NOT INSTALL BOXES BACK-TO-BACK IN WALLS.
1. PROVIDE A MINIMUM HORIZONTAL SEPARATION OF 6 INCHES BETWEEN BOXES INSTALLED ON OPPOSITE SIDES OF NON-RATED STUD WALLS. WHEN THE MINIMUM SEPARATION CANNOT BE MAINTAINED, INSTALL SOUND INSULATION PADS ON ALL FIVE SIDES OF THE BACK BOX IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
2. PROVIDE A MINIMUM HORIZONTAL SEPARATION OF 24 INCHES BETWEEN BOXES INSTALLED ON OPPOSITE SIDES OF FIRE-RATED WALLS. WHEN THE MINIMUM SEPARATION CANNOT BE MAINTAINED, THE BOX IS GREATER THAN 16 SQUARE INCHES OR THE TOTAL BOX AREA (ALL TRADES) PER 100 SQUARE FEET IS GREATER THAN OR EQUAL TO 100 SQUARE INCHES, INSTALL FIRE-RATED MOLDABLE PADS TO ALL FIVE SIDES OF THE BACK BOX TO MAINTAIN THE FIRE RATING OF THE WALL. INSTALL MOLDABLE PADS IN ACCORDANCE WITH UL LISTING FOR THE SPECIFIC PRODUCT. SOUND INSULATION PADS ARE NOT ACCEPTABLE FOR USE IN FIRE-RATED WALL APPLICATIONS UNLESS THE PRODUCT CARRIES THE NECESSARY FIRE RATING.
B. INSTALL SOUND INSULATION PADS ON ALL FIVE SIDES OF THE BACK OF ALL BOXES IN SOUND-RATED WALL ASSEMBLIES. SOUND-RATED WALL ASSEMBLIES ARE DEFINED AS PARTITION TYPES CARRYING A SOUND TRANSMISSION CLASS (STC) RATING.

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ELECTRICAL SPECIFICATIONS

C. THE CONTRACTOR SHALL ANCHOR SWITCH AND OUTLET BOX TO WALL CONSTRUCTION SO THAT IT IS FLUSH WITH THE FINISHED MASONRY, PANELING, DRYWALL, PLASTER, ETC. THE CONTRACTOR SHALL CHECK THE BOXES AS THE FINISH WALL SURFACE IS BEING INSTALLED TO ASSURE THAT THE BOX IS FLUSH. (PROVIDE PLASTER RINGS AS NECESSARY.)

D. MOUNT AT HEIGHTS SHOWN OR NOTED ON THE DRAWINGS OR AS GENERALLY ACCEPTED IF NOT SPECIFICALLY NOTED.

E. LOCATE BOXES IN MASONRY WALLS TO REQUIRE CUTTING OF MASONRY UNIT CORNER ONLY. COORDINATE MASONRY CUTTING TO ACHIEVE NEAT OPENINGS FOR BOXES.

F. PROVIDE KNOCKOUT CLOSURES FOR UNUSED OPENINGS.

G. SUPPORT BOXES INDEPENDENTLY OF CONDUIT.

H. USE MULTIPLE-GANG BOXES WHERE MORE THAN ONE DEVICE IS MOUNTED TOGETHER; DO NOT USE SECTIONAL BOXES. PROVIDE BARRIERS TO SEPARATE WIRING OF DIFFERENT VOLTAGE SYSTEMS.

I. INSTALL BOXES IN WALLS WITHOUT DAMAGING WALL INSULATION.

J. POSITION OUTLETS TO LOCATE LUMINAIRES AS SHOWN ON REFLECTED CEILING DRAWINGS.

K. PROVIDE RECESSED OUTLET BOXES IN FINISHED AREAS; SECURE BOXES TO INTERIOR WALL AND PARTITION STUDS, ACCURATELY POSITIONED TO ALLOW FOR SURFACE FINISH THICKNESS. USE STAMPED STEEL STUD BRIDGES FOR FLUSH OUTLETS IN HOLLOW STUD WALL, AND ADJUSTABLE STEEL CHANNEL FASTENERS FOR FLUSH CEILING OUTLET BOXES.

L. ALIGN WALL-MOUNTED OUTLET BOXES FOR SWITCHES, THERMOSTATS, AND SIMILAR DEVICES.

M. PROVIDE CAST OUTLET BOXES IN EXTERIOR LOCATIONS AND WET LOCATIONS, AND WHERE EXPOSED RIGID OR INTERMEDIATE CONDUIT IS USED.

18.11 PULL AND JUNCTION BOX INSTALLATION

A. LOCATE PULL BOXES AND JUNCTION BOXES ABOVE ACCESSIBLE CEILINGS OR IN UNFINISHED AREAS.

B. SUPPORT PULL AND JUNCTION BOXES INDEPENDENT OF CONDUIT.

C. DO NOT INSTALL BOXES BACK-TO-BACK IN WALLS.

1. PROVIDE A MINIMUM HORIZONTAL SEPARATION OF 6 INCHES BETWEEN BOXES INSTALLED ON OPPOSITE SIDES OF NON-RATED STUD WALLS. WHEN THE MINIMUM SEPARATION CANNOT BE MAINTAINED, INSTALL SOUND INSULATION PADS ON ALL FIVE SIDES OF THE BACK BOX IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
2. PROVIDE A MINIMUM HORIZONTAL SEPARATION OF 24 INCHES BETWEEN BOXES INSTALLED ON OPPOSITE SIDES OF FIRE-RATED WALLS. WHEN THE MINIMUM SEPARATION CANNOT BE MAINTAINED, THE BOX IS GREATER THAN 16 SQUARE INCHES OR THE TOTAL BOX AREA (ALL TRADES) PER 100 SQUARE FEET IS GREATER THAN OR EQUAL TO 100 SQUARE INCHES, INSTALL FIRE-RATED MOLDABLE PADS TO ALL FIVE SIDES OF THE BACK BOX TO MAINTAIN THE FIRE RATING OF THE WALL. INSTALL MOLDABLE PADS IN ACCORDANCE WITH UL LISTING FOR THE SPECIFIC PRODUCT. SOUND INSULATION PADS ARE NOT ACCEPTABLE FOR USE IN FIRE-RATED WALL APPLICATIONS UNLESS THE PRODUCT CARRIES THE NECESSARY FIRE RATING.

D. INSTALL SOUND INSULATION PADS ON ALL FIVE SIDES OF THE BACK OF ALL BOXES IN SOUND-RATED WALL ASSEMBLIES. SOUND-RATED WALL ASSEMBLIES ARE DEFINED AS PARTITION TYPES CARRYING A SOUND TRANSMISSION CLASS (STC) RATING.

18.12 EXPOSED BOX INSTALLATION

A. BOXES SHALL BE SECURED TO THE BUILDING STRUCTURE WITH PROPER SIZE SCREWS, BOLTS, HANGER RODS, OR STRUCTURAL STEEL ELEMENTS.

B. ON BRICK, BLOCK AND CONCRETE WALLS OR CEILINGS, EXPOSED BOXES SHALL BE SUPPORTED WITH NO LESS THAN TWO (2) ACKERMAN-JOHNSON, PAINE, PHILLIPS, OR APPROVED EQUAL SCREW ANCHORS OR EXPANSION SHIELDS AND ROUND HEAD MACHINE SCREWS. CAST BOXES SHALL NOT BE DRILLED.

C. ON STEEL STRUCTURES, EXPOSED BOXES SHALL BE SUPPORTED TO THE STEEL MEMBER BY DRILLING AND TAPPING THE MEMBER AND FASTENING THE BOXES BY MEANS OF ROUND HEAD MACHINE SCREWS.

D. BOXES MAY BE SUPPORTED ON STEEL MEMBERS BY APPROVED BEAM CLAMPS IF CONDUIT IS SUPPORTED BY BEAM CLAMPS.

E. BOXES SHALL BE FASTENED TO WOOD STRUCTURES BY MEANS OF A MINIMUM OF TWO (2) WOOD SCREWS ADEQUATELY LARGE AND LONG TO PROPERLY SUPPORT. (QUANTITY DEPENDS ON SIZE OF BOX.)

F. WOOD, PLASTIC, OR FIBER PLUGS SHALL NOT BE USED FOR FASTENINGS.

G. EXPLOSIVE DEVICES SHALL NOT BE USED UNLESS SPECIFICALLY ALLOWED.

END OF SECTION 26 05 33

SECTION 26 05 35 - SURFACE RACEWAYS

PART 19 - GENERAL

19.01 SECTION INCLUDES

A. SURFACE METAL RACEWAYS

19.02 REFERENCES

A. FS W-C-582 - CONDUIT, RACEWAY, METAL, AND FITTING; SURFACE

PART 20 - EXECUTION

20.01 INSTALLATION - SURFACE METAL RACEWAY AND MULTI-OUTLET ASSEMBLY

A. USE FLAT-HEAD SCREWS TO FASTEN CHANNEL TO SURFACES. MOUNT PLUMB AND LEVEL.

B. USE SUITABLE INSULATING BUSHINGS AND INSERTS AT CONNECTIONS TO OUTLETS AND CORNER FITTINGS.

C. MAINTAIN GROUNDING CONTINUITY BETWEEN RACEWAY COMPONENTS TO PROVIDE A CONTINUOUS GROUNDING PATH.

D. FASTENER: USE CLIPS AND STRAPS SUITABLE FOR THE PURPOSE.

E. FIELD CUTS TO BE CLEAN AND STRAIGHT AND USE THE PROPER TOOLS AS RECOMMENDED BY THE SYSTEM MANUFACTURER TO PROHIBIT DAMAGE TO FACTORY FINISH OR RACEWAY. JOINTS TO BE MATCHED SO THERE ARE NO GAPS OR SPACES IN THE COVER. FURNISH AND INSTALL MANUFACTURER'S RACEWAY ACCESSORIES AS NEEDED.

F. PROVIDE CONDUITS TO TECHNOLOGY RACEWAY PER DRAWINGS OR PROVIDE A MINIMUM OF ONE (1) 1-1/4" CONDUIT PER SIX FEET OF ASSEMBLY (MINIMUM 2) TO ABOVE CEILING FOR TECHNOLOGY REQUIREMENTS IF ASSEMBLY HAS TECHNOLOGY RACEWAY (CONTRACTOR SHALL PROVIDE QUANTITIES OF CONDUITS THAT PROVIDE MAXIMUM CAPACITY TO ASSEMBLY). PROVIDE CONDUITS EQUALLY SPACED WITHIN ENTIRE LENGTH OF ASSEMBLY.

G. PROVIDE ONE (1) 3/4" EMPTY CONDUIT PER SIX FEET OF ASSEMBLY (MINIMUM 1) TO ABOVE CEILING FOR FUTURE POWER NEEDS. PROVIDE CONDUITS EQUALLY SPACED WITHIN ENTIRE LENGTH OF ASSEMBLY.

END OF SECTION 26 05 35

SECTION 26 05 73 - POWER SYSTEM STUDY

PART 21 - GENERAL

21.01 SECTION INCLUDES

A. LOW VOLTAGE DISTRIBUTION SYSTEM POWER STUDY.

B. SHORT-CIRCUIT ANALYSIS AND REPORT.

C. SELECTIVE COORDINATION ANALYSIS AND REPORT.

21.02 RELATED SECTIONS

A. SECTION 26 05 00 - BASIC ELECTRICAL REQUIREMENTS

B. SECTION 26 11 00 - SECONDARY UNIT SUBSTATION

C. SECTION 26 23 00 - LOW VOLTAGE SWITCHGEAR

D. SECTION 26 24 13 - SWITCHBOARDS

E. SECTION 26 24 16 - PANELBOARDS

F. SECTION 26 24 22 - INTEGRATED POWER CENTERS

G. SECTION 26 28 11 - ARC REDUCTION EARTHING SYSTEM

21.03 QUALITY ASSURANCE

A. ANALYSES SHALL BE PERFORMED BY AN AGENT AUTHORIZED BY THE MANUFACTURER OF EQUIPMENT SPECIFIED IN THE RELATED SPECIFICATION SECTIONS.

21.04 SUBMITTALS

A. DOCUMENTATION SHALL BEAR THE SEAL/SIGNATURE OF THE LICENSED PROFESSIONAL ENGINEER WHO PERFORMED THE ANALYSIS.

B. THE INPUT FOR THE POWER SYSTEM STUDY SHALL BE BASED ON THE CONTRACT DOCUMENTS, WITH ESTIMATED CONDUCTOR LENGTHS AND FIELD INVESTIGATION OF EXISTING EQUIPMENT TYPES, SIZES, RATINGS PROVIDED BY THE ELECTRICAL CONTRACTOR.

C. DOCUMENTATION OF THE ANALYSES SHALL BE SUBMITTED IN A SINGLE BOUND ELECTRONIC (PDF OR EQUAL) FORMAT AND SHALL ACCOMPANY THE SHOP DRAWING SUBMITTALS FOR EQUIPMENT PROVIDED UNDER THE RELATED WORK SPECIFICATION SECTIONS. THE SUBMITTAL OF THESE RELATED SPECIFICATION SECTIONS WILL NOT BE REVIEWED WITHOUT THIS DOCUMENTATION. SUBMIT A SAMPLE ARC-FLASH HAZARD LABEL FOR OWNER REVIEW AND APPROVAL PRIOR TO PRINTING.

21.05 REFERENCES

A. NFPA 70 - NATIONAL ELECTRICAL CODE (NEC)

B. CEC CALIFORNIA ELECTRICAL CODE

C. NFPA 70E - STANDARD FOR ELECTRICAL SAFETY IN THE WORKPLACE

D. IEEE 1584 - IEEE GUIDE FOR PERFORMING ARC-FLASH HAZARD CALCULATIONS, LATEST VERSION

E. ANSI Z535.4 - PRODUCTS SAFETY SIGNS AND LABELS

21.06 SCOPE

A. PROVIDE A POWER SYSTEM STUDY OF THE ELECTRICAL SYSTEM SHOWN ON THE PLANS. THE STUDY SHALL INCLUDE ARC-FAULT ANALYSIS, SELECTIVE COORDINATION ANALYSIS AND ARC FLASH HAZARD ANALYSIS.

B. CONTRACTOR IS REQUIRED TO PROVIDE A CODE COMPLIANT SELECTIVELY COORDINATED ELECTRICAL SYSTEM. CONTRACTOR SHALL PROVIDE OVERCURRENT PROTECTIVE DEVICES WITH THE APPROPRIATE MODELS, FRAME SIZES, TRIP UNITS, ETC. AS REQUIRED TO PROVIDE A SELECTIVELY COORDINATED SYSTEM.

PART 22 - PRODUCTS

22.01 POWER SYSTEM STUDY

A. POWER SYSTEMS STUDY SHALL BE COMPLETED IN THE LATEST VERSION OF EASY POWER OR PRE-APPROVED EQUIVALENT PROGRAM.

B. POWER SYSTEM STUDIES INCLUDING, BUT NOT LIMITED TO SHORT-CIRCUIT ANALYSIS, SELECTIVE COORDINATION, AND ARC-FLASH ANALYSIS ARE INHERENTLY ITERATIVE IN NATURE. THE INITIAL AND SUBSEQUENT ANALYSIS COMMONLY REQUIRES ENGINEERING EVALUATION, EQUIPMENT MODIFICATION, SETTING ADJUSTMENTS, AND REVISED ANALYSIS REPORT. THE POWER SYSTEM ANALYSIS SCOPE SHALL NOT BE CONSIDERED COMPLETE UNTIL ALL OUTSTANDING ENGINEERING, EQUIPMENT AND DEVICE SETTING SOLUTIONS HAVE BEEN RESOLVED AND DOCUMENTED BY A FINAL REPORT. THE POWER SYSTEM STUDY VENDOR SHALL PROVIDE INCLUSIVE BID PROVISIONS FOR THE INITIAL, SUBSEQUENT, FINAL ANALYSIS AND ASSOCIATED REPORTS.

PART 23 - EXECUTION

23.01 SHORT-CIRCUIT ANALYSIS

A. PROVIDE A COMPLETE SHORT-CIRCUIT ANALYSIS FROM THE UTILITY SERVICE TO AND INCLUDING THE ENTIRE BUILDING DISTRIBUTION AS SHOWN ON THE DRAWINGS.

B. ANALYSIS SHALL INCLUDE THE ENTIRE DISTRIBUTION SYSTEM FROM THE POINT OF CONNECTION TO THE UTILITY POWER SOURCE TO THE DISTRIBUTION PANELS AND BRANCH CIRCUIT PANELBOARDS.

C. SHORT-CIRCUIT ANALYSIS DOCUMENTATION SHALL BE MADE IN ONE-LINE DIAGRAM FORM SHOWING THE MAGNITUDE AND LOCATION OF EACH CALCULATED FAULT. FAULT CURRENT CALCULATIONS SHALL BE MADE AT THE MAIN BUS OF EACH SWITCHBOARD, DISTRIBUTION PANEL, AND BRANCH CIRCUIT PANEL. A SUMMARY OF THE FAULT CURRENTS AVAILABLE SHALL ALSO BE SUBMITTED AND MADE AVAILABLE TO THE AHJ IF REQUESTED.

23.02 ADJUSTMENTS

A. MANUFACTURER'S AUTHORIZED REPRESENTATIVE OR CONTRACTOR SHALL SET ALL ADJUSTABLE PROTECTIVE DEVICES TO VALUES INDICATED IN THE APPROVED COORDINATION STUDY. APPLY SETTINGS PRIOR TO PLACING EQUIPMENT INTO OPERATION. WHEN THE SCOPE OF WORK OR EXECUTION INCLUDES REMODEL OR PHASES CONSTRUCTION, THE CONTRACTOR SHALL ADJUST APPLICABLE SETTINGS AS REQUIRED PRIOR TO EACH SYSTEM COMPONENT PLACED IN OPERATION.

B. WHEREVER THE ARC FLASH INCIDENT ENERGY EXCEEDS ARC FLASH CATEGORY 2 (I.E. GREATER THAN 8 CAL/CM^2), PROVIDE OPTIONS FOR ADJUSTING BREAKER TRIP TIMES, IF POSSIBLE, TO REDUCE ENERGIES TO CATEGORY 2 OR BELOW.

END OF SECTION 26 05 73

SECTION 26 08 01 - COMMISSIONING OF ELECTRICAL

PART 24 - GENERAL

24.01 SECTION INCLUDES

A. DESCRIPTION

B. RESPONSIBILITIES

C. RELATED WORK

D. TEST EQUIPMENT

24.02 DESCRIPTION

A. THE PURPOSE OF THIS SECTION IS TO SPECIFY DIVISION 26 RESPONSIBILITIES IN THE COMMISSIONING PROCESS.

B. THE SYSTEMS TO BE COMMISSIONED ARE THE ELECTRICAL LIGHTING SYSTEMS LISTED IN IECC 2021 SECTION C408 APPLICABLE TO THE PROJECT.

1. LIGHTING AND LIGHTING CONTROLS

24.03 RESPONSIBILITIES

A. COMMISSIONING REQUIRES THE PARTICIPATION OF THE DIVISION 26 CONTRACTOR TO ENSURE THAT ALL SYSTEMS ARE OPERATING IN A MANNER CONSISTENT WITH THE CONTRACT DOCUMENTS. THE GENERAL COMMISSIONING REQUIREMENTS AND COORDINATION ARE DETAILED IN SECTION 01 91 01. DIVISION 26 CONTRACTOR SHALL BE FAMILIAR WITH ALL PARTS OF SECTION 01 91 01 AND SHALL EXECUTE ALL COMMISSIONING RESPONSIBILITIES ASSIGNED TO THEM IN THE CONTRACT DOCUMENTS.

24.04 RELATED WORK

A. SPECIFIC COMMISSIONING REQUIREMENTS ARE GIVEN IN THE FOLLOWING SECTIONS OF THESE SPECIFICATIONS. ALL THE FOLLOWING SECTIONS APPLY TO THE WORK OF THIS SECTION.

1. SECTION 01 78 23 - OPERATIONS AND MAINTENANCE
2. SECTION 01 79 00 - DEMONSTRATION AND TRAINING
3. SECTION 01 91 01 - COMMISSIONING

PART 25 - PRODUCTS

25.01 TEST EQUIPMENT

A. THE CONTRACTOR SHALL PROVIDE ALL TEST EQUIPMENT NECESSARY TO FULFILL THE TESTING REQUIREMENTS OF THIS DIVISION. THIS EQUIPMENT INCLUDES, BUT IS NOT LIMITED TO, THE FOLLOWING:

1. LIGHT METER.
2. DIGITAL MULTIMETER CAPABLE OF MEASURING VOLTAGE (AC/DC), CURRENT, AND RESISTANCE.

B. ALL TESTING EQUIPMENT SHALL BE OF SUFFICIENT QUALITY AND ACCURACY TO TEST AND/OR MEASURE SYSTEM PERFORMANCE WITH THE TOLERANCES SPECIFIED IN THE RELATED SPECIFICATIONS. ALL EQUIPMENT SHALL BE CALIBRATED ACCORDING TO THE MANUFACTURER'S RECOMMENDED INTERVALS AND WHEN DROPPED OR DAMAGED. CALIBRATION TAGS SHALL BE AFFIXED OR CERTIFICATES READILY AVAILABLE.

C. REFER TO SECTION 01 91 01 FOR ADDITIONAL DIVISION 26 REQUIREMENTS.

PART 26 - EXECUTION

A. REFER TO SECTION 01 91 01 FOR ADDITIONAL INFORMATION.

END OF SECTION 26 08 01

SECTION 26 22 00 - DRY TYPE TRANSFORMERS

PART 27 - GENERAL

27.01 SECTION INCLUDES

A. DRY TYPE TWO WINDING TRANSFORMERS (TR-1)

27.02 REFERENCES

A. NEMA - ST 1 - SPECIALTY TRANSFORMERS

B. NEMA ST 20 - DRY TYPE TRANSFORMERS FOR GENERAL APPLICATIONS

C. ANSI/IEEE C57.12.01 - GENERAL REQUIREMENTS FOR DRY TYPE DISTRIBUTION AND POWER TRANSFORMERS

D. ANSI/IEEE C57.12.91 - TEST CODE FOR DRY TYPE DISTRIBUTION AND POWER TRANSFORMERS

E. DEPARTMENT OF ENERGY 10 CFR PART 431 - ENERGY CONSERVATION PROGRAM FOR COMMERCIAL EQUIPMENT: DISTRIBUTION TRANSFORMERS ENERGY CONSERVATION STANDARDS; FINAL RULE.

F. NEMA TP 2 - STANDARD TEST METHOD FOR MEASURING THE ENERGY CONSUMPTION OF DISTRIBUTION TRANSFORMERS

G. NEMA TP 3 - STANDARD FOR THE LABELING OF DISTRIBUTION TRANSFORMER EFFICIENCY

27.03 SUBMITTALS

A. SUBMIT PRODUCT DATA UNDER PROVISIONS OF SECTION 26 05 00.

B. INCLUDE OUTLINE AND SUPPORT POINT DIMENSIONS OF ENCLOSURES AND ACCESSORIES, UNIT WEIGHT, VOLTAGE, KVA, AND IMPEDANCE RATINGS AND CHARACTERISTICS, LOSS DATA, EFFICIENCY AT 35, 50, 75 AND 100 PERCENT RATED LOAD, SOUND LEVEL, TAP CONFIGURATIONS, INSULATION SYSTEM TYPE, AND RATED TEMPERATURE RISE.

27.04 DELIVERY, STORAGE, AND HANDLING

A. STORE AND PROTECT PRODUCTS UNDER PROVISIONS OF SECTION 26 05 00.

B. STORE IN A WARM, DRY LOCATION WITH UNIFORM TEMPERATURE. COVER VENTILATING OPENINGS TO KEEP OUT DUST.

C. HANDLE TRANSFORMERS USING ONLY LIFTING EYES AND BRACKETS PROVIDED FOR THAT PURPOSE. PROTECT UNITS AGAINST ENTRANCE OF RAIN, SLEET, OR SNOW IF HANDLED IN INCLEMENT WEATHER.

PART 28 - PRODUCTS

28.01 DRY TYPE TWO WINDING TRANSFORMERS

A. ACCEPTABLE MANUFACTURERS:

1. SQUARE D 7400 EX##T / SK300##KB SERIES
2. EATON V48M / H48M / B48M SERIES
3. ABB 9T SERIES

B. DRY TYPE TRANSFORMERS: NEMA ST 20, FACTORY-ASSEMBLED, AIR-COOLED DRY TYPE TRANSFORMERS; RATINGS AS SHOWN ON THE DRAWINGS. TRANSFORMERS SUPPLIED UNDER THIS PROJECT SHALL MEET THE US DEPARTMENT OF ENERGY (DOE) 2016 EFFICIENCY REQUIREMENTS OR THE MOST CURRENT DOE CFR IN EFFECT.

C. INSULATION SYSTEM AND AVERAGE WINDING TEMPERATURE RISE FOR RATED KVA AS FOLLOWS:

RATINGS	CLASS	RISE (DEGREE C)
LESS THAN 15	185	AS SHOWN ON THE DRAWINGS
OR HIGHER	220	AS SHOWN ON THE DRAWINGS

D. CASE TEMPERATURE SHALL NOT EXCEED 40°C RISE ABOVE AMBIENT AT ITS WARMEST POINT.

E. WINDING TAPS, TRANSFORMERS LESS THAN 15 KVA: TWO 5 PERCENT BELOW RATED VOLTAGE, FULL CAPACITY TAPS ON PRIMARY WINDING.

F. WINDING TAPS, TRANSFORMERS 15 KVA AND LARGER: TWO (2) 2-1/2% BELOW AND TWO (2) 2-1/2% ABOVE RATED VOLTAGE, FULL CAPACITY TAPS ON PRIMARY WINDING.

G. SOUND LEVELS: AVERAGE AUDIBLE SOUND LEVEL SHALL NOT EXCEED THE VALUES GIVEN BELOW WHEN TESTED TO NEMA ST 20 STANDARDS:

	AVERAGE SOUND LEVEL, DECIBELS			
	SELF-COOLED VENTILATED			SELF-COOLED SEALED
EQUIVALENT WINDING KVA RANGE	K-FACTOR = 1 K-FACTOR = 4 K-FACTOR = 9	K-FACTOR = 13 K-FACTOR = 20	FORCED AIR W/ FANS RUNNING	
0-9	40	40	67	45
9.01-30.00	45	45	67	50
30.01-50.00	45	48	67	50
50.01-150.00	50	53	67	55
150.01-300.00	55	58	67	57
300.01-500.00	60	63	67	59
500.01-700.00	62	65	67	61
700.00-1000.00	64	67	67	63

H. GROUND CORE AND COIL ASSEMBLY TO ENCLOSURE BY MEANS OF A VISIBLE FLEXIBLE COPPER GROUNDING STRAP.

I. COIL CONDUCTORS: CONTINUOUS WINDINGS WITH TERMINATIONS BRAZED OR WELDED.

J. ENCLOSURE: NEMA ST 20; TYPE 1. PROVIDE LIFTING EYES OR BRACKETS.

K. ISOLATE CORE AND COIL FROM ENCLOSURE USING VIBRATION-ABSORBING MOUNTS.

L. NAMEPLATE: NEMA TP 3; INCLUDE TRANSFORMER CONNECTION DATA AND OVERLOAD CAPACITY BASED ON RATED ALLOWABLE TEMPERATURE RISE.

28.02 ACCESSORIES

A. PROVIDE REQUIRED ACCESSORIES AS DESCRIBED BELOW. PROVIDE SCHEDULED ACCESSORIES WHEN LISTED WITH PLAN SCHEDULES. REFER TO PLAN SCHEDULES FOR ADDITIONAL REQUIREMENTS.

B. ELECTRONIC ISOLATION SHIELD:

1. PROVIDE ELECTROSTATIC WINDING SHIELD WITH SEPARATE INSULATED GROUNDING CONNECTION AS SHOWN ON THE DRAWINGS. REQUIRED

C. BARRIERS: PROVIDE FINGER SAFE BARRIERS FOR LINESIDE UNINSULATED AND UNGROUNDED TERMINATIONS AND COMPONENTS WHICH REMAIN ENERGIZED WHEN THE MAIN DISCONNECTING DEVICE IS 'OPEN'. REQUIRED

D. BARRIERS (SERVICE EQUIPMENT): PROVIDE SOLID BARRIERS FOR LINESIDE UNINSULATED AND UNGROUNDED TERMINATIONS AND COMPONENTS WHICH REMAIN ENERGIZED WHEN THE MAIN DISCONNECTING DEVICE IS 'OPEN'. REQUIRED

E. TRANSFORMER DISCONNECT LOCKABLE HASP: PROVIDE CIRCUIT BREAKERS, FUSED SWITCHES, AND DISCONNECTS SERVING TRANSFORMERS WITH A LOCKABLE PADLOCK HASP CAPABLE OF BEING LOCKED IN THE OPEN/CLOSED POSITION. REQUIRED

PART 29 - EXECUTION

29.01 INSTALLATION

A. SET TRANSFORMER PLUMB AND LEVEL.

B. USE FLEXIBLE CONDUIT, 2 FEET MINIMUM LENGTH, FOR CONNECTIONS TO TRANSFORMER CASE. MAKE CONDUIT CONNECTIONS TO SIDE PANEL OF ENCLOSURE.

C. MOUNT TRANSFORMERS ON FOUR 3"X3"X1/2" THICK, 50 DUROMETER RUBBER VIBRATION ISOLATING PADS SUITABLE FOR ISOLATING THE TRANSFORMER NOISE FROM THE BUILDING STRUCTURE.

D. VENTILATED TRANSFORMERS: PROVIDE FACTORY LABEL ON HORIZONTAL SURFACE TO PROHIBIT STORAGE ON TOP, FRONT, OR ADJACENT TO TRANSFORMER.

E. INSTALL PRIMARY, SECONDARY, AND GROUNDING ELECTRODE CONDUCTORS USING FACTORY OR FIELD FABRICATED ENCLOSURE ENTRIES. CONDUCTORS SHALL NOT BE ROUTED THROUGH VENTILATED OPENINGS.

29.02 FIELD QUALITY CONTROL

A. CHECK FOR DAMAGE AND TIGHT CONNECTIONS PRIOR TO ENERGIZING TRANSFORMER.

B. MEASURE PRIMARY AND SECONDARY VOLTAGES AND MAKE APPROPRIATE TAP ADJUSTMENTS. ADJUSTMENTS SHALL BE MADE AT COMPLETION OF PROJECT AND AT APPROXIMATELY 6 MONTHS FOLLOWING PROJECT ACCEPTANCE WHEN REQUESTED BY THE OWNER.

END OF SECTION 26 22 00

SECTION 26 24 16 - PANELBOARDS

PART 30 - GENERAL

30.01 SECTION INCLUDES

A. SERVICE AND DISTRIBUTION PANELBOARDS:

B. FUSIBLE BRANCH CIRCUIT PANELBOARDS: PANEL '###'

30.02 RELATED SECTIONS AND WORK

A. REFER TO THE ELECTRICAL DISTRIBUTION DIAGRAM AND ELECTRICAL SCHEDULES FOR SIZE, RATING, AND CONFIGURATION.

30.03 REFERENCES

A. NEMA AB 1 - MOLDED CASE CIRCUIT BREAKERS

B. NEMA FU 1 - LOW VOLTAGE CARTRIDGE FUSES

C. NEMA KS 1 - ENCLOSED SWITCHES

D. NEMA PB 1 - PANELBOARDS

E. NEMA PB 1.1 - INSTRUCTIONS FOR SAFE INSTALLATION, OPERATION AND MAINTENANCE OF PANELBOARDS RATED 600 VOLTS OR LESS

F. NEMA PB 1.2 - APPLICATION GUIDE FOR GROUND-FAULT PROTECTIVE DEVICES FOR EQUIPMENT

G. UL 248 - LOW-VOLTAGE FUSES

H. UL 67 - PANELBOARDS

30.04 SUBMITTALS

A. SUBMIT SHOP DRAWINGS FOR EQUIPMENT AND COMPONENT DEVICES UNDER PROVISIONS OF SECTION 26 05 00.

B. INCLUDE OUTLINE AND SUPPORT POINT DIMENSIONS, VOLTAGE, MAIN BUS AMPACITY, INTEGRATED SHORT CIRCUIT AMPERE RATING, CIRCUIT BREAKER AND FUSIBLE SWITCH ARRANGEMENT AND SIZES.

C. SELECTIVE COORDINATION STUDY: SUBMIT STUDY TO PROVE THAT ALL ESSENTIAL ELECTRICAL SYSTEMS, EMERGENCY SYSTEMS AND LEGALLY REQUIRED STANDBY SYSTEM PANELBOARDS ARE SELECTIVELY COORDINATED WITH ALL SUPPLY SIDE OVERCURRENT PROTECTIVE DEVICES.

D. ARC ENERGY REDUCTION DOCUMENTATION: SUBMIT DOCUMENTATION TO DEMONSTRATE THE ARC ENERGY REDUCTION SYSTEM IS SET TO OPERATE AT A VALUE BELOW THE AVAILABLE ARCING CURRENT.

E. REFURBISHED BRANCH PANEL ENCLOSURE DOCUMENTATION FOR NEW BRANCH PANELBOARDS INSTALLED IN EXISTING ENCLOSURES.

F. SUBMIT MANUFACTURER'S INSTRUCTIONS UNDER PROVISIONS OF SECTION 26 05 00.

30.05 SPARE PARTS

A. KEYS: FURNISH FOUR (4) EACH TO THE OWNER.

B. FUSES: FURNISH 10% OR A MINIMUM OF THREE (3) SPARE FUSES OF EACH TYPE AND RATING INSTALLED TO THE OWNER.

C. FUSE PULLERS: FURNISH ONE (1) FUSE PULLER TO THE OWNER.

PART 31 - PRODUCTS

31.01 RATINGS

A. DEFINITIONS:

1. SERIES RATED EQUIPMENT SHALL BE DEFINED AS EQUIPMENT THAT CAN ACHIEVE A REQUIRED UL AIC RATING WITH AN UPSTREAM DEVICE SUCH AS A MAIN BREAKER OR A COMBINATION OF DEVICES TO MEET OR EXCEED A REQUIRED UL AIC RATING. ALL SERIES RATED EQUIPMENT SHALL HAVE A PERMANENTLY ATTACHED NAMEPLATE INDICATING THAT DEVICE RATING MUST BE MAINTAINED. SEE SECTION 26 05 53 FOR ADDITIONAL REQUIREMENTS.
2. FULLY RATED EQUIPMENT SHALL BE DEFINED AS EQUIPMENT WHERE ALL DEVICES IN THAT EQUIPMENT SHALL CARRY A MINIMUM OF THE AIC RATING THAT IS SPECIFIED.

B. THE PANELBOARDS FOR THIS PROJECT SHALL BE FULLY RATED UNLESS OTHERWISE SPECIFICALLY NOTED IN THE DRAWINGS OR SPECIFICATIONS.

31.02 MAIN AND DISTRIBUTION PANELBOARDS

A. GENERAL

1. MANUFACTURERS:
   a. SQUARE D QMB, I-LINE
   b. ABB RELIAGEAR NEXT
   c. EATON PRL4, PRL5

B. PANELBOARDS: NEMA PB 1; TYPE AS SHOWN ON THE DRAWINGS.

C. ENCLOSURE: NEMA 3R;

D. PROVIDE CABINET FRONT WITH CONCEALED TRIM CLAMPS AND HINGED TRIM ON DOOR TO ALLOW ACCESS TO WIRING GUTTERS WITHOUT REMOVAL OF TRIM AND FLUSH LOCK. DOOR HARDWARE SHALL PROVIDE SWING CLEAR OPERATION (180-DEGREE SWING). FINISH IN MANUFACTURER'S STANDARD GRAY ENAMEL.

E. PROVIDE PANELBOARDS WITH COPPER BUS, RATINGS AS SCHEDULED ON THE DRAWINGS. PROVIDE COPPER GROUND BUS IN ALL PANELBOARDS.

F. ALL SPACES SHOWN ON THE ONE-LINE DIAGRAM SHALL BE FULLY PREPARED SPACES FOR FUTURE BREAKERS.

G. MINIMUM INTEGRATED SHORT CIRCUIT RATING: 100,000 AMPERES RMS SYMMETRICAL FOR 240-VOLT PANELBOARDS; 50,000 AMPERES RMS SYMMETRICAL FOR 480-VOLT PANELBOARDS, OR AS SHOWN ON THE DRAWINGS.

H. MOLDED CASE CIRCUIT BREAKERS: PROVIDE CIRCUIT BREAKERS WITH INTEGRAL THERMAL AND INSTANTANEOUS MAGNETIC TRIP IN EACH POLE.

I. ARC ENERGY REDUCTION:

1. PROVIDE AN ARC ENERGY REDUCTION SYSTEM TO REDUCE THE CLEARING TIME OF AN ARC FLASH EVENT. THE ARC ENERGY REDUCTION SYSTEM SHALL BE PROVIDED FOR OVERCURRENT PROTECTION DEVICES RATED 1,200 AMPS.
2. ENERGY-REDUCING MAINTENANCE SWITCH: PROVIDE AN ENERGY-REDUCING MAINTENANCE SWITCH VISUAL STATUS INDICATION WHEN ENGAGED. INSTALL THE MAINTENANCE SWITCH IN THE FIRST SECTION OF THE ELECTRICAL EQUIPMENT.

J. SUITABLE FOR USE AS SERVICE ENTRANCE EQUIPMENT. PROVIDE LINE SIDE (SERVICE STYLE) BARRIERS.

31.03 BRANCH CIRCUIT PANELBOARDS

A. GENERAL

1. MANUFACTURERS:
   a. SQUARE D NQ, NF
   b. ABB A SERIES
   c. EATON PRL1, PRL2

B. LIGHTING AND APPLIANCE BRANCH CIRCUIT PANELBOARDS: NEMA PB 1; CIRCUIT BREAKER TYPE.

C. ENCLOSURE: NEMA PB 1; TYPE 1.

D. PROVIDE CABINET FRONT WITH DOOR-IN-DOOR CONSTRUCTION, CONCEALED HINGE, AND FLUSH LOCK ALL KEYED ALIKE.

E. DOOR HARDWARE SHALL PROVIDE SWING CLEAR OPERATION (180-DEGREE SWING). FINISH IN MANUFACTURER'S STANDARD GRAY ENAMEL.

F. PROVIDE PANELBOARDS WITH COPPER BUS, RATINGS AS SCHEDULED ON THE DRAWINGS. PROVIDE COPPER GROUND BUS IN ALL PANELBOARDS.

G. ALL UNLABELED CIRCUITS SHOWN ON THE PANELBOARD SCHEDULE SHALL BE FULLY PREPARED SPACES FOR FUTURE BREAKERS.

H. ALL MULTIPLE-SECTION PANELBOARDS SHALL HAVE THE SAME DIMENSIONAL BACK BOX AND CABINET FRONT SIZE.

I. MINIMUM INTEGRATED SHORT CIRCUIT RATING: AS SHOWN ON THE DRAWINGS.

J. PROVIDE HANDLE LOCK-ON DEVICES FOR ALL BREAKERS SERVING EXIT SIGN AND LIGHTING CIRCUITS WITH EMERGENCY BATTERY UNITS. PROVIDE HANDLE LOCK-ON DEVICES AND RED HANDLES FOR BREAKERS SERVING FIRE ALARM PANELS.

K. MOLDED CASE CIRCUIT BREAKERS: BOLT-ON TYPE THERMAL MAGNETIC TRIP CIRCUIT BREAKERS, WITH COMMON TRIP HANDLE FOR ALL POLES. PROVIDE CIRCUIT BREAKERS UL LISTED AS TYPE SWD FOR LIGHTING CIRCUITS. PROVIDE UL CLASS A GROUND FAULT INTERRUPTER CIRCUIT BREAKERS WHERE SCHEDULED ON THE DRAWINGS. DO NOT USE TANDEM CIRCUIT BREAKERS.

L. SUITABLE FOR USE AS SERVICE ENTRANCE EQUIPMENT. PROVIDE LINE SIDE (SERVICE STYLE) BARRIERS.

31.04 ACCESSORIES

A. PROVIDE REQUIRED ACCESSORIES AS DESCRIBED BELOW. PROVIDE SCHEDULED ACCESSORIES WHEN LISTED WITH PLAN SCHEDULES. REFER TO PLAN SCHEDULES FOR ADDITIONAL REQUIREMENTS.

B. BARRIERS: PROVIDE FINGER SAFE BARRIERS FOR LINESIDE UNINSULATED AND UNGROUNDED TERMINATIONS AND COMPONENTS WHICH REMAIN ENERGIZED WHEN THE MAIN DISCONNECTING DEVICE IS 'OPEN'. REQUIRED

PART 32 - EXECUTION

32.01 INSTALLATION

A. INSTALL PANELBOARDS PLUMB AS INDICATED ON THE DRAWINGS IN CONFORMANCE WITH NEMA PB 1.1.

B. HEIGHT: 6 FEET TO HANDLE OF HIGHEST DEVICE.

C. PROVIDE FILLER PLATES FOR UNUSED SPACES IN PANELBOARDS.

D. PROVIDE CUSTOM TYPED CIRCUIT DIRECTORY FOR EACH BRANCH CIRCUIT PANELBOARD. LABEL SHALL INCLUDE EQUIPMENT NAME OR FINAL APPROVED ROOM NAME, ROOM NUMBER, AND LOAD TYPE FOR EACH CIRCUIT (EXAMPLES: SUMP SP-1 OR ROOM 101 RECEPT). REVISE DIRECTORY TO REFLECT CIRCUIT CHANGES REQUIRED TO BALANCE PHASE LOADS. PRINTED COPIES OF THE BID DOCUMENT PANEL SCHEDULES ARE NOT ACCEPTABLE AS CIRCUIT DIRECTORIES.

E. STUB FIVE (5) EMPTY ONE-INCH CONDUITS TO ACCESSIBLE LOCATION ABOVE CEILING OUT OF EACH RECESSED PANELBOARD.

32.02 FIELD QUALITY CONTROL

A. MEASURE STEADY STATE LOAD CURRENTS AT EACH PANELBOARD FEEDER. SHOULD THE DIFFERENCE AT ANY PANELBOARD BETWEEN PHASES EXCEED 20 PERCENT, REARRANGE CIRCUITS IN THE PANELBOARD TO BALANCE THE PHASE LOADS WITHIN 20 PERCENT. TAKE CARE TO MAINTAIN PROPER PHASING FOR MULTI-WIRE BRANCH CIRCUITS.

B. VISUAL AND MECHANICAL INSPECTION: INSPECT FOR PHYSICAL DAMAGE, PROPER ALIGNMENT, ANCHORAGE, AND GROUNDING. CHECK PROPER INSTALLATION AND TIGHTNESS OF CONNECTIONS FOR CIRCUIT BREAKERS, FUSIBLE SWITCHES, AND FUSES.

END OF SECTION 26 24 16

SECTION 26 27 29 - ELECTRIC VEHICLE CHARGING STATION

PART 33 - GENERAL

33.01 SECTION INCLUDES

A. ELECTRIC VEHICLE CHARGING STATIONS:

B. ENERGY LOAD MANAGEMENT FOR ELECTRIC VEHICLE CHARGING STATIONS

33.02 REFERENCES

A. THE EQUIPMENT AND COMPONENTS IN THIS SPECIFICATION SHALL BE DESIGNED AND MANUFACTURED ACCORDING TO THE LATEST REVISION OF THE FOLLOWING STANDARDS (UNLESS OTHERWISE NOTED):

1. SAE J1772 STANDARD FOR ELECTRIC VEHICLE CONDUCTIVE CHARGE COUPLER
2. ELECTRICAL CODE ARTICLE 625 ELECTRIC VEHICLE CHARGING SYSTEMS
3. CEC CALIFORNIA ELECTRICAL CODE ELECTRIC VEHICLE CHARGING SYSTEMS
4. UL 2202, ELECTRIC VEHICLE (EV) CHARGING SYSTEM EQUIPMENT
5. UL 2231, PERSONNEL PROTECTION SYSTEMS FOR ELECTRIC VEHICLE (EV) SUPPLY CIRCUITS
6. UL 2251, PLUGS, RECEPTACLES AND COUPLERS FOR ELECTRIC VEHICLES
7. UL 2594, ELECTRIC VEHICLE SUPPLY EQUIPMENT
8. UL AND CUL LISTED
9. ISO 15693

33.03 SUBMITTALS

A. SUBMIT PRODUCT DATA UNDER PROVISIONS OF SECTION 26 05 00.

B. PROVIDE PRODUCT DATA SHOWING CONFIGURATIONS, FINISHES, DIMENSIONS, CABLE, AND COUPLING INFORMATION.

C. PROVIDE MANUFACTURER INSTALLATION, OPERATION, AND MAINTENANCE INSTRUCTIONS.

D. CELLULAR NETWORK AND GATEWAY PLAN: SUBMIT MANUFACTURER CELLULAR NETWORK AND GATEWAY SITE PLAN FOR RFID AND REVENUE GENERATION COMMUNICATION. THE MANUFACTURER SITE PLAN SHALL CLEARLY IDENTIFY THE FOLLOWING:

1. LOCATION OF GATEWAY ENABLED STATIONS
2. LOCATION OF NON-GATEWAY ENABLED STATIONS
3. MANUFACTURER APPROVAL OF GATEWAY AND NON-GATEWAY ENABLED STATIONS TO ENSURE UNOBSTRUCTED COMMUNICATION BETWEEN STATIONS TYPES.

E. SUBMIT RFID SOFTWARE, HARDWARE, AND RFID CARD INFORMATION.

F. ENERGY LOAD MANAGEMENT:

1. SUBMIT OVERALL DIAGRAM OF SYSTEM NETWORK INCLUDING METERS, COMMUNICATION / ETHERNET SWITCHES, EV CHARGE STATIONS, RELATED POWER DISTRIBUTION EQUIPMENT, SYSTEM HEAD-END, WIRING AND CABLING.
2. PROVIDE DESCRIPTION OF OVERALL SYSTEM, USER INTERFACE, AND SYSTEM.

33.04 DELIVERY, STORAGE, AND HANDLING

A. CONTRACTOR SHALL INSPECT AND REPORT FOR DAMAGE.

B. CONTRACTOR SHALL STORE IN A CLEAN, DRY SPACE. COVER WITH HEAVY CANVAS OR PLASTIC TO KEEP OUT DIRT, WATER, CONSTRUCTION DEBRIS, AND TRAFFIC. HEAT ENCLOSURES TO PREVENT CONDENSATION.

C. CONTRACTOR SHALL HANDLE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS TO AVOID DAMAGING EQUIPMENT, INSTALLED DEVICES, AND FINISH.

D. CONTRACTOR SHALL STORE, PROTECT, AND HANDLE PRODUCTS IN ACCORDANCE WITH RECOMMENDED PRACTICES LISTED IN MANUFACTURER'S INSTALLATION AND MAINTENANCE MANUALS.

PART 34 - PRODUCTS

34.01 ELECTRIC VEHICLE CHARGING STATION

A. PLAN IDENTIFICATION:

1. ELECTRIC VEHICLE CHARGING STATION, SINGLE PORT TYPE.
3. ELECTRIC VEHICLE CHARGING STATION, DUAL PORT TYPE.

B. APPROVED MANUFACTURERS:

1. DUAL PORT CHARGING STATION PEDESTAL STYLE:
   a. CHARGE POINT CT6000 SERIES
2. SINGLE PORT CHARGING STATION WALL-MOUNTED STYLE
   a. CHARGE POINT CT6000 / CPF50 SERIES

C. ELECTRIC VEHICLE (EV) CHARGING STATION, LEVEL 2 CHARGING, WITH LCD DISPLAY, LED DISPLAY FOR CHARGING STATUS, FAULT INDICATION, POWER AVAILABLE, INTERNAL GROUND FAULT PROTECTION 20MA, INTEGRATED SINGLE PHASE REVENUE GRADE METER, ANTI-NUISANCE TRIPPING, AND RE-CLOSURE FEATURE, LISTED.

1. ENCLOSURE CONSTRUCTION: MINIMUM NEMA 3R
2. SYSTEM SUPPLY: 80 AMP, 208-VOLT, SINGLE PHASE, 60HZ.
3. CABLE / CONNECTOR: USABLE CABLE TO NOT EXCEED 25FT, UNLESS EQUIPPED WITH A CABLE MANAGEMENT SYSTEM. SAE J1772 COMPLIANT CONNECTOR. PROVIDE COMPLETE WITH CABLE/CONNECTOR SUPPORT WHILE NOT IN USE BRACKET.
4. ENVIRONMENT: WET LOCATION, -22°F TO 122°F

D. ELECTRONICS - COMMUNICATION:

1. WI-FI / WIRELESS CELLULAR NETWORK CONNECTION
2. ETHERNET NETWORK GATEWAY: PROVIDE IDENTIFIED STATION WITH NETWORK GATEWAY WHEN APPLICABLE.

PART 35 - EXECUTION

35.01 INSTALLATION

A. PROVIDE CONCRETE PAD AND MOW APRON FOR PEDESTAL INSTALLATION.

B. PLACEMENT:

1. VERIFY FIELD MEASUREMENTS WITH CIVIL AND ARCHITECTURAL PLANS.
2. INSTALL PEDESTAL 12 INCHES BEHIND CONCRETE CURB / PAVING LIMITS OR AS DIRECTED BY THE MANUFACTURER.
3. CENTER PEDESTAL IN SITE ISLANDS 24 INCHES OR LESS IN WIDTH.
4. CENTER DUAL PORT PEDESTALS BETWEEN PARKING STALLS. ALIGN WITH VEHICLE PARKING LINES.

C. GROUNDING ROD: PROVIDE 5/8 X 10'-0" COPPER CLAD STEEL GROUND ROD FOR EACH PEDESTAL, INSTALLED 12 INCHES BELOW FINISHED GRADE. PROVIDE BARE #6 GROUND WIRE WITH EXOTHERMIC WELD FOR BONDING TO EVCS PEDESTAL.

D. LABELING: PROVIDE PANEL AND CIRCUIT LABEL FOR ALL CIRCUITS SERVING THE ELECTRIC VEHICLE CHARGING STATION. LOCATE CIRCUIT LABELS ON THE INSIDE UTILITY ACCESS COVER FOR THE CHARGING STATION.

E. ETHERNET CONNECTIONS: PROVIDE FINAL ETHERNET CABLE AND TERMINATIONS PER MANUFACTURER INSTRUCTIONS.

F. CELLULAR NETWORK: PROVIDE SETUP, TESTING, AND CONFIGURATION OF CELLULAR NETWORK PER MANUFACTURER INSTRUCTIONS.

G. DISCONNECTING MEANS (DISCONNECTING MEANS NEC 625.43, WHERE APPLICABLE):

1. DISCONNECTING MEANS. FOR ELECTRIC VEHICLE SUPPLY EQUIPMENT RATED MORE THAN 60 AMPERES OR MORE THAN 150 VOLTS TO GROUND, THE DISCONNECTING MEANS SHALL BE PROVIDED AND INSTALLED IN A READILY ACCESSIBLE LOCATION. THE DISCONNECTING MEANS SHALL BE CAPABLE OF BEING LOCKED IN THE OPEN POSITION. THE PROVISION FOR LOCKING OR ADDING A LOCK TO THE DISCONNECTING MEANS SHALL BE INSTALLED ON OR AT THE SWITCH OR CIRCUIT BREAKER USED AS THE DISCONNECTING MEANS AND SHALL REMAIN IN PLACE WITH OR WITHOUT THE LOCK INSTALLED. PORTABLE MEANS FOR ADDING A LOCK TO THE SWITCH OR CIRCUIT BREAKER SHALL NOT BE PERMITTED.

35.02 OWNER TRAINING AND SYSTEM COMMISSIONING:

A. PROVIDE FACTORY REPRESENTATIVE FOR OWNER TRAINING AND DEMONSTRATION OF THE SYSTEM. OWNER TRAINING SHALL INCLUDE SERVICE, MAINTENANCE, TROUBLESHOOTING, AND GENERAL OPERATION OF SYSTEM. THE FACTORY REPRESENTATIVE SHALL ALSO PROVIDE CUSTOMER IN-PERSON TRAINING/SUPPORT FOR THE FOLLOWING:

1. CELLULAR NETWORK REGISTRATION, INITIALIZATION, AND TESTING

END OF SECTION 26 27 29

SECTION 26 28 13 - FUSES

PART 36 - GENERAL

36.01 SECTION INCLUDES

A. FUSES

B. SPARE FUSE CABINET

36.02 REFERENCES

A. UL 198C - HIGH-INTERRUPTING CAPACITY FUSES; CURRENT LIMITING TYPES

B. UL 198E - CLASS R FUSES

C. FS W-F-870 - FUSEHOLDERS (FOR PLUG AND ENCLOSED CARTRIDGE FUSES)

D. NEMA FU 1 - LOW VOLTAGE CARTRIDGE FUSES

E. NFPA 70 - NATIONAL ELECTRICAL CODE (NEC)

F. CEC CALIFORNIA ELECTRICAL CODE

36.03 SUBMITTALS

A. SUBMIT PRODUCT DATA UNDER PROVISIONS OF SECTION 26 05 00.

36.04 EXTRA MATERIALS

A. PROVIDE TWO FUSE PULLERS.

B. PROVIDE THREE OF EACH SIZE AND TYPE OF FUSE INSTALLED.

36.05 PROJECT CONDITIONS

A. WHERE AMBIENT TEMPERATURE TO WHICH FUSES ARE DIRECTLY EXPOSED IS LESS THAN 40°F OR MORE THAN 100°F, APPLY MANUFACTURER'S AMBIENT TEMPERATURE ADJUSTMENT FACTORS TO FUSE RATINGS.

PART 37 - PRODUCTS

37.01 MANUFACTURERS - FUSES

A. BUSSMAN, DIVISION OF EATON

B. EDISON FUSE, DIVISION OF COOPER INDUSTRIES

C. MERSEN

D. LITTELFUSE INC

37.02 FUSES

A. DIMENSIONS AND PERFORMANCE: NEMA FU 1, CLASS AS SPECIFIED OR INDICATED.

B. VOLTAGE: PROVIDE FUSES WITH VOLTAGE RATING SUITABLE FOR CIRCUIT PHASE-TO-PHASE VOLTAGE.

C. FUSES WITH RATINGS LARGER THAN 600 AMPERES: CLASS L (TIME DELAY), UNLESS OTHERWISE NOTED ON THE DRAWINGS.

D. FUSES WITH RATINGS LARGER THAN 200 AMPERES BUT EQUAL TO OR LESS THAN 600 AMPERES: CLASS RK-1 (TIME DELAY), UNLESS OTHERWISE NOTED ON THE DRAWINGS.

E. FUSES WITH RATINGS LESS THAN OR EQUAL TO 200 AMPERES (NOT INCLUDING CONTROL TRANSFORMER FUSES): CLASS RK-5, UNLESS OTHERWISE NOTED ON THE DRAWINGS.

F. CONTROL TRANSFORMER FUSES: CLASS CC (TIME DELAY).

G. FUSES FOR PACKAGED EQUIPMENT: SIZE AND TYPE AS RECOMMENDED BY EQUIPMENT MANUFACTURER.

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DIV. OF THE STATE ARCHITECT
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SS ☑ FLS ☑ ACS ☑
DATE: 03/18/2026

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ALTADENA ELEMENTARY SCHOOL

33366
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ELECTRICAL SPECIFICATIONS

37.03 SPARE FUSE CABINET

A. CABINET: WALL-MOUNTED, 0.05-INCH- THICK STEEL UNIT WITH FULL-LENGTH, RECESSED PIANO-HINGED DOOR AND KEY-CODED CAM LOCK AND PULL.
   1. SIZE: ADEQUATE FOR STORAGE OF SPARE FUSES SPECIFIED WITH 15 PERCENT SPARE CAPACITY MINIMUM.
   2. FINISH: GRAY, BAKED ENAMEL.
   3. IDENTIFICATION: "SPARE FUSES" IN 1-1/2-INCH- HIGH LETTERS ON EXTERIOR OF DOOR.
   4. FUSE PULLERS: FOR EACH SIZE OF FUSE.

PART 38 - EXECUTION

38.01 INSTALLATION

A. INSTALL FUSES WHERE INDICATED ON THE DRAWINGS AND SPECIFICATIONS.
B. INSTALL FUSES IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTION.
C. INSTALL FUSES IN PACKAGED EQUIPMENT AS REQUIRED BY EQUIPMENT MANUFACTURER.
D. INSTALL FUSE WITH LABEL ORIENTED SUCH THAT MANUFACTURER, TYPE, AND SIZE ARE EASILY READ.

END OF SECTION 26 28 13

SECTION 26 28 16 - DISCONNECT SWITCHES

PART 39 - GENERAL

39.01 SECTION INCLUDES

A. FUSIBLE SWITCHES
B. NON-FUSIBLE SWITCHES
C. MOLDED CASE CIRCUIT SWITCHES
D. ENCLOSURES

39.02 RELATED SECTIONS AND WORK

A. REFER TO THE DISCONNECT AND STARTER SCHEDULE FOR RATING AND CONFIGURATION.

39.03 REFERENCES

A. NEMA KS 1 - ENCLOSED SWITCHES

39.04 SUBMITTALS

A. SUBMIT PRODUCT DATA UNDER PROVISIONS OF SECTION 26 05 00.
B. PRODUCT DATA: FOR EACH TYPE OF ENCLOSED SWITCH, CIRCUIT BREAKERS, ACCESSORY AND COMPONENT INDICATED, INCLUDE DIMENSIONS, WEIGHTS, AND MANUFACTURER'S TECHNICAL DATA ON FEATURES, PERFORMANCE, AND RATINGS.
C. ELECTRICAL CHARACTERISTICS: FOR EACH TYPE OF ENCLOSED SWITCH, ENCLOSURE TYPES, CURRENT AND VOLTAGE RATINGS, SHORT-CIRCUIT CURRENT RATINGS, UL LISTING FOR SERIES RATING OF INSTALLED DEVICES, FEATURES, CHARACTERISTICS, RATINGS, AND FACTORY SETTINGS OF INDIVIDUAL OVERCURRENT PROTECTIVE DEVICES AND AUXILIARY COMPONENTS.

39.05 COORDINATION

A. COORDINATE LAYOUT AND INSTALLATION OF SWITCHES, CIRCUIT BREAKERS, AND COMPONENTS WITH OTHER CONSTRUCTION, INCLUDING CONDUIT, PIPING, EQUIPMENT, AND ADJACENT SURFACES. MAINTAIN REQUIRED WORKSPACE CLEARANCES AND REQUIRED CLEARANCES FOR EQUIPMENT ACCESS DOORS AND PANELS.

PART 40 - PRODUCTS

40.01 FUSIBLE AND NON-FUSIBLE SWITCHES

A. ACCEPTABLE MANUFACTURERS:
   1. SQUARE D 3110 SERIES
   2. EATON DH SERIES
   3. ABB TH SERIES
B. FUSIBLE SWITCH ASSEMBLIES: NEMA KS 1; TYPE HEAVY DUTY, QUICK-MAKE, QUICK-BREAK, LOAD INTERRUPTER ENCLOSED KNIFE SWITCH WITH EXTERNALLY OPERABLE HANDLE INTERLOCKED TO PREVENT OPENING FRONT COVER WITH SWITCH IN ON POSITION WITHOUT A TOOL. HANDLE LOCKABLE IN OFF POSITION. FUSE CLIPS: CLASS 'R' FUSE CLIPS ONLY, UNLESS INDICATED OTHERWISE ON THE DRAWINGS.
C. DS-#; NON-FUSIBLE SWITCH ASSEMBLIES: NEMA KS 1; TYPE HEAVY DUTY, QUICK-MAKE, QUICK-BREAK, LOAD INTERRUPTER ENCLOSED KNIFE SWITCH WITH EXTERNALLY OPERABLE HANDLE INTERLOCKED TO PREVENT OPENING FRONT COVER WITH SWITCH IN ON POSITION WITHOUT A TOOL. HANDLE LOCKABLE IN OFF POSITION.
D. ENCLOSURES: TYPE AS INDICATED ON THE DISCONNECT SCHEDULE.
E. ACCESSORIES: PROVIDE THE FOLLOWING ACCESSORIES. REFER TO DISCONNECT SCHEDULE FOR ADDITIONAL REQUIREMENTS FOR EACH APPLICATION.
   1. LOCKABLE
   2. PROVIDE FINGER SAFE BARRIERS FOR EXPOSED LINE-SIDE TERMINATIONS AND ENERGIZED COMPONENTS WHEN THE SWITCH IS IN THE OPEN POSITION.

40.02 MOLDED CASE CIRCUIT BREAKERS AND SWITCHES

A. ACCEPTABLE MANUFACTURERS:
   1. SQUARE D
   2. EATON
   3. ABB
B. MOLDED CASE CIRCUIT BREAKER: NEMA AB 1, WITH INTERRUPTING CAPACITY TO MEET AVAILABLE FAULT CURRENTS.
   1. ADJUSTABLE INSTANTANEOUS TRIP CIRCUIT BREAKERS: MAGNETIC TRIP ELEMENT WITH FRONT-MOUNTED, FIELD-ADJUSTABLE TRIP SETTINGS.
C. ACCESSORIES: PROVIDE THE FOLLOWING ACCESSORIES. REFER TO DISCONNECT SCHEDULE FOR ADDITIONAL REQUIREMENTS FOR EACH APPLICATION.
   1. LOCKABLE
   2. PROVIDE FINGER SAFE BARRIERS FOR EXPOSED LINE-SIDE TERMINATIONS AND ENERGIZED COMPONENTS WHEN THE SWITCH IS IN THE OPEN POSITION.

PART 41 - EXECUTION

41.01 INSTALLATION

A. INSTALL DISCONNECT SWITCHES WHERE INDICATED ON THE DRAWINGS.
B. INSTALL FUSES IN FUSIBLE DISCONNECT SWITCHES.
C. FIELD COORDINATE INSTALLATION WITH OTHER CONTRACTORS AND EQUIPMENT TO MAINTAIN CODE REQUIRED WORKING SPACE REQUIREMENTS.
D. PROVIDE ADHESIVE LABEL ON INSIDE DOOR OF EACH SWITCH INDICATING UL FUSE CLASS AND SIZE FOR REPLACEMENT.

41.02 ADJUSTING

A. SET FIELD-ADJUSTABLE CIRCUIT BREAKER TRIP RANGES.

END OF SECTION 26 28 16

SECTION 263100 - SOLAR PHOTOVOLTAIC SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. PHOTOVOLTAIC PANELS AND ARRAYS
B. PHOTOVOLTAIC GRID TIE STRING INVERTER
C. COMBINER/DISCONNECT

1.2 QUALITY ASSURANCE

A. MANUFACTURER: COMPANY SPECIALIZING IN PHOTOVOLTAIC PANEL OR INVERTER SYSTEMS WITH FIVE YEARS DOCUMENTED EXPERIENCE.
B. OPERATE, COMMISSION, AND DEMONSTRATE SEVEN (7) DAYS OF COMPLETE PHOTOVOLTAIC SYSTEM OPERATION PRIOR TO TURNOVER TO THE OWNER.
   1. REFER TO THE PART 3 FOR SYSTEM COMMISSIONING REQUIREMENTS.

1.3 REFERENCES

A. ANSI C62.41 - IEEE RECOMMENDED PRACTICE FOR SURGE VOLTAGES IN LOW-VOLTAGE AC POWER CIRCUITS
B. IEEE 519 - RECOMMENDED PRACTICES AND REQUIREMENTS FOR HARMONIC CONTROL IN ELECTRICAL POWER SYSTEMS.
C. IEEE 929 - RECOMMENDED PRACTICES FOR UTILITY INTERFACE OF PHOTOVOLTAIC SYSTEMS.
D. IEEE 1547 - STANDARD FOR INTERCONNECTING DISTRIBUTED RESOURCES WITH ELECTRONIC POWER SYSTEMS.
E. IEEE 1547.1 - STANDARD FOR CONFORMANCE TEST PROCEDURES FOR EQUIPMENT INTERCONNECTING DISTRIBUTED RESOURCES WITH ELECTRIC POWER SYSTEMS.
F. CEC CALIFORNIA ELECTRICAL CODE
G. UL 1703 - STANDARD FOR FLAT-PLATE PHOTOVOLTAIC MODULES AND PANELS
H. UL 1741 - STANDARD FOR INVERTERS, CONVERTERS, CONTROLLERS AND INTERCONNECTION SYSTEM EQUIPMENT FOR USE WITH DISTRIBUTED ENERGY RESOURCES
I. UL 1998 - STANDARD FOR SOFTWARE IN PROGRAMMABLE COMPONENTS

1.4 SUBMITTALS

A. SUBMIT PRODUCT DATA UNDER PROVISION OF SECTION 260500.
B. PHOTOVOLTAIC PANELS: INCLUDE UNIT DIMENSIONS, WEIGHT, MATERIAL CONSTRUCTION, WATTAGE, VOLTAGE, CURRENT, OPEN CIRCUIT VOLTAGE, SHORT CIRCUIT CURRENT, INSTALLATION AND MAINTENANCE INFORMATION, AND MANUFACTURER VOLTAGE CORRECTION FACTOR IN INFORMATION.
C. PHOTOVOLTAIC INVERTER: INCLUDE UNIT DIMENSIONS, WEIGHT, INSTALLATION AND MAINTENANCE INFORMATION. ALSO INCLUDE THE FOLLOWING:
   1. INPUT: DC VOLTAGE RANGE, MAX CURRENT INPUT.
   2. OUTPUT: AC VOLTAGE RANGE, TOTAL HARMONIC DISTORTION, POWER FACTOR, EFFICIENCY, MAXIMUM CURRENT OUTPUT.
   3. GENERAL: POWER CONSUMPTION, ENCLOSURE TYPE, COMPLIANCE WITH REFERENCES.
   4. ENVIRONMENT: AMBIENT TEMPERATURE RATING, COOLING REQUIREMENTS.
D. ROOF MOUNTED SYSTEM CERTIFICATION LETTER, SIGNED BY CONTRACTOR, THAT THE ROOF ADHESIVES, FASTENERS, HARDWARE, AND ACCESSORIES ARE APPROVED BY MANUFACTURERS OF BOTH THE ROOFING SYSTEM AND THE PHOTOVOLTAIC SYSTEM.
E. PROVIDE A LIST OF MANUFACTURER AND MODEL FOR PHOTOVOLTAIC PANELS, POWER OPTIMIZERS, INVERTERS AND RACKING SYSTEM WITH BID FORM FOR EVALUATION.

1.5 SYSTEM DESCRIPTION

A. COMPLETE PHOTOVOLTAIC SYSTEM RATED 100 KW 1000 VOLT DC AT STC INCLUDING PHOTOVOLTAIC PANELS, INVERTER SYSTEM, COMBINER/DISCONNECTS, METERING, AND REPORTING EQUIPMENT. SYSTEMS SHALL BE CONFIGURED TO PRODUCE 480Y/277 3 PHASE 4 WIRE 60 HZ POWER.
B. GRID-TIE INTERCONNECTION WITH UTILITY, INCLUDING ISLAND PROTECTION AND NET METERING.
C. THE PHOTOVOLTAIC SYSTEM SHALL INCLUDE A METERING SYSTEM FOR TOTAL SYSTEM POWER PRODUCTION AND A REPORTING SYSTEM TO MONITOR INDIVIDUAL COMPONENTS.
D. THE PHOTOVOLTAIC SYSTEM AND INVERTER SHALL BE CONFIGURED AS A GRID INTER-TIE SOLAR PHOTOVOLTAIC SYSTEM. THE INDIVIDUAL INVERTERS SHALL AUTOMATICALLY DE-ENERGIZE THEIR OUTPUT TO THE BUILDING ELECTRICAL SYSTEM AND DISCONNECT FROM THE PHOTOVOLTAIC PANELS UPON LOSS OF THE UTILITY ELECTRICAL SERVICE. THE PHOTOVOLTAIC INVERTER SYSTEM SHALL REMAIN DISCONNECTED UNTIL THE ELECTRICAL UTILITY VOLTAGE HAS BEEN RESTORED.
E. EQUIPMENT SHALL BE IDENTIFIED FOR USE IN SOLAR PHOTOVOLTAIC SYSTEMS.
F. EQUIPMENT, INCLUDING WIRING, FUSES, CIRCUIT BREAKERS, ETC., USED IN ANY DC PORTION OF THE PHOTOVOLTAIC POWER SYSTEM SHALL BE LISTED FOR USE IN 1000 VOLT DC CIRCUITS.

PART 2 - PRODUCTS

2.1 PHOTOVOLTAIC PANELS AND ARRAYS

A. OPERATING ENVIRONMENT CONDITIONS:
   1. OPERATING TEMPERATURE: -40 TO 90°C
   2. WET LOCATION LISTED
B. CELL MATERIAL: SILICON-BASED SOLAR CELL CONSTRUCTION WITH UV STABILIZED POLYMER. PROVIDE WITH BYPASS DIODE TECHNOLOGY FOR PARTIAL SHADING OPERATION.
C. PANEL CONSTRUCTION: ANODIZED ALUMINUM FRAME WITH GROUND POINT AND TEMPERED GLASS COVER.
D. PANEL CONNECTIONS AND TERMINATIONS:
   1. PROVIDE MANUFACTURER'S WIRING AND QUICK-CONNECT TERMINATIONS FOR SERIES CREATION OF MODULE-STRINGS INSTALLATION OF PANELS.
   2. PROVIDE MANUFACTURER WIRING TO COMBINER BOXES FOR PARALLEL GROUPING OF MODULE-STRINGS.
   3. ALL EXTERIOR WIRE AND TERMINATIONS SHALL BE LISTED SUNLIGHT RESISTANT.

2.2 COMBINER/DISCONNECT

A. COMBINATION OF COMBINER BOX AND SOLAR ARRAY DISCONNECT IN A SINGLE ENCLOSURE.
B. LOAD BREAK SWITCH RATED 1000 VDC MAXIMUM WITH LOCKOUT PROVISIONS.
C. FUSE HOLDERS RATED 30 AMP MAXIMUM. TERMINAL BLOCKS FOR EACH PV STRING.
D. PROVIDE FUSED SURGE PROTECTIVE DEVICE (SPD) WITH VISUAL STATUS INDICATOR AND REMOTE. BUSSMAN BSP SERIES OR APPROVED EQUAL.
E. ENCLOSURE: NEMA 4X.

2.3 PHOTOVOLTAIC GRID TIE STRING INVERTERS

A. INVERTER MANUFACTURERS:
   1. SMA AMERICA MODEL SUNNY TRIPOWER X 20-US (BASIS OF DESIGN)
   2. OR PRE-APPROVED EQUALS
B. OPERATING ENVIRONMENT CONDITION:
   1. MAXIMUM AMBIENT TEMPERATURE: 113°F
   2. WET LOCATION LISTED
C. INVERTER TECHNOLOGY: TRANSFORMERLESS FULL DC/AC RECTIFICATION, REAL SINE-WAVE OUTPUT WITH HIGH FREQUENCY PULSE WIDTH MODULATION PWM.
D. INTERNAL PROTECTION: INVERTER SHALL MEASURE UTILITY VOLTAGE, CURRENT, AND IMPEDANCE. LOSS OF UTILITY POWER SHALL CAUSE INVERTER TO SHUT DOWN AND DISCONNECT ITS OUTPUT TO THE AC BUS AND INPUT FROM THE DC BUS. INVERTER SHALL AUTOMATICALLY RECONNECT TO AC OUTPUT BUS AND DC INPUT BUS UPON RETURN OF UTILITY SOURCE.
E. THE INVERTER SHALL BE CONSTRUCTED TO NOT ALLOW BACKFEEDING FROM THE ELECTRICAL UTILITY TO THE PHOTOVOLTAIC PANELS OR DC INPUT BUS.
F. THE INVERTER SHALL HAVE INTEGRAL AC AND DC DISCONNECTS.

PART 3 - EXECUTION

3.1 INSTALLATION

A. PHOTOVOLTAIC CABLING SHALL BE INSTALLED IN RACEWAYS SEPARATE FROM OTHER BUILDING SYSTEM CABLING. PHOTOVOLTAIC CABLING SHALL BE INSTALLED IN CONDUIT WHEN LOCATED INTERIOR TO THE BUILDING.
B. THE PHOTOVOLTAIC PANELS AND ARRAYS SHALL BE CONFIGURED IN AN OPEN CIRCUIT, SHORT CIRCUIT, OR PROVIDED WITH AN OPAQUE COVERING TO DISABLE THE ARRAY FROM PRODUCING ELECTRICAL POWER DURING INSTALLATION. REFER TO THE MANUFACTURER'S INFORMATION FOR ADDITIONAL DISABLING REQUIREMENTS DURING INSTALLATION.
C. INSTALL FUSES IN ALL FUSE HOLDERS AND DISCONNECTS. PROVIDE A LABEL ON THE INSIDE OF EACH DISCONNECT IDENTIFYING THE SIZE, TYPE, AND MODEL OF EACH FUSE INSTALLED.
D. PROVIDE PROVISIONS TO SEAL ALL EXTERIOR PENETRATIONS. ALL PHOTOVOLTAIC SYSTEM ROOF PENETRATIONS SHALL BE SEALED BY THE ROOFING CONTRACTOR AT THE EXPENSE OF THE PHOTOVOLTAIC SYSTEM CONTRACTOR.
E. DC ARC-FAULT CIRCUIT PROTECTION: PROVIDE PVAFCI ARC-FAULT CIRCUIT INTERRUPTION PROTECTION FOR DC BRANCH CIRCUITS.
F. DC SHOCK HAZARD PROTECTION: PROVIDE PVHCS HAZARD CONTROL SYSTEM TO LIMIT ELECTRIC SHOCK POTENTIAL TO 80 VOLTS OR LESS POST RAPID SHUTDOWN INITIATION OR PER CODE.
G. WIRE AND CABLE SCHEDULE:
   1. THESE REQUIREMENTS ARE IN ADDITION TO THE REQUIREMENTS OF SECTION 260513.
   2. DC DISTRIBUTION SYSTEM:
      a. EXTERIOR: PHOTOVOLTAIC PANEL MANUFACTURER-SUPPLIED CABLING WITH QUICK CONNECTS.
      b. CONDUCTORS SHALL BE COLOR CODED AS FOLLOWS:
         1) PV-: BLACK
         2) PV+: RED
         3) GROUND BOND: GREEN
   3. AC DISTRIBUTION SYSTEM:
      a. REFER TO SECTION 260513.
   4. USE NO WIRE SMALLER THAN 10 AWG FOR DC WIRING OF THE PHOTOVOLTAIC SYSTEM.
   5. USE 8 AWG FOR DC WIRING OF PHOTOVOLTAIC SYSTEMS WITH DISTANCES BETWEEN THE PHOTOVOLTAIC PANEL AND PHOTOVOLTAIC INVERTER GREATER THAN 100 FEET.
H. PROVIDE PROVISIONS FOR PROGRAMMING AND INITIALIZING THE SYSTEM METERING AND REPORTING SOFTWARE PER THE OWNER'S REQUIREMENTS. THE CONTRACTOR SHALL ORGANIZE A MEETING WITH THE OWNER TO FINALIZE THE PROGRAMMING AND USER INTERFACES OF THE PROGRAM SOFTWARE.
I. INSTALL EQUIPMENT PER THE MANUFACTURER'S RECOMMENDATIONS.

3.2 LABELING

A. REFER TO SECTION 260553 FOR PRODUCT REQUIREMENTS.
B. LABEL ALL PHOTOVOLTAIC SYSTEM EQUIPMENT AS REQUIRED BY CODE.
C. LABEL GROUND FAULT INDICATORS:
   1. "IN THE EVENT OF A GROUND FAULT INDICATION - THE NORMALLY GROUNDED CONDUCTORS MAY BE ENERGIZED AND UNDERGROUNDED"
D. LABEL ALL AC-ALTERNATING CURRENT AND DC-DIRECT CURRENT DISCONNECTS OF THE PHOTOVOLTAIC POWER SYSTEM.
   1. "---PHOTOVOLTAIC SYSTEM DISCONNECT---WARNING. ELECTRIC SHOCK HAZARD. DO NOT TOUCH TERMINALS. TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION"
E. THE AC DISCONNECTING MEANS FOR EACH PHOTOVOLTAIC INVERTER SHALL BE LABELED WITH THE FOLLOWING:
   1. OPERATING CURRENT:
   2. OPERATING VOLTAGE:
   3. MAXIMUM SYSTEM VOLTAGE:
F. LABEL DC RACEWAYS, CABLING, JUNCTION BOXES, AND CONDUIT BODIES WITH ADHESIVE MARKINGS AND LABELS SUITABLE FOR THE ENVIRONMENT:
   1. COLOR: WHITE CAPITAL LETTERS ON RED BACKGROUND.
   2. LABEL TEXT: PHOTOVOLTAIC POWER SOURCE.
   3. LABEL INTERVALS: MAXIMUM 10 INTERVALS OR AS REQUIRED BY CODE TO IDENTIFY ALL CONDUITS RUN EXPOSED OR LOCATED ABOVE ACCESSIBLE CEILINGS. CONDUITS LOCATED ABOVE NON-ACCESSIBLE CEILING OR IN FLOORS AND WALLS SHALL BE LABELED WITHIN 3 FEET OF BECOMING ACCESSIBLE, OR SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, AND FLOORS. LABELS FOR MULTIPLE CONDUITS SHALL BE ALIGNED.
G. LABEL DC SYSTEM DISCONNECT AND POWER CONVERSION EQUIPMENT WITH THE FOLLOWING:
   1. EQUIPMENT TYPE AND CONTRACT DOCUMENTS DESIGNATION OF EQUIPMENT.
   2. NAME OF UPSTREAM EQUIPMENT AND LOCATION OF THE UPSTREAM EQUIPMENT IF IT IS NOT LOCATED WITHIN SIGHT.
   3. NOMINAL EQUIPMENT VOLTAGE AND RATING.
   4. MAX DC VOLTAGE.
   5. AVAILABLE FAULT CURRENT (FROM BATTERIES IF APPLICABLE).
   6. DATE OF FAULT CURRENT STUDY; REFER TO ONE-LINE DIAGRAM.
H. LABEL EACH ELECTRICAL SERVICE LOCATION WITH RAPID SHUTDOWN FEATURE:
   1. LABEL TEXT: "SOLAR PV SYSTEM WITH RAPID SHUTDOWN. TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN ARRAY."
I. SHORT CIRCUIT CURRENT: THE INTERACTIVE SYSTEM POINT OF INTERCONNECTION SHALL BE LABELED AT THE DISCONNECTING MEANS WITH THE FOLLOWING:
   1. MAXIMUM AC OUTPUT OPERATING CURRENT:
   2. OPERATING AC VOLTAGE:
J. THE BUILDING SERVICE ENTRANCE DISCONNECT SHALL BE CLEARLY LABELED TO IDENTIFY THERE IS A PHOTOVOLTAIC SYSTEM INTERCONNECTION. THE LOCATION OF THE INTERACTIVE SYSTEM DISCONNECT SHALL BE IDENTIFIED WITH A PLAQUE READING: "WARNING - PHOTOVOLTAIC SYSTEM DISCONNECT LOCATED AT PARKING CANOPY."
K. CONDUCTOR IDENTIFICATION:
   1. PV SYSTEM DC CIRCUIT CONDUCTORS SHALL BE IDENTIFIED AT ALL TERMINATION CONNECTIONS.
   2. IDENTIFICATION SHALL INCLUDE COLOR CODED SHRINK TUBE TAGGING, CONDUCTOR COLORED INSULATION, OR MARKING TAPE. INCLUDE +, POSITIVE, OR POS IDENTIFICATION STYLE LABELING IN ADDITION TO COLOR IDENTIFICATION.

3.3 FIELD QUALITY CONTROL

A. PERFORM FIELD INSPECTION AND TESTING UNDER PROVISIONS OF SECTION 260500.
B. CHECK FOR DAMAGE AND TIGHT CONNECTIONS PRIOR TO ALLOWING THE PHOTOVOLTAIC PANELS TO BEGIN POWER GENERATION.
C. CHECK FOR DAMAGE AND PROPER OPERATION OF THE PHOTOVOLTAIC INVERTERS.
D. VERIFY OPERATION OF THE METERING AND REPORTING SYSTEM COMPONENTS. ADJUST AND UPDATE THE GRAPHICAL USER INTERFACE FOR PROJECT SPECIFIC CONDITIONS.

3.4 SYSTEM COMMISSIONING

A. PROVIDE SYSTEM COMMISSIONING REPORT UNDER PROVISIONS OF SECTION 260500.
B. NOTIFY ARCHITECT/ENGINEER SEVEN DAYS PRIOR TO BEGINNING FINAL WITNESS TESTING OF THE PHOTOVOLTAIC SYSTEM.
   1. THE ELECTRICAL CONTRACTOR SHALL FULLY TEST THE COMPLETE PHOTOVOLTAIC SYSTEM PRIOR TO NOTIFYING THE ARCHITECT/ENGINEER FOR FINAL WITNESS TESTING.
C. TEST, MEASURE, AND RECORD THE FOLLOWING SYSTEM VALUES:
   1. DATE:
   2. TIME OF TEST:
   3. TESTERS:
   4. SUN OVERCAST CONDITIONS (FULL SUN) (SCATTERED CLOUDS) (FULL CLOUD COVERAGE).
   5. INVERTER:
      a. DC INPUT CURRENT:
      b. DC INPUT VOLTAGE:
      c. AC OUTPUT CURRENT:
      d. AC OUTPUT VOLTAGE:
      e. OUTPUT POWER:
D. PERFORMANCE TEST OF INTERACTIVE INVERTER SYSTEM:
   1. VERIFY PROPER OPERATION OF THE PHOTOVOLTAIC SYSTEM. VERIFY THE PHOTOVOLTAIC SYSTEM IS PRODUCING POWER AND DELIVERING IT TO THE BUILDING ELECTRICAL DISTRIBUTION SYSTEM.
   2. SIMULATE POWER OUTAGE OF ELECTRICAL UTILITY BY SWITCHING THE MAIN ELECTRICAL SERVICE DISCONNECT FROM "CLOSED" TO "OPEN".
   3. VERIFY THAT EACH INDIVIDUAL PHOTOVOLTAIC INVERTER HAS STOPPED PRODUCING ELECTRICAL ENERGY AND HAS DISCONNECTED ITSELF FROM THE PHOTOVOLTAIC PANELS AND BUILDING ELECTRICAL DISTRIBUTION SYSTEM.
   4. SIMULATE RETURN OF UTILITY ELECTRICAL POWER BY SWITCHING THE MAIN ELECTRICAL SERVICE DISCONNECT FROM "OPEN" TO "CLOSED".
   5. VERIFY EACH PHOTOVOLTAIC INVERTER HAS RECONNECTED TO THE PHOTOVOLTAIC PANELS AND BUILDING ELECTRICAL DISTRIBUTION SYSTEM. VERIFY POWER DELIVERY FROM THE PHOTOVOLTAIC INVERTERS TO THE BUILDING ELECTRICAL DISTRIBUTION SYSTEM.
   6. DOCUMENT ANY TEST FAILURE, INCLUDING REASON FOR FAILURE AND CORRECTIVE ACTIONS. RETEST THE PHOTOVOLTAIC SYSTEM TO COMPLETE SATISFACTORY OPERATION.

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ELECTRICAL SPECIFICATIONS

ELECTRICAL ABBREVIATIONS LEGEND

A	AMPERE
A/C	AIR-CONDITIONING
AC	ALTERNATING CURRENT; ARMORED CABLE
ADJ	ADJUSTABLE
AF	AMPERE FUSE; AMPERE FRAME
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AFCI	ARC FAULT CIRCUIT INTERRUPTER
AHU	AIR HANDLING UNIT
AIC	AMPERE INTERRUPTING CAPACITY
AL	ALUMINUM
ALT	ALTERNATE
ALUM	ALUMINUM
AMP	AMPERE
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
AP	ACCESS PANEL
APPROX	APPROXIMATE
ARCH	ARCHITECT
ASYM	ASYMMETRICAL
AT	AMPERE TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AUX	AUXILIARY
AVG	AVERAGE
AWG	AMERICAN WIRE GAUGE
BATT	BATTERY
BD	BOARD
BFG	BELOW FINISHED GRADE
BLDG	BUILDING
BPS	BOLTED PRESSURE SWITCH
BR	BRANCH
BRKR	BREAKER
C	CONDUIT; CENTIGRADE
C/C	CENTER TO CENTER
CAB	CABINET
CAP	CAPACITY
CB	CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TELEVISION
CD	CANDELA; CLOTHES DRYER
CF	CUBIC FEET; COMPACT FLUORESCENT
CHW	CHILLED WATER
CHWP	CHILLED WATER PUMP
CIP	CAST IN PLACE
CIR	CIRCUIT
CKT	CIRCUIT
CLF	CURRENT LIMITING FUSE
CLG	COOLING; CEILING
CM	CONSTRUCTION MANAGER
CMU	CONCRETE MASONRY UNIT
CO	CENTRAL OFFICE
COGB	CENTRAL OFFICE GROUND BAR
COL	COLUMN
COMB	COMBINATION
COMPR	COMPRESSOR
CONC	CONCRETE
COND	CONDENSATE; CONDUCTOR
CONT	CONTINUOUS; CONTINUED; CONTRACTOR
CP	CONTROL PANEL
CPT	CONTROL POWER TRANSFORMER
CSAC	CENTRAL STATION AIR CONDITIONER
CT	CURRENT TRANSFORMER
CU	COPPER; CUBIC
CU FT	CUBIC FOOT
CUH	CABINET UNIT HEATER
CW	COOL WHITE; COLD WATER; CLOTHES WASHER
CY	CUBIC YARD
CYL	CYLINDER
D	DEEP; DEPTH; DISCHARGE
DB	DECIBEL; DIRECT BURIED
DC	DIRECT CURRENT
DDC	DIRECT DIGITAL CONTROL
DF	DRINKING FOUNTAIN
DHW	DOMESTIC HOT WATER
DIA	DIAMETER
DIAG	DIAGONAL
DIAM	DIAMETER
DIFF	DIFFUSER
DISC	DISCONNECT
DIST	DISTRIBUTION
DN	DOWN
DP	DUSTPROOF; DOUBLE POLE
DPDT	DOUBLE POLE, DOUBLE THROW
DPST	DOUBLE POLE, SINGLE THROW
DT	DUSTTIGHT; DOUBLE THROW
DW	DISHWASHER
DWG	DRAWING
DX	DIRECT EXPANSION
E	EQUIPMENT ONLY; EAST; ELECTRICAL; EXISTING
EA	EACH
EBBR	ELECTRIC BASEBOARD RADIATION
EB	ELECTRONIC BALLAST
EC	ELECTRICAL CONTRACTOR
EF	EXHAUST FAN
EGC	EQUIPMENT GROUNDING CONDUCTOR
EIFS	EXTERIOR INSULATION FINISH SYSTEM
ELECT	ELECTRICIAN; ELECTRICAL; ELECTRONIC
ELEV	ELEVATOR; ELEVATION
EM	EMERGENCY
EMERG	EMERGENCY
EMS	ENERGY MANAGEMENT SYSTEM
EMT	ELECTRICAL METALLIC TUBING
ENCL	ENCLOSURE
ENG	ENGINE; ENGINEERED
ENGR	ENGINEER
EP	EXPLOSIONPROOF; ELECTRIC-PNEUMATIC
EQUIP	EQUIPMENT
ER	EXISTING TO REMAIN
ES	ENERGY SAVER
EST	ESTIMATED
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
EX	EXISTING
EXCAV	EXCAVATION
EXIST	EXISTING
EXH	EXHAUST
EXP	EXPOSED
EXR	EXISTING RELOCATED
EXT	EXTERIOR
EXTG	EXISTING
F	FUSED; FAHRENHEIT
FA	FIRE ALARM
FAAP	FIRE ALARM ANNUNCIATOR PANEL
FACP	FIRE ALARM CONTROL PANEL
FC	FOOT-CANDLE
FCU	FAN COIL UNIT
FD	FUSED DISCONNECT
FDR	FEEDER
FEP	FLUORINATED ETHYLENE PROPYLENE
FFEC	FOODSERVICE FACILITIES EQUIPMENT CONTRACTOR
FIG	FIGURE
FIN	FINISHED
FIXT	FIXTURE
FLA	FULL LOAD AMPS
FLR	FLOOR
FLUOR	FLUORESCENT
FM	FREQUENCY MODULATION; FACTORY MUTUAL
FPM	FEET PER MINUTE
FR	FIRE RATING
FT	FOOT; FEET
FTG	FITTING; FOOTING
FURN	FURNISHED
FVNR	FULL VOLTAGE NON-REVERSING
G	GROUND
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GEN	GENERAL; GENERATOR
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFI	GROUND FAULT INTERRUPTER
GFP	GROUND FAULT PROTECTOR
GND	GROUND
GP	GENERAL PURPOSE
GPM	GALLONS PER MINUTE
GRC	GALVANIZED RIGID CONDUIT
GRD	GROUND; GROUNDED
GRS	GALVANIZED RIGID STEEL
H	HIGH
HACR	HEATING, AIR CONDITIONING & REFRIGERATION
HD	HEAVY DUTY
HG	MERCURY
HH	HAND HOLE
HIC	HIGH INTERRUPTING CAPACITY
HO	HIGH OUTPUT
HOA	HAND-OFF-AUTOMATIC
HORIZ	HORIZONTAL
HP	HORSEPOWER; HIGH PRESSURE
HPF	HIGH POWER FACTOR
HPS	HIGH PRESSURE SODIUM
HR	HOUR
HRS/DAY	HOURS PER DAY
HSC	HIGH SHORT CIRCUIT
HT	HEIGHT
HTG	HEATING
HTRS	HEATERS
HV	HIGHT VOLTAGE
HVAC	HEATING, VENTILATION & AIR-CONDITIONING
HW	HOT WATER; HEAVY WALL
HWP	HEATING WATER PUMP
HYD	HYDRAULIC
HZ	HERTZ
IC	INTERRUPTING CAPACITY
ID	INSIDE DIAMETER
IDF	INTERMEDIATE DISTRIBUTION FRAME
IEEE	INSTITUTE OF ELECTRICAL & ELECTRONICS ENGINEERS
IF	INSIDE FROSTED
IG	ISOLATED GROUND
IMC	INTERMEDIATE METAL CONDUIT
IMP	IMPEDANCE
IN	INCH
INCAND	INCANDESCENT
INCL	INCLUDED; INCLUDING
INST	INSTALLATION
INSUL	INSULATION; INSULATED
INT	INTERIOR; INTERNAL
INV EL	INVERT ELEVATION
IS	INSTANT START
J	JOULE; JUNCTION
JB	JUNCTION BOX
J-BOX	JUNCTION BOX
K	THOUSAND
KCMIL	THOUSAND CIRCULAR MILS
KEC	KITCHEN EQUIPMENT CONTRACTOR
KHZ	KILOHERTZ
KK	KIRK KEY
KP	KEYPAD
KV	KILOVOLT
KVA	KILOVOLT AMPERE
KVAR	KILOVOLT AMPERE REACTIVE
KW	KILOWATT
KWH	KILOWATT-HOUR
L	LENGTH; LONG
LAB	LABOR; LABORATORY
LB	POUND; ELL CONDUIT BODY
LEC	LABORATORY EQUIPMENT COMPANY (CONTRACTOR)
LED	LIGHT EMITTING DIODE
LF	LINEAR FOOT
LG	LONG; LENGTH; LARGE
LLD	LAMP LUMEN DEPRECIATION
LM	LUMEN
LO	LOCKOUT
LP	LIGHTING PANEL
LPF	LOW POWER FACTOR
LRA	LOCKED ROTOR AMPS
LT	LIGHT; LIQUID-TIGHT
LTG	LIGHTING
LTR	LETTER
LV	LOW VOLTAGE
M	THOUSAND; MATERIAL; MECHANICAL; METER
MA	MILLIAMPERE
MACH	MACHINE
MAG STR	MAGNETIC STARTER
MAINT	MAINTENANCE
MAN	MANUAL
MAT	MATERIAL
MATV	MASTER ANTENNA TELEVISION
MAX	MAXIMUM
MC	METAL CLAD CABLE; MECHANICAL CONTRACTOR; MOTOR CONTROLLER
MCA	MINIMUM CIRCUIT AMPS
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCCB	MOLDED CASE CIRCUIT BREAKER
MCM	THOUSAND CIRCULAR MILS
MCP	MOTOR CIRCUIT PROTECTOR
MCS	MOTOR CIRCUIT SWITCH
MDF	MAIN DISTRIBUTION FRAME
MDP	MAIN DISTRIBUTION PANELBOARD
MECH	MECHANICAL
MED	MEDIUM
MFG	MANUFACTURING
MFR	MANUFACTURER
MH	MANHOLE; METAL HALIDE; MAN-HOUR
MHZ	MEGAHERTZ
MI	MALLEABLE IRON; MINERAL INSULATED
MIC	MICROPHONE
MIN	MINIMUM; MINUTE
MISC	MISCELLANEOUS
MLO	MAIN LUG ONLY
MO	MONTH
MOBIL	MOBILIZATION
MOCP	MAXIMUM OVERCURRENT PROTECTION
MOG	MOGUL
MTD	MOUNTED
MTG	MOUNTING
MTS	MANUAL TRANSFER SWITCH
MULT	MULTI; MULTIPLY
MV	MERCURY VAPOR, MEGAVOLT; MEDIUM VOLTAGE
MVA	MEGAVOLT AMPERES
MVAR	MEGAVOLT AMPERES REACTIVE
MW	MEGAWATT
N	NORTH; NEW; NEUTRAL
N/A	NOT AVAILABLE; NOT APPLICABLE
NA	NON-AUTOMATIC
NAT	NATURAL
NC	NORMALLY CLOSED
ND	NORMAL DUTY
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NF	NON-FUSED
NFD	NON-FUSED DISCONNECT
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT
NM	NON-METALLIC SHEATHED CABLE
NO	NUMBER; NORMALLY OPEN
NTS	NOT TO SCALE
O&P	OVERHEAD AND PROFIT
OC	ON CENTER; OVERCURRENT
OD	OUTSIDE DIAMETER
ODS	OVERHEAD DISTRIBUTION SYSTEM
OH	OVERHEAD
OHD	OVERHEAD DOOR
OL	OVERLOAD
OPGP	OFFICE PRINCIPAL GROUND POINT
OS&Y	OUTSIDE SCREW AND YOKE
OZ	OUNCE
P	POLE; PULL
PA	PUBLIC ADDRESS
PB	PUSHBUTTON; PULL BOX
PC	POWER CONNECTOR; PHOTOCELL
PD	PROTECTIVE DEVICE
PE	PROFESSIONAL ENGINEER
PF	POWER FACTOR
PFCC	POWER FACTOR CORRECTION CAPACITOR
PH	PHASE
PIV	POST INDICATOR VALVE
PKG	PACKAGE
PL	PILOT LIGHT
PLBG	PLUMBING
PNL	PANELBOARD
PR	PAIR
PRI	PRIMARY
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH GAUGE
PT	POTENTIAL TRANSFORMER
PU	PER UNIT
PVC	POLYVINYL CHLORIDE
PWR	POWER
QUAN	QUANTITY
R	RESISTANCE; RELOCATED; RECESSED
RCS	RELAY CONTROL STATION
RECEPT	RECEPTACLE
RECIRC	RECIRCULATING
REF	REFERENCE; REFRIGERATED
REQ'D	REQUIRED
RET	RETURN
RF	RETURN FAN
RGS	RIGID GALVANIZED STEEL
RLA	RUNNING LOAD AMPS
RM	ROOM
RMS	ROOT MEAN SQUARE
RNC	RIGID NON-METALLIC CONDUIT
RP	RAINPROOF
RPM	REVOLUTIONS PER MINUTE
RR	RESTROOM
R&R	REMOVE & REPLACE
RS	RAPID START
RSC	RIGID STEEL CONDUIT
RT	RAINTIGHT
S	SOUTH
SCCR	SHORT-CIRCUIT CURRENT-RATING
SCHED	SCHEDULE
SCR	SHORT CIRCUIT RATING
SD	SERVICE DROP
SE	SERVICE ENTRANCE; SERVICE EQUIPMENT
SEC	SECONDARY
SF	SUPPLY FAN; SQUARE FOOT
SL	SLIM LINE; SERVICE LATERAL
SN	SOLID NEUTRAL
SP	SINGLE POLE
SPD	SURGE PROTECTIVE DEVICE
SPDT	SINGLE POLE, DOUBLE THROW
SPKR	SPEAKER
SPST	SINGLE POLE, SINGLE THROW
SQ	SQUARE
SQ FT	SQUARE FOOT
SQ IN	SQUARE INCH
SR	SERVICE RACEWAY; SURFACE RACEWAY
SS	STAINLESS STEEL; SAFETY SWITCH
S/S	START/STOP
ST	STEEL: SHUNT TRIP; SINGLE THROW
STD	STANDARD
STR	STARTER
STRUCT	STRUCTURAL
SUBS	SUBCONTRACTORS
SURF	SURFACE
SV	SOLENOID VALVE
SW	SWITCH
SWD	SWITCHING DUTY
SWBRD	SWITCHBOARD
SY	SQUARE YARD
SYM	SYMMETRICAL
SYN	SYNTHETIC
SYS	SYSTEM
T	TEMPERATURE; TRANSFORMER
TB	TERMINAL BLOCK
TC	TIME CLOCK
TCC	TEMPERATURE CONTROL CONTRACTOR
TD	TIME DELAY
TELE	TELEPHONE
TFE	TETRAFLUOROETHYLENE
TFF	TOP OF FINISHED FLOOR
TFMR	TRANSFORMER
TH	THICK
THD	TOTAL HARMONIC DISTORTION: THREAD
TR	TAMPER RESISTANT
TS	TRIGGER START
TTB	TELEPHONE TERMINAL BOARD
TV	TELEVISION
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
TYP	TYPICAL
UC	UNDER (CABINET OR COUNTER)
UF	UNDERGROUND FEEDER
UG	UNDERGROUND
UH	UNIT HEATER
UHF	ULTRA HIGH FREQUENCY
UL	UNDERWRITERS LABORATORY
UNFIN	UNFINISHED
U0I	UNLESS OTHERWISE INDICATED
UTIL	UTILITY
UTP	UNSHIELDED TWISTED PAIR
UVR	UNDERVOLTAGE RELAY (RELEASE)
V	VOLT; VENTILATION
VA	VOLT AMPERES
VAR	VOLT-AMPERES REACTIVE
VAV	VARIABLE AIR VOLUME
VDT	VIDEO DISPLAY TERMINAL
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VHF	VERY HIGH FREQUENCY
VHO	VERY HIGH OUTPUT
VOL	VOLUME
VT	VAPORTIGHT
W	WIRE; WATT; WIDE; WEST; WASTE
W/	WITH
WG	WIRE GUARD
WM	"WIREMOLD" (SURFACE RACEWAY)
WO	WELDER OUTLET
WP	WEATHERPROOF
WT	WEIGHT: WATERTIGHT
WWF	WELDED WIRE FABRIC
WW	WELL WATER; WARM WHITE
XHD	EXTRA HEAVY DUTY
XFMR	TRANSFORMER
XFER	TRANSFER
Y	WYE
°	DEGREE
Δ	DELTA
Ø	PHASE; DIAMETER
#	POUND; NUMBER
%	PERCENT
@	AT
~	APPROXIMATELY
'	FEET
"	INCHES

LIGHTING OCCUPANCY SENSORS & CONTROLLERS

NOTE: ALL WALL SWITCHES CONTROLLING EMERGENCY CIRCUITS SHALL BE ENGRAVED WITH "EMERGENCY"

IO ab	WALL MOUNTED INFRA-RED OCCUPANCY SENSOR. LETTERS "ab" INDICATES DUAL RELAY SENSOR. MOUNTING HEIGHT PER ADA MOUNTING DETAIL THIS SHEET - UON OR REQUIRED.
DO ab	WALL MOUNTED DUAL TECHNOLOGY OCCUPANCY SENSOR. LETTERS "ab" INDICATES DUAL RELAY SENSOR. LETTER "D" INDICATES DIMMING CONTROL. MOUNTING HEIGHT PER ADA MOUNTING DETAIL THIS SHEET - UON OR REQUIRED.
ab	WALL MOUNTED VACANCY SENSOR (MANUAL ON), MOUNTING HEIGHT PER ADA MOUNTING DETAIL THIS SHEET - UON OR REQUIRED. LETTERS "ab" INDICATES DUAL RELAY SENSOR. BOTH SWITCH LEGS TO BE CONFIGURED IN A "MANUAL ON" CONFIGURATION.
UO ab	WALL MOUNTED ULTRASONIC OCCUPANCY SENSOR. LETTERS "ab" INDICATES DUAL RELAY SENSOR. MOUNTING HEIGHT PER ADA MOUNTING DETAIL THIS SHEET - UON OR REQUIRED.
OS m	CEILING MOUNTED OCCUPANCY SENSOR. "m" INDICATES SENSOR WITH POWER PACK AND HVAC CONTROL RELAY. "s" INDICATES SATELLITE SENSOR.
OS D	WALL MOUNTED OCCUPANCY SENSOR/CONTROLLER (AUTO ON), "D" INDICATES DIMMING CONTROL
D x*	AUTOMATIC CONTINUOUS DIMMING DAYLIGHTING CONTROLLER USED TO DIM LIGHTS WHEN SUFFICIENT NATURAL LIGHT IS PRESENT. NUMBER IN PARENTHESIS INDICATES THE AVERAGE WORKPLANE "TARGET ILLUMINATION" SYMBOL VALUE. ADJACENT LOWER CASE LETTERS "x*" INDICATES SWITCH LEG(S) CONTROLLED.
OP x*	CEILING MOUNTED COMBINATION OCCUPANCY SENSOR AND PHOTOCELL
DD	DIGITAL DISPLAY WALL CONTROLLER
#	MULTI-SCENE PUSHBUTTON WITH ON/OFF/RAISE/LOWER("#" INDICATES NUMBER OF SCENES)
MZ abc	MULTI-ZONE PUSHBUTTON. ("abc" INDICATES ZONING REQUIRED)
R	RELAY PACK FOR ON/OFF SWITCHING OF CONTROLLED RECEPTACLE AND HVAC ENABLE
	NOTE: REFER TO POWER PLANS FOR LOCATION AND QUANTITY OF CONTROLLED RECEPTACLES (PLUGLOAD).
—LV—	LOW VOLTAGE (LV) WIRING BETWEEN OCCUPANCY, DAYLIGHT SENSORS, AND/OR LV SWITCHES. QUANTITY AND SPECIFICATIONS OF WIRE PER MANUFACTURER REQUIREMENTS.

BRANCH CIRCUIT SYMBOLS

NOTE: ALL NON-FINISHED CONDUIT TO BE PAINTED TO MATCH THE ADJACENT SURFACE, WHETHER CEILING OR WALL

A-1,3,5	HOME RUN TO PANEL. LETTER DESIGNATES PANEL, NUMBERS INDICATE CIRCUITS. HASH MARKS INDICATE NUMBER OF CONDUCTORS IN CONDUIT RUN, #12 AWG MINIMUM UNLESS OTHERWISE NOTED.
A-1&3&5	HOME RUN TO PANEL. LETTER DESIGNATES PANEL, NUMBERS INDICATE CIRCUITS WITH SEPARATE NEUTRALS. "&" INDICATES SEPARATE NEUTRALS.
A-1+3+5	HOME RUN TO PANEL. LETTER DESIGNATES PANEL, NUMBERS INDICATE CIRCUITS. "+" INDICATES SEPARATE #10 NEUTRAL THROUGHOUT BRANCH CIRCUIT. HASH MARK " " INDICATES AN ISOLATED GROUND CONDUCTOR.
	BRANCH CIRCUIT CONDUIT CONCEALED ABOVE CEILING, IN WALL OR SURFACE MOUNTED. CONDUIT SHALL INCLUDE PHASE, NEUTRAL AND GROUND CONDUCTORS AS REQUIRED FOR CIRCUITS (UNLESS OTHERWISE NOTED). 1/2" CONDUIT MINIMUM, (2)#12 AWG CONDUCTORS MINIMUM
	UNDERGROUND CONDUIT OR BRANCH CIRCUIT ROUTED IN FLOOR SLAB OR CONCRETE. COORDINATE INSTALLATION WITH GENERAL CONTRACTOR AND SUPPORT AS REQUIRED. REFER TO PLANS FOR MINIMUM SIZE OF CONDUITS AND CONDUCTORS AND A CODE SIZED EQUIPMENT GROUND.
	CONDUIT STUB OUT, CAP, MARK AND RECORD ON AS-BUILT DRAWINGS
	CONDUIT CONTINUATION.
	FLEXIBLE CONNECTION AS REQUIRED. NUMBER OF CONDUCTORS AS REQUIRED. VERIFY CONNECTION REQUIREMENTS WITH MANUFACTURER PRIOR TO ROUGH-IN.
DN	CONDUIT/ BRANCH CIRCUIT/FEEDER CONTINUATION DOWN WALL TO FLOOR BELOW
UP	CONDUIT/ BRANCH CIRCUIT/FEEDER CONTINUATION UP WALL TO FLOOR ABOVE

SITE UTILITY SYMBOLS

MH	MAN HOLE - POWER OR COMMUNICATION AS INDICATED ON PLANS
HH	HAND HOLE - POWER OR COMMUNICATION AS INDICATED ON PLANS
PB OR P	PULLBOX, SIZED PER N.E.C. OR AS NOTED.
	POWER POLE
PC	POWER CONNECTION TO EQUIPMENT
U-XFMR	UTILITY TRANSFORMER PROVIDED BY LOCAL UTILITY JURISDICTION.
S	PAD MOUNTED SWITCH
CC	CONNECTION CABINET (UTILITY METER MOUNT)
PM	PRIMARY SITE METER ENCLOSURE
ME	METER ENCLOSURE. EITHER ON BUILDING OR ON UTILITY EQUIPMENT
CT	CT ENCLOSURE. EITHER ON BUILDING OR UTILITY EQUIPMENT
EG	ENGINE GENERATOR
TP	TELECOMMUNICATION PEDESTAL

EMERGENCY LIGHT SYMBOLS

- ILLUMINATED EXIT SIGN WITH NUMBER OF FACES AND DIRECTION OF EGRESS ARROWS AS INDICATED.
- LOW LEVEL EXIT SIGN AS SPECIFIED ON LIGHTING FIXTURE SCHEDULE.
- EGRESS EMERGENCY BATTERY PACK LIGHT FIXTURE (BUGEYE).
- A1-1/EM — "EM" AND/OR SHADED CONNECTION POINT INDICATES FIXTURE WITH EMERGENCY BATTERY PACK (MINIMUM 1100 LUMEN OUTPUT) OR FIXTURE ON EMERGENCY INVERTER.

FLOOR BOX / SPECIALTY SYMBOLS

RECESSED COMBINATION FLOOR BOX WITH POWER AND DATA CONNECTIONS TO FURNITURE SYSTEMS/VARIOUS FLOOR APPLICATIONS. ALL CONNECTION REQUIREMENTS SHALL BE VERIFIED WITH THE MANUFACTURER PRIOR TO INSTALLATIONS. REFER TO SHEET E0.01 FOR ADDITIONAL SPECIFICATION INFORMATION AND APPLICATIONS.

TECHNOLOGY SYMBOLS

	SECURITY CAMERA. ACTI I910 (OR EQUAL.) WITH ASSOCIATED COMPONENTS. INSTALL (1) CATEGORY 6 CABLE TO NEAREST IDF. USE OSP TYPE OF CABLE WHEN RUN UNDERGROUND.
	SECURITY CAMERA. ACTI Z92 (OR EQUAL.) WITH ASSOCIATED COMPONENTS. INSTALL (1) CATEGORY 6 CABLE TO NEAREST IDF. USE OSP TYPE OF CABLE WHEN RUN UNDERGROUND.
NVR	NETWORK VIDEO RECORDER. ACTI GNR-410 (OR EQUAL.) RACKMOUNT NVR WITH ASSOCIATED COMPONENTS.
CR	ACCESS CONTROL DOOR SET. PROXPRO READER # 5355 (OR EQUAL.) AND DOOR CONTACT WITH ASSOCIATED COMPONENTS AND CABLING.
DAC	DOOR ACCESS CONTROLLER. ACCELATERM CICP2800 WITH ASSOCIATED COMPONENTS AS REQUIRED.
INT	AUDIO/VIDEO INTERCOM SET, ACTI Q950 WITH ASSOCIATED COMPONENTS AND CABLING.

POWER FIXTURE SYMBOL LEGEND

THE LEGEND INDICATED BELOW REPRESENTS DIFFERENT TYPES OF RECEPTACLE /ELECTRICAL DEVICE SYMBOLS UTILIZED FOR THIS PROJECT. NOT ALL BUT FEW SYMBOLS WILL BE USED FOR THE INDICATED SCOPE OF THE PROJECT. RECEPTACLES SHALL MEET CALIFORNIA BUILDING CODE CHAPTER 11B IN ORDER TO COMPLY WITH THE REQUIREMENTS FOR ACCESSIBLE REACH REFER TO DETAILS SHEETS FOR ACCESSIBILITY MOUNTING HEIGHTS.

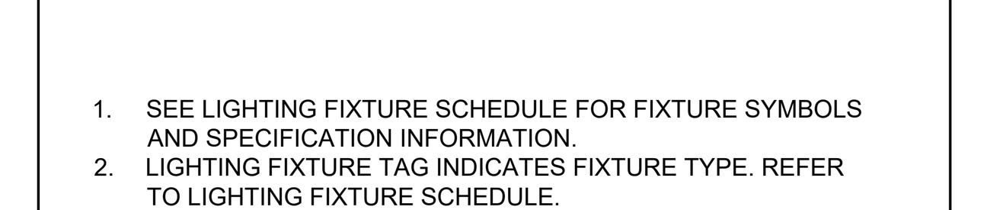
- DUPLEX RECEPTACLE
- DUPLEX CONTROLLED RECEPTACLE
- ISOLATED DUPLEX RECEPTACLE
- DEDICATED 20A, DUPLEX RECEPTACLE
- GFCI DUPLEX RECEPTACLE
- DUPLEX RECEPTACLE WITH USB
- EMERGENCY DUPLEX RECEPTACLE. TICK MARKS SHOWN ON ANY DEVICE REPRESENTS RECEPTACLE CONNECTED TO THE EMERGENCY CIRCUIT (RED DEVICE)
- SIMPLEX RECEPTACLE
- SPECIAL RECEPTACLE
- DUPLEX RECEPTACLE FLUSH IN CEILING - MOUNT FLUSH IN FLOOR WHEN INDICATED IN A FLOOR BOX SYMBOL.
- DOUBLE DUPLEX RECEPTACLE FLUSH IN CEILING - MOUNT FLUSH IN FLOOR WHEN INDICATED IN A FLOOR BOX SYMBOL.
- SIMPLEX RECEPTACLE FLUSH IN CEILING - MOUNT FLUSH IN FLOOR WHEN INDICATED IN A FLOOR BOX SYMBOL.
- SPECIAL RECEPTACLE FLUSH IN CEILING - MOUNT FLUSH IN FLOOR WHEN INDICATED IN A FLOOR BOX SYMBOL.
- PEDESTAL MOUNTED RECEPTACLE
- GFCI PEDESTAL MOUNTED RECEPTACLE
- DUPLEX AFCI RECEPTACLE
- FOUR-PLEX (QUAD) AFCI RECEPTACLE
- FOUR-PLEX(QUAD): TWO ISOLATED GROUND DUPLEX RECEPCALES, WALL MOUNTED.
- RECESSED FLAT PANEL TV/DISPLAY WALL BOX WITH FLUSH GROMMETED COVER PANEL (FSR #PWB-100-???) AND MINIMUM OF (1) 1-1/4"C.O. FROM TOP-MOUNTED L.V. CONDUIT ENTRY BOX TO ACCESSIBLE CEILING. SEE PLANS FOR ANY ADDITIONAL CONDUIT REQUIREMENTS. PROVIDE ADDITIONAL L.V. AND LINE VOLTAGE CONDUIT ENTRY BOXES AS REQUIRED TO ACCOMPLISH WALL BOX CONFIGURATION DEPICTED ON PLANS. FLUSH GROMMETED COVER SHALL BE WHITE, BLACK OR CUSTOM COLOR PER ARCHITECT. WHEN FIELD CONDITIONS PROHIBIT INSTALLATION OF THIS DEVICE (SUCH AS WALL STUD/CAVITY DEPTH OF LESS THAN 3" ETC), CONFIRM VIA WRITTEN RFI THE INSTALLATION OF A TRADITIONAL POWER AND DATA RECEPTACLE INSTALLATION ALONG SIDE CCTV/AV JUNCTION BOX CONSISTING OF 4-GANG DEEP JUNCTION BOX WITH 2"C.O. TO ACCESSIBLE CEILING IN ADDITION TO ANY OTHER CONDUIT REQUIREMENTS DEPICTED ON PLANS. REFER TO ARCHITECTURAL PLANS AND ELEVATIONS FOR MOUNTING HEIGHT.
- DUPLEX RECEPTACLE MOUNTED ABOVE COUNTER
- DUPLEX CONTROLLED RECEPTACLE MOUNTED ABOVE COUNTER
- ISOLATED DUPLEX RECEPTACLE MOUNTED ABOVE COUNTER
- DEDICATED 20A, DUPLEX RECEPTACLE MOUNTED ABOVE COUNTER
- DUPLEX, GFCI RECEPTACLE MOUNTED ABOVE COUNTER
- FOUR-PLEX (QUAD) RECEPTACLE
- FOUR-PLEX (QUAD) GFCI RECEPTACLE
- FOUR-PLEX (QUAD) RECEPTACLE WITH USB
- FOUR-PLEX (QUAD) RECEPTACLE FLUSH IN CEILING
- FOUR-PLEX (QUAD) RECEPTACLE MOUNTED ABOVE COUNTER
- FOUR-PLEX (QUAD) GFCI RECEPTACLE MOUNTED ABOVE COUNTER
- SIMPLEX RECEPTACLE MOUNTED ABOVE COUNTER
- SPECIAL RECEPTACLE MOUNTED ABOVE COUNTER
- PEDESTAL MOUNTED RECEPTACLE
- GFCI PEDESTAL MOUNTED RECEPTACLE
- DUPLEX, AFCI RECEPTACLE MOUNTED ABOVE COUNTER
- FOUR-PLEX (QUAD) AFCI RECEPTACLE
- FOUR-PLEX(QUAD): TWO ISOLATED GROUND DUPLEX RECEPTACLE AND ONE DUPLEX RECEPTACLE, MOUNTED ABOVE COUNTER
- FLUSH MOUNTED WALL BOX WITH FLEX CONNECTIONS TO SYSTEMS FURNITURE, ONE FOR POWER AND ONE FOR DATA. VERIFY CONNECTION REQUIREMENTS WITH MANUFACTURER. SEE PLAN NOTE FOR ADDITIONAL WALL BOX REQUIREMENTS. PROVIDE TANDEM (2) 4S/DP BOX FOR EACH TYPE WITH 1" C FLEX GREY SEALTIGHT CONDUIT FROM BOX TO FURNITURE CONNECTION PANEL WITH ADEQUATE SLACK, MINIMUM 3' LENGTH FIELD CUT TO ADJUST TO FINAL FURNITURE PLACEMENT.

DUPLEX RECEPTACLES INDICATED WITH HALF SHADE, SHALL BE CONTROLLED VIA LIGHTING OCCUPANCY SENSOR OR CONTROL PANEL (LCP). REFER TO LIGHTING OCCUPANCY SENSORS AND CONTROLS LEGEND. WHERE FOUR-PLEX(QUAD) RECEPTACLES ARE PROVIDED AS CONTROLLED, A SINGLE DUPLEX RECEPTACLE SHALL BE CONTROLLED. AT LEAST ONE DUPLEX RECEPTACLE PER FLOOR BOXES, FLUSHED FLOOR MOUNTED RECEPTACLES OR POKE-THRUS SHALL BE CONTROLLED IF NEEDED.

POWER EQUIPMENT AND DEVICE LEGEND

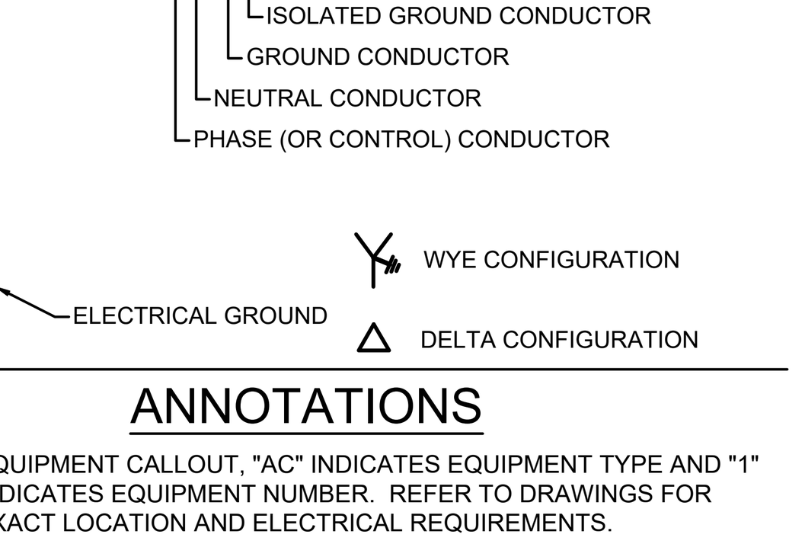
	FLUSH MOUNTED ELECTRICAL PANELBOARD OR LOAD CENTER.
	SURFACE MOUNTED ELECTRICAL PANELBOARD OR LOAD CENTER.
	TELEPHONE TERMINAL BACKBOARD SIZED AS NOTED, REFER TO SYSTEM GROUND DETAIL.
	MAIN SWITCHBOARD. REFER TO PLANS
	DISTRIBUTION BOARD. REFER TO PLANS
UPS-A	UNINTERRUPTIBLE POWER SUPPLY. REFER TO PLANS
ATS-1	AUTOMATIC TRANSFER SWITCH. REFER TO PLANS
F	FUSED DISCONNECT SWITCH, HP RATED, OR COMBINATION MOTOR STARTER/DISCONNECT SWITCH WITH FUSES PER EQUIPMENT MANUFACTURER AND WEATHERPROOF AS REQUIRED. PROVIDE FINAL CONNECTION TO UNIT EQUIPMENT. SEE MOTORIZED EQUIPMENT SCHEDULE FOR DISCONNECT AND STARTER SIZES.
	MOTOR STARTER COMBINATION SWITCH WITH HOA SELECTOR SWITCH, ON "RUNNING LIGHT" RESET AND OVERLOAD PROTECTION.
	NON-FUSED DISCONNECT SWITCH, HP RATED AND WEATHERPROOF AS REQUIRED. PROVIDE FINAL CONNECTION TO UNIT EQUIPMENT. SEE MOTORIZED EQUIPMENT SCHEDULE FOR DISCONNECT SIZES.
M CT.	UTILITY COMPANY METER. PROVIDE "CT's" AND "PT's" AS REQUIRED, REFER TO SINGLE LINE DIAGRAM.
1 150AF 150AT 3P	CIRCUIT BREAKER, LINE 1 REPRESENTS FRAME SIZE/RATING; LINE 2 REPRESENTS TRIP SIZE/RATING; LINE 3 REPRESENTS NUMBER OF POLES AND LINE 4 REPRESENTS MISCELLANEOUS BREAKER INFO. (SEE BELOW): SHUNT = PROVIDE SHUNT TRIP MECHANISM. HACR = PROVIDE HACR-RATED BREAKER. GFP = GROUND FAULT PROTECTION CLCB = CURRENT LIMITING CIRCUIT BREAKER SS = PROVIDE SOLID STATE CIRCUIT BREAKER
60AS 3P 50AF CLASS J	FUSIBLE SWITCH: LINE 1 REPRESENTS SWITCH SIZE/RATING; LINE 2 REPRESENTS NUMBER OF POLES; LINE 3 REPRESENTS FUSE SIZE/RATING; LINE 4 REPRESENTS FUSE TYPE; LINE 5 REPRESENTS MISCELLANEOUS FUSE INFO. (SEE BELOW): SHUNT= PROVIDE SHUNT TRIP MECHANISM. GFP = GROUND FAULT PROTECTION CLF = CURRENT LIMITING FUSE
	GROUND CONNECTION, SIZE AS INDICATED OR AS REQUIRED.
SD	SMOKE DETECTOR
TV	AUDIO/VIDEO OUTLET BOX, PROVIDE 4" SQUARE JUNCTION BOX WITH 2" CONDUIT & PULLSTRING STUBBED 6" ABOVE ACCESSIBLE CEILING. SEE AV DRAWINGS FOR SPECIFICATIONS AND MOUNTING REQUIREMENTS.
CR	CARD READER OUTLET BOX
CR K	CARD READER OUTLET BOX WITH KEY PAD
CR T	CARD READER OUTLET BOX WITH TIME ATTENDANT PAD NOTE: REFER TO DETAILS SHEET/S FOR ADDITIONAL INFORMATION AND MOUNTING REQUIREMENTS FOR ALL CARD READERS.
PP	PUSH PLATE OUTLET BOX, MOUNTING HEIGHT PER ADA DEVICE MOUNTING REQUIREMENTS.
MS	MASTER CONTROL SWITCH, MOUNTING HEIGHT PER ADA DEVICE MOUNTING REQUIREMENTS.
J	WALL MOUNTED JUNCTION BOX. MOUNTING HEIGHT AS NOTED. 4S/DP MINIMUM OR AS REQUIRED BY N.E.C..
J	JUNCTION BOX, MOUNTED IN ACCESSIBLE CEILING FOR APPLICATION DENOTED ON PLAN. 4S/DP MINIMUM OR AS REQUIRED BY N.E.C..
IM	ELECTRICAL CONNECTION TO INTERACTIVE MARKER-BOARD. COORDINATE CONNECTION TYPE AND REQUIREMENTS WITH MANUFACTURER'S INSTALLATION GUIDES. VERIFY MOUNTING LOCATION AND HEIGHT WITH ARCHITECT AND DISTRICT EQUIPMENT INSTALLER PRIOR TO ROUGH-IN OF ELECTRICAL.
	SURFACE MOUNTED MULTI-OUTLET ASSEMBLY. 18"O.C. UNLESS OTHERWISE INDICATED. REFER TO GENERAL PRODUCT SPECIFICATIONS. PROVIDE ALL COMPONENTS NECESSARY FOR A COMPLETE INSTALLATION.
T	THERMOSTAT OUTLET BOX, PROVIDE 1/2"C.O. TO RESPECTIVE MECHANICAL UNIT.
M	EXHAUST FAN, OR MOTOR LOAD. REFER TO MECHANICAL, PLUMBING OR KITCHEN DRAWINGS FOR SPECIFIC LOAD REQUIREMENTS OR AS NOTED.
	1-PHASE MOTOR - VOLTAGES @ 120V, 208V OR 277V
	3-PHASE MOTOR - VOLTAGES @ 208V OR 480V
G	GENERATOR SET
HD	HAND DRYER
MCC	MOTOR CONTROL CENTER (SUPPLIED BY OTHER)
CB	CIRCUIT BREAKER BOX RATING AS SPECIFIED
GND	GROUND BAR
ST	SHUNT-TRIP BUTTON - FLUSH MOUNTED UNLESS OTHERWISE NOTED NEMA 3R FOR EXTERIOR LOCATIONS
VFD	VARIABLE FREQUENCY DRIVE
DDC	DIRECT DIGITAL CONTROL PANEL
DD	DUCT SMOKE DETECTOR
	CONDUIT SEAL-OFF FITTINGS
	ELECTRIC DUCT HEATER
\$ HD	HEAVY DUTY SWITCH (MOTOR RATED SWITCH)
SFD	SMOKE FIRE DAMPER
\$ 3 ab	SINGLE POLE SWITCHES, MOUNTING HEIGHT PER ADA REQUIREMENTS SUBSCRIPTS AT SYMBOL INDICATE THE FOLLOWING: 2 - DOUBLE POLE; 3 - THREE WAY; 4 - FOUR WAY; D - LOW VOLTAGE DIMMER K - KEY OPERATED; LV - LOW VOLTAGE; M - MOTOR STARTING; P - PILOT LIGHT; R - REMOTE CONTROL NOTE: ALL WALL SWITCHES CONTROLLING EMERGENCY CIRCUITS SHALL BE ENGRAVED WITH "EMERGENCY"
T	LOW VOLTAGE TRANSFORMER. REFER TO PLANS
T1A	TRANSFORMER (15KVA OR ABOVE), WITH EQUIPMENT TAG. (TAG INSIDE OR OUTSIDE, DEPENDING ON SIZE). IN MOST CASES, ACTUAL SIZE SHOWN ON PLANS (ELECTRICAL ROOMS).

LIGHTING SYMBOLS

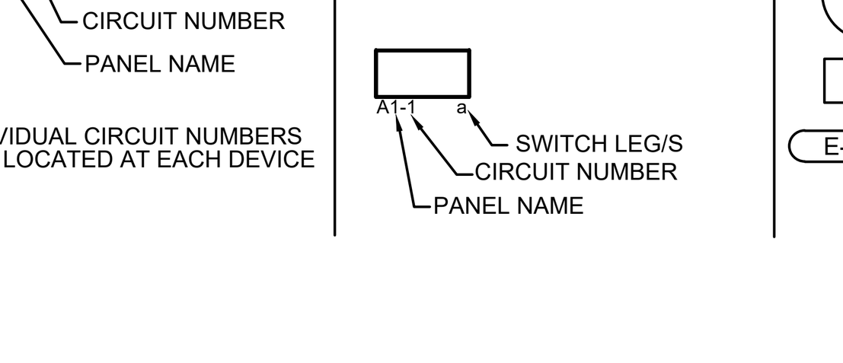


1. SEE LIGHTING FIXTURE SCHEDULE FOR FIXTURE SYMBOLS AND SPECIFICATION INFORMATION.
2. LIGHTING FIXTURE TAG INDICATES FIXTURE TYPE. REFER TO LIGHTING FIXTURE SCHEDULE.

TYPICAL WIRING DESIGNATIONS



CIRCUIT DESIGNATIONS



* INDIVIDUAL CIRCUIT NUMBERS ARE LOCATED AT EACH DEVICE

ANNOTATIONS

AC-1	EQUIPMENT CALLOUT, "AC" INDICATES EQUIPMENT TYPE AND "1" INDICATES EQUIPMENT NUMBER. REFER TO DRAWINGS FOR EXACT LOCATION AND ELECTRICAL REQUIREMENTS.
3 / E-1	DETAIL CALLOUT, "3" INDICATES DETAIL NUMBER "E-1" INDICATES SHEET NUMBER.
FR1	LIGHTING FIXTURE DESIGNATION
E-1000	PLAN NOTE REFERENCE, REFER TO NOTES ON SHEET, OR AS DIRECTED.
1	REVISION REFERENCE.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 03-125900 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 03/18/2026

LPA

ARCHITECTURE ENGINEERING INTERIOR DESIGN LANDSCAPE ARCHITECTURE PLANNING

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C30830
9/30/2027
RENEWAL DATE
STATE OF CALIFORNIA

ALTADENA ELEMENTARY SCHOOL

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ALTADENA ELEMENTARY SCHOOL

Revision	Date

Submittal	Date
100% SCHEMATIC DESIGN	12/05/2025
DSA SUBMITTAL	02/02/2026

Job Number	33366
Checked By	AG /SC
Scale	

ELECTRICAL NOTES, SYMBOLS, & ABBREVIATIONS

E0.01

LOW VOLTAGE GENERAL NOTES

1. CONDUITS SHALL, (a) CONTAIN NO CONTINUOUS SECTIONS LONGER THAN 30M (98 FT.), AND, (b) CONTAIN NO MORE THAN (2) 90° BENDS OR (1) REVERSE BEND WITHOUT INSTALLING A PULLBOX. CONDUITS IN PLACE OF PULLBOXES ARE UNACCEPTABLE.
2. CONDUITS SHALL CONTAIN PLASTIC OR NYLON PULL TAPE RATED AT 200 LBS. WITH A MINIMUM OF 5 FEET OF EXTRA PULL TAPE COILED AT EACH END.
3. CONDUIT BEND RADIUS SHALL BE (a) A MINIMUM OF 6 TIMES THE INTERNAL CONDUIT DIAMETER FOR CONDUITS 2" IN DIAMETER OR LESS, AND, (b) 10 TIMES THE INTERNAL CONDUIT DIAMETER FOR CONDUITS MORE THAN 2" IN DIAMETER.
4. TERMINATE CONDUITS AND SLEEVES THAT PROTRUDE THROUGH STRUCTURAL FLOORS 2"-3" ABOVE THE FLOOR SURFACE.
5. INSTALL BUSHINGS AND BELL ENDS AS REQUIRED ON ALL CONDUITS.
6. FLEX CONDUIT IS GENERALLY UNACCEPTABLE FOR USE AS A COMMUNICATIONS CONDUIT EXCEPT AT SEISMIC JOINTS AND AS APPROVED IN WRITING BY THE ENGINEER.
7. ALL UNDER SLAB OR IN-SLAB CONDUITS SHALL BE INSTALLED IN A MANNER THAT PREVENTS WATER INFILTRATION OF THE CONDUIT. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE GROUND WATER, RAIN WATER OR CONSTRUCTION WATER IS PREVENTED FROM ENTERING AND/OR REMOVED FROM THE CONDUITS PRIOR TO PLACEMENT OF COMMUNICATIONS CABLES. SEE SITE UTILITY PLAN NOTES FOR ADDITIONAL UNDERGROUND COMMUNICATIONS CONDUIT SEALING REQUIREMENTS.

   ALL PULLBOXES SHALL BE SIZED AND INSTALLED PER ANSI/TIA/EIA-569B. PULLBOXES FOR UNDER FLOOR CONDUIT RUNS ARE NOT PERMITTED UNLESS OTHERWISE NOTED. PULLBOXES FOR OVERHEAD CONDUIT RUNS SHALL BE LOCATED ABOVE ACCESSIBLE CEILINGS WITHIN THE ACCESSIBLE CEILING SPACE AND SUPPORTED INDEPENDENTLY FROM THE STRUCTURE AND CONDUIT SUPPORTS. PULLBOXES FOR ROOF MOUNTED OR EXTERIOR ABOVE GRADE APPLICATIONS SHALL BE NEMA 3 RATED. PULLBOXES SHALL BE SIZED ACCORDING TO THE FOLLOWING:

8.

CONDUIT SIZE	WIDTH	LENGTH	DEPTH	WIDTH INCREASE PER ADDITIONAL CONDUIT
1"	4"	16"	3"	2"
2"	8"	36"	4"	5"
3"	12"	48"	5"	6"
4"	15"	60"	8"	8"

   FOR OTHER CONDUIT SIZES REFER TO ANSI/TIA/EIA 569B TABLE 12. - LATEST PUBLISHED EDITION.

9. CONDUIT(S) SHALL EXIT A PULLBOX ON THE WALL OPPOSITE THE WALL ENTERED.
10. PROVIDE LABELING OF EACH CONDUIT PER GENERAL ELECTRICAL SPECIFICATIONS.
11. PROVIDE INTERNAL/EXTERNAL GAS AND WATER TIGHT MECHANICAL SEALING/PLUGGING OF EACH BUILDING ENTRY CONDUIT AS SPECIFIED ELSEWHERE IN THE DRAWINGS AND SPECIFICATIONS.
12. COORDINATE ALL MOUNTING DIMENSIONS FOR ELECTRICAL DEVICES AND SWITCHES WITH ARCHITECTURAL INTERIOR ELEVATIONS PRIOR TO ROUGH-IN.
13. COORDINATE ALL PENETRATIONS WITH STRUCTURAL PLANS AND DETAILS. NO PENETRATIONS ARE PERMITTED UNLESS SPECIFICALLY NOTED ON STRUCTURAL DRAWINGS.

LIGHTING GENERAL NOTES

1. REFER TO ARCHITECTURAL PLANS FOR EXACT LOCATION & ELEVATION OF ALL LIGHTING FIXTURES AND ALL DEVICES. ALL WALL-MOUNTED DEVICE HEIGHTS SHALL BE VERIFIED WITH THE ARCHITECT PRIOR TO ROUGH-IN.
2. VERIFY EXACT CEILING CONSTRUCTION WITH ARCHITECTURAL REFLECTED CEILING PLAN AND PROVIDE LIGHTING FIXTURES WITH ALL NECESSARY MOUNTING HARDWARE.
3. ALL RECESSED FIXTURES SHALL BE PROVIDED WITH ALL REQUIRED STRUCTURAL SUPPORTS AS REQUIRED BY THE CURRENTLY ADOPTED ISSUE OF THE UNIFORM BUILDING CODE, AS WELL AS ANY LOCAL CODES.
4. ALL COVE MOUNTED FIXTURES SHALL EXTEND THE FULL LENGTH OF THE COVE. CONTRACTOR TO FIELD MEASURE COVE LENGTH AND ORDER QUANTITY OF FIXTURES AS REQUIRED.
5. ALL DIMMING BRANCH CIRCUITS SHALL BE PROVIDED WITH A DEDICATED NEUTRAL CONDUCTOR FOR EACH ZONE/CHANNEL.
6. ALL FLUORESCENT DIMMING ZONES/CHANNELS SHALL BE PROVIDED WITH 3 LINE VOLTAGE CONDUCTORS (NEUTRAL, DIMMED HOT, SWITCHED HOT) OR 2 LINE VOLTAGE CONDUCTORS/2 CONTROL CONDUCTORS AS REQUIRED BY THE CONTROL/BALLAST TYPE.
7. ALL EMERGENCY BATTERY PACK FIXTURES SHALL BE PROVIDED WITH A CONSTANT HOT CONNECTION TO THE CHARGING LEAD. SEE GENERAL LIGHTING FIXTURE SCHEDULE NOTES FOR MORE INFORMATION.
8. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXIT SIGN CHEVRONS AND NUMBER OF FACES PER EXIT SIGN. ANY DISCREPANCIES BETWEEN EXIT SIGNS SHOWN ON THE ELECTRICAL AND ARCHITECTURAL PLANS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT PRIOR TO ORDERING EXIT SIGNS.
9. WHEN EXPOSED CEILINGS OR OPEN GRID CONDITIONS OCCUR, THE CONTRACTOR WILL NEED TO PROVIDE THE FOLLOWING ITEMS:

   - ALL BRANCH CIRCUITS SHALL BE IN EMT.
   - ALL BRANCH CIRCUITS SHALL BE ROUTED NEATLY TRAINED AND IN PARALLEL TO STRUCTURES OR DUCT WORK. THE TERM "TRAINED" MEANS ALL PARALLEL CONDUITS SHALL MAINTAIN THE SAME SPATIAL RELATIONSHIP WITH EACH OTHER FOR ENTIRE RUN TO INCLUDE RADIUS BENDS AND SWEEPS.

   VISUALLY OBJECTIONABLE BRANCH CIRCUITS WILL BE REROUTED AT THE REQUEST OF THE ARCHITECT AT NO ADDITIONAL COST.
10. ALL LED REMOTE INDICATORS FOR DUCT DETECTORS AND FIRE/SMOKE DAMPERS REQUIRED BY THE LOCAL AHJ SHALL BE LOCATED IN CEILINGS IN COORDINATION WITH ARCHITECT PRIOR TO ANY ROUGH-IN.
11. RECESSED FIXTURES LOCATED IN A FIRE-RATED CEILING OR WALL SHALL BE PROVIDED WITH A 5-SIDED RATED ENCLOSURE SO CONSTRUCTED AS TO ALLOW CODE AND MANUFACTURER-REQUIRED CLEARANCES BETWEEN THE FIXTURE AND THE ENCLOSURE.
12. REFER TO GENERAL POWER PLAN NOTES AND COMMUNICATIONS PATHWAYS GENERAL NOTES FOR ADDITIONAL REQUIREMENTS WHEN POWER AND/OR DATA DEVICES ARE SHOWN ON THIS PLAN.
13. CONTRACTOR TO INCLUDE AN ALLOWANCE TO CORE AND SEAL PENETRATIONS THROUGH STRUCTURAL CONCRETE WALLS. COORDINATE LOCATIONS AND REQUIREMENTS WITH ARCHITECTURAL AND STRUCTURAL DRAWINGS.
14. COORDINATE ALL PENETRATIONS WITH STRUCTURAL PLANS AND DETAILS. NO PENETRATIONS ARE PERMITTED UNLESS SPECIFICALLY NOTED ON STRUCTURAL DRAWINGS.

POWER GENERAL NOTES

1. ALL RECEPTACLES ON COMMON WALLS SHALL BE SEPARATE BOXES AND OFFSET 24" MINIMUM.
2. ALL PENETRATIONS THROUGH FIRE RATED WALLS SHALL BE PROTECTED FROM THE SPREAD OF FIRE WITH AN APPROVED FIRESTOP SYSTEM EQUAL OR GREATER THAN THE FIRE RATING OF THE WALL.
3. COORDINATE ALL MOUNTING DIMENSIONS FOR ELECTRICAL DEVICES AND SWITCHES WITH ARCHITECTURAL INTERIOR ELEVATIONS PRIOR TO ROUGH-IN.
4. ALL FURNITURE FEED LOCATIONS TO BE VERIFIED WITH ARCHITECT AND FURNITURE VENDOR PRIOR TO ROUGH IN.
5. ALL FURNITURE WHIPS SHALL BE TRIMMED TO REDUCE EXCESS WHIP LENGTH.
6. WHEN EXPOSED CEILINGS OR OPEN GRID CONDITIONS OCCUR, THE CONTRACTOR WILL NEED TO PROVIDE THE FOLLOWING ITEMS:

   - ALL BRANCH CIRCUITS SHALL BE IN EMT.
   - ALL BRANCH CIRCUITS SHALL BE ROUTED NEATLY AND IN PARALLEL TO STRUCTURES OR DUCT WORK.

   VISUALLY OBJECTIONABLE BRANCH CIRCUITS WILL BE REROUTED AT THE REQUEST OF THE ARCHITECT AT NO ADDITIONAL COST.
7. EXPOSED CABLE/CONDUCTORS INSTALLED IN A PLENUM SPACE SHALL CONFORM TO CEC, ARTICLE 300.22(C).
8. PROVIDE G.F.C.I. TYPE RECEPTACLE(S) WITHIN 6 FEET OF ANY SINK.
9. CONTRACTOR TO INCLUDE AN ALLOWANCE TO CORE AND SEAL PENETRATIONS THROUGH STRUCTURAL CONCRETE WALLS. COORDINATE LOCATIONS AND REQUIREMENTS WITH ARCHITECTURAL AND STRUCTURAL DRAWINGS.
10. COORDINATE ALL PENETRATIONS WITH STRUCTURAL PLANS AND DETAILS. NO PENETRATIONS ARE PERMITTED UNLESS SPECIFICALLY NOTED ON STRUCTURAL DRAWINGS.
11. COORDINATE ALL KITCHEN CONDUIT AND EQUIPMENT ROUGH-IN ON KITCHEN DRAWINGS.

ROOF GENERAL NOTES

1. ELECTRICAL CONTRACTOR SHALL REFER TO MECHANICAL/PLUMBING AND ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS AND CHARACTERISTICS OF ALL EQUIPMENT LISTED IN SCHEDULE. ANY MODIFICATIONS AND/OR ADDITIONAL WORK NECESSARY SHALL BE INCLUDED IN THE BASE BID.
2. ELECTRICAL CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF ALL CONNECTION POINTS WITH THE EQUIPMENT INSTALLER PRIOR TO ROUGH-IN.
3. ELECTRICAL CONTRACTOR SHALL PROVIDE LOCAL REMOTE DISCONNECTING MEANS FOR ALL ELECTRIC HEATING EQUIPMENT IF REQUIRED BY THE LOCAL ELECTRICAL CODE.
4. ELECTRICAL CONTRACTOR SHALL COORDINATE THE ROUTING OF CONDUIT/WIRING TO ROOF-MOUNTED EQUIPMENT WITH EQUIPMENT INSTALLER PRIOR TO ROUGH-IN. WHERE ROOF-MOUNTED EQUIPMENT IS MANUFACTURED TO BE FED FROM WITHIN MECHANICAL CURB ASSEMBLY - SEPARATE ROOF PENETRATIONS FOR WIRING CONNECTIONS SHALL NOT BE PERMITTED. ALL WIRING SHALL BE BELOW THE ROOF IN AN ACCESSIBLE CEILING SPACE LOCATION.
5. ALL ROOF MOUNTED EQUIPMENT SHALL BE NEMA 3R RATED.

DEMOLITION NOTES

1. THE ELECTRICAL DRAWINGS ARE DIAGRAMMATIC ONLY. DO NOT SCALE THE ELECTRICAL DRAWINGS TO DETERMINE THE LOCATION OF EQUIPMENT OR OUTLETS. SEE ARCHITECTURAL PLANS, WHERE PROVIDED ON PROJECT, FOR EXTENT OF DEMOLITION.
2. THE EXISTING CONDITIONS SHOWN ARE FROM AVAILABLE RECORD DRAWINGS AND SHOWN FOR REFERENCE ONLY. CONTRACTOR SHALL VERIFY ACTUAL EXISTING CONDITIONS AT SITE PRIOR TO SUBMITTING BID. ALL DEMOLITION, ALTERATION, EXTENSION, RELOCATION, REHABILITATION WORK SHALL BE INCLUDED IN CONTRACT. NO ADDITIONAL ALLOWANCE OR CHANGE ORDERS WILL BE ACCEPTED.
3. CONTRACTOR IS RESPONSIBLE TO RELOCATE OR REMOVE FROM WALLS, CEILINGS, FLOOR SPACES, ETC. ANY EXISTING CONDUITS, WIRES, BOXES, FITTINGS, FIXTURES OR OTHER ELECTRICAL EQUIPMENT WHICH INTERFERES WITH PLANNED REMODEL WORK. PROVIDE CIRCUIT CONTINUATION REQUIRED FOR ALL EXISTING OUTLETS, FIXTURES, EQUIPMENT, ETC. SCHEDULED TO REMAIN.
4. NOTIFY THE ENGINEER IMMEDIATELY WHEREVER EXISTING EQUIPMENT IS ENCOUNTERED WHICH MUST BE RELOCATED DUE TO THE NEW CONSTRUCTION, OR NOT INDICATED ON "AS-BUILT" DRAWINGS OR WAS BURIED UNDERGROUND OR EMBEDDED IN STRUCTURE WALLS.
5. CAREFULLY PROTECT ALL WALLS, TRIM, FLOORS, EQUIPMENT, UTILITY LINES AND MATERIALS. WHEN WORKING ON FINISHED SURFACES, LIMIT DAMAGE TO THE SMALLER AREA IF POSSIBLE AND RESTORE TO THE ORIGINAL CONDITION ALL SURFACES WHICH ARE DAMAGED BECAUSE OF THE INSTALLATION OF THIS WORK.
6. EQUIPMENT, MATERIALS AND SUPPLIES TEMPORARILY REMOVED FOR PROTECTION SHALL BE REPLACED IN ORIGINAL LOCATIONS. ANY MATERIALS DAMAGED SHALL BE REPLACED WITH NEW MATERIALS OF LIKE KIND AND QUALITY.
7. DEMOLITION WORK SHALL BE DONE IN A MANNER WHICH WILL NOT CAUSE UNNECESSARY INCONVENIENCE OR DANGER TO USERS OF THE PREMISES AND ADJACENT SITE, AND NOT INTERFERE WITH ITS OPERATION. ANY DEMOLITION WORK TO BE PERFORMED MUST BE PLANNED IN ADVANCE.
8. DO ALL DRILLING, CUTTING, ETC. REQUIRED TO DEMOLISH ELECTRICAL WORK AS INDICATED OR PROVIDE BLANK COVER PLATE ON ALL OUTLETS EXPOSED BY REMOVAL OF FIXTURE OF DEVICES.
9. RESEAL ALL PENETRATIONS OR OPENING THROUGH WALLS, CEILING, FLOORS, ETC., TO MAINTAIN THE RATING OF STRUCTURE.
10. CONTRACTOR SHALL VERIFY EXISTING CONDUIT/CONDUCTOR RUNS ON CIVIL DEMOLITION PLAN, SHEET C1.1. REUSE AS REQUIRED AND REMOVE ALL UNUSED CONDUIT/CONDUCTORS. REMOVE CONDUIT BACK TO SCOPE OF WORK LIMIT LINE. AT EACH END OF FEEDER, TAG AND LABEL CONDUIT. DOCUMENT DETAILED DIMENSIONS ON AS-BUILTS. REMOVE CONDUCTORS BACK TO SOURCE (VERIFY WITH OWNER). UNUSED CONDUIT IN INACCESSIBLE LOCATIONS (WALLS TO REMAIN) CAN BE ABANDONED IN PLACE.
11. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDUIT/WIRING RUNS, REUSE AS REQUIRE AND REMOVED ALL UNUSED CONDUIT/WIRING. UNUSED CONDUIT IN INACCESSIBLE LOCATIONS (WALLS TO REMAIN) CAN BE ABANDONED IN PLACE. REMOVE UNUSED WIRING.
12. CONTRACTOR TO VERIFY CIRCUIT NUMBER AND LOADS FOR ALL EXISTING EQUIPMENT PRIOR TO INSTALLATION OF NEW OR RELOCATED ELECTRICAL EQUIPMENT. REASSIGN CIRCUITS AND LOADS ACCORDINGLY. PROVIDE COMPLETE "AS BUILT" DRAWINGS AND TYPEWRITTEN DIRECTORIES FOR PANELS.
13. WHERE NECESSARY TO SHUT OFF UTILITY SERVICES OR CAUSE INTERRUPTION TO POWER OR SIGNAL SYSTEMS WHILE A BUILDING IS OCCUPIED OR THAT EFFECT ADJACENT BUILDINGS, SCHEDULE OUTAGES OR INTERRUPTIONS WITH THE OWNER, BUILDING OCCUPANTS AND/OR ADJACENT BUILDING OWNER(S) AND OCCUPANTS PRIOR TO CONDUCTING OUTAGE(S) OR INTERRUPTIONS.

GENERAL NOTES (con't)

34. ALL EXISTING SITE RELATED ELECTRICAL EQUIPMENT (I.E. UNDERGROUND UTILITIES, DUCTS, STRUCTURES, PULL BOXES, ETC.) LOCATIONS ARE DIAGRAMMATIC IN NATURE AND ONLY REFLECT APPROXIMATE LOCATIONS, QUANTITIES, AND/OR ROUTING INFORMATION. ALL REFERENCED INFORMATION HAS EITHER BEEN SURVEYED, REPORTED BY THE OWNER/ OWNERS REP, AND/OR REFERENCED ON AN AS-BUILT RECORD DOCUMENTS. ALL EXISTING ELECTRICAL EQUIPMENT REFERENCE D ON THESE DRAWINGS IS TO BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF BY ACCEPTING THESE PLANS OR PROCEEDING WITH ELECTRICAL SCOPE OF WORK, AGREES TO ACCEPT LIABILITY AND SHALL RENDER THE ENGINEER OF RECORD HARMLESS FOR ANY ELECTRICAL EQUIPMENT NOT REPORTED TO THE ENGINEER DURING THE DESIGN PROCESS. THE CONTRACT TO TAKE THE REQUIRED PRECAUTIONARY MEASURES TO ENSURE ALL EXISTING ELECTRICAL EQUIPMENT IS PROTECTED IN PLACE.
35. ANY EXISTING BUILDING STRUCTURES OR SURFACES DAMAGED BY DEMOLITION OR DURING INSTALLATION ACTIVITIES SHALL BE REPAIRED, PATCHED, AND/OR REFINISHED TO THE SATISFACTION OF THE OWNER AND DSA.
36. ALL EXISTING ELECTRICAL EQUIPMENT INDICATED TO BE DEMOLISHED SHALL BE REMOVED ENTIRELY AND ALL AFFECTED SURFACES OR STRUCTURES SHALL BE REPAIRED, REPLACED, AND/OR REFINISHED TO MATCH THE ADJACENT SURFACES OR DAMAGED ITEM(S).
37. FOR CLARITY ONLY RECONSTRUCTION OR NEW WORK RELATED ELEMENTS AND SELECT EXISTING FACILITIES SPECIFICALLY REQUIRING COORDINATION WITH ANY NEW WORK.
38. ALL CONDUITS, BOXES, SURFACE MOUNTED RACEWAYS, SUPPORT DEVICES, AND ASSOCIATED FITTINGS SHALL BE MOUNTED IN CONCEALED LOCATIONS ABOVE CEILINGS, DUCTS, TRUSSES, BEAMS, ETC. IN AREAS WHERE A CONCEALED MOUNTING LOCATION IS NOT AVAILABLE EQUIPMENT SHALL BE PAINTED TO MATCH THE ADJACENT SURFACES.
39. ANY PENETRATIONS BY CONDUITS OR OTHER ELECTRICAL EQUIPMENT THROUGH A FIRE RATED WALL - WHETHER EXISTING OR NEW - SHALL MAINTAIN THE APPROPRIATE FIRE RATING BY SEALING THE PENETRATION WITH THE APPROPRIATE UL-LISTED FIRE-STOP MATERIAL/SYSTEM.
40. ELECTRICAL CONTRACTOR SHALL PREPARE AND SUBMIT THE FOLLOWING CALIFORNIA ENERGY COMMISSION T-24 CERTIFICATE OF ACCEPTANCE LTG-1-1, PARTS 1, 2, & 3; LIGHTING CONTROL LTG-2-A; AND/OR AUTOMATIC DAYLIGHTING CONTROL LTG-3-A, AS THEY APPLY TO THE BUILDING DEPARTMENT PRIOR TO ISSUANCE OF THE CERTIFICATE OF OCCUPANCY.
41. LEED COMMISSIONING NOTE: ELECTRICAL CONTRACTOR TO COORDINATE AND PROVIDE ASSISTANCE FOR COMPLETE COMMISSIONING OF ALL SYSTEMS IDENTIFIED IN COMMISSIONING AGENT'S DOCUMENTS, INCLUDING BUT NOT LIMITED TO LIGHTING CONTROLS, ELECTRONIC METERING, ETC.

SITE PLAN GENERAL NOTES

1. ALL INFORMATION REFERENCED IS PRELIMINARY IN NATURE AND DOES NOT REPRESENT FINAL DESIGN DOCUMENTS. ALL INFORMATION AND REQUIREMENTS RELATIVE TO UTILITY INFRASTRUCTURE SHALL BE COORDINATED, VERIFIED, AND INSTALLED PER FINAL UTILITY COMPANY DESIGN DOCUMENTS.
2. ROUTING OF ALL CONDUIT SHALL BE COORDINATED IN THE FIELD AND CONFIRMED BY ENGINEER AND ARCHITECT.
3. COORDINATE ALL CONDUIT ROUTING, ELECTRICAL DEVICE LOCATIONS, PULL BOX LOCATIONS, ETC. WITH LANDSCAPE PLANTING PLANS TO AVOID CONFLICTS WITH TREES, SHRUBS, ETC.
4. ALL CONDUCTOR AND CABLE RUNS ARE TO BE CONTINUOUS. NO CONDUCTORS OR LOW VOLTAGE CABLING TO BE INSTALLED AS PART OF INCREMENT ONE. ALL CONDUCTORS AND LOW VOLTAGE CABLING TO BE INSTALLED AS PART OF INCREMENT TWO AND TERMINATED INSIDE OF THE BUILDING.
5. ALL CONDUIT SHALL BE PROVIDED WITH PROPERLY SIZED PULL STRING PER UTILITY COMPANY STANDARDS.
6. ALL EQUIPMENT MOUNTED OUTDOORS SHALL BE INSTALLED IN A WEATHERPROOF NEMA 3R ENCLOSURE.
7. SEE ARCHITECTURAL/LANDSCAPE ARCHITECTURAL PLANS FOR EXACT LOCATIONS OF FIXTURES, PULLBOXES, MANHOLES, OTHER ELECTRICAL DEVICES, ETC. COORDINATE ALL UNDERGROUND STRUCTURES AND CONDUIT ROUTING WITH LANDSCAPE ARCHITECT PRIOR TO ROUGH-IN TO ENSURE THAT SUCH ITEMS ARE NOT PLACED IN CRITICAL LANDSCAPE PLANTING/HARDSCAPE AREAS.
8. PROVIDE CONCRETE ENCASEMENT FOR ALL TRENCHES WITH MORE THAN THREE (3) CONDUITS. ENCASE PER UTILITY COMPANY REQUIREMENTS.
9. CONTRACTOR TO ABANDON BUT NOT DEMOLISH ALL CONDUITS IN FAIRMONT.

SITE UTILITY PLAN GENERAL NOTES

THESE NOTES ESTABLISH MINIMUM QUALITY LEVELS AND COORDINATION REQUIREMENTS. RESPECTIVE UTILITY COMPANY PLANS AND REQUIREMENTS TAKE PRECEDENCE OVER THESE NOTES WITH REGARD TO RESPECTIVE UTILITY COMPANY CONDUIT AND UNDERGROUND STRUCTURE SYSTEMS.

1. CALL UNDERGROUND SERVICE ALERT (USA) AT 1 (800) 422-4133 OR APPLICABLE STATE AND LOCAL DIG SAFE OR UNDERGROUND ALERT HOTLINES PRIOR TO CONSTRUCTION START.
2. COORDINATE ALL UNDERGROUND STRUCTURES AND CONDUIT ROUTING WITH LANDSCAPE ARCHITECT PRIOR TO ROUGH-IN TO ENSURE THAT SUCH ITEMS ARE NOT PLACED IN CRITICAL LANDSCAPE PLANTING/HARDSCAPE AREAS.
3. VAULTS, MAINTENANCE HOLES (MH's) AND CONDUITS SHALL MAINTAIN A MINIMUM COVER OF 24" BELOW FINAL SURFACE AT ALL CONDITIONS. INCLUDE ALL COSTS IN BASE BID TO MEET UTILITY COMPANY REQUIREMENTS WHICH MAY REQUIRE GREATER MINIMUM CONDUIT DEPTHS.
4. VAULTS, MH's AND PULLBOXES (PB's) SHALL BE EQUIPPED WITH KNOCKOUT PANELS OR PRE-CAST INDIVIDUAL CONDUIT OPENINGS. CONDUITS SHALL ONLY ENTER AND EXIT ON END/SHORT WALLS. CONDUITS MAY NOT ENTER AND EXIT ON SIDE/LONG WALLS, CEILINGS OR FLOORS UNLESS OTHERWISE NOTED.
5. CUT DUCTS FLUSH WITH INTERIOR VAULT/MH/PB WALL.
6. GROUT AROUND DUCT ENTRANCES ON VAULT/MH/PB WALLS.
7. SLURRY BACKFILL AROUND DUCTS WITHIN 5 FEET OF VAULT/MH/PB TO PREVENT SHEARING.
8. CONDUITS PASSING UNDER THE BUILDING PERIMETER SHALL BE ENCASED IN LIGHTWEIGHT CONCRETE OR WATER-IMPERVIOUS CLAY TO PREVENT WATER INFILTRATION. SEE ELECTRICAL SPECIFICATIONS FOR ADDITIONAL INFORMATION.
9. CONDUIT BEND RADIUS FOR BUILDING ENTRANCES AND AT POLES SHALL BE A MINIMUM OF 24" FOR CONDUITS WITH LESS THAN 2" INTERNAL DIAMETER AND A MINIMUM OF 48" FOR CONDUITS WITH MORE THAN 2" INTERNAL DIAMETER.
10. PREFERRED CONDUIT SWEEP RADIUS BETWEEN VAULTS IS 25 FEET. UNDER NO CIRCUMSTANCES SHALL THE CONDUIT SWEEP RADIUS BE LESS THAN 12.5 FEET. MAXIMUM OF 90 DEGREES PER SWEEP AND LIMITED TO NO MORE THAN (2) 90 DEGREE SWEEPS BETWEEN VAULTS.
11. VAULTS/MH's/PB's ARE TO BE EQUIPPED WITH RACKING, GROUNDING LUGS, AND BOLT-DOWN LIDS UNLESS OTHERWISE NOTED.
12. VAULTS AND MH's TO BE EQUIPPED WITH ROUND COVERS, EXTENSION RINGS AS REQUIRED, LADDERS AND (3) SEGMENTS OF 6 FOOT HIGH CABLE RACKING PER EACH LONG WALL.
13. LABEL ALL NON-UTILITY COMMUNICATION VAULT/MH/PB COVERS WITH "COMMUNICATIONS" UNLESS OTHERWISE NOTED ON PLANS.
14. COORDINATE FINAL VAULT/MH/PB OPENING HEIGHT WITH G.C. PRIOR TO ROUGH-IN TO ENSURE FINAL GRADE DOES NOT SLOPE INTO VAULT/MH/PB OPENING.
15. CONTRACTOR TO PROVIDE A MINIMUM OF 8" DEEP COMPACTED 1/2" DIAMETER GRAVEL, UNDER ALL VAULTS, MH's OR PB's TO ENSURE UNIFORM DISTRIBUTION OF SOIL PRESSURE ON THE FLOOR AND BE ABLE TO DISSIPATE WATER OUT OF THE VAULT, MH OR PB.
16. ALL VAULTS/MH's/PB's WITHOUT GROUNDING LUGS SHALL HAVE AN 8' x 3/4" COPPER GROUND ROD DRIVEN THRU THE FLOOR TO ALLOW GROUNDING OF ITEMS WITHIN.
17. ALL VAULTS/MH's/PB's SHALL BE PROVIDED WITH TRAFFIC RATED COVERS WHEN LOCATED IN PAVED AREAS UTILIZED FOR VEHICLE TRAFFIC.
18. IF THE WATER OR MOISTURE BARRIER ON OR NEAR THE FOUNDATION OF A BUILDING IS DISTURBED IN ANY MANNER BY EXCAVATION OR OTHER CONSTRUCTION WORK. THE MOISTURE BARRIER MUST BE REPAIRED FOLLOWING THE RECOMMENDATIONS OF THE MANUFACTURER OF THE ORIGINAL BARRIER PRODUCT.
19. THE CONTRACTOR SHALL INCLUDE IN BASE BID ALL COSTS TO COMPLY WITH ALL REQUIREMENTS FOR CONFINED SPACE ENTRY PER THE OSHA REQUIREMENTS 29 CFR-1910.146, 29 CFR-1910.268, ETC. DURING ANY CONFINED SPACE ENTRY.
20. ANY DUCTS LEAVING A VAULT, MH OR PB ROUTED INTO A FACILITY SHALL BE PLUGGED AT EACH END USING REMOVEABLE MECHANICAL PLUGS DESIGNED TO PREVENT WATER AND GAS FROM ENTERING THE FACILITY.
21. SEE ELECTRICAL SPECIFICATIONS AND PLAN DETAILS FOR ADDITIONAL REQUIREMENTS REGARDING UNDERGROUND CONDUITS AND IN-GRADE VAULT/MH/PB/JUNCTION BOXES.

GENERAL NOTES:

1. THE ELECTRICAL CONTRACTOR (EC) SHALL INCLUDE AND PROVIDE IN BID ALL LABOR AND MATERIALS NECESSARY FOR A COMPLETE AND OPERATIONAL INSTALLATION OF ALL ELECTRICAL SYSTEMS.
2. EC SHALL COORDINATE AND OBTAIN ALL APPROVALS, PERMITS, AND DOCUMENTS FROM REGULATORY AGENCIES AND UTILITY COMPANIES.
3. ALL CONDUIT RACEWAY SYSTEMS ARE TO BE INSTALLED AS FOLLOWS:
   a. RIGID GALVANIZED STEEL IS TO BE INSTALLED IN ALL AREAS WHICH ARE EXPOSED TO WEATHER AND/OR PHYSICAL DAMAGE.
   b. FLEXIBLE METALLIC CONDUIT I S PERMITTED FOR SHORT CONNECTIONS TO LIGHT FIXTURES (6'-0" MAX). FLEXIBLE CONDUIT SHALL ALSO BE INSTALLED FOR EQUIPMENT REQUIRING VIBRATION ISOLATION AND HORIZONTAL RUNS IN WOODEN STUD WALLS.
   c. ELECTRICAL METALLIC TUBING (EMT) WITH COMPRESSION TYPE FITTINGS SHALL BE USED FOR BUILDING INTERIOR WORK.
   d. PVC CONDUIT SHALL BE USED FOR UNDERGROUND CONDUITS. ROUTE CODE SIZED GROUND WIRE INSIDE OF CONDUIT. CONDUIT RISERS AND STUBS ABOVE GRADE SHALL BE I.M.C. WITH HALF-LAPPED TAPE COVERING OR PVC COATING.
4. UNLESS OTHERWISE NOTED OR REFERENCED ON THE DRAWINGS ALL NEW ELECTRICAL WIRING IS TO BE 600V RATED COPPER WITH TYPE "THHN/THWN" INSULATION.
5. ALL MOUNTING HEIGHTS REFERENCED ON DRAWINGS ARE MEASURED FROM FINISHED FLOOR UNLESS OTHERWISE REFERENCED OR INDICATED ON THE DRAWINGS.
6. ALL ELECTRICAL EQUIPMENT LOCATIONS (LIGHTING, RECEPTACLE, FLOOR BOX, ETC.) ARE TO BE VERIFIED WITH THE ARCHITECT AND/OR EQUIPMENT SUPPLIER PRIOR TO BEGINNING ANY ROUGH-IN.
7. ALL LIGHTING FIXTURES SHALL BE MOUNTED AND SUPPORTED IN ACCORDANCE WITH OSHA STANDARDS, AND ALL STATE, LOCAL, SEISMIC, AND NATIONAL ELECTRIC CODES.

   EQUIPMENT ANCHORAGE NOTE:

   THE ATTACHMENT OF THE FOLLOWING ITEMS SHALL BE DESIGNATED TO RESIST THE FORCES PRESCRIBED ABOVE, BUT NEED NOT BE DETAILED ON THE PLANS, AND THE PROJECT INSPECTOR WILL VERIFY THAT THESE ITEMS (EQUIPMENT) HAVE BEEN ANCHORED:

   A. EQUIPMENT WEIGHING LESS THAN 400 PUNDS AND SUPPORTED DIRECTLY ON THE FLOOR OR ROOF.
   B. FURNITURE REQUIRED TO BE ATTACHED IN ACCORDANCE WITH ASCE 7-10, SECTION 13.5
   C. TEMPORARY OR MOVABLE EQUIPMENT WITH FLEXIBLE CONNECTION TO POWER OR UTILITIES.
   D. EQUIPMENT WEIGHING LESS THAN 20 PUNDS SUPPORTED BY VIBRATION ISOLATORS.
   E. EQUIPMENT WEIGHING LESS THAN 20 POUNDS SUSPENDED FROM A ROOF OR FLOOR OR HUNG ON A WALL.

   PIPING, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEMS BRACING NOTE:

   PIPING, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEMS SHALL BE BRACED TO COMPLY WITH THE FORCES AND DISPLACEMENTS PRESCRIBED IN ASCE 7-10 SECTION 13.3 AS DEFINED IN ASCE 7-10 SECTION 13.6.8, 13.6.7, 13.6.5.6 AND 2013 CBC, SECTIONS 1615A.1.20, 1615A.1.21 AND 1615A.1.22.

   THE BRACING AND ATTACHMENTS TO THE STRUCTURE SHALL BE DETAILED ON THE APPROVED DRAWINGS OR THEY SHALL COMPLY WITH ONE OF THE OSHPD PRE-APPROVALS (OPA #), AS MODIFIED TO SATISFY ANCHORAGE REQUIREMENTS OF ACI 318, APPENDIX D.

   COPIES OF THE MANUAL SHALL BE AVAILABLE ON THE JOBSITE PRIOR TO THE START OF HANGING AND BRACING OF THE PIPE, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEMS.

   THE STRUCTURAL ENGINEER OF RECORD SHALL VERIFY THE ADEQUACY OF THE STRUCTURE TO SUPPORT THE HANGER AND BRACE LOADS.

1. THE DRAWINGS INCLUDED IN THIS DOCUMENT SET ARE DIAGRAMMATIC. THEY ARE REPRESENTATIVE OF THE ENGINEER OF RECORDS DESIGN INTENT FOR ALL ELECTRICAL DEVICES/EQUIPMENT AND THE INDIVIDUAL POWER FEEDS THEY ARE TO BE CONNECTED TO. THE SELECTED EC SHALL BE RESPONSIBLE FOR PROVIDING ALL J-BOXES, CONDUIT, WIRING/ CABLING, ETC. AS REQUIRED FOR A COMPLETE AND OPERATIONAL ELECTRICAL INSTALLATION.
2. ALL ELECTRICAL EQUIPMENT (PANELS, RECEPTACLES, J-BOXES, ETC.) SHALL BE WEATHERPROOF AND/OR INSTALLED IN A NEMA 3R ENCLOSURE WHERE APPLICABLE OR INSTALLED OUTDOORS. PROVIDE PLAN REFERENCED DETAILS FOR ALL PANELS/EQUIPMENT WEIGHING ≥ 20 POUNDS HUNG FROM ROOF/FLOOR ABOVE OR ON WALL OR ≥ 400 POUNDS SUPPORTED ON ROOF/FLOOR.
3. ALL ELECTRICAL WORK SHALL BE PERFORMED ACCORDING TO STATE, LOCAL, NATIONAL, AND DISTRICT STANDARDS AND CODES. COORDINATE SPECIFIC REQUIREMENTS WITH DISTRICT STANDARDS AND AUTHORITY HAVING JURISDICTION.
4. ALL ELECTRICAL EQUIPMENT SHALL BE NEW AND IS TO BE CLEARLY LABELED/IDENTIFIED AS UNDERWRITER LABORATORIES (UL) COMPLIANT UNLESS OTHERWISE NOTED OR REFERENCED IN THE DRAWINGS OR SPECIFICATIONS.
5. EC IS RESPONSIBLE FOR SECURING ALL REQUIRED BUILDING PERMITS AND SHALL INCLUDE THE COST TO SECURE BUILDING PERMITS IN THEIR FINAL BID.
6. UNLESS OTHERWISE WRITTEN, STATED, OR REFERENCED IN DRAWINGS OR SPECIFICATIONS CONTRACTOR SHALL GUARANTEE THE COMPLETE ELECTRICAL INSTALLATION FOR A PERIOD OF 1-YEAR.
7. ALL ELECTRICAL DISTRIBUTION EQUIPMENT (PANELS, DISTRIBUTION BOARDS, TRANSFORMERS, ETC), FEEDERS (CONDUIT, CONDUCTOR SIZE, AND QUANTITY), MECHANICAL EQUIPMENT, ELEVATORS, VARIABLE FREQUENCY DRIVES (VFD'S), ETC. MAY ONLY BE REFERENCED ON THE SINGLE-LINE DRAWING AND NOT INDIVIDUAL PLAN SHEETS. EC SHALL REVIEW AND VERIFY ALL REFERENCED INFORMATION ON THE SINGLE-LINE DRAWING.
8. EC SHALL BE RESPONSIBLE FOR ALL REQUIRED SAW-CUTTING, CORE DRILLING, PATCHING, REFINISHING, ETC. AS REQUIRED FOR INSTALLATION OF ELECTRICAL EQUIPMENT AND SYSTEMS. ANY PENETRATIONS OR OPENINGS MADE IN WALLS OR STRUCTURES SHALL BE PATCHED AND/OR SEALED AS REQUIRED TO MAINTAIN THE INTEGRITY AND/OR RATING OF THE WALL OR STRUCTURE. NO STRUCTURE MEMBER SHALL BE NOTCHED/CUT/DRILLED/BORED UNLESS SPECIFICALLY DETAILED ON THE DSA APPROVED DRAWINGS. ALTERNATIVELY, OBTAIN APPROVAL FROM STRUCTURAL ENGINEER OF RECORD AND DSA IF NO SUCH DETAILS OCCUR PRIOR TO INITIATING SUCH WORK.
9. EC SHALL VISIT THE SITE PRIOR TO SUBMISSION OF THEIR FINAL BID TO VERIFY ALL EXISTING SITE CONDITIONS WHICH MAY AFFECT THE COMPLETION OF THE ELECTRICAL INSTALLATION. ALL METHODS AND REQUIREMENTS FOR \ INSTALLATION SHALL BE DETERMINED PRIOR TO BID DATE. ELECTRICAL EC SHALL NOTIFY THE ENGINEER OF RECORD OF ANY REQUIRED MODIFICATIONS WHICH ARE NOT REFERENCED ON THESE ELECTRICAL PLANS. SUBMITTAL OF THE EC'S BID DEMONSTRATES THE CONTRACTOR'S AWARENESS OF ALL SITE CONDITIONS AND REQUIRED WORK TO BE PERFORMED.
10. ALL CEILINGS AND CEILING SYSTEMS AS A RULE ARE CONSIDERED TO BE INACCESSIBLE. ALL ELECTRICAL DEVICES AND EQUIPMENT INSTALLED ABOVE CEILINGS ARE TO BE MOUNTED IN A LOCATION WHICH IS ACCESSIBLE. IN SITUATIONS WHERE ELECTRICAL DEVICES AND EQUIPMENT MUST BE INSTALLED IN AN AREA WHICH IS INACCESSIBLE, EC SHALL INSTALL AN ADEQUATELY SIZED, CODE COMPLIANT ACCESS PANEL AS REQUIRED BY CURRENT CODES - LOCATION OF THE REQUIRED ACCESS PANEL SHALL BE COORDINATE WITH THE ARCHITECT AND INTERIOR DESIGNER PRIOR TO ROUGH-IN.
11. EC IS RESPONSIBLE FOR COMPLETING ALL FINAL ELECTRICAL CONNECTIONS TO OWNER FURNISHED EQUIPMENT AND SHALL PROVIDE ALL MOTOR START SWITCHES, DISCONNECTS, ETC. AS REQUIRED.
12. ALL ELECTRICAL EQUIPMENT CONNECTIONS, MOUNTING LOCATIONS, ELECTRICAL REQUIREMENTS, ETC. ARE TO BE COORDINATED AND VERIFIED PRIOR TO COMMENCEMENT OF ELECTRICAL ROUGH-IN.
13. EC TO SUBMIT SHOP DRAWINGS FOR THE APPROVAL OF THE ELECTRICAL ENGINEER OF RECORD FOR ALL ELECTRICAL EQUIPMENT AND MATERIALS TO BE UTILIZED IN THE ELECTRICAL INSTALLATION. ALL APPROVALS BY THE ENGINEER OF RECORD MUST BE SECURED PRIOR TO COMPLETION OF ANY PURCHASE ORDERS OR ROUGH-IN WORK.
14. THESE ELECTRICAL DRAWINGS AND ASSOCIATED SPECIFICATIONS ARE TO BE CONSIDERED CONTRACT DOCUMENTS FOR AGENCY REVIEW/APROVAL AND EC BIDDING PURPOSES.
15. THE COMPLETE ELECTRICAL SYSTEM SHALL BE GROUNDED IN ACCORDANCE WITH NEC/CEC ARTICLE 250. ALL POWER AND LIGHTING CIRCUITS SHALL BE INSTALLED WITH A MINIMUM #12AWG CU GROUND WIRE UNLESS OTHERWISE NOTED OR REFERENCED.
16. EC TO PROVIDE ENGRAVED PHENOLIC NAMEPLATES ON ALL DISCONNECT SWITCHES, DISTRIBUTION EQUIPMENT, J-BOXES ETC. WITH METALLIC COVERS.
24. ALL COVER PLATES FOR LIGHT SWITCHES AND OUTLETS SHALL BE STAINLESS STEEL WITH PANEL AND CIRCUIT ENGRAVED NAMEPLATES FOR THE FOLLOWING AREAS: ALL CLASSROOM/RECREATIONAL/THEATRICAL ETC. BUILDINGS ON ELEMENTARY SCHOOL/MIDDLE SCHOOL/HIGH SCHOOL/COLLEGE/UNIVERSITY CAMPUSES; AND IN RESTROOMS/LAB SPACES/HEALTHCARE FACILITIES/ABOVE COUNTER SPACES/KITCHENS/SHOP AREAS/ANY HIGH ABUSE AREAS/ETC IN ALL CIVIC/INSTITUTIONAL/HEALTHCARE/OFFICE-WORKSPACE ENVIRONMENTS - UNLESS OTHERWISE NOTED. PLASTIC COVER PLATES WITH THE APPROPRIATE COLOR SHALL BE PERMITTED IN ALL OTHER AREAS - UNLESS OTHERWISE CODES. IN INSTANCES WHERE PLASTIC COVER PLATES ARE UTILIZED EC SHALL WALL MOUNT AN ENGRAVED PHENOLIC NAMEPLATE WITH THE PANEL AND CIRCUIT NUMBER DIRECTLY ABOVE THE DEVICE.
25. AT THE COMPLETION OF THE PROJECT THE EC SHALL PROVIDE THE OWNER WITH A COMPLETE SET OF AS-BUILT ELECTRICAL DRAWINGS.
26. ANY AND ALL WORK THAT REQUIRES AN INTERRUPTION TO A BUILDING(S) ELECTRICAL SERVICE MUST BE COORDINATED WITH THE DISTRICT A MINIMUM OF 48 HOURS IN ADVANCE. ANY SERVICE DOWNTOWN SHALL NOT OCCUR DURING SCHOOL HOURS.
27. EC SHALL BE RESPONSIBLE FOR FOR ENSURING THAT ALL LOW VOLTAGE SYSTEMS ARE COMPATIBLE AND ARE COMPLETE AND OPERATIONAL.
28. EC SHALL PERMANENTLY TAG ALL CONDUCTORS IN EACH ELECTRICAL AND LOW VOLTAGE SYSTEM AS REFERENCED IN THE SPECIFICATIONS.
29. ANY SURFACE MOUNTED EXPOSED CONDUIT IN VIEW OF THE PUBLIC SHALL BE PAINTED TO MATCH THE FINISH OF THE SURFACE TO WHICH IT IS MOUNTED WITH TWO (2) COATS OF PAINT. ALL EXTERIOR SURFACE MOUNTED EXPOSED CONDUITS ARE TO BE PAINTED WITH TWO (2) COATS OF WEATHERPROOF LATEX PAINT.
30. EC TO PROVIDE ALL CONDUIT ONLY (C.O.) INFRASTRUCTURE WITH A 3/16" NYLON PULL ROPE. LABEL PULL ROPE AT EACH END WITH THE LOCATIONS OF ORIGIN AND TERMINATION.
31. IN INSTANCES WHERE A CONFLICT BETWEEN THE ELECTRICAL DRAWINGS AND THE SPECIFICATIONS FOR THE PROJECT EXISTS, THE EC SHALL ADHERE TO THE MORE STRINGENT REQUIREMENT.
32. THE SEISMIC ANCHORAGE OF ELECTRICAL EQUIPMENT SHALL CONFORM TO C.C.R. TITLE 24, 2010 CBC SECTION 1615A AND ASCE7-05 SECTION 13.3 THRU 13.6. ANCHORAGE DETAILS NOT SHOWN ON THE APPROVED PLANS OR OTHERWISE APPROVED BY DSA ARE SUBJECT TO FIELD APPROVAL BY THE ARCHITECT AND/OR STRUCTURAL ENGINEER OF RECORD AND DSA.
33. ELECTRICAL DRAWINGS ARE DIAGRAMMATIC. AS SUCH, ALL ELECTRICAL EQUIPMENT LOCATIONS, CONDUIT ROUTING, ETC. ARE NOT PRECISE AND SHALL BE COORDINATED, VERIFIED, AND DETERMINED IN THE FIELD. EC TO INSTALL ALL ELECTRICAL EQUIPMENT AND ROUTE ALL CONDUITS IN LOCATIONS WHICH MEET CODE REQUIREMENTS FOR ACCESSIBILITY/MOUNTING AND DO NOT INTERFERE WITH ANY BUILDING STRUCTURES, UTILITIES, OR OTHER TRADE EQUIPMENT.
34. ELECTRICAL EQUIPMENT SHALL BE LISTED BY A CITY OF IRVINE RECOGNIZED ELECTRICAL TESTING LABORATORY OR APPROVED BY THE DEPARTMENT.

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9/30/2027
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STATE OF CALIFORNIA

ALTADENA ELEMENTARY SCHOOL

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Developed for
ALTADENA ELEMENTARY SCHOOL

Revision	Date

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DSA SUBMITTAL	02/02/2026

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Checked By	AG /SC
Scale	

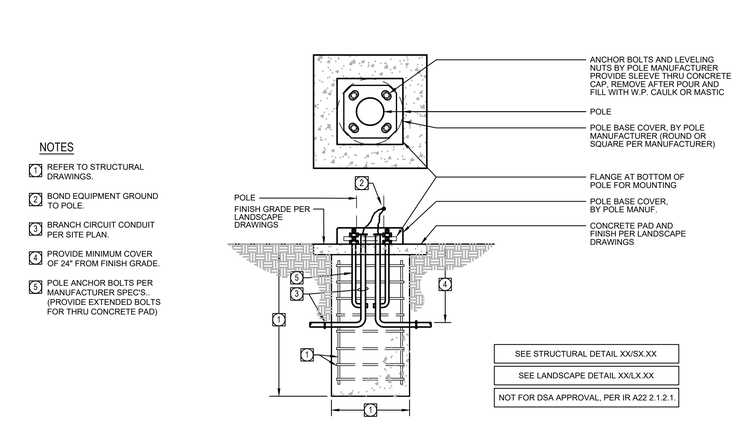
GENERAL NOTES

E0.20

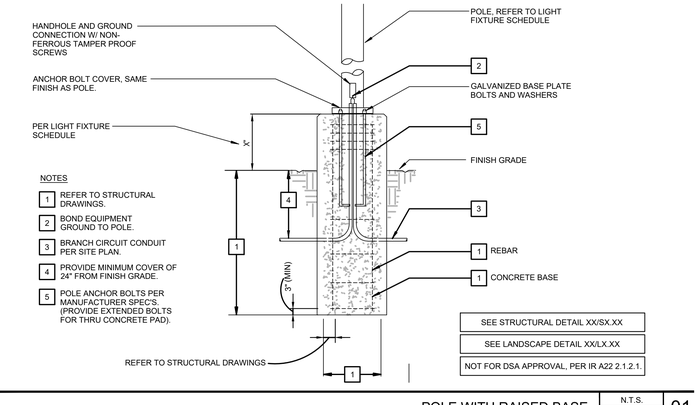
LIGHTING FIXTURE SCHEDULE

			Electrical			Source					Manufacturer					
Type	Name	Description	Apparent Load	Voltage	Driver	Lumens	CCT	CRI	Condition	BUG Rating	Manufacturer	Model Number	Equal 1	Equal 2	Finish	Location
ZN1-2	20' Single head Parking pole	"Galeon" series, 20' pole with type 2R optics, size 16 light squares with 4 light squares, level 3 output, single head with integral occ sensor with dimming to 50% and photocell, include round straight aluminum pole, 4" diameter pole with 3 bolts with base cover single head mounting template	213.0 VA	277 V	0-10V dimming driver to 10%	22523	3000K	80	EXTERIOR	B3-U0-G3	COOPER	#GALN-SA-4C-830-U-T2R-[finish]-DIM-PR-MS/DIM-L20 + RSA-4-T-20-N-[finish]-2-1 with base cover	BEACON VIPER	GARDCO PUREFORM	TBD	Play area (path of egress)
ZN1-4H	20' Single head Parking pole	"Galeon" series, 17.5' pole with type 4FT optics with house side shield, size 16 light squares with 4 light squares, level 3 output, single head with integral occ sensor with dimming to 50% and photocell, include round straight aluminum pole, 4" diameter pole with 3 bolts with base cover single head mounting template, on 30" concrete base, custom cut pole to 17'-6"	213.0 VA	277 V	0-10V dimming driver to 10%	15914	3000K	80	EXTERIOR	B3-U0-G3	COOPER	#GALN-SA-4C-830-U-T4FT-HSS-[finish]-DIM-PR-MS/DIM-L20 + RSA-4-T-17.5-N-[finish]-2-1 with base cover	BEACON VIPER	GARDCO PUREFORM	TBD	Parking lot
ZN1-4	20' Single head Parking pole	"Galeon" series, 20' pole with type 4FT optics, size 16 light squares with 4 light squares, level 3 output, single head with integral occ sensor with dimming to 50% and photocell, include round straight aluminum pole, 4" diameter 20' pole with 3 bolts with base cover single head mounting template	213.0 VA	277 V	0-10V dimming driver to 10%	22052	3000K	80	EXTERIOR	B3-U0-G3	COOPER	#GALN-SA-4C-830-U-T4FT-[finish]-DIM-PR-MS/DIM-L20 + RSA-4-T-20-N-[finish]-2-1 with base cover	BEACON VIPER	GARDCO PUREFORM	TBD	Hardball courts
ZN1-4C	20' Single head Parking pole	"Galeon" series, 17.5' pole with type 4FT optics, size 16 light squares with 4 light squares, level 3 output, single head with integral occ sensor with dimming to 50% and photocell, include round straight aluminum pole, 4" diameter pole with 3 bolts with base cover single head mounting template, on 30" concrete base, custom cut pole to 17'-6"	213.0 VA	277 V	0-10V dimming driver to 10%	22052	3000K	80	EXTERIOR	B3-U0-G3	COOPER	#GALN-SA-4C-830-U-T4FT-[finish]-DIM-PR-MS/DIM-L20 + RSA-4-T-17.5-N-[finish]-2-1 with base cover	BEACON VIPER	GARDCO PUREFORM	TBD	Parking lot
ZN2	20' Double Head Parking pole	"Galeon" series, 17.5' pole with type 4FT optics for parking lot side and T2R optics on pedestrian side, size 16 light squares with 4 light squares, level 3 output, double head at 180 degrees with integral occ sensor with dimming to 50% and photocell, include round straight aluminum pole, 4" diameter pole with 3 bolts with base cover single head mounting template, on 30" concrete base, custom cut pole to 17'-6"	426.0 VA	277 V	0-10V dimming driver to 10%	=22523+22052	3000K	80	EXTERIOR	B3-U0-G3	COOPER	#GALN-SA-4C-830-U-T4FT and T2R head-[finish]-DIM-PR-MS/DIM-L20 + RSA-4-T-17.5-N-[finish]-2-2 with base cover	BEACON VIPER	GARDCO PUREFORM	TBD	Parking lot
ZN3-3	20' 3 Head Event Pole	"GFLD Galleon II Floodlight" series, 20' event pole with 3 adjustable heads, medium wide symmetrical round distribution, 800mA drive current, refer to detail sheet for diagram of aiming and for locations of heads on the pole, inlcude occ sensor and photocell, provide 3/4" conduit inside poles for future camera connections	132.0 VA	277 V	0-10V dimming driver to 10%	13317	3000K	90	EXTERIOR	B3-U0-G0	COOPER	#GFLD-SA1-C-930-4-MWR-[MOUNTING]-[FINISH]-DIM + RSA-4-T-20-N-[finish]-[mounting type]-3 with base cover	SELUX OLIVIO MEDIO	LITHONIA D-SERIES	TBD	Auditorum
ZN3-4	20' 4 Head Event Pole	"GFLD Galleon II Floodlight" series, 20' event pole with 4 adjustable heads, medium wide symmetrical round distribution, 800mA drive current, refer to detail sheet for diagram of aiming and for locations of heads on the pole, inlcude occ sensor and photocell, provide 3/4" conduit inside poles for future camera connections	176.0 VA	277 V	0-10V dimming driver to 10%	17756	3000K	90	EXTERIOR	B3-U0-G0	COOPER	#GFLD-SA1-C-930-4-MWR-[MOUNTING]-[FINISH]-DIM + RSA-4-T-20-N-[finish]-[mounting type]-4 with base cover	SELUX OLIVIO MEDIO	LITHONIA D-SERIES	TBD	Auditorum
ZN3-5	20' 5 Head Event Pole	"GFLD Galleon II Floodlight" series, 20' event pole with 5 adjustable heads, medium wide symmetrical round distribution, 800mA drive current, refer to detail sheet for diagram of aiming and for locations of heads on the pole, inlcude occ sensor and photocell, provide 3/4" conduit inside poles for future camera connections	220.0 VA	277 V	0-10V dimming driver to 10%	22195	3000K	90	EXTERIOR	B3-U0-G0	COOPER	#GFLD-SA1-C-930-4-MWR-[MOUNTING]-[FINISH]-DIM + RSA-4-T-20-N-[finish]-[mounting type]-5 with base cover	SELUX OLIVIO MEDIO	LITHONIA D-SERIES	TBD	Auditorum

Include nighttime aiming to confirm aiming per diagrams



POLE WITH CONCRETE PAD N.T.S. 02



POLE WITH RAISED BASE N.T.S. 01

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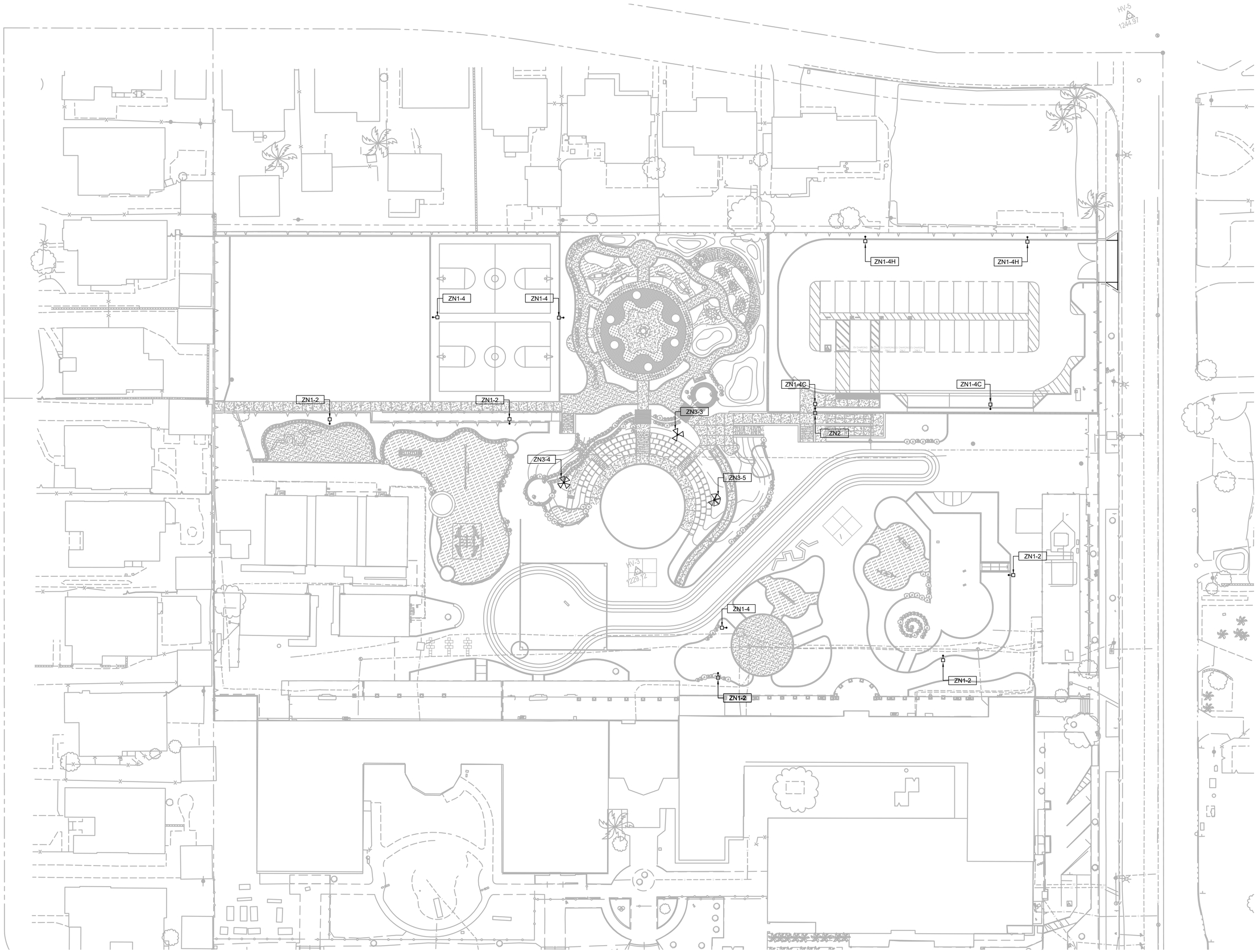
SITE LIGHTING FIXTURE SCHEDULE & DETAILS

E0.30



LIGHTING SITE PLAN 01

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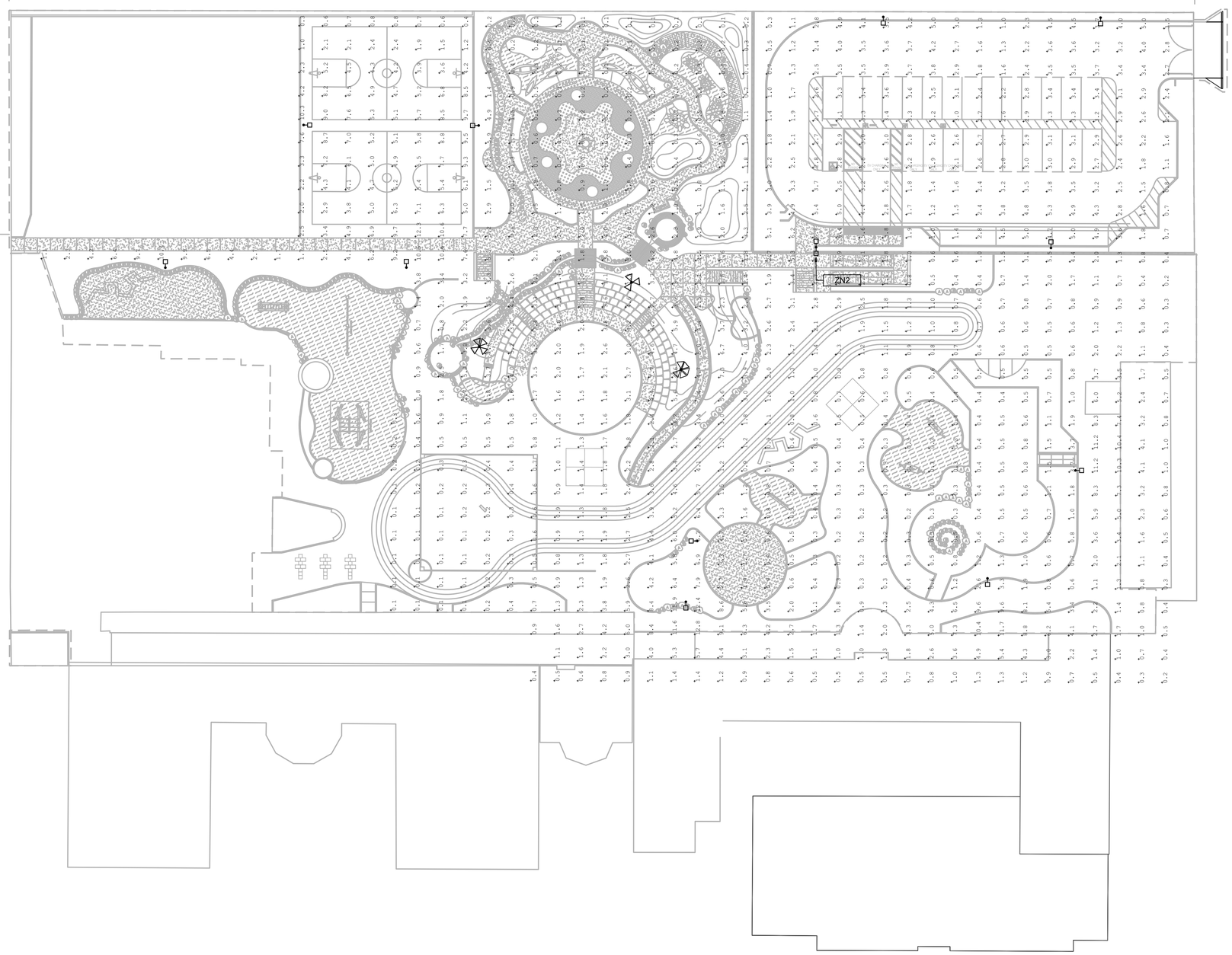
Scale	1" = 20'

LIGHTING SITE PLAN

E1.11



LIGHTING PHOTOMETRIC SITE PLAN 1" = 20' 01

0 10 20 40

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LIGHTING PHOTOMETRIC SITE PLAN

E6.01

EVENT POLE MOUNTING CONFIGURATIONS

FIXTURE TYPE	HEAD	ANGULAR LOCATION	CLOCKWISE FROM HAND HOLE	FIXTURE HEAD MOUNTING HEIGHT
ZN3-3	HEAD 1	D	45°	20'
	HEAD 2	M	180°	18'
	HEAD 3	S	270°	19'
ZN3-4	HEAD 1	D	45°	19'
	HEAD 2	M	180°	18'
	HEAD 3	Q	240°	20'
	HEAD 4	V	315°	18'
ZN3-5	HEAD 1	C	30°	19'
	HEAD 2	G	90°	18'
	HEAD 3	J	135°	18'
	HEAD 4	P	225°	17'
	HEAD 5	V	315°	20'

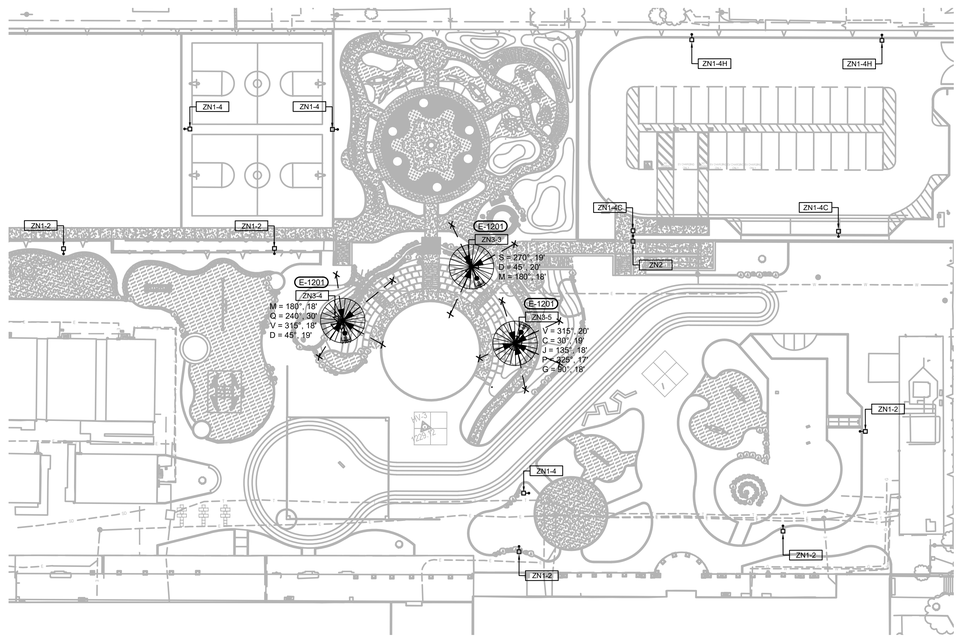
LEGEND

HAND HOLE
(CONTRACTOR TO POSITION POLE SUCH THAT HAND HOLE IS ORIENTED TOWARD DIRECTION OF "HH" SYMBOL ON PLAN.)

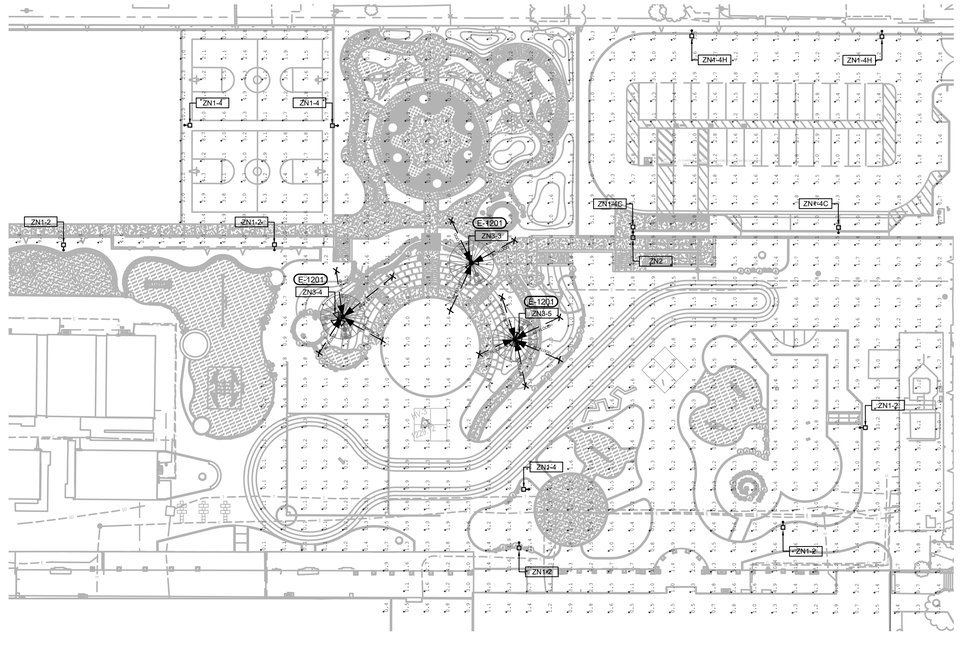
EVENT/LIGHTING FIXTURE HEAD

HAND HOLE

ANGULAR LOCATION OF ARMS FROM HAND HOLE AT 0° PROCEEDING AROUND POLE CLOCKWISE.



EVENT POLE MOUNTING CONFIGURATIONS | 1" = 30' | 07



LIGHTING SITE AIMING DIAGRAM | 1" = 30' | 05

GENERAL NOTES

1. REFER TO LANDSCAPE DRAWINGS FOR EXACT LOCATIONS OF SITE LIGHTING FIXTURES.
2. NOTIFY ARCHITECT AND ENGINEER OF RECORD OF ANY DISCREPANCIES (INCLUDING BUT NOT LIMITED TO FIXTURE LOCATIONS, FIXTURE TYPES, AND MOUNTING CONDITIONS), PRIOR TO FINALIZING FIXTURE ORDER WITH DISTRIBUTOR AND INSTALLING FIXTURE.
3. THE ORIENTATION OF MULT-HEAD EVENT POLE HEADS SHOWN ON PLAN REPRESENT GENERAL POSITIONING/ORIENTATION OF POLES. ONCE THE FIXTURES HAVE BEEN INSTALLED, CONTRACTOR IS TO AIM FIXTURE PER AIMING VECTORS SHOWN ON 07/E9.14.
4. IN ADDITION TO ORIENTING AND AIMING FIXTURES AS SOWN ON PLAN, CONTRACTOR IS TO SCHEDULE AIMING SESSION(S) WITH LIGHTING DESIGNER TO FINALIZE AIMING; REFER TO GENERAL NOTE #19 ON SHEET E0.20 FOR MORE INFORMATION.
5. IN ADDITION TO THE CHARTS AND DIAGRAMS ON THIS SHEET, REFER TO SITE LIGHTING PLAN E1.11, PHOTOMETRIC PLAN E9.12, AND LIGHTING FIXTURE SCHEDULE E0.20 FOR ADDITIONAL INFORMATION ON EVENT POLES, SPECIFICATIONS, AND LOW-VOLTAGE HARDWARE LOCATIONS.
6. PHOTOMETRIC ANALYSIS SHOWN REPRESENTS ILLUMINANCE VALUES, IN FOOT-CANDLES. UNDER NORMAL POWER FOR AREAS THAT ARE REQUIRED TO HAVE EGRESS LIGHTING PER THE CBC.
7. PER THE CBC, EGRESS ILLUMINATION TO AND INCLUDING THE SAFE DISPERSAL AREA(S) SHALL NOT BE LESS THAN 1FC AT ANY POINT, MEASURED ALONG THE PATH OF EGRESS.
8. PER SECTION 5.106.8 OF THE CALIFORNIA GREEN BUILDING CODE, LUMINAIRES WITH LUMEN OUTPUTS OF LESS THAN 6200LM ARE NOT REQUIRED TO COMPLY WITH ALLOWABLE MAXIMUM BUG RATINGS AS SHOWN IN TABLE 5.106.8.

KEYNOTES

(E-1201) AIMING DIAGRAM IS INTENDED TO SHOW DESIGN INTENT FOR EVENT POLE LIGHTS.

EVENT POLE FIXTURE HEADS TO BE PRE-AIMED DURING THE DAY WITH A LASER POINTER. CENTER OF BEAM TO BE FOCUSED ON X. FINAL AIMING TO BE SCHEDULED WITH LIGHTING DESIGNER AT NIGHT PER CONTRACT DOCUMENTS.

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9/30/2027
RENEWAL DATE
STATE OF CALIFORNIA

ALTADENA ELEMENTARY SCHOOL

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Developed for
ALTADENA ELEMENTARY SCHOOL

Revision	Date

Submittal	Date
100% SCHEMATIC DESIGN	12/05/2025
DSA SUBMITTAL	02/02/2026

Job Number	33366
Checked By	AG /SC
Scale	1" = 20'

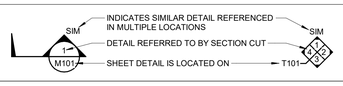
LIGHTING SITE AIMING DIAGRAM AND CONFIGURATION

E9.14

VIEW KEY

NAME — LEVEL NAME
10'-0" — HEIGHT ABOVE PROJECT 0'-0"

1 — KEYNOTE: INDICATES NOTE USED TO DESCRIBE ADDITIONAL INFORMATION ABOUT WORK REQUIRED, SPECIFIC TO THE SHEET AND/OR DETAIL



LINE TYPE AND TAG KEY:

NEW WORK BY THIS CONTRACTOR (WIDE LINE)
——— NEW
- - - - - - - - EXISTING TO BE REMOVED (SHORT DASHED PATTERN)
— — — NEW UNDERFLOOR OR UNDERGROUND (LONG DASHED PATTERN)

EXISTING TO REMAIN OR WORK BY OTHERS (NARROW LINE)
——— EXISTING
- - - - - - - - EXISTING TO BE REMOVED BY OTHERS (SHORT DASHED PATTERN)
— — — EXISTING UNDERFLOOR OR UNDERGROUND (LONG DASHED PATTERN)

HALFTONING DOES NOT MODIFY SCOPE.

'TAG'-E — TAGS WITH DASH 'E' INDICATES THE REFERENCED OBJECT IS EXISTING

TAG-1 — UNDERLINED TAG INDICATES OBJECT IS IN-SCOPE. IF NEW, ADDITIONAL INFORMATION IS AVAILABLE IN A SCHEDULE, MATERIAL LIST, OR SYMBOL LIST

INDICATES AN EXISTING SYSTEM'S POINT OF CONNECTION/REMOVAL

APPLICABLE CODES

CONTRACTOR SHALL COMPLY WITH APPLICABLE CODES AND LOCAL AMENDMENTS INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING:

BUILDING CODE:	CBC 2025 EDITION
FIRE CODE:	IFC 2025 EDITION
PLUMBING CODE:	CPC 2025 EDITION
MECHANICAL CODE:	CMC 2025 EDITION
ELECTRICAL CODE:	NFPA 70 (NEC) 2025 EDITION
LIFE SAFETY CODE:	NFPA 101 2022 EDITION
ENERGY CONSERVATION CODE:	IECC 2022 EDITION
HEALTH DEPARTMENT CODE:	CURRENT EDITION
LOCAL BUILDING CODE:	CURRENT EDITION

CONTRACTOR ABBREVIATION KEY

ABBR:	DESCRIPTION:
A.C.	ASBESTOS ABATEMENT CONTRACTOR
A.V.C.	AUDIO/VISUAL CONTRACTOR
C.C.	CIVIL CONTRACTOR
C.M.	CONSTRUCTION MANAGER
E.C.	ELECTRICAL CONTRACTOR
F.P.C.	FIRE PROTECTION CONTRACTOR
F.S.C.	FOOD SERVICE CONTRACTOR
G.C.	GENERAL CONTRACTOR
H.C.	HEATING CONTRACTOR
M.C.	MECHANICAL CONTRACTOR
N.C.C.	NURSE CALL CONTRACTOR
P.C.	PLUMBING CONTRACTOR
S.C.	SECURITY CONTRACTOR
T.C.	TECHNOLOGY CONTRACTOR
T.C.C.	TEMPERATURE CONTROLS CONTRACTOR
V.C.	VENTILATION CONTRACTOR

CONTACT PERSONS:

DESCRIPTION:	PERSON:
PROJECT MANAGER	KRISTINA NAKAMOTO
ELECTRICAL	MOHAMMAD G. ASSAF
TECHNOLOGY AV	RYAN BETSWORTH

TECHNOLOGY SYMBOL LIST

SYMBOL	TAG	EQUIPMENT LIST ABBREVIATION	DESCRIPTION
R1		AC-R1-W	SECURITY CREDENTIAL READER (WALL) TYPE 1
AMP		AV-AMP-1	AV AMPLIFIER (WALL)
		AV-AMP-3	AV AMPLIFIER (WALL)
A	AN1	AV-AN1-W	AV ANTENNA (WALL)
	AN2	AV-AN2-W	AV ANTENNA (WALL)
M	MP5	AV-MIC-5	AV MICROPHONE (WALL)
	MP6	AV-MIC-6	AV MICROPHONE (WALL)
	MP1	AV-MP1-W	AV MICROPHONE (WALL)
	MP2	AV-MP2-R	AV MICROPHONE (WALL)
	MP3	AV-MP3-C	AV MICROPHONE (WALL)
S	SP1	AV-SP1-C	AV PERFORMANCE SPEAKER (CEILING)
S	SP1	AV-SP1-W	AV PERFORMANCE SPEAKER (WALL)
	SP2	AV-SP2-W	AV PERFORMANCE SPEAKER (WALL)
	SP3	AV-SP3-P	AV PERFORMANCE SPEAKER (WALL)
	SP4	AV-SP4-W	AV PERFORMANCE SPEAKER (WALL)
1	TP2	AV-TP2-W	AV TOUCH PANEL (WALL)
	WP5	AV-WP5-W	AV WALLPLATE/BACKBOX (WALL)
		AV-CM-1-W	CAM-1 SINGLE LENS CAMERA_WALL
C#	C1-WAP	SC-WAP-W	INFORMATION OUTLET (WALL)
RI	RI	SC-RI-W	INFORMATION OUTLET ROUGH-IN (WALL)

PATHWAY SYMBOL LIST:

SYMBOL	DESCRIPTION
DIAMETER ø C	CONDUIT
	CONDUIT DOWN
	CONDUIT UP OR UP/DOWN
	CONDUIT SLEEVE
	CONTINUATION

TECHNOLOGY SYMBOL LIST GENERAL NOTES:

1. UNDERLINED SUBSCRIPTS NEXT TO SYMBOL INDICATES DEVICE TYPE. REFER TO TECHNOLOGY EQUIPMENT SCHEDULE T500 FOR ADDITIONAL INFORMATION.

TECHNOLOGY ABBREVIATION KEY

ABBR:	DESCRIPTION:
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
BFC	BELOW FINISHED CEILING
C	CONDUIT
DE	DELAYED EGRESS
DPDT	DOUBLE POLE DOUBLE THROW
FOV	FIELD OF VIEW
J-BOX	JUNCTION BOX
POE	POWER OVER ETHERNET
PTZ	PAN TILT ZOOM
SIM	SIMILAR
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
+#	MOUNTING HEIGHT ABOVE FINISHED FLOOR
EF-#	ENTRANCE FACILITY
MC-#	MAIN CROSS-CONNECT
TR-#	TELECOMMUNICATIONS ROOM

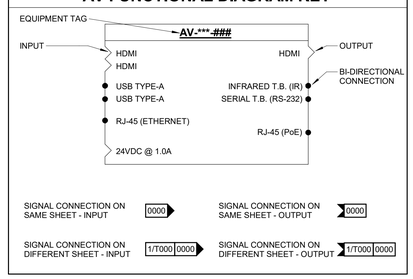
SUGGESTED MATRIX OF RESPONSIBILITY

ITEM:	SHOWN ON:	FURNISHED BY:	INSTALLED BY:	NOTES:
TECHNOLOGY ROUGH-IN, REFER TO TECHNOLOGY EQUIPMENT SCHEDULE AND SPECIFICATIONS FOR DEFINITION	T-SERIES	E.C.	E.C.	3. 4.
INFORMATION OUTLET FACEPLATES, JACKS, AND TERMINATIONS	T-SERIES	T.C.	T.C.	
TELECOMMUNICATION SYSTEMS ROUGH-IN	T-SERIES	E.C. [T.C]	E.C.	1.
TELECOMMUNICATION EQUIPMENT, CABLING, AND TERMINATIONS	T-SERIES	T.C.	T.C.	
GROUNDING LUGS ON TECHNOLOGY EQUIPMENT	T-SERIES	T.C.	E.C.	6.
BONDING SYSTEM FOR TECHNOLOGY SYSTEM, REFER TO SPECIFICATION SECTION 27 05 26 FOR DEFINITION	T-SERIES	E.C.	E.C.	7. 8.
CONNECTION OF TECHNOLOGY BONDING SYSTEM TO THE ELECTRICAL GROUND SYSTEM	T-SERIES	E.C.	E.C.	
LINE VOLTAGE POWER (+120V OR GREATER)	E-SERIES	E.C.	E.C.	
LINE VOLTAGE POWER (NOT SHOWN BUT REQUIRED FOR PROPER INSTALLATION OF SYSTEM)	N/A	T.C.	E.C.	2. 4.
LOW VOLTAGE CABLING FOR TECHNOLOGY SYSTEMS	T-SERIES	T.C.	T.C.	
CABLE HANGERS AND SUPPORTS OR OTHER CABLE ROUTING METHODS (OTHER THAN CONDUIT AND CABLE TRAY)	T-SERIES	T.C.	T.C.	5.
TECHNOLOGY SERVICE ENTRANCE CONDUITS, HANDHOLES, AND MANHOLES	[E]T-SERIES	E.C.	E.C.	

SUGGESTED MATRIX OF RESPONSIBILITY NOTES

Key Name	SUGGESTED MATRIX NOTES
1.	LOCATIONS OF TELECOMMUNICATIONS ROUGH-INS SHALL BE INDICATED BY THE INFORMATION OUTLET SYMBOLS ON THE DRAWINGS. REFER TO THE TECHNOLOGY SYMBOL LIST FOR ADDITIONAL INFORMATION.
2.	BASED ON THE INHERENT DIFFERENCES IN PRODUCTS FROM VARIOUS MANUFACTURERS, ALL REQUIRED EQUIPMENT MAY NOT BE SHOWN ON THE DRAWINGS FOR ALL ACCEPTABLE MANUFACTURERS.
3.	INCLUDES BACKBOXES AND CONDUIT REQUIRED FOR THE TECHNOLOGY SYSTEMS INSTALLATION. THE E.C. SHALL BASE THE BID ON THE BASIS OF DESIGN SHOWN ON THE CONTRACT DOCUMENTS.
4.	ALL CHANGES TO THE SLEEVES, BACKBOXES, CONDUITS, AND POWER REQUIRED BECAUSE OF THE T.C.'S SELECTION OF AN ALTERNATE ACCEPTABLE MANUFACTURER OR FROM SYSTEM CONFIGURATIONS THAT ARE LEFT TO THE CHOICE OF THE CONTRACTOR SHALL BE INCLUDED IN THE T.C.'S BID. THIS BID SHALL INCLUDE INSTALLATION BY A LICENSED ELECTRICIAN.
5.	UNLESS TRADE RULES DICTATE OTHERWISE.
6.	FURNISHED AS PART OF THE EQUIPMENT WHEN POSSIBLE, OR FURNISHED TO THE E.C. FOR INSTALLATION IN THE FIELD.
7.	INCLUDES ALL CONDUCTORS, GROUND BARS, AND TERMINATIONS FOR THE COMPLETE BONDING SYSTEM REQUIRED BY THE SPECIFICATIONS.
8.	REFER TO ELECTRICAL DRAWINGS FOR LOCATIONS OF PANELS AND SWITCHBOARDS SHOWN IN THE TECHNOLOGY BONDING RISER DIAGRAM AND TYPICAL TELECOM ROOM BONDING FLOW DIAGRAM.

AV FUNCTIONAL DIAGRAM KEY



TECHNOLOGY GENERAL NOTES:

1. ##-###-# INDICATES TECHNOLOGY EQUIPMENT SCHEDULE ITEM LABELED AS "EQUIPMENT LIST ABBREVIATION"
2. REFER TO TECHNOLOGY EQUIPMENT SCHEDULE AND SPECIFICATIONS FOR FULL DESCRIPTIONS AND MANUFACTURERS OF ALL DEVICES.

TECHNOLOGY MOUNTING SUBSCRIPT KEY:
- A MOUNT AT +6" TO CENTERLINE ABOVE COUNTER OR BACKSPLASH
- H MOUNT ORIENTED HORIZONTALLY
- L MOUNT IN CASEWORK
- M MOUNT IN MODULAR FURNITURE
- S MOUNT IN SURFACE RACEWAY

A SLASH IS USED BETWEEN TWO SUBSCRIPTS, E.G., A/H.

3. REFER TO THE TECHNOLOGY EQUIPMENT SCHEDULE FOR MORE COMPLETE DESCRIPTION AND ITEMS.

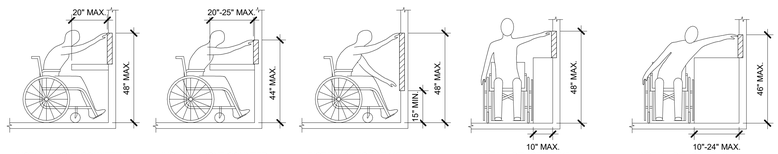
TECHNOLOGY INSTALLATION NOTES:

1. THE COMPLETE INSTALLATION SHALL BE IN ACCORDANCE WITH THE ADA STANDARDS FOR ACCESSIBLE DESIGN. REFER TO THE ADA GUIDELINES FOR ALL CONFIGURATION DETAILS ON THIS PAGE FOR ADDITIONAL INFORMATION.
2. CONCEAL ALL CONDUIT IN WALLS, PARTITIONS, ABOVE CEILING, IN FLOOR SLAB, ETC. UNLESS OTHERWISE INDICATED ON THE PLANS OR IN THE SPECIFICATIONS. CONDUIT IN MECHANICAL ROOMS AND STORAGE ROOMS WITHOUT CEILINGS MAY BE EXPOSED ON BUILDING STRUCTURE.
3. THE CONTRACTOR IS RESPONSIBLE FOR REMOVAL AND REPLACEMENT OF THE CEILINGS, CEILING TILES, AND CEILING GRID ASSOCIATED WITH THE AREAS OF WORK BY ALL CONTRACTORS.
4. EACH CONTRACTOR IS RESPONSIBLE FOR DAMAGE CAUSED BY THEIR ACTIONS TO THE WALLS, FLOORS, CEILINGS, AND ROOFS. THE CONTRACTOR WHOSE WORK CAUSES DAMAGE IS RESPONSIBLE FOR PATCHING TO MATCH ORIGINAL CONSTRUCTION, FIRE RATING, AND FINISH.

TECHNOLOGY OUTSIDE PLANT NOTES

1. THE LOCATION OF THE CONDUIT, HAND HOLES AND/OR MAINTENANCE HOLES SHOWN ARE APPROXIMATE LOCATIONS. FIELD VERIFY THE LOCATION OF ALL UTILITIES PRIVATE AND/OR PUBLIC PRIOR TO THE INSTALLATION OF THE COMPONENT. FIELD COORDINATE THE FINAL LOCATION WITH THE OWNER AND ENGINEER PRIOR TO INSTALLATION.
2. POTHOLING TO LOCATE EXISTING UNDERGROUND UTILITIES, IF APPLICABLE, SHALL BE INCLUDED IN THE CONTRACTOR'S BID. CONTRACTOR IS RESPONSIBLE FOR FINAL PLACEMENT OF HAND HOLES AND/OR MAINTENANCE HOLES AND SHALL NOTIFY THE ENGINEER OF FINAL LOCATIONS PRIOR TO INSTALLATION.
3. HAND HOLES AND/OR MAINTENANCE HOLES SHALL BE CONSTRUCTED SO THAT THE TOP OF THE FRAME WILL BE FLUSH WITH THE GROUND LINE.
4. REMOVAL AND REPLACEMENT OF THE EXISTING UNDERGROUND UTILITIES THAT ARE REQUIRED TO COMPLETE THE INSTALLATION SHALL BE INCLUDED IN THE CONTRACTOR'S BID.
5. CONTRACTOR SHALL INCLUDE IN THEIR BID ANY REMOVAL AND REPLACEMENT OF EXISTING SIDEWALK, PAVEMENT, GRASS, SHRUBS, TREES, ETC. THAT WILL BE IMPACTED BY THE INSTALLATION OF THE NEW CONDUITS SHOWN ON THE DRAWINGS. IF TREES ARE REQUIRED TO BE REMOVED THE CONTRACTOR SHALL CONTACT THE OWNER AND DISCUSS OPTIONS PRIOR TO CUTTING DOWN ANY TREE OR SHRUB OVER 5" IN HEIGHT.
6. NO ADDITIONAL COST SHALL BE APPROVED FOR PLACING CONDUITS DEEPER THAN REQUIRED MINIMUM DEPTH.
7. PROVIDE A MINIMUM OF 25'-0" SLACK LOOP WITHIN EACH HAND HOLES AND/OR MAINTENANCE HOLES. SLACK LOOP SHALL BE SECURE SO COPPER IS NOT RESTING ON EARTH AFTER FINAL INSTALLATION.

TECHNOLOGY SHEET INDEX



ADA STANDARDS FOR ACCESSIBLE DESIGN

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Developed for
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Revision	Date

Submittal	Date
DSA SUBMITTAL	02/02/2026

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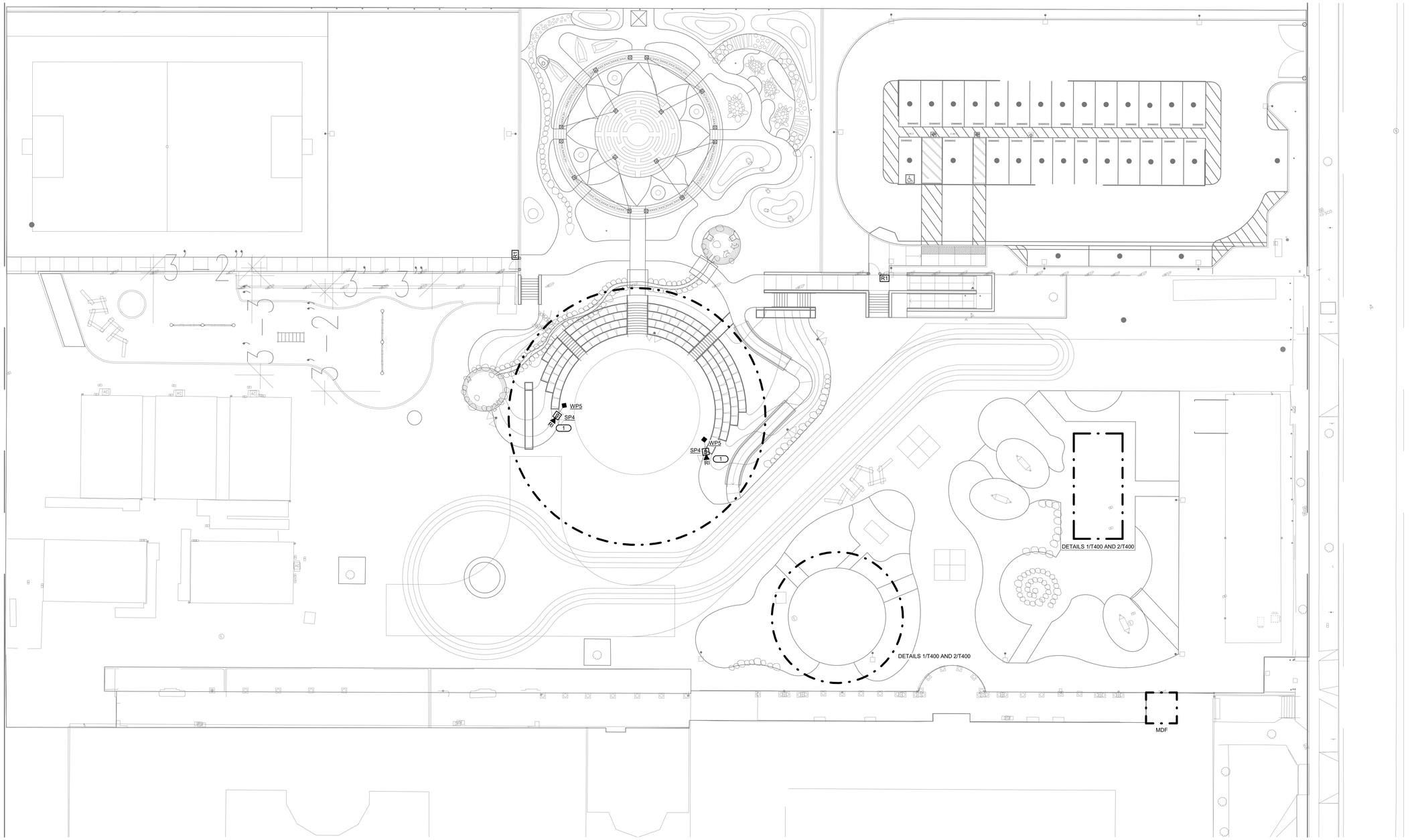
Scale	As indicated

T000

TECHNOLOGY COVERSHEET



1 SITE PLAN - TECHNOLOGY

1/16" = 1'-0"

NORTH

KEYNOTES:

1. CONTRACTOR TO PROVIDE PATHWAY FROM NEAREST TELECOM ROOM TO SITE POLE FOR FUTURE DATA FOR WIRELESS ACCESS POINT AND SECURITY CAMERA.

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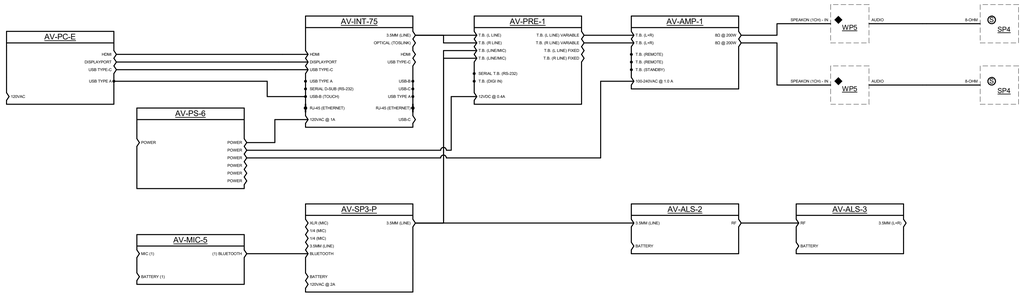
SITE PLAN - TECHNOLOGY

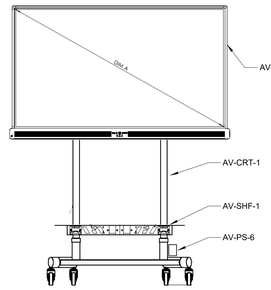


1 PORTABLE INTERACTIVE DISPLAY CART FUNCTIONAL DIAGRAM

NO SCALE

NOTES:

1. ASSEMBLE AV-SP3-P IN A TURNKEY MANNER WITHIN CASE FOR USER VOICE REINFORCEMENT AND INTEGRATE AV-MIC-5.
2. CONFIGURE AV-ALS-2 AND AV-ALS-3 TO A CARRIER FREQUENCY NOT IN CONFLICT WITH SURROUNDING FREQUENCIES AND CONFIRM OPERATION. TURN OVER TO OWNER'S REPRESENTATIVE.



2 PORTABLE INTERACTIVE DISPLAY CART ELEVATION

NO SCALE

NOTES:

1. ROUTE CABLES FROM DISPLAY'S CONNECTIVITY DOWN TO SHELF UTILIZING MOBILE CART'S INTEGRATED CABLE MANAGEMENT. LEAVE 3' OF EACH CABLE AVAILABLE AT THE SHELF FOR CONNECTION TO USER DEVICES. CABLES SHALL BE LONG ENOUGH TO ALLOW DISPLAY TO RAISE TO THE MAXIMUM HEIGHT ALLOWED BY THE CART WITHOUT LIMITATIONS IMPOSED BY CABLE LENGTH.
2. MOUNT POWER STRIP TO CART OR SHELF IN A LOCATION ALLOWABLE BY INTERACTIVE DISPLAY'S POWER CORD; ROUTE POWER CORD FROM DISPLAY TO POWER STRIP UTILIZING MOBILE CART'S INTEGRATED CABLE MANAGEMENT. DISPLAY SHALL BE ABLE TO RAISE TO THE MAXIMUM HEIGHT ALLOWED BY THE CART WITHOUT LIMITATIONS IMPOSED BY CORD LENGTH OR POWER STRIP LOCATION.
3. TOTAL CART ASSEMBLY WEIGHT IS 115.5 LBS. MAXIMUM HEIGHT IS 84.72".

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T400

TECHNOLOGY DETAILS AND DIAGRAMS

TECHNOLOGY EQUIPMENT SCHEDULE

THE EQUIPMENT LIST ABBREVIATIONS AND THE TECHNOLOGY EQUIPMENT SCHEDULE ARE FOR THE CONVENIENCE OF THE CONTRACTOR. EACH CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF QUANTITIES AND SHALL FURNISH ALL MATERIAL REQUIRED, WHETHER SPECIFIED OR NOT, TO PRODUCE A SATISFACTORY WORKING SYSTEM.

CATALOG NUMBERS ARE NOT TO BE CONSIDERED COMPLETE BUT ARE GIVEN ONLY TO AID THE CONTRACTOR IN THE SEARCH FOR MATERIAL. NO MATERIAL SHALL BE ORDERED BY MANUFACTURER AND CATALOG NUMBER ONLY. EACH CONTRACTOR SHALL FIRST READ THE COMPLETE DESCRIPTION OF THE MATERIAL ON THESE DRAWINGS AND SPECIFICATIONS. THE FIRST MANUFACTURER LISTED IS THE BASIS OF DESIGN. "STANDARD COLOR" INDICATES FACTORY FINISH AVAILABLE AT NO ADDITIONAL CHARGE.

EQUIPMENT LIST ABBREVIATION	EQUIPMENT LIST DESCRIPTION	MANUFACTURER AND MODEL
AC-R1-W	CARD READER	VERKADA OWNER PROVIDED CONTRACTOR INSTALLED
AV-ALS-2	PORTABLE WIDE-BAND BODY-PACK ASSISTIVE LISTENING TRANSMITTER, 17 SELECTABLE FREQUENCIES BETWEEN 72MHZ AND 78MHZ, AT 75 KHZ PEAK WITH A FREQUENCY RESPONSE OF 180 HZ TO 13 KHZ. UP TO 30 HRS OPERATION WITH TWO AA ALKALINE BATTERIES, BATTERY RECHARGE ABILITY UTILIZING WILLIAMS SOUND DROP-IN CHARGERS. 3.5 MM MICROPHONE JACK AND 2.5 MM AUXILIARY AUDIO INPUT JACK. MICROPHONE CORD SERVES AS THE TRANSMITTING ANTENNA. THREE BUTTONS ON THE FRONT TO ACCESS CHANNEL SELECT, MASTER AND AUX GAIN, COMPRESSION ON/OFF. CHANNEL LOCK AND SCREEN ADJUSTMENTS, OLED SCREEN ON THE FRONT OF THE TRANSMITTER DISPLAYING CURRENT OPERATING STATUS AND MENU INFORMATION. ABILITY TO OPERATE IN DUAL CHANNEL MODE WHEREBY THE USER CAN SWITCH BETWEEN TWO DIFFERENT TRANSMITTING CHANNEL PRESETS, EACH WITH ITS OWN SET-UP PARAMETERS (CHANNEL, MASTER VOLUME, AUX VOLUME). POWER SWITCH ALSO SERVES AS A MICROPHONE MUTE CONTROL. COMPLIES WITH FCC PART 15 AND COVERED UNDER A LIMITED LIFETIME WARRANTY.	WILLIAMS AV PPA T46
AV-ALS-3	PORTABLE ASSISTIVE LISTENING RECEIVER. RECEIVER SHALL BE BODY-PACK STYLE WITH IMPACT-RESISTANT BLACK PC/ABS PLASTIC HOUSING AND HINGED BATTERY DOOR. UNIT SHALL INCLUDE DETACHABLE BELT CLIP FOR HANDS-FREE OPERATION. PROVIDE 3.5MM STEREO JACK TO ACCOMMODATE STEREO OR MONO LOW IMPEDANCE EARPHONES, HEADPHONES, OR NECKLOOPS. RECEIVER SHALL FEATURE HIGH-RESOLUTION OLED DISPLAY FOR STATUS AND MENU ACCESS, DIGITAL TUNING, DIGITAL SQUELCH, AND BATTERY-SAVING SLEEP/AUTO-OFF MODES. 17 PRESET WIDEBAND CHANNELS (72-76 MHZ) WITH CHANNEL-LOCK CAPABILITY. BATTERY COMPARTMENT SHALL INCLUDE SLIDE SWITCH FOR ALKALINE OR NIMH RECHARGEABLE BATTERY SELECTION. RECEIVER SHALL BE COMPATIBLE WITH WILLIAMS SOUND DROP-IN CHARGERS CHG 3512 AND CHG 3502. PROVIDE MAXIMUM OUTPUT OF 35MW AT 16Ω, AUDIO FREQUENCY RESPONSE 200HZ TO 15KHZ ±3DB, SIGNAL-TO-NOISE RATIO 65DB MINIMUM, AND SENSITIVITY 2µV OR BETTER AT 120DB SINAD. RECEIVER SHALL BE FCC COMPLIANT. PROVIDE ALL ACCESSORIES REQUIRED FOR FULL OPERATION, ONE (1) COMPATIBLE NECK LOOP, AND ONE (1) COMPATIBLE PAOR OF HEADPHONES.	WILLIAMS AV PPA R38
AV-ALS-4	WIRELESS FM ASSISTIVE LISTENING SYSTEM TRANSMITTER WITH 72-76 MHZ OPERATING FREQUENCY, COMPATIBLE WITH WILLIAMS SOUND FM RECEIVERS. FEATURES INCLUDE OLED DISPLAY, INTEGRATED AUDIO INPUT MIXER (XLR, 1/4" TRS, RCA, 3.5MM), USB PORT FOR CONFIGURATION, AND NETWORK CONTROL CAPABILITY. PROVIDES UP TO 1000 FT (300 M) TRANSMISSION RANGE, SELECTABLE CHANNELS, AND DIGITAL COMPANDING FOR HIGH FIDELITY AUDIO. INCLUDE RACK MOUNT KIT, ANTENNA, AND POWER SUPPLY.	WILLIAMS AV FM TS5C D RPK 005
AV-AMP-1	0	EXTRON XPA U 2002
AV-AMP-3	FOUR-CHANNEL NETWORK POWER AMPLIFIER, 4 X 1000 WATTS @ 4/8 OHMS OR 70V/100V DIRECT DRIVE, CLASS D, Q-SYS ECOSYSTEM INTEGRATION, ETHERNET CONTROL AND MONITORING, FLEXIBLE OUTPUT ROUTING, BRIDGEABLE CHANNELS, 20 HZ – 20 KHZ FREQUENCY RESPONSE, <0.05% THD, 8 X 8 GPIO, 1U RACK MOUNT, UNIVERSAL POWER SUPPLY, REAR PANEL INPUT/OUTPUT CONNECTIONS, FAN COOLED, INCLUDES RACK MOUNT KIT. DIMENSIONS: 19" W X 1.75" H X 16.7" D. WEIGHT: 18.7 LBS.	QSC CX-Q 4K4
AV-AN1-W	WIRELESS MIC WALL MOUNT REMOTE ANTENNA WITH MOUNTING BRACKET AND PRE-MADE BNC TO BNC COAX CABLE.	SHURE ANTENNA UA8 BRACKET UA505 CABLE UA825
AV-AN2-W	PROVIDED WITH AV-BT-1	N/A
AV-CAB-2	WALL MOUNTED EQUIPMENT RACK. 12 SPACE (21" HIGH) X 22" DEEP SECTIONAL WALL RACK WITH NO FRONT DOOR, REMOVABLE SIDE PANELS, AND VENTILATED TOP AND BOTTOM PANELS FOR PASSIVE COOLING. RACK SHALL SUPPORT UP TO 200 LBS. OF EQUIPMENT, INCLUDE CABLE MANAGEMENT FEATURES, AND PROVIDE 19" EIA-310-D COMPLIANT RAILS WITH RU MARKERS. FINISH: BLACK POWDER COAT. PROVIDE ALL REQUIRED MOUNTING HARDWARE AND ACCESSORIES FOR COMPLETE INSTALLATION. INSTALL A 12" X 12" SQUARE PULL BOX. PROVIDE 1" EMT CONDUIT PER DEVICE SERVED BY THIS RACK ON PLANS OR UNLESS OTHERWISE NOTED.	MIDDLE ATLANTIC DWR-12-22
AV-CM-1-W	DUAL CAMERA WITH SPEAKER TRACKING AND SWITCHING	CRESTRON IV-CAMHK-12-#-1B
AV-CRT-1	LARGE FORMAT MOBILE CART FOR FLAT-PANEL AND INTERACTIVE DISPLAYS UP TO 98" AND 300 LBS. OPEN MOBILE BASE DESIGN FOR NESTING MULTIPLE CARTS, LOCKING HEAVY-DUTY 4" CASTERS FOR MANEUVERABILITY, AND ADJUSTABLE MOUNTING HEIGHT ALONG T60 POLES. SUPPORTS BOTH PORTRAIT AND LANDSCAPE ORIENTATION. MAXIMUM VESA MOUNTING PATTERN: 200MM X 200MM TO 900MM X 600MM. FINISH: BLACK & SILVER. DIMENSIONS: 44.94" (W) X 84.72" (H) X 28.98" (D). WEIGHT CAPACITY: 300 LBS. PRODUCT WEIGHT: 79 LBS. LIMITED LIFETIME WARRANTY. NOTE: THIS IS A MOBILE CART AND IS NOT WALL MOUNTED. NO BACKBOX OR CONDUIT INSTALLATION REQUIRED.	PREMIER MOUNTS LFC-L
AV-DSP-1	AUDIO, VIDEO, AND CONTROL (AV&C) PROCESSOR, 64 X 64 NETWORKED AUDIO CHANNELS (Q-LAN / AES67), EIGHT ON-BOARD FLEX CHANNELS AND GPIO, 8 X ACOUSTIC ECHO CANCELLATION (AEC) PROCESSORS, UP TO 32 X 32 DANTE AUDIO CHANNELS (8 X 8 INCLUDED), SUPPORTS UP TO THREE Q-SYS NM-T1 TABLETOP MICROPHONES (UP TO SIX WITH COLLABORATION BUNDLE SCALING LICENSE), USB AV BRIDGING (8 X 8 AUDIO + Q-SYS CAMERA SUPPORT), EXTERNAL USB AUDIO DEVICE HOST, SUPPORTS UP TO 2 VOIP SOFTPHONE INSTANCES, FULL FEATURED Q-SYS CONTROL ENGINE, DUAL GIGABIT ETHERNET PORTS, INTERNAL POWER SUPPLY, 1U HALF-WIDTH, INCLUDES MOUNTING HARDWARE. DIMENSIONS: 11.3" L X 8.7" W X 1.7" H. WEIGHT: 4.0 LBS.	Q-SYS CORE 8 FLEX
AV-INT-75	INTERACTIVE FLAT PANEL DISPLAY, 75" DIAGONAL, 4K UHD RESOLUTION, MULTI-TOUCH CAPABILITY, INTEGRATED ANDROID 13 OPS MODULE, WI-FI 6, BLUETOOTH 5.2, USB-C WITH 100W POWER DELIVERY, MULTIPLE HDMI INPUTS, INTEGRATED 2X 18W + 15W SUBWOOFER SOUND SYSTEM, ADVANCED PALM REJECTION, PEN AND TOUCH DIFFERENTIATION, SECURE SIGN-IN, REMOTE MANAGEMENT, INSTANT WHITEBOARD, SCREENSHARE, AND CLOUD CONNECTIVITY. INCLUDES VESA MOUNTING COMPATIBILITY, ENERGY STAR CERTIFIED, SUITABLE FOR EDUCATIONAL AND COLLABORATIVE ENVIRONMENTS. COLOR: BLACK. CONTRACTOR TO PROVIDE MATCHING VESA MOUNT TO INTERFACE WITH MOBILE CART.	PROMETHEAN ACTIVPANEL 10 PREMIUM FOR REFERENCE ONLY COORDINATE WITH OWNER
AV-LED-75	75" UHD FLAT PANEL DISPLAY	LG 75UR640SPUD
AV-MIC-5	WIRELESS BELT-PACK TRANSMITTER DESIGNED TO WORK WITH ANCHOR AUDIO "ANCHORLINK" TECHNOLOGY. 3.5 MM JACK FOR LAVALIER/COLLAR/HEADSET MIC. 1.9 GHZ FREQUENCY BAND. POWERED BY TWO AA BATTERIES. MUTE AND VOLUME CONTROLS. CONTRACTOR TO PROVIDE LM-LINK LAPEL MICROPHONE.	ANCHOR AUDIO WB-LINK

TECHNOLOGY EQUIPMENT SCHEDULE

THE EQUIPMENT LIST ABBREVIATIONS AND THE TECHNOLOGY EQUIPMENT SCHEDULE ARE FOR THE CONVENIENCE OF THE CONTRACTOR. EACH CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF QUANTITIES AND SHALL FURNISH ALL MATERIAL REQUIRED, WHETHER SPECIFIED OR NOT, TO PRODUCE A SATISFACTORY WORKING SYSTEM.

CATALOG NUMBERS ARE NOT TO BE CONSIDERED COMPLETE BUT ARE GIVEN ONLY TO AID THE CONTRACTOR IN THE SEARCH FOR MATERIAL. NO MATERIAL SHALL BE ORDERED BY MANUFACTURER AND CATALOG NUMBER ONLY. EACH CONTRACTOR SHALL FIRST READ THE COMPLETE DESCRIPTION OF THE MATERIAL ON THESE DRAWINGS AND SPECIFICATIONS. THE FIRST MANUFACTURER LISTED IS THE BASIS OF DESIGN. "STANDARD COLOR" INDICATES FACTORY FINISH AVAILABLE AT NO ADDITIONAL CHARGE.

EQUIPMENT LIST ABBREVIATION	EQUIPMENT LIST DESCRIPTION	MANUFACTURER AND MODEL
AV-MIC-6	DUAL WIRELESS MICROPHONE SYSTEM WITH DANTE, 1 RACK UNIT, INCLUDES BODY PACK, LAVALIER MICROPHONE, INCLUDES HANDHELD MICROPHONE TRANSMITTER. INCLUDES DUAL PORT CHARGING STATION.	SHURE ULXD4D-GV DANTE DUAL RECEIVER ULXD1 BODY PACK W MX150 LAVALIER ULXD2/SM58 HANDHELD TRANSMITTER SBC200 DOCKING STATION
AV-MNT-1	AV BACK BOX AND LED DISPLAY MOUNT WITH X-ARM AND CRESTRON FLEX PLATE	RP VISUAL WALLMATE 32B
AV-MNT-2	AV BACK BOX AND LED DISPLAY MOUNT WITH X-ARM	RP VISUAL WALLMATE 32B
AV-MP1-W	XLR 3-PIN FEMALE CONNECTOR, MOUNTED ON 2RU RACK BLANK.	NEUTRIK D SERIES
AV-MP2-R	DUAL WIRELESS MICROPHONE SYSTEM WITH DANTE, 1 RACK UNIT, INCLUDES BODY PACK, LAVALIER MICROPHONE, INCLUDES HANDHELD MICROPHONE TRANSMITTER. INCLUDES DUAL PORT CHARGING STATION.	SHURE ULXD4D-GV DANTE DUAL RECEIVER ULXD1 BODY PACK W MX150 LAVALIER ULXD2/SM58 HANDHELD TRANSMITTER SBC200 DOCKING STATION
AV-MP3-C	OVERHEAD MINI MICROPHONE, ELECTRET CONDENSER, INTERCHANGEABLE CARTRIDGES,RF FILTERING, FREQUENCY RESPONSE 50-1000HZ, PHANTON POWER 11-52VDC 2.0MA, PROVIDE BLACK IN COLOR WITH CARDIOID CARTRIDGE.	SHURE MX200
AV-NS-1	MANAGED NETWORK SWITCH. 12-PORT GIGABIT ETHERNET L2+/L3 LITE MANAGED SWITCH WITH 8 POE+ PORTS (UP TO 240W TOTAL POWER BUDGET), 2 COMBO SFP COPPER/FIBER PORTS, AND 2 DEDICATED SFP PORTS. SUPPORTS ADVANCED NETWORKING FEATURES INCLUDING VLAN, QOS, IGMP SNOOPING, STATIC ROUTING, AND SECURITY MANAGEMENT. INCLUDES WEB-BASED GUI, CLI, AND SNMP MANAGEMENT OPTIONS. PROVIDE ALL REQUIRED MOUNTING HARDWARE, POWER CORD, AND ACCESSORIES FOR RACK OR WALL INSTALLATION. DO NOT CONNECT TO SCHOOL LAN.	NETGEAR GSM4212P
AV-PC-E	USERS' BRING-YOUR-OWN-DEVICE (BYOD) COMPUTER; PROVIDED BY OTHERS	*
AV-PRE-1	0	EXTRON MVC 121xi
AV-PS-6	SURGE PROTECTOR, 6 NEMA 5-15R OUTLETS WITH LOCKING SAFETY COVERS, 15 FT. NEMA 5-15P POWER CORD, 120V AC, 15A, 1620 JOULES SURGE SUPPRESSION, ALL-METAL HOUSING, INTEGRATED LED INDICATOR, SWITCHLESS DESIGN, RESETTABLE 15A CIRCUIT BREAKER, MOUNTING FLANGES INCLUDED.	EATON UL24CB-15
AV-SHF-1	LARGE SHELF ACCESSORY COMPATIBLE WITH PREMIER MOUNTS CART PRODUCTS, PROVIDES A STABLE PLATFORM FOR AV EQUIPMENT SUCH AS LAPTOPS OR DOCUMENT CAMERAS, ADJUSTABLE HEIGHT, BLACK FINISH, MAXIMUM WEIGHT CAPACITY 50 LBS, SHELF DIMENSIONS: 39.82" W X 17.5" D.	PREMIER MOUNTS PSD-SHLFXL
AV-SP1-C	PERFORMANCE AUDIO SPEAKER, CEILING MOUNTED, RECESSED, SOUND REINFORCEMENT, HEMISPHERICAL DISPERSION, FULL RANGE TYPE WITH BASS REFLEX ENCLOSURE, 60 WATT (16 OHMS) AND 120 WATT (8 OHMS) CONTINUOUS POWER HANDLING, SENSITIVITY: 90dB SPL @1W/1M, 70Hz-20kHz FREQUENCY RESPONSE. PRODUCTS TO BE CONSIDERED FOR PRE-APPROVAL MUST BE SUBMITTED WITH A POLAR FREQUENCY RESPONSE CURVE AT 500, 1000, 2000, 4000 AND 8000 Hz, AS WELL AS A FREQUENCY RESPONSE CURVE.	JBL CONTROL 45
AV-SP1-W	PRO AUDIO SPEAKER: INDOOR/OUTDOOR, 10" WOOFER, 2414H-C COMPRESSION DRIVER, 100°X100° COVERAGE, 250W @8Ω, 60W 70V/100V MULTI TAP TRANSFORMER. INVISIBALL MOUNTING HARDWARE INCLUDED, DIMENSIONS 23.3"H X 14.6"W X 13.5"D, WEIGHT 41.5LBS.	JBL CONTROL 31
AV-SP2-W	PRO AUDIO SPEAKER: INDOOR/OUTDOOR, TWO-WAY 8" WOOFER, 1" PEI TWEETER, 100°X100° COVERAGE, 120W @8Ω, 60W 70V/100V MULTI TAP TRANSFORMER. INVISIBALL MOUNTING HARDWARE INCLUDED, DIMENSIONS 15.2"H X 11.1"W X 8.6"D, WEIGHT 15LBS.	JBL CONTROL 28-1
AV-SP3-P	PORTABLE PERSONAL PA SYSTEM DESIGNED FOR SPEECH AND SMALL AUDIENCE USE. BUILT-IN DUAL WIRELESS MICROPHONE RECEIVER (1.9 GHZ WIRELESS FREQUENCY). 4.5" WOOFER, 30 W RATED POWER OUTPUT (AC/DC), AND MAXIMUM SPL OF ~100 DB AT 1 M. FREQUENCY RESPONSE 100 HZ TO 15 KHZ ±3DB. AC INPUT (100-240 V, 50/60HZ). MIC/LINE INPUTS: ¼" INPUT, 3.5 MM AUX INPUT (AND SEPARATE AUX MIC INPUT), 3.5MM AUX OUTPUT. CONTRACTOR TO PROVIDE RC-30 BATTERY RECHARGE KIT AND SOFT-MINI CARRY BAG.	ANCHOR AUDIO AN-MINI-U2BT
AV-SP4-W	LOUDSPEAKER, PASSIVE COLUMN ARRAY, WEATHER RESISTANT, 8 X 3" NEODYMIUM FULL-RANGE DRIVERS. PASSIVE UNIBEAM TECHNOLOGY. 70V/100V TRANSFORMER WITH MULTIPLE TAPS (8W, 15W, 30W, 60W). 30W POWER HANDLING (EN54-24). 114 DB PEAK SPL, 120° HORIZONTAL DISPERSION, 30° ASYMMETRICAL VERTICAL DISPERSION, IP64 RATED, EXTRUDED ALUMINUM ENCLOSURE, PERFORATED ALUMINUM GRILLE, BLACK OR WHITE FINISH, INCLUDES SURFACE-MOUNT PAN BRACKET. DIMENSIONS: 4-3/8" W X 17-1/8" H X 4-3/4" D. WEIGHT: 10.2 LBS. INSTALL A 4" SQUARE BACKBOX WITH A SINGLE GANG ROUGH-IN. INSTALL A 1" EMT CONDUIT TO COMMUNICATIONS CLOSET DATA D110.	RENKUS- HEINZ UBX8 W-WALL-UBX-PT
AV-TP2-W	IOS-BASED TABLET COMPUTER WITH MULTI-TOUCH DISPLAY, WI-FI CONNECTIVITY, MINIMUM 10.2" RETINA DISPLAY, BASE GB STORAGE, FRONT AND REAR CAMERAS, BUILT-IN MICROPHONE AND SPEAKERS, BLUETOOTH, AND USB-C CONNECTOR. PROVIDE WITH POWER ADAPTER, CHARGING CABLE, AND REQUIRED ACCESSORIES. CONFIGURE FOR ENTERPRISE USE AS REQUIRED. COLOR: STANDARD APPLE FINISH (SILVER, SPACE GRAY, OR AS SPECIFIED). Q-SYS CONTROL APP, SOFTWARE APPLICATION FOR APPLE IPAD OR ANDROID TABLET, PROVIDES CUSTOMIZABLE USER INTERFACE FOR CONTROL OF Q-SYS ECOSYSTEM DEVICES INCLUDING AUDIO, VIDEO, AND CONTROL SYSTEMS. ENABLES TOUCHSCREEN CONTROL OF PRESETS, VOLUME, SOURCE SELECTION, ROOM COMBINING, AND OTHER SYSTEM FUNCTIONS. SUPPORTS SECURE NETWORK COMMUNICATION WITH Q-SYS CORE PROCESSORS. PROVIDE ALL REQUIRED LICENSING, CONFIGURATION, AND INTEGRATION SERVICES. INSTALL ON OWNER-PROVIDED OR CONTRACTOR-PROVIDED TABLET AS SPECIFIED.	APPLE IPAD 11"; IOS VER.26 OR LATER Q-SYS Q-SYS CONTROL APP (iOS)
AV-UCE-2	INTEGRATOR SERIES UC BRACKET ASSEMBLY WITH UC ENGINE AND UCPR EXTENDER	CRESTRON UC-CX100-T
AV-UCPR-1	UC PRESENTATION RECEIVER	CRESTRON UC-PR
AV-WP5-W	SINGLE WALLPLATE WITH NL2MP SPEAKON JACK IN WEATHER RESISTANT BOX	NEUTRIK #102L
AV-WPD-1	WIRELESS PRESENTATION DEVICE AND DONGLE	CRESTRON AM-3200 AM-TX3-100ATE 16B
SC-RI-W	TECHNOLOGY ROUGH-IN FOR FUTURE USE	N/A
SC-WAP-W	INFORMATION OUTLET, POLE MOUNT, 2-PORT, NO COVERPLATE. CABLES SHALL BE TERMINATED WITH MALE PLUG ASSEMBLY. INTENDED TO PROVIDE CONNECTIVITY FOR FUTURE WIRELESS ACCESS POINT.	LEGRAND FACEPLATE: N/A MALE PLUG: CAT6A

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ALTADENA ELEMENTARY SCHOOL
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Developed for
ALTADENA ELEMENTARY SCHOOL

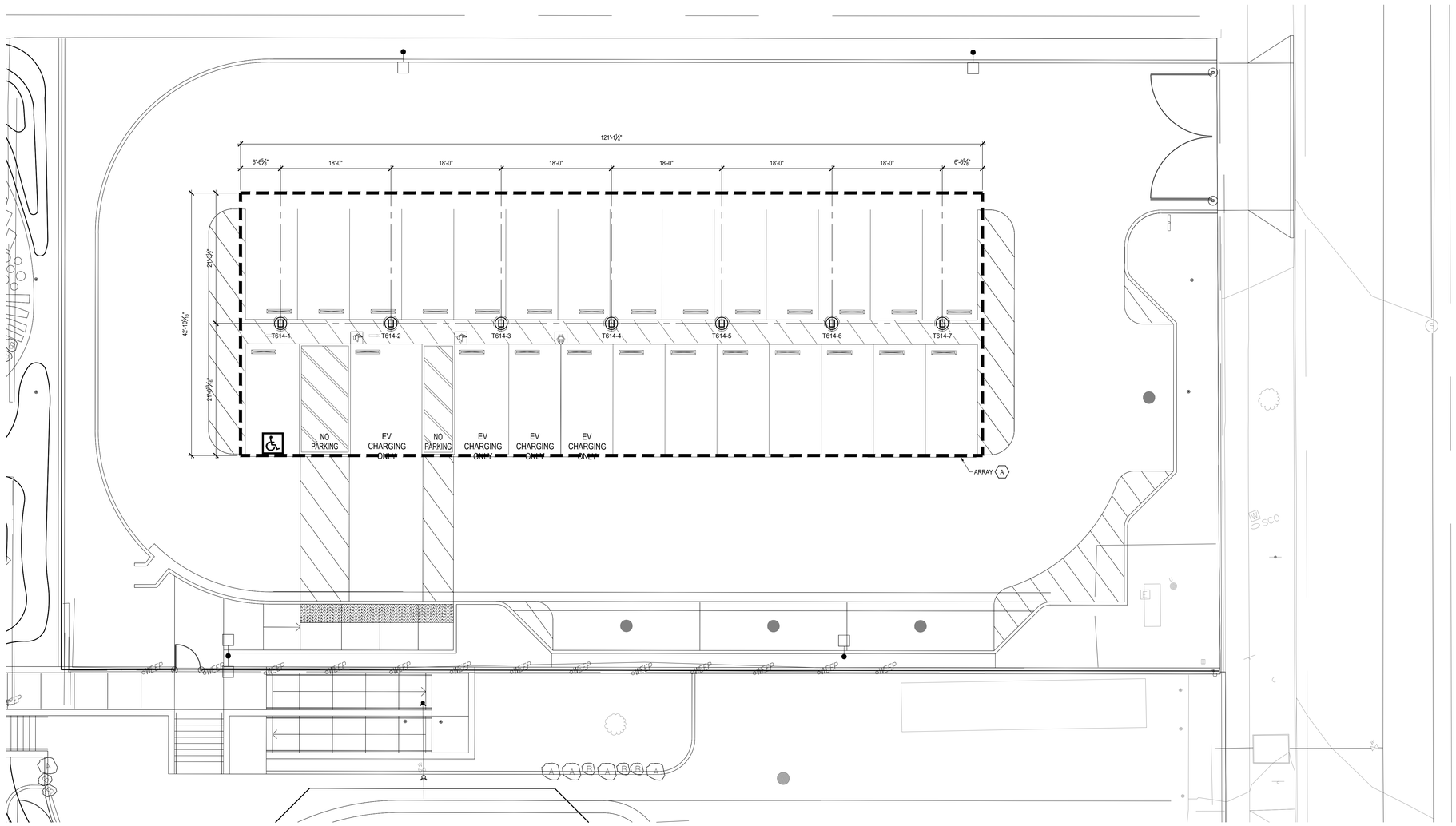
Revision Date

Submittal Date
DSA SUBMITTAL 02/02/2026

Job Number	33366
Checked By	Checker
Scale	

T500

TECHNOLOGY SCHEDULES



1 - **COLUMN PLAN**

1/8" = 1'-0"

NORTH

LEGEND

(N) PHOTOVOLTAIC ARRAY OUTLINES

(C) INDICATES COLUMN WITH NON-STRUCTURAL CONCRETE BOLLARD.

GENERAL NOTES

REFERS TO ULTIMATE GUARDIAN 22.6.1 PC: A# PROJECT A# 04-123955

G1. CONTRACTOR TO DEMO (E) LIGHT POLES AND LIGHT FIXTURES AS REQUIRED.

G2. SEE SHEET S-20 FOR TYPICAL CONDUIT ROUTING.

G3. SEE DETAIL 3/S-20 FOR TYPICAL CONDUIT MOUNTING.

G4. SEE DETAIL 4/S-20 OR 5/S-20 FOR TYPICAL ELECTRICAL BOX MOUNTING.

G5. ALL DIMENSIONS ON THIS SHEET ARE PROJECTED FLAT.

G6. MIN. 4,000 psi CONCRETE WITH TYPE II CEMENT.

G7. SOILS CLASS PER SITE SPECIFIC STRUCTURAL SHEET(S).

G8. DIMENSION INCLUDES 1.5" EXTRA LENGTH ON EACH END OF EACH ARRAY.

G9. CONTRACTOR TO DEMO EXISTING BUSHES AND TREES AS REQUIRED.

G10. MIN (1) STAR WASHER IN CONFORMANCE WITH ASME B18.21.1 EACH END OF EACH PURLIN.

G11. GEOTECHNICAL REPORT # 25-3846 DATED JANUARY 22, 2026 PROVIDED BY KOURY ENGINEERING AND ADDENDUM LETTER DATED MARCH 10, 2026

KEY NOTES

1 SEE SHEET PV-2 FOR CANOPY DETAILS

2 DEEPENED FOUNDATION PER 6/S-21.

SEISMIC CRITERIA

SHORT SPECTRAL RESPONSE:	S_S = 2.19 g
LONG SPECTRAL RESPONSE:	S_1 = 0.73 g
SHORT SPECTRAL RESPONSE:	S_{DS} = 1.56 g
LONG SPECTRAL RESPONSE:	S_{D1} = 0.96 g
SEISMIC DESIGN CATEGORY:	D
SITE CLASS:	CD
ROOF SNOW LOAD:	0 PSF

DESIGN WIND SPEED

BASIC WIND SPEED = 110 mph
V_{ASD} = 85 MPH
WIND EXPOSURE = C

CONCRETE INSPECTION

PER SECTION 1705A.3.3.2 - BATCH PLANT INSPECTION NOT REQUIRED WITH FOLLOWING REQUIREMENTS:

1. AN APPROVED AGENCY SHALL CHECK THE FIRST BATCH AT THE START OF THE DAY TO VERIFY MATERIALS AND PROPORTIONS CONFORM TO THE APPROVED MIX DESIGN.
2. A LICENSED WEIGHMASTER SHALL POSITIVELY IDENTIFY QUANTITY OF MATERIALS AND CERTIFY EACH LOAD BY A BATCH TICKET.
3. BATCH TICKETS, INCLUDING MATERIAL QUANTITIES AND WEIGHTS SHALL ACCOMPANY THE LOAD, SHALL BE TRANSMITTED TO THE INSPECTOR OF RECORD BY THE TRUCK DRIVER WITH LOAD IDENTIFIED THEREON. THE LOAD SHALL NOT BE PLACED WITHOUT A BATCH TICKET IDENTIFYING THE MIX. THE INSPECTOR OF RECORD SHALL KEEP A DAILY RECORD OF PLACEMENTS, IDENTIFYING
EACH TRUCK, ITS LOAD, AND TIME OF RECEIPT AT THE JOBSITE, AND APPROXIMATE LOCATION
4. OF DEPOSIT IN THE STRUCTURE AND SHALL MAINTAIN A COPY OF THE DAILY RECORD AS REQUIRED BY THE ENFORCEMENT AGENCY.

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ALTADENA ELEMENTARY SCHOOL

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Developed for
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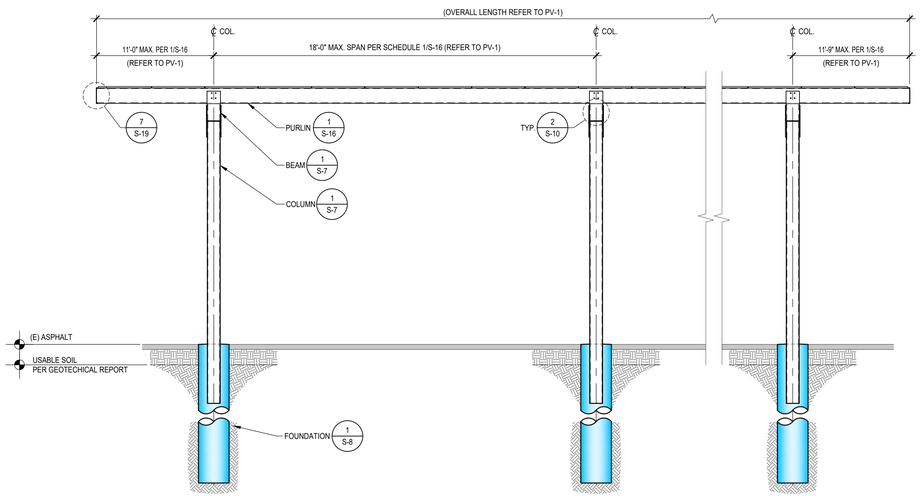
Revision	Date

Submittal	Date
DSA SUBMITTAL	02/02/2026

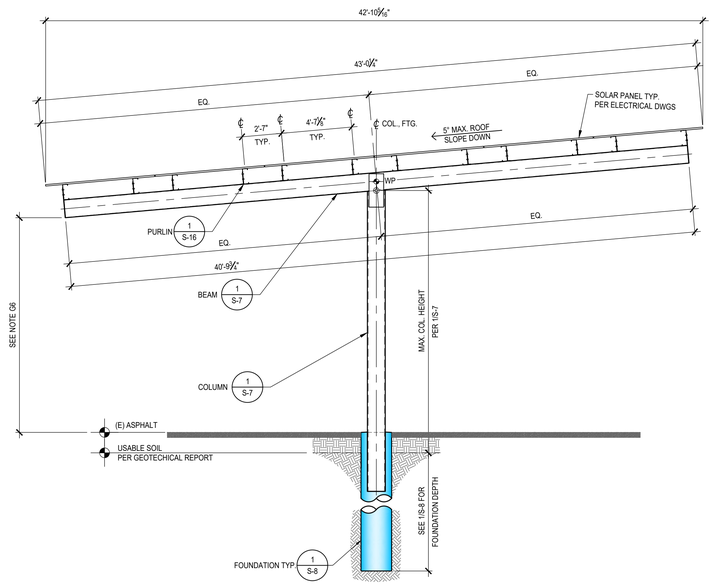
Job Number	26-1010
Checked By	MDS
Scale	AS NOTED

COLUMN PLAN

PV-1



3 - T-STRUCTURE TYPICAL SIDE ELEVATION SIMPLE-SPAN 1/4" = 1'-0"



2 - T-STRUCTURE END ELEVATION SIMPLE-SPAN 1/4" = 1'-0"

GENERAL NOTES

REFERS TO ULTIMATE GUARDIAN 22.6.1 PC; A# PROJECT A# 04-123955

G1. FOR DETAILS, REFER TO 1 S-6, 2 S-6, 3 S-6

G2. NOT USED.

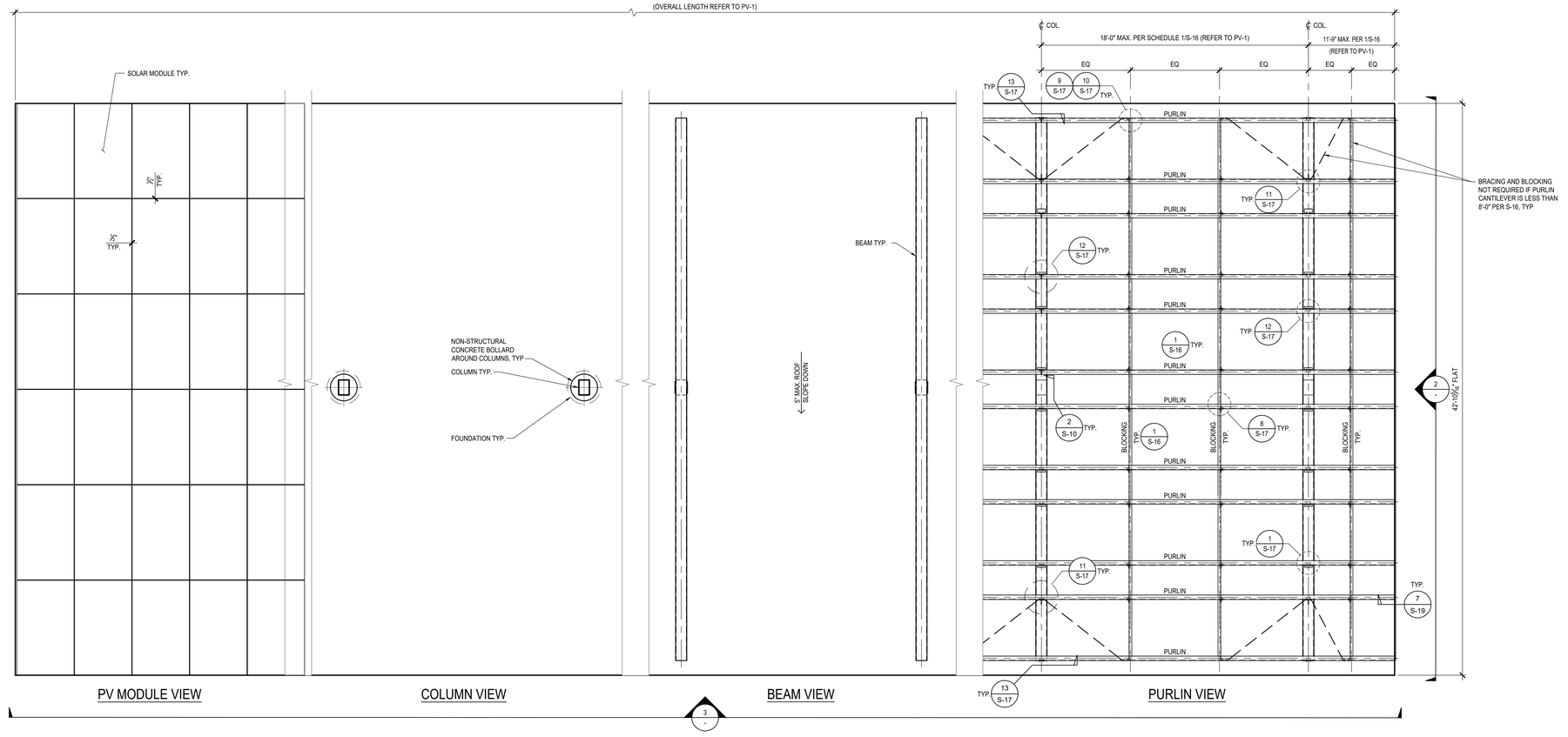
G3. T-STRUCTURE SOILS CLASS W PER SCHEDULE ON S-3.

G4. STEEL SHALL BE ORDERED AND INSTALLED BASED ON THE SLOPED DIMENSIONS, NOT THE FLAT DIMENSIONS.

G5. SOLAR PANEL ATTACHMENT PER DETAILS ON SHEET S-18.

G6. STRUCTURES SHALL BE CONSTRUCTED TO 14'-0" MIN. CLR.

G7. ASSUMED TOLERANCE FOR PURLIN SLOPE: = 6"/30'
GEOTECHNICAL REPORT DIFFERENTIAL SETTLEMENT = 1"/30'
RESULTING SITE ALLOWABLE PURLIN SLOPE: = 5"/30'
BOLT HOLES IN PURLIN SHALL BE 1/8" OVERSIZED PER STEEL NOTE #24 ON SHEET S-3.



1 - T-STRUCTURE FRAMING PLAN SIMPLE-SPAN 1/4" = 1'-0"

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6 PANEL
T-STRUCTURE
SIMPLE-SPAN
SITE SPECIFIC

PV-2

ULTIMATE GUARDIAN 22.6.1 - HIGH WIND & HIGH SEISMIC

PHOTOVOLTAIC SUPPORT STRUCTURES

THE ULTIMATE GUARDIAN IS THE SUPREME SOLAR PC ON THE MARKET WITH OVER 15,000,000 COMBINATIONS & CALCULATIONS RUN!

PC OWNERSHIP

4 STEL ENGINEERING

26030 ACERO
MISSION VIEJO, CA 92691

PHONE: (949) 305-1150
FAX: (949) 305-1420

STRUCTURAL ENGINEER OF RECORD:
DUSTIN K. ROSEPINK, S5885

POINT OF CONTACT:
GARY MILLS, DIRECTOR OF ENGINEERING

M BAR C CONSTRUCTION INC.

1770 LA COSTA MEADOWS DR.
SAN MARCOS, CA 92078

LIC # 869960
B AND C51

POINT OF CONTACT:
ERIK KRIVOKOPICH

PHONE: (760) 744-4131
FAX: (760) 744-4449

STANDARD NOTES FOR PC USE

- 4 S.T.E.L. ENGINEERING, INC. SHALL ALWAYS BE GIVEN THE OPPORTUNITY TO BID THE DSA SUBMITTAL PACKAGE (I.E. TO ACT AS THE DESIGN PROFESSIONAL IN GENERAL RESPONSIBLE CHARGE).
- 4 S.T.E.L. ENGINEERING, INC. SHALL ALWAYS BE THE SEOR FOR ALL PROJECTS UTILIZING THE PC, NO OTHER FIRM IS ALLOWED TO PERFORM THIS SERVICE WITH THIS PC.
- M BAR C CONSTRUCTION, INC. SHALL ALWAYS BE THE STEEL CONTRACTOR FOR THE STEEL CANOPIES (PURLINS, BEAMS, COLUMNS, FOUNDATIONS, AND ASSOCIATED CONNECTIONS). NO OTHER CONTRACTOR IS ALLOWED TO PERFORM THIS SCOPE OF WORK WITH THIS PC.
- FOR CONSTRUCTION COST INFORMATION, CONTACT M BAR C CONSTRUCTION, INC.
- CUSTOM SIZES AND LOADING REQUIRE SUPPLEMENTARY SHOP DRAWINGS AND CALCULATIONS.

LEGAL NOTES

- USE OF PC WITHOUT WRITTEN CONSENT FROM 4 S.T.E.L. ENGINEERING, INC. AND/OR M BAR C CONSTRUCTION, INC. IS STRICTLY PROHIBITED.
- ALL INFORMATION HEREIN IS PROPRIETARY INFORMATION AND UNDER THE OWNERSHIP OF 4 S.T.E.L. ENGINEERING, INC & M BAR C CONSTRUCTION, INC.
- ALL INFORMATION COPYRIGHT 2009, 2011 & 2014.

DESIGN PARAMETER CHECK LIST

1. REFER TO SHEET S-2 FOR 'DESIGN CHECK LIST' AND 'SITE SPECIFIC PARAMETERS'.
2. WHEN A SITE-SPECIFIC PROJECT IS LOCATED IN A FLOOD ZONE OTHER THAN ZONE X, A LETTER STAMPED FROM A GEOTECHNICAL ENGINEER IS REQUIRED IS NEEDED TO VALIDATE THE ALLOWABLE SOIL VALUES SPECIFIED IN THE PC DRAWINGS ARE STILL APPLICABLE. UNLESS THE BOTTOMS OF FOUNDATIONS ARE RAISED ABOVE THE DESIGN FLOOD ELEVATION, A VALIDATION LETTER FROM THE GEOTECHNICAL ENGINEER SHALL BE PROVIDED, EVEN IF THE PRESUMPTIVE LOAD BEARING VALUES PER CBC SECTION 1806A.2 ARE USED.
   EXCEPTION: WHEN A SITE-SPECIFIC PROJECT IS LOCATED IN A FLOOD ZONE D (UNDEFINED) AND THE APPLICANT PROVIDES EVIDENCE FROM THE LOCAL JURISDICTION OR A QUALIFIED DESIGN PROFESSIONAL CONFIRMING THE SITE IS NOT IN A FLOOD HAZARD ZONE.
3. WET STAMPED & SIGNED COPIES OF PC PLANS ARE NOT REQUIRED FOR SITE SPECIFIC PC USE.
4. CHANGES TO PC DOCUMENTS ARE GOVERNED BY DSA PL 07-02, SECTION 5. INCONSEQUENTIAL CHANGES MAY BE MADE TO THE EXTENT THAT THEY CAN BE REVIEWED WITHIN THE TWO-HOUR OTC TIME FRAME. CHANGES TO CODE-REGULATED ASPECTS TO PC DOCUMENTS ARE NOT PERMITTED AND SHALL BE SUBMITTED AND REVIEWED THROUGH THE REGULAR PLAN REVIEW PROCESS.
5. THE SITE SPECIFIC DESIGN PROFESSIONAL IN GENERAL RESPONSIBLE CHARGE IS RESPONSIBLE FOR ENSURING ALL INFORMATION SHOWN IN THE DESIGN PARAMETER CHECKLIST ARE MET AND PROVIDED AT THE TIME OF DSA SUBMITTAL.
6. THE SITE SPECIFIC DESIGN PROFESSIONAL IS RESPONSIBLE FOR OBTAINING A STATEMENT FROM THE PC DESIGN PROFESSIONAL REGARDING THE SOLAR PANEL ADEQUACY. SEE NOTES 12 AND 13 OF THE SOLAR PANEL AND SOLAR PANEL CONNECTION NOTES ON S-3 FOR INFORMATION REGARDING OBTAINING THIS STATEMENT.
7. THE SITE SPECIFIC DESIGN PROFESSIONAL IN GENERAL RESPONSIBLE CHARGE IS RESPONSIBLE FOR ENSURING 4 S.T.E.L. ENGINEERING, INC. HAS BEEN PROPERLY CONTRACTED TO PERFORM THE ROLE AS SEOR. NO OTHER FIRM SHALL PERFORM THE SEOR ROLE. 4 S.T.E.L. ENGINEERING, INC./DUSTIN ROSEPINK SHALL ONLY ACT AS THE SEOR IF PROPERLY CONTRACTED.
8. 4 S.T.E.L. ENGINEERING, INC./DUSTIN ROSEPINK WILL NOT SIGN ANY DSA FORMS (I.E. DSA-5, DSA-6, ETC.), REVIEW OR APPROVE ANY SUBMITTALS (I.E. GEOTECHNICAL REPORTS, CONCRETE MIX DESIGNS, SHOP DRAWINGS, ETC.) FOR THE SITE SPECIFIC PROJECT UNLESS HE IS ACTING AS THE DESIGN PROFESSIONAL IN GENERAL RESPONSIBLE CHARGE OR THE SITE SPECIFIC STRUCTURAL ENGINEER OF RECORD PER NOTE 3 ABOVE.

SHEET INDEX

30 SHEETS

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 03-125900 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 03/18/2026

4 STEL ENGINEERING
26030 ACERO
MISSION VIEJO, CA 92691
949.305.1150 | FAX 949.305.1420

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ERIK@MBARCONLINE.COM
LIC # 869960
B AND CS1
(775) 787-8845

ENGINEER'S APPROVAL

REGISTERED PROFESSIONAL ENGINEER
DUSTIN K. ROSEPINK
S 5885
STATE OF CALIFORNIA

BID INFORMATION

THE STRUCTURES AND DESIGNS IN THIS PC ARE PROPRIETARY TO M BAR C CONSTRUCTION, INC. AND 4 S.T.E.L. ENGINEERING, INC. ALL SITES USING THIS PC: M BAR C CONSTRUCTION, INC. SHALL BE THE STEEL CONTRACTOR & 4 S.T.E.L. ENGINEERING, INC. SHALL BE THE SEOR. SEE THE STANDARD NOTES FOR PC USE ON S-1 FOR ADDITIONAL REQUIREMENTS.

PRE-CHECK (PC) DOCUMENT

CODE: 2022 CBC

A SEPARATE PROJECT APPLICATION FOR CONSTRUCTION IS REQUIRED

APPROVED
DIV. OF THE STATE ARCHITECT
APP: 04-123955 PC
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑ CG ☐
DATE: 10/14/2024

SITE SPECIFIC INFORMATION

ALTADENA ELEMENTARY SCHOOL
743 E CALAVERAS ST.
ALTADENA, CA 91001

REVISIONS

MARK	DATE	DESCRIPTION

4 STEL JOB #	MC02-V3-6
DATE	10-03-24
DRAWN BY	GM
CHECKED	RWS

UG 22.6.1

COVER SHEET 1

S-1

NOTE: IF DWG. IS NOT 24 x 36, IT IS NOT FULL SIZE

DESIGN CHECK LIST

INSTRUCTIONS:
DESIGN PROFESSIONAL SHALL ENSURE ADEQUACY OF PC DESIGN AND PLAN PREPARATION BY VERIFYING THAT ALL THE APPLICABLE CHECKLIST ITEMS BELOW HAVE BEEN PROPERLY EVALUATED/EXECUTED.

SUBMISSION IS FOR: [ ] OTC [X] REGULAR SUBMITTAL

SEOR	
[X]	ALLOWABLE LATERAL PRESSURE OF SOIL AT PROJECT SITE LIMITS GROUND-LEVEL LATERAL DISPLACEMENT OF THE STRUCTURE TO A MAXIMUM OF 1/2"
[X]	SITE SPECIFIC GEOTECHNICAL REPORT HAS BEEN PROVIDED WITH A GEOHAZARD SECTION INCLUDED.
[X]	VERIFY THE SITE PLAN SOLAR PANEL LAYOUT IS PROVIDED WITH AREA THAT DOES NOT EXCEED THE PC MAXIMUM.
[X]	VERIFY IF CGS APPROVAL OF GEOTECHNICAL REPORT REQUIRED BECAUSE INDIVIDUAL PC STRUCTURES EXCEED 4000 SQ FT OR SITE IS LOCATED IN A STATE OR LOCAL GEOHAZARD ZONE. STRUCTURES MAY BE BROKEN UP INTO MULTIPLE 4,000 SQ FT STRUCTURES WITH SEISMIC BREAKS PER STUCTURAL DATA ON S-2.
[X]	SOLAR PANEL + NON STRUCTURAL ITEMS < 3.15 PSF
[X]	S-2: VERIFY THE SITE PLANS PLANS UTILIZE A RISK CATEGORY II STRUCTURE.
[X]	S-2: VERIFY APPROPRIATE SEISMIC SEPARATION PER 'STRUCTURAL DATA'.
[X]	S-2: VERIFY THAT TABLES IN 'SITE SPECIFIC PARAMETERS' SECTION HAVE BEEN COMPLETED
[X]	S-3: VERIFY THAT DESIGN PROFESSIONAL STATEMENT REGARDING SOLAR PANEL MEETING PC CRITERIA PER HAS BEEN PROVIDED PER NOTE 15 WITHIN "PV PANEL AND PV PANEL FASTENER INSTALLATION PROCEDURE"
[X]	S-3: VERIFY THAT OPTIONS FOR CONCRETE DURABILTY BASED ON EXPOSURE CLASS AND THE FOUNDATION SOILS CLASS HAVE BEEN SELECTED.
[X]	S-3: VERIFY THE SITE SPECIFIC FOUNDATION LOCATIONS MEET WITH NOTE 10 ON S-3 IN THE SOILS NOTES SECTION FOR SET BACK FROM TOP OF SLOPES, OR THAT THE GEOTECHNICAL REPORT HAS ALLOWED A SMALLER DISTANCE.
[X]	S-5: VERIFY THAT COLD FORMED SECTIONS AND HOT ROLLED SECTIONS HAVE BEEN SELECTED BASED ON THE SITE SPECIFIC PC ID'S UTILIZED ON SHEETS S-7, S-12, AND S-16.
[X]	S-6: FOR T STRUCTURE, VERIFY WHETHER CANTILEVER MID-SPAN BLOCKING / BRACING REQUIRED PER S-16.
[X]	S-6: FOR T STRUCTURE, VERIFY 2' MAXIMUM DIFFERENCE IN COLUMN HEIGHTS WITHIN A STRUCTURE.
[X]	S-6: SELECT APPLICABLE FRAMING, BOLLARD, AND FOUNDATION OPTIONS.
[X]	S-7: VERIFY T PC ID SELECTION MATCHES SITE SPECIFIC LAYOUT. VERIFY IF MULTI SPAN PURLIN HAS BEEN SELECTED FOR NOTE 3 IF APPLICABLE.
[X]	S-8: VERIFY T PC ID FOUNDATION SELECTION MATCHES SITE SPECIFIC LAYOUT AND THAT SOILS CLASS SELECTION MATCHES S-3. VERIFY THAT SPIRAL TIE LENGTH AND SPACINGS HAVE BEEN SELECTED IN DETAIL 2. VERIFY IF STEEL CASING REQUIRED IN DETAIL 2. VERIFY IF NON-STRUCTURAL BOLLARD IS REQUIRED PER DETAIL 3.
[ ]	S-9: VERIFY T SPREAD FOOTING PC ID SELECTION MATCHES SITE SPECIFIC LAYOUT. VERIFY IF NON-STRUCTURAL BOLLARD IS REQUIRED PER DETAIL 2.
[X]	S-10: VERIFY T BEAM TO COLUMN PC ID SELECTION MATCHES SITE SPECIFIC LAYOUT.
[ ]	S-11: FOR OT STRUCTURE, VERIFY WHETHER CANTILEVER MID-SPAN BLOCKING / BRACING REQUIRED PER S-16.
[ ]	S-11: FOR OT STRUCTURE, VERIFY 2' MAXIMUM DIFFERENCE IN COLUMN HEIGHTS WITHIN A STRUCTURE.
[ ]	S-11: SELECT APPLICABLE FRAMING, BOLLARD, AND FOUNDATION OPTIONS.
[ ]	S-12: VERIFY OT PC ID SELECTION MATCHES SITE SPECIFIC LAYOUT. VERIFY IF MULTI SPAN PURLIN HAS BEEN SELECTED FOR NOTE 3 IF APPLICABLE.
[ ]	S-13: VERIFY OT PC ID FOUNDATION SELECTION MATCHES SITE SPECIFIC LAYOUT AND THAT SOILS CLASS SELECTION MATCHES S-3. VERIFY THAT SPIRAL TIE LENGTH AND SPACINGS HAVE BEEN SELECTED IN DETAIL 2. VERIFY IF STEEL CASING REQUIRED IN DETAIL 2. VERIFY IF NON-STRUCTURAL BOLLARD IS REQUIRED PER DETAIL 3.
[ ]	S-14: VERIFY OT SPREAD FOOTING PC ID SELECTION MATCHES SITE SPECIFIC LAYOUT. VERIFY IF NON-STRUCTURAL BOLLARD IS REQUIRED PER DETAIL 2.
[ ]	S-15: VERIFY OT BEAM TO COLUMN PC ID SELECTION MATCHES SITE SPECIFIC LAYOUT.
[X]	S-16: VERIFY PURLIN ID SELECTION MATCHES SITE SPECIFIC LAYOUT. VERIFY IF THE PURLIN CANTILEVER SCHEDULE SHOWS THAT THE T OR OT PC ID FOR THE ARRAY END COLUMNS NEED TO BE INCREASED DUE TO THE SITE SPECIFIC CANTLIEVER EXCEEDING THE MAX CANTILEVER LENGTH SHOWN. VERIFY THAT THE PURLIN BRACE AND SPLICE DETAILS HAVE BEEN SELECTED AND MATCH THE INFORMATION FROM THE SELECTION FOR THE PURLIN ID.
[X]	S-17: VERIFY THAT THE PURLIN BRACE AND SPLICE DETAILS HAVE BEEN SELECTED AND MATCH THE INFORMATION FROM THE SELECTION FOR THE PURLIN ID ON S-16.
[X]	S-18: VERIFY PURLIN LAYOUT AND BOLTING OPTIONS HAVE BEEN SELECTED. VERIFY SOLAR PANEL LAYOUT OPTIONS SELECED MATCH SITE SPECIFIC PLANS. VERIFY PV MODULE MOUNTING BOLT SIZE SELECTED MATCHES REQUIRED PV MODULE MOUNTING BOLT SIZE SPECIFIED IN THE PV MODULE INSTALLATION MANUAL. VERIFY WHETHER ANY GROUNDING/BONDING OPTIONS HAVE BEEN SELECTED.
[X]	S-20: IF SHEET IS PRESENT, VERIFY THAT COLUMN MOUNTED EQUIPMENT SELECTIONS MATCH SITE SPECIFIC PLANS.
[X]	S-21: VERIFY OPTIONAL BOLLARD SELECTIONS MATCH SITE SPECIFIC PLANS. VERIFY FOUNDATION OPTIONS FOR CONDUIT ROUTING MATCH SITE SPECIFIC PLANS.
[ ]	S-23: IF SHEET IS PRESENT, VERIFY THAT EQUIPMENT PAD AND RACK SELECTIONS MATCH SITE SPECIFIC PLANS.
[ ]	S-23: IF SHEET IS PRESENT AND BATTERY/BESS EQUIPMENT ITEM 19 SELECTED, VERIFY THAT ALL SITE SPECIFIC DRAWING REQUIREMENTS HAVE BEEN PROVIDED PER NOTE 14 ON DETAIL 1.
[ ]	S-29: IF SHEET IS PRESENT, VERIFY THAT ENCLOSURE OPTIONS HAVE BEEN SELECTED.
[ ]	S-30: IF SHEET IS PRESENT, VERIFY THAT FENCING OPTIONS HAVE BEEN SELECTED.

SITE SPECIFIC PARAMETERS

INSTRUCTIONS:
DESIGN PROFESSIONAL SHALL CHECK THE APPROPRIATE SELECTION BOXES BELOW AND ENTER THE DESIGN PARAMETERS APPLICABLE TO THE SPECIFIC PROJECT SITE.

SNOW
- [ ] 0 psf
- pg = ________ psf
- pf = ________ psf [X] 5 psf [ ] 20 psf
- Ce = ________

WIND
- V = 101 mph < = 110 mph
- Kzt = 1.00 ≤ 1
- EXPOSURE: [X] C [ ] D

SEISMIC
- [X] DESIGN BASED ON SITE CLASS DETERMINED PER CHAPTER 20 OF ASCE 7-16
  GEOTECHICAL INVESTIGATION PROVIDED
  SITE CLASS: [ ] C [X] D [ ] E
  S_S = 2.19 Fa = 1.0 PER ASCE 7-16 SUPPL 3, TABLE 11.4-1
- [ ] DESIGN BASED ON SITE SPECIFIC GROUND MOTION HAZARD ANALYSIS PER CHAPTER 21 OF ASCE 7-16
  SHORT-PERIOD DESIGN SPECTRAL RESPONSE PARAMETER, S_{DS}, SHALL BE AS SPECIFIED IN GEOTECHNICAL INVESTIGATION
  CGS APPROVAL REQUIRED
  NOT ELIGIBLE FOR OTC REVIEW
  SITE CLASS: [ ] C [ ] D [ ] E

S_{DS} = $^2/_3$ Fa. S_S = 1.56 ≤ 1.867
$C_S = S_{ds} \times I_e / R$ = ≤ 1.493 USED IN DESIGN
SEISMIC DESIGN CATEGORY: [X] D [ ] E

SEOR	
[X]	STRUCTURE WIDTH < = 43 FT
[X]	SOLAR PANEL: REC ALPHA PRO M , WEIGHT 71.6 LBS
[ ]	SOLAR PANEL DIMENSIONS 85.6 IN. x 49.7 IN. = 30.55 ft² < = ~~28.13~~ ft² — 33.36 ft² FOR 101 MPH SITE SPECIFIC WIND SPEED
[X]	SOLAR PANEL ALLOWABLE STRENGTH WIND UPWARD PRESSURE (ASD) 33.4 PSF IS > = 29.7 PSF
[X]	SOLAR PANEL ALLOWABLE STRENGTH WIND DOWNWARD PRESSURE (ASD) 33.4 PSF IS > = 32.4 PSF
[ ]	SOLAR PANEL ALLOWABLE STRENGTH WIND DOWNWARD PRESSURE (ASD) + 5PSF SNOW ___ PSF IS > = 27.9 PSF
[ ]	SOLAR PANEL ALLOWABLE STRENGTH WIND DOWNWARD PRESSURE (ASD) + 20PSF SNOW ___ PSF IS > = 36.4 PSF

REGISTERED PROFESSIONAL ENGINEER
DUSTIN K. ROSEPINK
S 5885
STRUCTURAL
STATE OF CALIFORNIA

MAXIMUM DESIGN PARAMETERS

RISK CATEGORY:....................II

ROOF LIVE LOAD (L_r):
- WITH SOLAR PANELS INSTALLED:..............12 psf (PER IR 16-8. REVISED 03/03/2021)
- OPEN TRELLIS SYSTEM:..............12 psf (PER IR 16-8. REVISED 03/03/2021)
- POINT LOAD:..............300 lb (PER IR 16-8. REVISED 03/03/2021)

MAX. ROOF SNOW LOAD (S):..............0 PSF, 5 psf, 20 psf (VARIES - PER STRUCTURE SELECTED)

MAX. DEAD LOAD:
- SOLAR PANEL/RACKING/ELEC..............3.15 psf

WIND: DIRECTIONAL PROCEDURE
- BASIC WIND SPEED..............110 mph (3 SECOND GUST) (SEE NOTES BELOW) [1]
- WIND EXPOSURE:..............C[1]
- INTERNAL PRESSURE:..............N/A (OPEN STRUCTURE)
- ....K_d=0.85
- ....K_z=0.88, 0.925 (SEE NOTES BELOW) [1]
- ....K_{zt}=1.00

SNOW:
GROUND SNOW, p_g = 0 psf, 5 psf, 20.0 psf
C_e = 0.9
C_t = 1.2
I = 1.0
C_s = 1.0
p_s = $0.7.C_e.C_t.I.p_g.C_s$ = 0 psf, 5 psf, 20.0 psf
ROOF SNOW, p_f = 0 psf, 5 psf, 20.0 psf
$p_{S.E}$ = 0.0 psf

SEISMIC:
- BASE:..............FROM USABLE SOIL HT. PER GEOTECHNICAL REPORT
- SEISMIC IMPORTANCE FACTOR:..............I_e = 1.0
- SITE CLASS:.............. E [3]
- SHORT SPECTRAL RESPONSE:..............S_{DS} = 1.867 [2]
- RESPONSE MODIFICATION FACTOR:.............. R = 1.25
- SEISMIC RESPONSE COEFFICIENT:..............C_S = 1.493 [2]
- SEISMIC REDUNDANCY FACTOR:..............ρ = 1.3
- .... ρC_S= 1.941

DESIGN BASE SHEAR: (LRFD)
- T-STRUCTURES:.............. 18,700 [2] lb MAX. (VARIES - PER STRUCTURE SELECTED)
- OFFSET T-STRUCTURES:.............. 13,876 [2] lb MAX. (VARIES - PER STRUCTURE SELECTED)

SEISMIC DESIGN CATEGORY:.............. E
SEISMIC FORCE RESISTING SYSTEM:..............ORDINARY STEEL CANTILEVERED COLUMN
ANALYSIS PROCEDURE:.............. EQUIVALENT LATERAL FORCE

NOTES:

1. THIS PC'S WIND FORCE RESISTING SYSTEM IS DESIGNED TO ONE WIND CRITERIA.
   110 mph EXPOSURE C WITH q_h = 24.3 psf MAX.
   EACH CRITERIA IS DESIGNED WITH THE K_z, K_d, AND K_{zt} PER THE ABOVE. THIS PC MAY BE USED IN ANY LOCATION WITH ANY WIND SPEED AND VALUES OF K_z, K_d, AND K_{zt} SUCH THAT THE RESULTING q_h FOR THE SITE DOES NOT EXCEED 24.3 psf. THE DESIGN PROFESSIONAL IN GENERAL RESPONSIBLE CHARGE IS RESPONSIBLE FOR ENSURING THE WIND CRITERIA SELECTED HAS A HIGHER q_h THAN THE SITE SPECIFIC q_h.
2. THIS PC'S SEISMIC FORCE RESISTING SYSTEM IS DESIGNED TO ONE SEISMIC CRITERIA.
   S_{DS} = 1.867 WITH R = 1.25 AND $\rho C_s = S_{DS}/R$ = 1.867/1.25 = 1.493 x (1.3)=1.941.
   THIS PC MAY BE USED IN ANY LOCATION WITH SUCH THAT THE RESULTING C_s USING THE APPROPRIATE R VALUE DOES NOT EXCEED THE DESIGN CRITERIA C_s VALUES. THE DESIGN PROFESSIONAL IN GENERAL RESPONSIBLE CHARGE IS RESPONSIBLE FOR ENSURING THE C_s CRITERIA SELECTED HAS A HIGHER C_s THAN THE SITE SPECIFIC C_s. S_{DS} VALUE TO BE CONFIRMED BY THE GEOTECHNICAL REPORT AND CLEARLY IDENTIFIED ON THE CONSTRUCTION DRAWINGS.
3. THIS PC IS EXEMPTED FROM SITE-SPECIFIC GROUND MOTION HAZARD ANALYSIS REQUIREMENTS OF ASCE 7 SECTION 11.4.8. THIS PC IS DESIGNED USING THE EQUIVALENT LATERAL FORCE PROCEDURE AND A SEISMIC RESPONSE COEFFICIENT BASED ON THE SHORT PERIOD DESIGN SPECTRAL RESPONSE ACCELERATION, SDS.
   FOR SITE CLASS 'D'; THE INCREASE IN THE SM1 PARAMETER PRESCRIBED IN THE EXCEPTION TO ASCE 7 SEC 11.4.8, ITEM 1, DOES NOT IMPACT THE DESIGN OF THE STRUCTURE.
   FOR SITE CLASS 'E'; THE STRUCTURE COMPLIES WITH THE EXCEPTION 1 CONDITIONS OF ASCE 7 SECTION 11.4.8, ITEM 2.

BUILDING DATA

TYPE OF CONSTRUCTION.............. II B
OCCUPANCY..............VARIES - SEE EXAMPLES BELOW
NUMBER OF STORIES..............1
BUILDING AREAS..............VARIES DUE TO OCCUPANCY - SEE EXAMPLES BELOW
MODULE SIZES.............. VARIES WITH OPTIONS
BUILDING LENGTH:
ALL WIDTHS.............. MAX. 500'-0" LENGTH
NOTE: NO SEISMIC AND/OR THERMAL EXPANSION JOINTS REQUIRED ALONG THE LENGTH OF THE STRUCTURES. (ALL JOINTS ARE INTERNAL)

OCCUPANCY AND BUILDING AREA EXAMPLES:
ALL STRUCTURES SHALL BE BASED ON RISK CATEGORY II STRUCTURE.

~~OCCUPANCY A:~~
~~EXAMPLE 1:~~
~~STRUCTURES LOCATED OVER LUNCH AREA WITHOUT FIXED SEATING~~
~~OCCUPANCY: A-2~~
~~OCCUPANCY LOAD: 15 ft²/person - MAX 300 PERSONS FOR RISK II~~
~~MAX SQ FT: 4,500 ft²~~
~~EXAMPLE 2:~~
~~STRUCTURES LOCATED OVER LUNCH AREA WITH FIXED SEATING~~
~~OCCUPANCY: A-2~~
~~OCCUPANCY LOAD: 18 in/person ALONG LINEAR BENCH~~
~~MAX 300 PERSONS FOR RISK II~~
~~MAX SQ FT: 5,400 LINEAR INCHES OF FIXED SEATING UNDER THE STRUCTURE~~
~~EXAMPLE 3:~~
~~STRUCTURES LOCATED OVER AN AREA DESIGNATED FOR ASSEMBLY (TYPICALLY AMPHITHEATER, OR OTHER SPACE WITH FIXED SEATING OR DESIGNATED AS A STANDING ASSEMBLY AREA)~~
~~OCCUPANCY: A~~
~~OCCUPANCY LOAD: 7 ft²/person - MAX 300 PERSONS FOR RISK II~~
~~MAX SQ FT: 2,100 ft²~~
~~SHADE STRUCTURE~~
~~EXAMPLE 1:~~
~~STRUCTURES LOCATED OVER A FIELD, BLACKTOP, PLAYGROUND EQUIPMENT, OR OTHER NON-DESIGNATED USE SPACES~~
~~OCCUPANCY: E~~
~~OCCUPANCY LOAD: 20 ft²/person - MAX 250 PERSONS FOR RISK II~~
~~MAX SQ FT: 5,000 ft²~~

PARKING
EXAMPLE 1:
STRUCTURES LOCATED OVER PARKING
OCCUPANCY: S-2
OCCUPANCY LOAD: 200 ft²/person
MAX SQ FT: UNLIMITED PER CBC 406.5.4 AND 406.5.5

GENERAL NOTES

1. ALL WORK SHALL CONFORM TO TITLE 24, CALIFORNIA CODE OF REGULATIONS (CCR).
2. CHANGES TO THE APPROVED DRAWINGS AND SPECIFICATIONS SHALL BE MADE BY ADDENDA OR CONSTRUCTION CHANGE DOCUMENTS APPROVED BY THE DIVISION OF THE STATE ARCHITECT, AS REQUIRED BY SECTION 4-338, PART 1, TITLE 24, CCR.
3. A 'DSA CERTIFIED' PROJECT INSPECTOR EMPLOYED BY THE DISTRICT (OWNER) AND APPROVED BY THE DIVISION OF THE STATE ARCHITECT SHALL PROVIDE CONTINUOUS INSPECTION OF THE WORK. THE DUTIES OF THE INSPECTOR ARE DEFINED IN SECTION 4-342, CALIFORNIA BUILDING STANDARDS ADMINISTRATIVE CODE (PART 1, TITLE 24, CCR).
4. A 'DSA CERTIFIED' INSPECTOR WITH CLASS 2 CERTIFICATION IS REQUIRED FOR THIS PROJECT.
5. A 'DSA CERTIFIED' INSPECTOR WHO IS SPECIFICALLY QUALIFIED IN MECHANICAL AND ELECTRICAL WORK WILL BE REQUIRED FOR THIS PROJECT.
6. A DSA ACCEPTED TESTING LABORATORY DIRECTLY EMPLOYED BY THE SCHOOL BOARD SHALL CONDUCT ALL THE REQUIRED TESTS AND INSPECTIONS FOR THE PROJECT.
7. GRADING PLANS, DRAINAGE IMPROVEMENTS, ROAD AND ACCESS REQUIREMENTS AND ENVIRONMENTAL HEALTH CONSIDERATIONS SHALL COMPLY WITH ALL LOCAL ORDINANCES.
8. IF THE PROJECT IS DIVIDED INTO INCREMENTS: THE SCOPE OF WORK FOR EACH INCREMENT MUST BE CLEARLY SPECIFIED ON THE TITLE SHEET OF ALL INCREMENTS SUBMITTED.
9. DESIGN PER 2022 CBC AND ITS PRESCRIBED LOADING AND MATERIAL SPECIFICATIONS:
   - ASCE 7-16
   - ASCE 19-16
   - 15TH EDITION AISC STEEL MANUAL
   - AISI S100-16(2020) W/S2-20 COLD-FORMED STEEL STRUCTURAL MEMBERS, WITH SUPP. 2, 2020 EDITION
   - ACI 318-19
10. THESE STRUCTURES ARE NOT DESIGNED TO BE, NOR SHALL THEY BE, ENCLOSED.
11. ALL DIMENSIONS, CONDITIONS, AND ELEVATIONS ARE TO BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCING WORK OR FABRICATION. IF ANY DISCREPANCIES ARE FOUND OR IF ANY CONDITION EXISTS NOT AS SHOWN ON THE DRAWINGS THE DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE SHALL BE NOTIFIED IMMEDIATELY.
12. IF A SNOW LOAD OPTION IS USED THEN THE SITE-SPECIFIC MAX. ROOF SNOW LOADING INCLUDING DRIFT MUST BE LESS THAN OR EQUAL TO THE PSF OF SNOW LOAD SELECTED FOR THE SITE USE (5 OR 20 PSF).
13. NO FUTURE STRUCTURAL ROOF DECK OR SHEATHING MAY BE APPLIED TO THE OPEN GRID.
14. THE ALLOWABLE MAXIMUM PSF ALLOWED FOR THE SOLAR PANEL, ELECTRICAL, AND OTHER NON-STRUCTURAL ITEMS IS 3.15 PSF.
15. ALL SCREWS TO BE ITW BUILDEX TEK SCREWS PER ICC ESR-1976 OR ELCO DRILL SCREW PER ICC ESR-3294.
16. ALL UNISTRUT PARTS & CALLOUTS MAY BE SUBSTITUTED BY OTHER MANUFACTURERS W/ EQUIVALENT STRENGTH.

FIRE LIFE SAFETY

AUTOMATIC FIRE SPRINKLERS REQUIRED? (Y/N).......N

1. FOR ALL CANOPY ARRAYS - VERIFY COMPLIANCE W/ CFC 503.2.1
   NEW FIRE APPARATUS ACCESS ROADS SHALL HAVE AN UNOBSTRUCTED WIDTH OF NOT LESS THAN 20 FEET, EXCLUSIVE OF SHOULDERS, EXCEPT FOR APPROVED SECURITY GATES IN ACCORDANCE WITH SECTION 503.6, AND AN UNOBSTRUCTED VERTICAL CLEARANCE OF NOT LESS THAN 13 FEET 6 INCHES
2. ALL GROUNDING SHALL BE IN ACCORDANCE WITH CEC ART. 250

ACCESS

1. CONCRETE BOLLARD ABOVE FOUNDATIONS (RAISED PIERS) CANNOT BE LOCATED IN ACCESSIBLE PARKING SPACES OR ACCESS AISLES.
2. SLOPED PORTIONS OF FOUNDATIONS, WHEN LOCATED IN ACCESSIBLE PARKING STALL OR ACCESS AISLE, MUST HAVE A SLOPE LESS THAN OR EQUAL TO 2.08%
3. MINIMUM ARRAY CLEAR HEIGHTS IN ACCESSIBLE AREAS:
   8'-2" - WHEN LOCATED OVER ACCESSIBLE PARKING OR ACCESS AISLES
   9'-6" - WHEN LOCATED OVER ACCESSIBLE PASSENGER LOADING ZONES

BID INFORMATION

THE STEEL STRUCTURES IN THIS PC ARE PROPRIETARY TO M BAR C CONSTRUCTION, INC. AND 4 S.T.E.L. ENGINEERING, INC. THE STEEL WORK SHALL NOT GO OUT TO BID.

PRE-CHECK (PC) DOCUMENT

CODE: 2022 CBC

A SEPARATE PROJECT APPLICATION FOR CONSTRUCTION IS REQUIRED

STRUCTURAL DATA

LATERAL RESISTING SYSTEM.............. CANTILEVERED COLUMN
FOUNDATION.............. PIER AND SPREAD FOOTING
MINIMUM REQUIRED SEISMIC SEPARATION.............. 10"
TESTING AND INSPECTION LIST.............. SEE SHEETS S-3 & S-4
DESIGNED TO SUPPORT FIRE SPRINKLERS..............NO

CODES

GOVERNING CODES:

CALIFORNIA CODE OF REGULATIONS:
~~2022~~ 2025 CALIFORNIA ADMINISTRATIVE CODE, PART 1, TITLE 24 C.C.R.
2022 CALIFORNIA BUILDING CODE (CBC), PART 2, TITLE 24 C.C.R.
(2021 INTERNATIONAL BUILDING CODE VOLUMES 1-2 AND 2022 CALIFORNIA AMENDMENTS)
2022 CALIFORNIA ELECTRICAL CODE (CEC), PART 3, TITLE 24 C.C.R.
(2020 NATIONAL ELECTRICAL CODE AND 2022 CALIFORNIA AMENDMENTS)
2022 CALIFORNIA MECHANICAL CODE (CMC) PART 4, TITLE 24 C.C.R.
(2021 UNIFORM MECHANICAL CODE AND 2022 CALIFORNIA AMENDMENTS)
2022 CALIFORNIA PLUMBING CODE (CPC), PART 5, TITLE 24 C.C.R.
(2021 UNIFORM PLUMBING CODE AND 2022 CALIFORNIA AMENDMENTS)
2022 CALIFORNIA ENERGY CODE (CEC), PART 6, TITLE 24 C.C.R.
2022 CALIFORNIA FIRE CODE, PART 9, TITLE 24 C.C.R.
(2021 INTERNATIONAL FIRE CODE AND 2022 CALIFORNIA AMENDMENTS)
2022 CALIFORNIA GREEN BUILDING STANDARDS CODE, PART 11, TITLE 24 C.C.R.
2022 CALIFORNIA REFERENCED STANDARDS, PART 12, TITLE 24 C.C.R.
TITLE 19 C.C.R., PUBLIC SAFETY, STATE FIRE MARSHAL REGULATIONS.

NFPA 13	AUTOMATIC FIRE SPRINKLER SYSTEMS	2022 EDITION
NFPA 72	NATIONAL FIRE ALARM & SIGNALING CODE	2022 EDITION

REFERENCE CODE SECTIONS FOR APPLICABLE STANDARDS:

2022 CBC, CHAPTER 35
2022 CFC, CHAPTER 80

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 03-125900 INC:
REVIEWED FOR
SS [X] FLS [X] ACS [X]
DATE: 03/18/2026

4 STEL ENGINEERING
26030 ACERO
MISSION VIEJO, CA 92691
949.305.1150 | FAX 949.305.1420

M BAR C CONSTRUCTION INC.
1770 LA COSTA MEADOWS DRIVE
SAN MARCOS, CA 92078
ERIK KRIVOKOPICH
PHONE: (760) 744-4131
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B AND C51
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ENGINEER'S APPROVAL
REGISTERED PROFESSIONAL ENGINEER
DUSTIN K. ROSEPINK
S 5885
STRUCTURAL
STATE OF CALIFORNIA

BID INFORMATION
THE STRUCTURES AND DESIGNS IN THIS PC ARE PROPRIETARY TO M BAR C CONSTRUCTION, INC. AND 4 S.T.E.L. ENGINEERING, INC. ALL SITES USING THIS PC: M BAR C CONSTRUCTION, INC. SHALL BE THE STEEL CONTRACTOR & 4 S.T.E.L. ENGINEERING, INC. SHALL BE THE SEOR. SEE THE STANDARD NOTES FOR PC USE ON S-1 FOR ADDITIONAL REQUIREMENTS.

PRE-CHECK (PC) DOCUMENT
CODE: 2022 CBC
A SEPARATE PROJECT APPLICATION FOR CONSTRUCTION IS REQUIRED

APPROVED
DIV. OF THE STATE ARCHITECT
APP: 04-123955 PC
REVIEWED FOR
SS [X] FLS [X] ACS [X] CG [ ]
DATE: 10/14/2024

SITE SPECIFIC INFORMATION
ALTADENA ELEMENTARY SCHOOL
743 E CALAVERAS ST.
ALTADENA, CA 91001

REVISIONS

MARK	DATE	DESCRIPTION

4 STEL JOB #	MC02-V3-6
DATE	10-03-24
DRAWN BY	GM
CHECKED	RWS

UG 22.6.1

COVER SHEET 2

S-2

NOTE: IF DWG. IS NOT 24 x 36, IT IS NOT FULL SIZE

PV PANEL AND PV PANEL FASTENER INSTALLATION PROCEDURE

1. PRIOR TO PRETENSIONED PANEL FASTENER INSTALLATION, THE CONTRACTOR MUST SUBMIT TO THE PROFESSIONAL IN RESPONSIBLE CHARGE FOR REVIEW AND ACCEPTANCE A DETAILED PRETENSIONED PANEL FASTENER INSTALLATION PROCEDURE OUTLINING PROVISIONS TO ENSURE ALL PRETENSIONED PANEL FASTENERS ARE INSTALLED AND TORQUED WITHIN THE SPECIFIED MINIMUM AND MAXIMUM TORQUE RANGE. A COPY OF THE RESPONSIBLE DESIGN PROFESSIONAL-ACCEPTED INSTALLATION PROCEDURE SHALL BE PROVIDED TO THE SPECIAL INSPECTOR AND PROJECT INSPECTOR PRIOR TO COMMENCING PANEL FASTENER INSTALLATION.

   NOTE: THE FASTENER INSTALLATION PROCEDURE MAY ALSO BE SUBMITTED AT TIME OF SITE-SPECIFIC APPLICATION AND INCLUDED ON THE SITE-SPECIFIC CONTRACT DOCUMENTS.

2. INSTALLATION VERIFICATION TESTING AND SPECIAL INSPECTION

   PC DRAWINGS HAVING PRETENSIONED PANEL FASTENER CONNECTIONS SHALL SPECIFY ON APPLICABLE PANEL CONNECTION DETAIL(S):

   SPECIAL INSPECTION AND TORQUE TESTING OF PRETENSIONED PANEL FASTENER INSTALLATION SHALL BE PERFORMED BY A QUALIFIED REPRESENTATIVE OF THE LABORATORY OF RECORD (LOR) IN ACCORDANCE WITH SECTION 2.1.8 ABOVE OF IR PC-7 PC DESIGN CRITERIA FOR CANTILEVERED CANOPY STRUCTURES.

3. SPECIAL INSPECTION AND TESTING
   TO ENSURE COMPLIANCE WITH THE CONTRACTOR'S INSTALLATION PROCEDURE AND DSA-APPROVED CONSTRUCTION DOCUMENTS, SPECIAL INSPECTION OF PRETENSIONED PANEL FASTENER INSTALLATION SHALL BE PERFORMED AS FOLLOWS:
   a. VERIFY THAT SPECIFIED FASTENERS ARE UTILIZED.
   b. VERIFY THAT INSTALLERS HAVE ACCESS TO AND FOLLOW THE INSTALLATION PROCEDURE, INCLUDING ANY SPECIFIED CALIBRATED INSTALLATION EQUIPMENT.
   c. VERIFY AND DOCUMENT PRE-INSTALLATION QUALIFICATION FOR EACH PV PANEL FASTENER INSTALLER BEFORE CONTINUING WITH INSTALLATION BEYOND THIS QUALIFICATION PROCEDURE ON THE PROJECT AS FOLLOWS:
   d. PERFORM TORQUE TESTING OF 30 RANDOMLY SELECTED (AS SPECIFIED IN THE CALIFORNIA ADMINISTRATIVE CODE [CAC]) PANEL FASTENERS FROM THE FIRST 100 FASTENERS INSTALLED.
   e. IF 30 CONSECUTIVE CONFORMING TEST ARE NOT ACHIEVED WITHIN THE FIRST 100 FASTENERS INSTALLED, INSTALL ANOTHER 100 FASTENERS, AND REPEAT THE TESTING PROCESS UNTIL 30 CONSECUTIVE TEST ARE ACHIEVED. ALL FASTENERS FAILING INSTALLATION TORQUE REQUIREMENTS SHALL BE REPLACED AND/OR RE-INSTALLED CORRECTLY BY THE INSTALLER AND TESTED FOR CONFORMANCE.
   f. EQUIPMENT AND TOOLS (E.G., TORQUE WRENCHES) USED FOR VERIFICATION SHALL BE PROVIDED BY THE LOR AND CALIBRATED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND PERTINENT STANDARD (E.G., ANSI/ASME B107).

4. SPECIAL INSPECTION AND TESTING RATES
   AFTER COMPLETION OF THE PRE-INSTALLATION QUALIFICATION DESCRIBED IN SECTION 2.1.8.3.3 ABOVE, SPECIAL INSPECTION AND TORQUE TESTING OF THE REMAINING INSTALLED PRETENSIONED PANEL FASTENERS (CHOSEN RANDOMLY AS SPECIFIED IN THE CAC, UNLESS INSTALLATION CONCERNS SUGGEST OTHERWISE) TO VERIFY THAT MINIMUM TORQUE VALUES ARE ACHIEVED AND THAT MAXIMUM VALUES ARE NOT EXCEEDED SHALL OCCUR AT LEAST AT THE RATES SHOWN BELOW TO VERIFY CONFORMANCE FOR EACH INSTALLER:

SPECIAL INSPECTION AND TORQUE TESTING RATES TABLE

TOTAL NUMBER OF PANEL FASTENERS ON THE PROJECT	SPECIAL INSPECTION	% OF TOTAL TO BE TESTED
0 - 800	CONTINUOUS	50
801 - 1600	CONTINUOUS	33
1601-3500	PERIODIC*	20
3501-7500	PERIODIC*	10
MORE THAN 7500	PERIODIC*	5

   * FOR PROJECTS WITH MORE THAN 1600 TOTAL PANEL FASTENERS, THE FIRST 1600 SHALL RECEIVE CONTINUOUS INSPECTION.
   IF ANY FASTENER FAILS TORQUE TESTING, ALL FASTENERS OF THE SAME TYPE AND BY THE SAME INSTALLER, BUT NOT PREVIOUSLY TESTED, SHALL BE TESTED UNTIL 20 CONSECUTIVE FASTENERS PASS, THEN RESUME THE INITIAL TEST FREQUENCY

5. ALL SOLAR PANELS MUST BE INSTALLED BY PROPERLY TRAINED AND QUALIFIED PERSONNEL. PROPERLY TRAINED PERSONNEL SHALL BE:
   - FAMILIAR WITH THE DIFFERENCE BETWEEN A DRILL GUN AND AN IMPACT GUN.
   - FAMILIAR WITH HOW TO MEASURE THE TORQUE ON THE INSTALLED BOLT.
   - SHALL BE TRAINED IN INSTALLATION OF STRUCTURAL STEEL BOLTING.
6. ALL SOLAR PANEL INSTALLATION BOLTS SHALL BE ASTM F593C STAINLESS STEEL BOLTS.
7. TESTING OF ASTM F593C SOLAR PANEL ATTACHMENT BOLTS IS REQUIRED.
8. SOLAR PANELS MUST BE SECURED TO THE STRUCTURE WITH A MINIMUM OF 4 DIRECT BOLTS. ALL 4 BOLTS MUST BE PROPERLY INSTALLED, TORQUED, AND INSPECTED FOR ALL PANELS INSTALLED ON A STRUCTURE BY THE END OF THE WORK DAY. NO PANEL MAY BE LEFT ON THE STRUCTURE WITHOUT ALL 4 BOLTS INSTALLED AND PROPERLY TORQUED.
9. THE INSTALLATION TORQUE SHALL BE INSPECTED TO BE IN CONFORMANCE WITH 5/S-18 OR 7/S-18.
10. SPECIAL INSPECTION OF SOLAR PANEL BOLT INSTALLATION SHALL BE PER NOTE 3 ABOVE.
11. CONTRACTOR RESPONSIBLE FOR SOLAR PANEL INSTALLATION AND ATTACHMENT SHALL PROVIDE A SUBMITTAL TO THE SITE SPECIFIC STRUCTURAL ENGINEER OF RECORD FOR THEIR REVIEW CONTAINING: THE PANEL INSTALLATION PROCEDURES, METHOD TO ENSURE ALL PANELS HAVE ALL 4 BOLTS INSTALLED AND PROPERLY TORQUED BEFORE THE END OF EVERY WORK DAY, ALL TOOLS USED TO SECURE THE SOLAR PANEL (INCLUDING BUT NOT LIMITED TO: POWER TOOLS RPMS, TOOLS MAX TORQUE ABILITY, METHOD OF ENSURING TOQUE VALUES ARE NOT EXCEEDED, ETC)., AND ALL BOLTS AND HARDWARE USED TO SECURE THE PANEL TO THE STRUCTURE.
12. SOLAR PANELS MAY BE INSTALLED IN LANDSCAPE OR PORTRAIT SUBJECT TO PANEL MANUFACTURER INSTALLATION REQUIREMENTS.
13. SOLAR PANELS ARE TO BE LISTED AND LABELED IN ACCORDANCE WITH UL1703, OR IEC / UL61730-1 & IEC / UL61730-2 PER CBC SECTION 1511.9 FOR BOTH PORTRAIT AND LANDSCAPE INSTALLATIONS.
14. THE LOAD RATINGS FOR THE SOLAR PANELS SELECTED BY THE CONTRACTOR MUST MEET OR EXCEED THE ACTUAL DESIGN WIND PRESSURES SHOWN ON THE PC PLANS. SEE S-1 DESIGN PARAMETER CHECK LIST NOTE 2 FOR DESIGN WIND PRESSURES.
15. THE OWNER'S SITE PROFESSIONAL SHALL PROVIDE PRODUCT DOCUMENTATION FROM THE SOLAR PANEL SUPPLIER, INCLUDING PANEL DIMENSIONS AND LOAD RATINGS, TO THE PC DESIGN PROFESSIONAL FOR REVIEW PRIOR TO SUBMITTAL TO DSA FOR PLAN REVIEW. DOCUMENTATION SHALL IDENTIFY PANEL LOAD RATINGS AS ALLOWABLE OR STRENGTH LEVEL,THE NUMBER OF FASTENERS REQUIRED TO ACHIEVE THE RATING, AND SPECIFY WHETHER THE LOADS LISTED ARE DESIGN OR TEST VALUES FROM THE UL 1703 TESTS. UPON ACCEPTANCE, THE PC DESIGN PROFESSIONAL SHALL PROVIDE A STATEMENT TO OWNER'S SITE PROFESSIONAL THAT THE SOLAR PANELS ARE IN COMPLIANCE WITH THE APPROVED PC PLANS. THE OWNER'S SITE PROFESSIONAL SHALL SUBMIT THE STATEMENT AND PANEL DOCUMENTATION TO DSA WITH THE PLAN REVIEW PACKAGE.
16. IF 4 S.T.E.L. ENGINEERING, INC. IS NOT THE DESIGN PROFESSIONAL IN GENERAL RESPONSIBLE CHARGE IT WILL NEED TO BE CONTRACTED BY THE APPROPRIATE PARTY IN ORDER TO SUPPLY THE REQUIRED DOCUMENTATION IN NOTE 12 ABOVE. THE CONTRACT SHALL PROVIDE THE APPROPRIATE FEE AND A MINIMUM OF 15 BUSINESS DAYS LEAD TIME TO REVIEW THE DOCUMENTS IN ORDER TO GENERATE THE REQUIRED STATEMENT. ANY REQUESTS MADE WITH LESS NOTICE WILL REQUIRE ADDITIONAL FEES. SAME DAY REQUESTS WILL NOT BE ACCEPTED.

SPECIAL INSPECTION

1. SOILS:
   - VERIFY THE SITE HAS BEEN PREPARED PROPERLY PRIOR TO PLACEMENT OF CONTROLLED FILL AND/OR EXCAVATIONS FOR FOUNDATIONS.
   - VERIFY THAT THE FOUNDATION EXCAVATIONS ARE PROPER WIDTH, EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL.
   - VERIFY THAT MATERIALS BELOW FOOTINGS ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY.
2. PIER FOUNDATIONS:
   - INSPECT DRILLING OPERATIONS AND MAINTAIN COMPLETE AND ACCURATE RECORDS FOR EACH PIER.
   - VERIFY LOCATIONS OF PIERS.
3. CONCRETE:
   - VERIFY USE OF REQUIRED DESIGN MIX, DETERMINE THE TEMPERATURE OF THE CONCRETE, AND (WHERE REQUIRED) PERFORM AIR CONTENT TEST.
   - TEST CONCRETE (COMPRESSION TEST).
   - INSPECT PLACEMENT OF FORMWORK, REINFORCING STEEL, EMBEDDED ITEMS, AND CONCRETE. INSPECT CURING AND FORM REMOVAL.
   - INSPECT INSTALLATION OF POST-INSTALLED ANCHORS.
   - TEST POST-INSTALLED ANCHORS PER 2022 CBC 1910A.5.
   - ALL ½"Ø HILTI STAINLESS STEEL KB-TZ2 BOLTS TO BE INSTALLED TO 40 FT- LBS OF TORQUE. ALL ⅝"Ø HILTI STAINLESS STEEL KB-TZ2 BOLTS TO BE INSTALLED TO 60 FT- LBS OF TORQUE. ALL ¾"Ø HILTI STAINLESS STEEL KB-TZ2 BOLTS TO BE INSTALLED TO 125 FT- LBS OF TORQUE. AT LEAST 50% OF THE INSTALLED ANCHORS SHALL BE TESTED. HILTI KB TZ2 BOLTS PER ICC ESR-4266.
   - SLUMP TEST SHALL BE PERFORMED PER SITE SPECIFIC DSA-103.
4. STEEL:
   - VERIFY THAT ALL MATERIALS ARE APPROPRIATELY MARKED AND THAT:
     - MILL CERTIFICATES INDICATE MATERIAL PROPERTIES THAT COMPLY WITH REQUIREMENTS.
     - MATERIAL SIZES, TYPES AND GRADES COMPLY WITH REQUIREMENTS.
   - TEST UNIDENTIFIED MATERIALS.
   - VERIFY MEMBER LOCATIONS, BRACING AND ALL DETAILS CONSTRUCTED IN THE FIELD.
   - VERIFY STIFFENER LOCATIONS, CONNECTION TAB LOCATIONS, AND ALL CONSTRUCTION DETAILS FABRICATED IN THE SHOP.
   - VERIFY WELD FILLER MATERIAL IDENTIFICATION MARKINGS PER AWS DESIGNATION LISTED ON THE DSA APPROVED DOCUMENTS AND THE WPS.
   - VERIFY WELD FILLER MATERIAL MANUFACTURER'S CERTIFICATE OF COMPLIANCE.
   - VERIFY WPS, WELDER QUALIFICATIONS, AND EQUIPMENT.
   - INSPECT GROOVE, MULTI-PASS, AND FILLET WELDS > 5/16" (BOTH SHOP AND FIELD WELDS).
5. SHOP FABRICATION:
   - VERIFY FABRICATOR'S FABRICATION AND QUALITY CONTROL PROCEDURES.
   - VERIFY ALL ASPECTS OF SHOP FABRICATION INCLUDING MEMBER LOCATIONS, DIMENSIONAL LAYOUT OF ALL PARTS AND PIECES, ALL WELDING, BOLTING, ETC.
6. SEE DSA APPROVED 103 FOR ADDITIONAL REQUIREMENTS.

CONCRETE NOTES

1. CONCRETE MIN. 4,500 PSI AT 28 DAYS UNLESS THE GEOTECHNICAL REPORT ALLOWS FOR A LOWER STRENGTH (4,000 PSI MIN.). BATCH PLANT INSPECTION NOT REQUIRED.
2. CONCRETE TO REACH 1,000 psi PRIOR TO REMOVAL OF SHORING AND/OR INSTALLATION OF BEAMS AND PURLINS. (NOTE: A HIGHER COMPRESSIVE CONCRETE MAY BE USED TO ACHIEVE 1,000 psi SOONER. SUBMIT AN APPROVED CONCRETE MIX DESIGN TO JUSTIFY) OR 24 HRS WHICH COMES FIRST.
3. CONCRETE TO REACH 3,000 psi PRIOR TO INSTALLATION OF SOLAR PANELS. (NOTE: A HIGHER COMPRESSIVE CONCRETE MAY BE USED TO ACHIEVE 3,000 psi SOONER. SUBMIT AN APPROVED CONCRETE MIX DESIGN TO JUSTIFY).
4. REINFORCEMENT BARS SHALL BE ASTM A615, GR60. MINIMUM U.N.O.
5. MINIMUM CONCRETE COVER SHALL BE 2½" TO EARTH (DRILLED PIER FOUNDATIONS ONLY), 3" TO EARTH ALL OTHER CONCRETE, 2" TO SKY. PER CBC TABLE 1808A.8.2.
6. ALL REINFORCING STEEL AND OTHER EMBEDDED ITEMS SHALL BE SECURELY POSITIONED PRIOR TO THE POURING OF CONCRETE.
7. ALL CONCRETE WORK SHALL COMPLY WITH ACI 301 & 318 LATEST EDITION.
8. AGGREGATE GRADATION AND QUALITY SHALL BE IN ACCORDANCE WITH ACI 302-IR.
9. COLD JOINTS SHALL HAVE A ROUGHENED SURFACE. BONDING AGENT SHALL COMPLY WITH ASTM C1059. A SUBMITTAL FOR CONCRETE BONDING AGENT SHALL BE APPROVED BY DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE PRIOR TO INSTALLATION. DSA INSPECTOR OF RECORD TO PERIODICALLY INSPECT INSTALLATION OF BONDING AGENT.
10. BATCH PLANT INSPECTION NOT REQUIRED PER CBC 1705A3.3.2. SUBJECT TO:
    - A LICENSED WEIGHMASTER SHALL POSITIVELY IDENTIFY QUANTITY OF MATERIALS AND CERTIFY EACH LOAD BY A BATCH TICKET.
    - BATCH TICKETS, INCLUDING MATERIAL QUANTITIES AND WEIGHTS SHALL ACCOMPANY THE LOAD, SHALL BE TRANSMITTED TO THE INSPECTOR OF RECORD BY THE TRUCK DRIVER WITH LOAD IDENTIFIED THEREON. THE LOAD SHALL NOT BE PLACED WITHOUT A BATCH TICKET IDENTIFYING THE MIX. THE INSPECTOR OF RECORD SHALL KEEP A DAILY RECORD OF PLACEMENTS, IDENTIFYING EACH TRUCK, ITS LOAD, AND TIME OF RECEIPT AT THE JOBSITE, AND APPROXIMATE LOCATION OF DEPOSIT IN THE STRUCTURE AND SHALL MAINTAIN A COPY OF THE DAILY RECORD AS REQUIRED BY THE ENFORCEMENT AGENCY.
11. CONCRETE MAY BE PUMPED, POURED, TAILGATED OR OTHER SUCH METHODS INTO PLACE. CONCRETE SHALL BE ALLOWED TO FREE FALL THE ENTIRE DEPTH OF THE FOUNDATION, AS INDICATED IN ACI 304R-09, CHAPTER 5. PLACEMENT OF ANY FREE-FALL CONCRETE SHALL BE SUCH THAT THE CONCRETE DOES NOT ALTER THE EMBEDMENT DEPTH OR THE CLEARANCE OF THE REINFORCING BAR CAGE OR OTHER EMBEDDED MATERIALS.
12. CONCRETE SHALL MEET THE FOLLOWING MINIMUM REQUIREMENTS BASED ON EXPOSURE CLASS IN ACCORDANCE WITH ACI 318-19 TABLE 19.3.2.1 WHEN DETERMINED BY A SITE SPECIFIC GEOTECHNICAL REPORT. WHEN EXPOSURE CLASS NOT SPECIFIED, USE "NOT DETERMINED" AS PERMITTED BELOW.
13. AIR-ENTRAINED CONCRETE AT EXPOSURE CLASSES F1, F2 AND F3 SHALL MEET ACI 318-19 SECTION 19.3.3.

REQUIREMENTS FOR CONCRETE BASED ON EXPOSURE CLASS

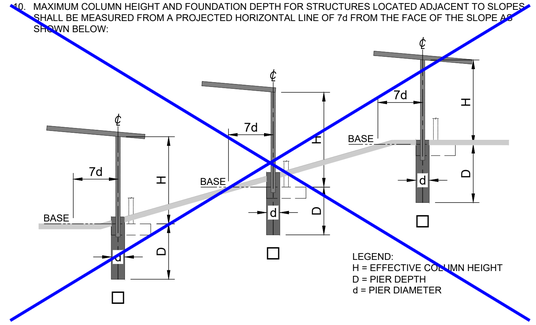
USE	EXPOSURE CLASS ACI TABLE 19.3.1.1	MINIMUM CONCRETE STRENGTH F'_c	CEMENT TYPE ASTM C150	MAX. WATER/CEMENT RATIO W/M
☐	NOT DETERMINED	4,500 PSI	TYPE V	0.45
☒	F0, S0, W0, W1, C0, C1	4,000 PSI	TYPE II	N/A
☐	S1, W2	4,000 PSI	TYPE II	0.50
☐	C2, F3	5,000 PSI	TYPE V	0.40
☐	ALL OTHER	4,500 PSI	TYPE V	0.45

STEEL NOTES

1. COLD FORMED STEEL SIZES ARE BASED ON GAUGE THICKNESS.
2. PURLINS, BEAMS, POSTS (FRAMING MEMBERS) HAVE MIN. YIELD STRENGTHS AS INDICATED.
3. ZINC COATING OF STRUCTURAL STEEL SHALL CONFORM WITH G90 STANDARD OR BETTER COLD FORMED STEEL (CFS) MEMBERS TO BE GALVANIZED IN ACCORDANCE WITH ASTM A653 G90 STANDARD. HOLLOW STRUCTURAL STEEL (HSS) MEMBERS AND STEEL PLATES SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A123, UNLESS NOTED OTHERWISE.
4. ALL STEEL MEMBERS SHALL BE GALVANIZED OR PAINTED WITH ZINC-RICH PRIMER, UNDERCOAT AND FINISH COAT OR EQUIVALENT PAINT SYSTEM. CONTRACT DOCUMENTS SHALL SPECIFY THE TYPE OF SSPC CORROSION RESISTING SYSTEM TO BE UTILIZED AND THE SSPC GRADE FOR CLEANING, MINIMUM SSPC GRADE SP2.
5. STRUCTURAL STEEL SHALL BE HOT-DIP GALVANIZED (MINIMUM ASTM A123 OR A153, CLASS D) OR PAINTED WITH ZINC-RICH PRIMER, UNDERCOAT, AND FINISH COAT; OR EQUIVALENT PAINT SYSTEM. COLD-FORMED STEEL MEMBERS SHALL BE 55% ALUMINUM-ZINC ALLOY COATED PER ASTM A792/A792M STANDARD IN ACCORDANCE TO AISI S240 TABLE A4-1, CP 90 COATING DESIGNATION.
6. ALL EXPOSED STEEL FASTENERS, INCLUDING CAST IN PLACE ANCHOR BOLTS/RODS, SHALL BE STAINLESS STEEL (TYPE 304 MINIMUM), HOT-DIP GALVANIZED (ASTM A153, CLASS D MINIMUM OR ASTM F2329), OR PROTECTED WITH CORROSION-PREVENTIVE COATING THAT DEMONSTRATED NO MORE THAN 2% OF RED RUST IN MINIMUM 1,000 HOURS OF EXPOSURE IN SALT SPRAY TEST PER ASTM B117. ZINC-PLATED FASTENERS DO NOT COMPLY WITH THIS REQUIREMENT. (EXAMPLE PROPRIETARY COATINGS THAT COMPLY WITH THE 1000 HOUR REQUIREMENT INCLUDE BUT ARE NOT NECESSARILY LIMITED TO: QUIK GUARD BY SIMPSON, KWIK-COTE BY HILTI, STALGARD BY ELCO, VISTACORR BY SFS INTEC, ETC.)
7. ALL STEEL FABRICATION SHALL COMPLY WITH LATEST AISC SPECIFICATIONS.
8. ALL WELDING SHALL COMPLY WITH THE LATEST AWS D1.1. ALL WELD FILLER MATERIAL SHALL HAVE A MINIMUM CHARPY V-NOTCH (CVN) VALUE OF 20 FT-LBS AT A TEMPERATURE OF -20° F.
9. ALL BOLTS TO MEET OR EXCEED ASTM A307. NO BOLTING INSPECTIONS REQUIRED U.N.O.
10. ALL PLATES AND ANGLES TO BE ASTM A36 U.N.O.
11. ALL STRUCTURAL TUBING TO BE ASTM A1085 U.N.O.
12. ALL PURLINS TO BE ASTM A653 GR. 55
13. REPAIR ANY DAMAGED GALVANIZATION AFTER FIELD WELDS WITH AN APPROVED REPAIR METHOD.
14. ALL MEMBERS TO BE GALVANIZED OR PRIMED AND PAINTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. ALL CONTRACT DOCUMENTS SHALL SPECIFY THE TYPE OF SSPC CORROSION RESISTING SYSTEM TO BE UTILIZED AND THE SSPC GRADE FOR CLEANING, MINIMUM SSPC GRADE SP2.
15. ALL BEAM TO COLUMN CONNECTIONS TO MEET WITH DETAILS 3 OR 4/S-10, 3 OR 4/S-15 FOR CORROSION PROTECTION.
16. ALL A307 BOLTS MAY BE SUBSTITUTED WITH THE SAME QUANTITY OF SAE J429 GRADE 2 BOLTS OF THE SAME DIAMETER.
17. A1085 STEEL HAS SAME OR BETTER PROPERTIES AND WELDABILITY THAN A500 GR. B.
18. BOLT HOLES FOR ½" Ø BOLTS SHALL BE 9/16" Ø.
19. BOLTS SHALL BE TIGHTENED TO SNUG-TIGHT CONDITION UNLESS NOTED OTHERWISE.
20. ALL BOLTS SHALL BE PROVIDED WITH A METHOD TO PREVENT NUTS FROM LOOSENING. SAMPLE ACCEPTABLE METHODS ARE: LOCK WASHERS, NYLOCK NUTS, BOLTS WITHOUT WASHERS WITH SERRATED NUTS, ND PATCH, LOCTITE, OTHER SIMILAR CHEMICAL LOCKING DEVICES, OR OTHER SIMILAR LOCKING DEVICES. ONLY ONE METHOD IS REQUIRED. CONTRACTOR TO IDENTIFY A METHOD IN ALL SUBMITTALS TO THE DESIGN PROFESSIONAL IN GENERAL RESPONSIBLE CHARGE.
21. ALL BOLTS IN THIS PC OTHER THAN THOSE SHOWN IN DETAILS 3/S-18, 4/S-18, 5/S-18, 7/S-18 DO NOT REQUIRE SPECIAL INSPECTION.
22. ALL HSS MEMBERS MAY BE SUBSTITUTED WITH AN ALTERNATE HSS MEMBER WITH EQUAL OR GREATER DIMENSIONS IN HEIGHT, WIDTH, AND THICKNESS. EXAMPLE HSS 12x8x¼ MAY BE SUBSTITUTED WITH 12x8x5/16 OR 14x10x5/16 OR 16x12x⅜ OR OTHER MEMBER WITH A HEIGHT EQUAL TO OR GREATER THAN 12 INCHES WITH A WIDTH EQUAL TO OR GREATER THAN 8 INCHES WITH A WALL THICKNESS OF ¼ INCH OR GREATER.
23. ALL HSS MEMBERS USING ASTM A1085 MATERIAL MAY SUBSTITUTE ASTM A500, GRADE B MATERIAL PROVIDED THE THICKNESS OF THE MEMBER IS INCREASED BY A MINIMUM OF 1/16".
24. BOLT HOLES IN THE PURLIN MEMBERS FOR THE PURLIN TO BEAM CONNECTIONS AND PURLIN SPLICES MAY BE OVERSIZED BY ⅛".

SOILS NOTES

1. A SITE SPECIFIC GEOTECHNICAL REPORT IS REQUIRED.
2. THE GEOTECHNICAL ENGINEER SHALL REVIEW THE SITE CONDITIONS, TESTING RESULTS, ALL APPLICABLE ALLOWABLE INCREASES AND SPECIFY THE FINAL SOIL CLASS TO BE USED FROM THE TABLE BELOW. THE GEOTECHNICAL ENGINEER SHALL PROVIDE IN THE GEOTECHNICAL REPORT THE BASE VALUES WITHOUT INCREASE FOR MINIMUM 24" DIAMETER PIERS. THE ALLOWABLE VERTICAL END BEARING, ALLOWABLE LATERAL BEARING, ALLOWABLE DOWNWARD SKIN FRICTION AND ALLOWABLE SKIN FRICTION TO RESIST UPLIFT. FACTORS OF SAFETY USED FOR THESE BASE VALUES ARE TO BE CLEARLY IDENTIFIED. THE GEOTECHNICAL ENGINEER SHALL ALSO PROVIDE ANY ALLOWABLE INCREASES TO THE BASE VALUES. POSSIBLE ALLOWABLE INCREASES TO BE CONFIRMED BY THE GEOTECHNICAL ENGINEER ARE: DOUBLE LATERAL BEARING VALUES DUE TO ISOLATED FOUNDATIONS, DOUBLE LATERAL BEARING VALUES DUE TO THE STRUCTURE NOT BEING ADVERSELY AFFECTED BY 1/2" DEFLECTION AT THE SURFACE, A 4/3 INCREASE DUE TO SHORT TERM LOADING AND ANY OTHER ALLOWABLE INCREASES. THE GEOTECHNICAL ENGINEER SHALL MAKE RECOMMENDATION FOR THE SOIL CLASS TO BE USED AFTER ALL INCREASES HAVE BEEN APPLIED, WHERE ALLOWED PER THE 2022 CBC LOAD COMBINATIONS. ALL FOUNDATIONS HAVE BEEN DESIGNED BASED ON THE VALUES PRESENTED IN THE TABLE BELOW. THE GEOTECHNICAL REPORT SHALL ADDRESS IF THE USE OF STEEL CASING THAT IS TWISTED INTO PLACE AND LEFT INSTALLED AFFECTS ANY ALLOWABLE VALUES.
3. THE GEOTECHNICAL ENGINEER MAY SPECIFY DIFFERENT SOILS CLASSES TO BE USED FOR THE DIFFERENT STRUCTURE TYPES (T OR OT), DIFFERENT AREAS OF THE SITE (I.E. NORTH LOT OR WEST LOT), OR THE ENGINEER MAY SPECIFY ONE SOILS CLASS TO BE USED FOR THE ENTIRE SITE.
4. THE GEOTECHNICAL ENGINEER SHALL ADDRESS IN THE REPORT ANY CONCRETE DURABILITY REQUIREMENTS IN ACCORDANCE WITH ACI 318-19 CHAPTER 4.
5. THE GEOTECHNICAL REPORT SHALL BE SPECIFIC TO THE LOCATION OF THE PHOTOVOLTAIC STRUCTURES. BORING(S) SHALL BE DONE AT THE SPECIFIC LOCATION(S) WHERE THE PHOTOVOLTAIC STRUCTURES ARE TO OCCUR. THE GEOTECHNICAL REPORT SHALL CONFORM TO 2022 CBC SECTION 1803A.
6. GEOTECHNICAL ENGINEER SHALL IDENTIFY THE LOCATION WHERE "USABLE SOIL" STARTS WHICH IS ALLOWED TO BE AT GRADE OR DEEPER IF NECCESSARY. SEE DETAILS 2/S-6, 2/S-11, 3/S-11.
7. A COPY OF THE GEOTECHNICAL REPORT SHALL BE PROVIDED AT THE TIME OF PLAN REVIEW.
8. AT THE TIME OF PLAN REVIEW, THE STRUCTURAL ENGINEER OF RECORD SHALL SELECT A SOILS CLASS ON THE SITE-SPECIFIC PLANS BASED ON THE GEOTECHNICAL REPORT.
9. DESIGN OF PC STRUCTURE ASSUMES A MAXIMUM LATERAL DISPLACEMENT OF 1/2" AT THE BASE; ALLOWABLE LATERAL BEARING VALUES THAT RESULT IN LARGER DISPLACEMENTS ARE NOT ACCEPTABLE FOR USE WITH THIS PC STRUCTURE
10. MAXIMUM COLUMN HEIGHT AND FOUNDATION DEPTH FOR STRUCTURES LOCATED ADJACENT TO SLOPES SHALL BE MEASURED FROM A PROJECTED HORIZONTAL LINE OF 7d FROM THE FACE OF THE SLOPE AS SHOWN BELOW:



PIER FOUNDATIONS - FINAL DESIGN VALUES [1,2,3]

USE	SOILS CLASS	MIN. ALLOWABLE END BEARING (psf)	MIN. ALLOWABLE LATERAL BEARING (psf/ft)	MAX. LATERAL BEARING (psf)	MIN. ALLOWABLE SKIN FRICTION DOWN (psf)	MIN. ALLOWABLE SKIN FRICTION UP (psf)
☒	CLASS W	0	267	4,000	250	125
☐	CLASS X	0	400	6,000	365	162.5
☐	CLASS Y	0	533	8,000	365	175
☐	CLASS Z	0	800	12,000	425	212.5

SPREAD FOOTINGS - FINAL DESIGN VALUES [1,2,3]

USE	SOILS CLASS	MIN. ALLOWABLE END BEARING (psf)	MIN. ALLOWABLE LATERAL BEARING (psf/ft)	MAX. LATERAL BEARING (psf)	SLIDING FRICTION μ
☐	ALL	1,500	100	2,000	0.25

NOTES:
1. TABLE ALREADY TAKES INTO ACCOUNT 1/3 INCREASE AND DOUBLING OF THE PASSIVE PRESSURE WITHOUT ANY FURTHER INCREASES. GEOTECHNICAL ENGINEER IS REQUIRED TO SPECIFY THE SOILS CLASS WHERE FINAL VALUES WITH INCREASES ARE NOT ALLOWED TO EXCEED THESE VALUES)
2. DOUBLING THE PASSIVE PRESSURE DUE TO SOIL ARCHING EFFECTS IS NOT ALLOWED IN CONJUCTION WITH DOUBLING BASED ON THE 1/2" DEFLECTION AT THE SURFACE.
3. THE FOUNDATION DESIGNS FOR THIS PC ARE BASED ON 2022 CBC ALTERNATE BASIC LOAD COMBINATIONS PER SECTION 1605A.3.2 WHERE 1/3 INCREASES ARE ALLOWED.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 03-125900 INC: A
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 03/18/2026

4 STEL ENGINEERING
26030 ACERO
MISSION VIEJO, CA 92691
949.305.1150 | FAX 949.305.1420

M BAR C CONSTRUCTION INC.
1770 LA COSTA MEADOWS DRIVE
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LIC # 869960
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ENGINEER'S APPROVAL

BID INFORMATION
THE STRUCTURES AND DESIGNS IN THIS PC ARE PROPRIETARY TO M BAR C CONSTRUCTION, INC. AND 4 S.T.E.L. ENGINEERING, INC. ALL SITES USING THIS PC: M BAR C CONSTRUCTION, INC. SHALL BE THE STEEL CONTRACTOR & 4 S.T.E.L. ENGINEERING, INC. SHALL BE THE SEOR. SEE THE STANDARD NOTES FOR PC USE ON S-1 FOR ADDITIONAL REQUIREMENTS.

PRE-CHECK (PC) DOCUMENT
CODE: 2022 CBC
A SEPARATE PROJECT APPLICATION FOR CONSTRUCTION IS REQUIRED

APPROVED
DIV. OF THE STATE ARCHITECT
APP: 04-123955 PC
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑ CG ☐
DATE: 10/14/2024

SITE SPECIFIC INFORMATION
ALTADENA ELEMENTARY SCHOOL
743 E CALAVERAS ST.
ALTADENA, CA 91001

REVISIONS

MARK	DATE	DESCRIPTION

4 STEL JOB #	MC02-V3-6
DATE	10-03-24
DRAWN BY	GM
CHECKED	RWS

UG 22.6.1

GENERAL NOTES

S-3

NOTE: IF DWG. IS NOT 24 x 36, IT IS NOT FULL SIZE

DSA 103-22: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS, 2022 CBC

Application Number: 04-122157
DSA File Number: 7C-61
School Name: Ultimate Guardian PC-22.6
- Spread Footing Only with Post Installed Anchors
Increment Number:
School District: N/A
Date Created: 2023-04-06

Geotechnical Reports: Project has a geotechnical report, or CDs indicate soils special inspection is required by GE

	S1. GENERAL:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**a.** Verify that: • 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 are adequate to achieve the design bearing capacity.	**Periodic**	**GE***	* By geotechnical engineer or his or her qualified representative. (See Appendix (end of this form) form for exemptions.)

	C1. CAST-IN-PLACE CONCRETE			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**a.** Verify use of required design mix.	**Periodic**	**SI**	**Table 1705A.3 Item 5, 1910A.1.**
☑	**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.)
☑	**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.
☑	**d.** Test concrete (f'c).	**Test**	**LOR**	**1905A.1.17;** ACI 318-19 Section 26.12.

	C5. POST-INSTALLED ANCHORS:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**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 318-14 Sections 17.8 & 17.8.1.* May be performed by the project inspector when specifically approved by DSA.
☑	**b.** Test post-installed anchors.	**Test**	**LOR**	**1910A.5.** (See Appendix (end of this form) for exemptions.)

	S/A1. STRUCTURAL STEEL, COLD-FORMED STEEL AND ALUMINUM USED FOR STRUCTURAL PURPOSES			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**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.
☑	**b.** Test unidentified materials	**Test**	**LOR**	**2202A.1.**
☑	**c.** Examine seam welds of HSS shapes	**Periodic**	**SI**	DSA IR 17-3.
☑	**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**).

	S/A3. WELDING:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**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.
☑	**b.** Verify weld filler material manufacturer's certificate of compliance.	**Periodic**	**SI**	DSA IR 17-3.
☑	**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**
☑	**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;** ASC 360-16 (and AISC 341-16 as applicable); DSA IR 17-3.
☑	**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.

	S/A5. FIELD WELDING (IN ADDITION TO SECTION S/A3):			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**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.
☑	**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.

	X1. OTHER:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**c.** SOLAR PANEL ATTACHMENT	**Continuous**	**LOR**	Pre-tension bolt connections and calibration of test equipment
☑	**d.** SOLAR PANEL ATTACHMENT BOLTS	**Test**	**LOR**	Bolts shall be identified, sampled, and tested in accordance with DSA IR 17-8.19

1. Soils Testing and Inspection: Geotechnical Verified Report Form DSA 293
2. Structural Testing and Inspection: Laboratory Verified Report Form DSA 291
3. Post-installed Anchors: Laboratory Verified Report Form DSA 291, or, for independently contracting SI, Special Inspection Verified Report Form DSA 292
4. Shop Welding Inspection: Laboratory Verified Report Form DSA 291, or, for independently contracting SI, Special Inspection Verified Report Form DSA 292

5 - SAMPLE DSA-103 - STRUCTURES WITH ONLY SPREAD FOUNDATIONS WITH POST INSTALLED ANCHORS

4 - SAMPLE DSA-103 - STRUCTURES WITH PIER & SPREAD FOUNDATIONS WITHOUT POST INSTALLED ANCHORS

3 - SAMPLE DSA-103 - STRUCTURES WITH PIER & SPREAD FOUNDATIONS WITH POST INSTALLED ANCHORS

2 - SAMPLE DSA-103 - STRUCTURES WITH ONLY PIER FOUNDATIONS WITHOUT POST INSTALLED ANCHORS

6 - SAMPLE DSA-103 - STRUCTURES WITH ONLY SPREAD FOUNDATIONS WITHOUT POST INSTALLED ANCHORS

1 - SAMPLE DSA-103 - STRUCTURES WITH ONLY PIER FOUNDATIONS WITH POST INSTALLED ANCHORS

THE EXAMPLE FORM DSA-103'S SHOWN ON THIS SHEET ARE FOR ILLUSTRATION PURPOSES ONLY TO ASSIST IN THE COMPLETION OF FUTURE PROJECT-SPECIFIC FORM DSA-103'S. A FORM DSA-103 IS TO BE COMPLETED FOR EACH APPLICATION THAT THIS PC IS BEING INCORPORATED INTO AND ALL EXAMPLE FORM DSA-103'S ARE TO BE CROSSED OUT ON THIS DRAWING

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 03-125900 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 03/18/2026

4 STEEL ENGINEERING
26930 ACERO
MISSION VIEJO, CA 92691
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ENGINEER'S APPROVAL

REGISTERED PROFESSIONAL ENGINEER
DUSTIN K. ROSEMAN
S 5885
CIVIL
STATE OF CALIFORNIA

BID INFORMATION
THE STRUCTURES AND DESIGNS IN THIS PC ARE PROPRIETARY TO M BAR C CONSTRUCTION, INC. AND 4 S.T.E.L. ENGINEERING, INC. ALL SITES USING THIS PC: M BAR C CONSTRUCTION, INC. SHALL BE THE STEEL CONTRACTOR & S.T.E.L. ENGINEERING, INC. SHALL BE THE SEOR. SEE THE STANDARD NOTES FOR PC USE ON S-1 FOR ADDITIONAL REQUIREMENTS.

PRE-CHECK (PC) DOCUMENT
CODE: 2022 CBC
A SEPARATE PROJECT APPLICATION FOR CONSTRUCTION IS REQUIRED

APPROVED
DIV. OF THE STATE ARCHITECT
APP: 04-123955 PC
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑ CG ☐
DATE: 10/14/2024

SITE SPECIFIC INFORMATION
ALTADENA ELEMENTARY SCHOOL
743 E CALAVERAS ST.
ALTADENA, CA 91001

REVISIONS

MARK	DATE	DESCRIPTION

4 STEL JOB #	MC02-V3-6
DATE	10-03-24
DRAWN BY	GM
CHECKED	RWS
UG 22.6.1	

SAMPLE DSA-103 FORMS

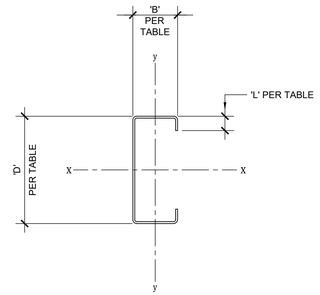
S-4

NOTE: IF DWG. IS NOT 24 x 36, IT IS NOT FULL SIZE

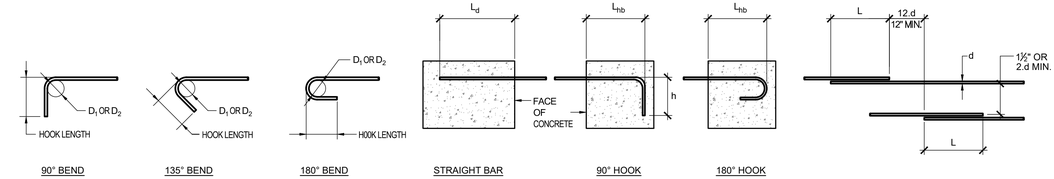
USE	SECTION NAME	D (in)	B (in)	L (in)	GA	WT (lb/ft)	A (in^2)	AXIS X-X			AXIS Y-Y		
								I_x (in^4)	S_{xe} (in^3)	r_x (in)	I_y (in^4)	S_y (in^3)	r_y (in)
☐	CS5 x 2.5 x 0.057	5	2.5	0.625	16	2.086	0.613	2.513	0.819	2.025	0.529	0.322	0.929
☐	CS7 x 2.5 x 0.057	7	2.5	0.625	16	2.401	0.726	5.462	1.288	2.743	0.590	0.334	0.902
☐	CS7 x 2.5 x 0.071	7	2.5	0.625	14	3.086	0.907	6.768	1.934	2.732	0.723	0.402	0.893
☒	CS9 x 2.5 x 0.057	9	2.5	0.625	16	2.856	0.839	9.864	1.630	3.428	0.635	0.341	0.870
☐	CS11 x 2.5 x 0.057	11	2.5	0.625	16	3.241	0.953	15.945	2.245	4.091	0.668	0.347	0.838

NOTES:

1. COLD FORMED STEEL (CFS) BLOCKING MATERIAL SHALL CONFORM TO ASTM A653 SS GRADE 55 (F_y = 55 KSI, F_u = 70 KSI) OR ASTM A1011 SS GRADE 55 (F_y = 55 KSI, F_u = 70 KSI).
2. COLD FORMED STEEL (CFS) DESIGNED PER 2012 AISI SPECIFICATIONS AND COLD-FORMED STEEL DESIGN MANUAL.
3. CFS SECTION PROPERTIES LISTED ABOVE ARE MINIMUM SECTION PROPERTIES REQUIRED PER THE LATEST STEEL FRAMING INDUSTRY ASSOCIATION (SFIA) PRODUCT TECHNICAL GUIDE. ACTUAL MANUFACTURER'S PROPERTIES MUST MEET OR EXCEED SFIA PROPERTIES.



3 - PURLIN BLOCKING AND BRACING
COLD FORMED C-SECTIONS
N.T.S.



FINISHED BEND DIAMETERS		
BAR SIZE	D_1	D_2
#3	1½"	2¼"
#4	2"	3"
#5	2½"	3¼"
#6, #7, #8	6.d	6.d

"D_1" - FINISHED BEND DIA. FOR STIRRUP & TIE HOOKS.
"D_2" - BEND DIA. FOR STD HOOKS.
"d" - BAR DIAMETER

STANDARD HOOK LENGTHS				
BAR SIZE	MAIN REINF.		STIRRUP & TIE HOOKS	
	90°	180°	90°	135°
#3	6"	4"	3½"	4¼"
#4	8"	4½"	4½"	4½"
#5	10"	5"	6"	6"
#6	12"	6"	12"	7½"
#7	14"	7"	14"	9"
#8	16"	8"	16"	10"

REINFORCEMENT DEVELOPMENT LENGTHS				
CONCRETE STRENGTH		F'c = 3,000 PSI		
NOMINAL BAR SIZE	h	L_d		L_{hb}
		TOP BARS	OTHER BARS	
#3	6"	1'-10"	1'-5"	9"
#4	8"	2'-5"	1'-10"	11"
#5	10"	3'-0"	2'-4"	1'-2"
#6	1'-0"	3'-7"	2'-9"	1'-5"
#7	1'-2"	5'-3"	4'-0"	1'-7"
#8	1'-4"	6'-0"	4'-7"	1'-10"

NOTES:
1. TOP BARS ARE HORIZONTAL BARS WITH MORE THAN 12 INCHES OF CONCRETE CAST BELOW.

REINFORCEMENT LAP SPLICE LENGTH 'L'		
CONCRETE STRENGTH	F'c=3,000 PSI	
NOMINAL BAR SIZE	TOP BARS	OTHER BARS
#3	2'-4"	1'-10"
#4	3'-2"	2'-5"
#5	3'-11"	3'-0"
#6	4'-8"	3'-7"
#7	6'-9"	5'-3"
#8	7'-9"	6'-0"

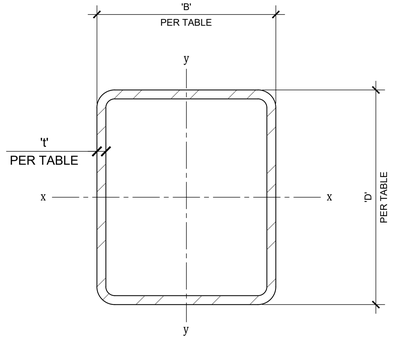
NOTES:
1. LAP SPLICE SHALL BE INCREASED 50% WHERE CLEAR SPACE BETWEEN BARS IS LESS THAN 2 BAR DIAMETERS AND/OR THE CLEAR COVER IS LESS THAN ONE BAR DIAMETER.

A STANDARD HOOKS
B DEVELOPMENT LENGTHS
C OFFSETS AND LAP SPLICES

1 - TYPICAL REINFORCEMENT BAR BENDS ~~AND LAPS~~
N.T.S.

USE	SECTION NAME	D (in)	B (in)	t (in)	WT (lb/ft)	A (in^2)	AXIS X-X			AXIS Y-Y		
							I_x (in^4)	Z_x (in^3)	r_x (in)	I_y (in^4)	Z_y (in^3)	r_y (in)
☐	HSS 12 x 8 x 1/4	12	8	0.250	32.630	9.590	196.000	39.100	4.520	105.000	29.600	3.310
☐	HSS 12 x 8 x 5/16	12	8	0.313	40.350	11.900	239.000	48.000	4.480	128.000	36.400	3.280
☐	HSS 12 x 8 x 3/8	12	8	0.375	47.900	14.400	279.000	56.500	4.450	149.000	35.100	3.250
☐	HSS 12 x 8 x 1/2	12	8	0.500	62.460	18.400	353.000	72.400	4.380	188.000	54.700	3.200
☐	HSS 14 x 10 x 1/4	14	10	0.250	39.430	11.600	331.000	56.000	5.340	198.000	44.600	4.130
☒	HSS 14 x 10 x 5/16	14	10	0.313	48.860	14.400	406.000	69.100	5.310	242.000	55.000	4.100
☐	HSS 14 x 10 x 3/8	14	10	0.375	58.100	17.100	476.000	81.500	5.280	284.000	64.800	4.080
☐	HSS 14 x 10 x 1/2	14	10	0.500	76.070	22.400	608.000	105.000	5.210	361.000	83.600	4.010
☒	HSS 14 x 10 x 5/8	14	10	0.625	93.340	27.400	728.000	127.000	5.150	431.000	101.000	3.970

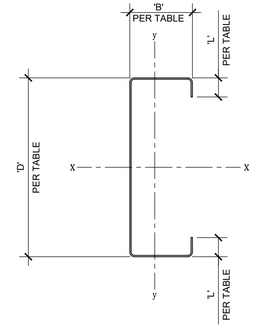
NOTES
1. HSS BEAMS AND COLUMNS SHALL CONFORM TO ASTM A1085, F_y=50 ksi.



4 - HOLLOW STRUCTURAL SECTIONS
N.T.S.

USE	SECTION NAME	D (in)	B (in)	L (in)	GA	WT (lb/ft)	A (in^2)	AXIS X-X			AXIS Y-Y		
								I_x (in^4)	S_{xe} (in^3)	r_x (in)	I_y (in^4)	S_y (in^3)	r_y (in)
☐	CS8 x 4 x 0.071	8	4	1.000	14	4.240	1.246	13.167	2.656	3.251	2.797	1.060	1.498
☐	CS10 x 3.5 x 0.102	10	3.5	0.875	12	6.310	1.855	28.148	5.118	3.895	2.992	1.207	1.270
☐	CS10 x 4 x 0.071	10	4	1.000	14	4.720	1.388	21.961	3.424	3.977	3.009	1.086	1.472
☐	CS10 x 4 x 0.102	10	4	1.000	12	6.650	1.957	30.639	5.255	3.957	4.137	1.499	1.454
☐	CS12 x 3.5 x 0.102	12	3.5	1.000	12	7.010	2.059	43.269	6.590	4.584	3.159	1.244	1.239
☐	CS12 x 4 x 0.071	12	4	1.000	14	5.210	1.531	33.532	4.082	4.680	3.183	1.105	1.442
☒	CS12 x 4 x 0.102	12	4	1.000	12	7.350	2.161	46.868	6.761	4.658	4.376	1.527	1.423
☐	CS14 x 3.5 x 0.071	14	3.5	1.000	14	5.450	1.602	44.787	4.789	5.283	2.486	0.915	1.226

NOTES:
1. COLD FORMED STEEL (CFS) PURLIN MATERIAL SHALL CONFORM TO ASTM A653 SS GRADE 55 (F_Y = 55 KSI, F_U = 70 KSI) OR ASTM A1011 SS GRADE 55 (F_Y = 55 KSI, F_U = 70 KSI).
2. COLD FORMED STEEL (CFS) DESIGNED PER 2012 AISI SPECIFICATIONS AND AISI COLD-FORMED STEEL DESIGN MANUAL.
3. CFS SECTION PROPERTIES LISTED ABOVE ARE MINIMUM SECTION PROPERTIES REQUIRED PER THE LATEST STEEL FRAMING INDUSTRY ASSOCIATION (SFIA) PRODUCT TECHNICAL GUIDE. ACTUAL MANUFACTURER'S PROPERTIES MUST MEET OR EXCEED SFIA PROPERTIES.



2 - PURLINS
COLD FORMED C-SECTIONS
N.T.S.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 03-125900 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 03/18/2026

4 STEEL ENGINEERING
26030 ACERO
MISSION VIEJO, CA 92691
949.305.1150 | FAX 949.305.1420

M BAR C CONSTRUCTION INC.
1770 LA COSTA MEADOWS DRIVE
SAN MARCOS, CA 92078
ERIK KRIVOKOPICH
PHONE: (760) 744-4131
FAX: (760) 744-4449
ERIK@MBARCONLINE.COM
LIC # 869960 B AND C-57 (775) 787-8845

ENGINEER'S APPROVAL

REGISTERED PROFESSIONAL ENGINEER DUSTIN K. ROSENTRETER S 5885 STATE OF CALIFORNIA

BID INFORMATION
THE STRUCTURES AND DESIGNS IN THIS PC ARE PROPRIETARY TO M BAR C CONSTRUCTION, INC. AND 4 S.T.E.L. ENGINEERING, INC. ALL SITES USING THIS PC: M BAR C CONSTRUCTION, INC. SHALL BE THE STEEL CONTRACTOR & 4 S.T.E.L. ENGINEERING, INC. SHALL BE THE SEOR. SEE THE STANDARD NOTES FOR PC USE ON S-1 FOR ADDITIONAL REQUIREMENTS.

PRE-CHECK (PC) DOCUMENT
CODE: 2022 CBC
A SEPARATE PROJECT APPLICATION FOR CONSTRUCTION IS REQUIRED

APPROVED
DIV. OF THE STATE ARCHITECT
APP: 04-123955 PC
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑ CG ☐
DATE: 10/14/2024

SITE SPECIFIC INFORMATION
ALTADENA ELEMENTARY SCHOOL
743 E CALAVERAS ST.
ALTADENA, CA 91001

REVISIONS

MARK	DATE	DESCRIPTION

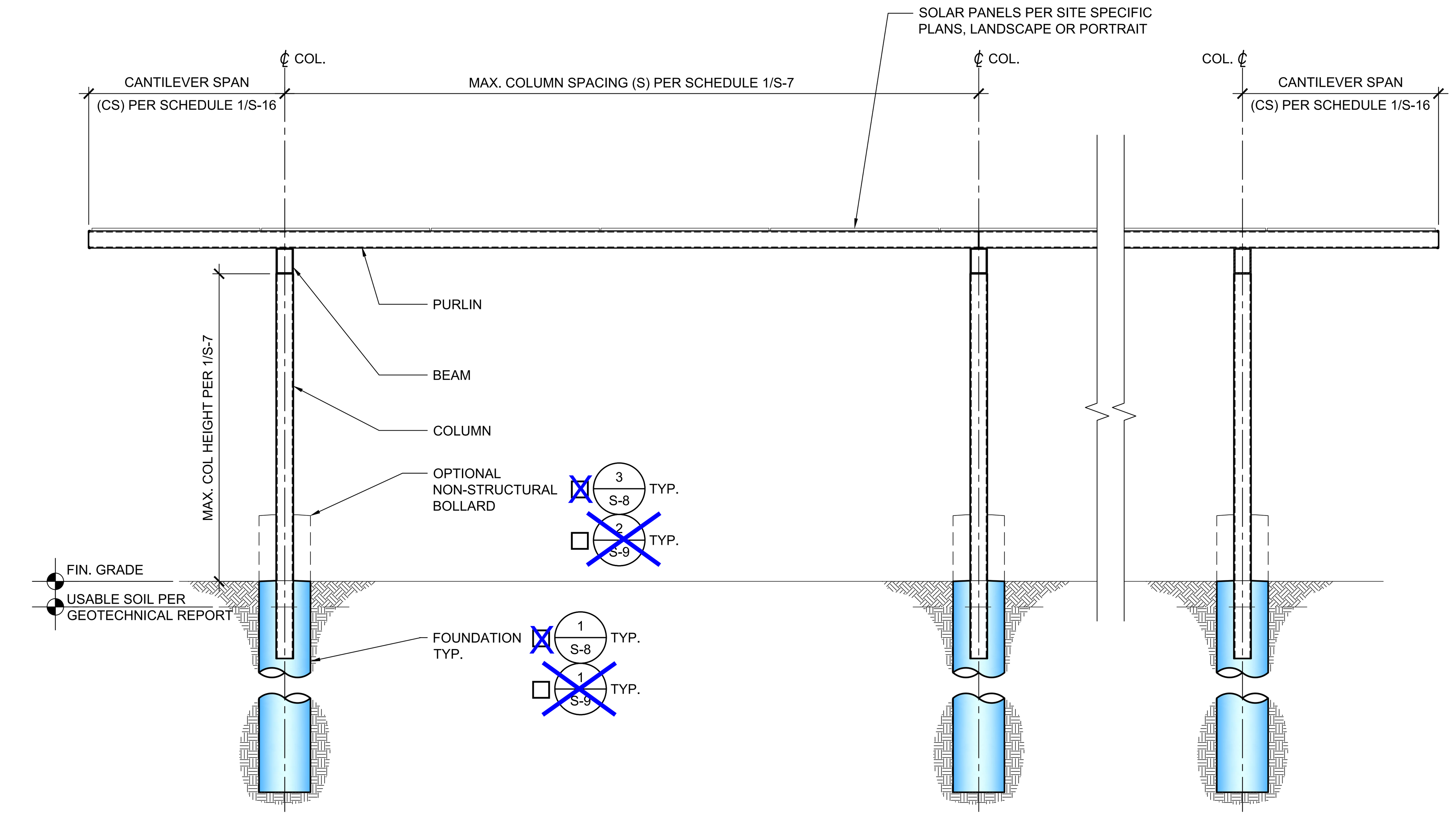
4 STEL JOB #	MC02-V3-6
DATE	10-03-24
DRAWN BY	GM
CHECKED	RWS

UG 22.6.1

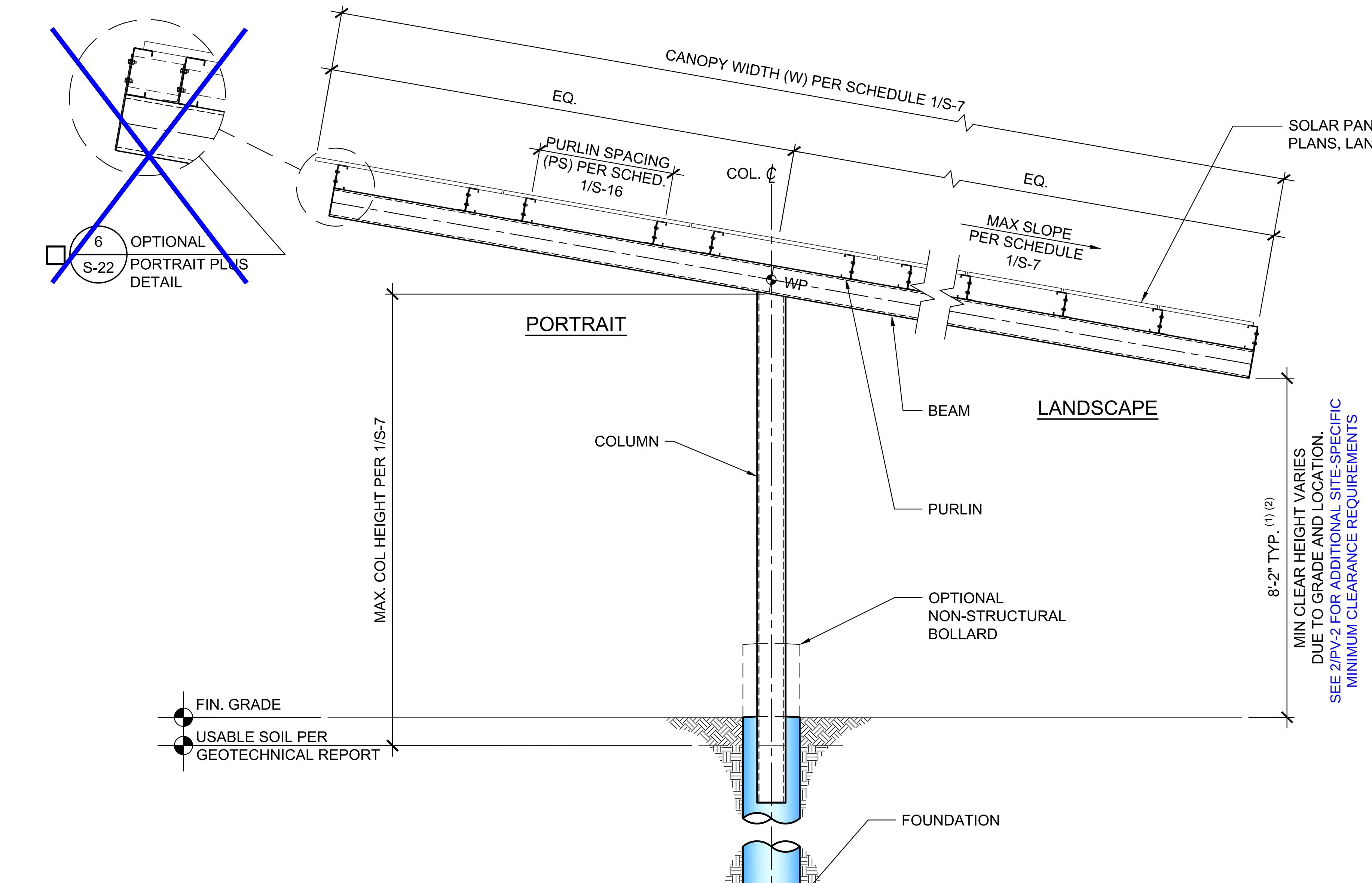
SECTION PROPERTIES & REBAR DETAILS

S-5

NOTE: IF DWG. IS NOT 24 x 36, IT IS NOT FULL SIZE

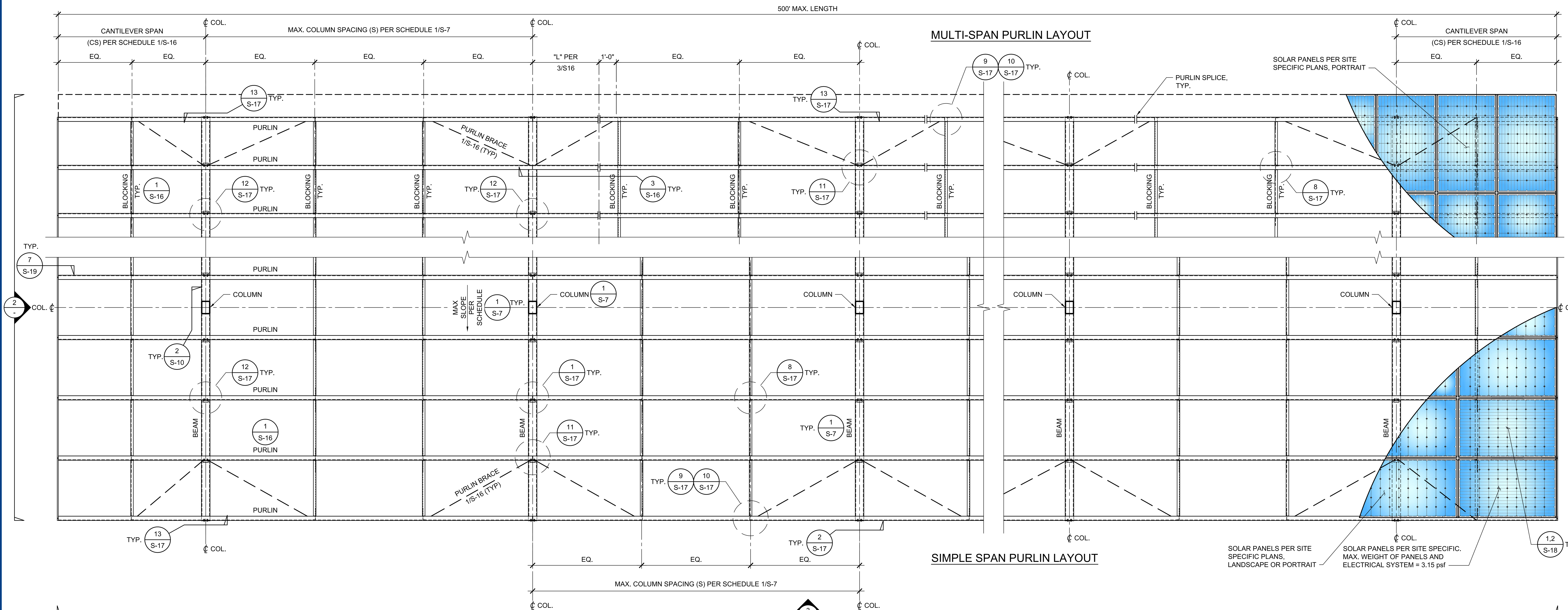


3
-
T-STRUCTURE - TYPICAL SIDE ELEVATION
N.T.S.



NOTES:
1. SEE ACCESS NOTES ON SHEET S-2 WHEN LOCATED IN ACCESSIBLE AREAS.
2. SEE FIRE LIFE SAFETY NOTE #1 ON SHEET S-2 WHEN AT FIRE LANE.

2
-
T-STRUCTURE - END ELEVATION
N.T.S.



NOTE:
1. BEAM, COLUMN, CONNECTION, AND FOUNDATION SIZES AT ENDS OF STRUCTURE MAY NEED TO BE INCREASED DEPENDING ON PURLIN CANTILEVER. SEE PURLIN SCHEDULE '1/S-16' NOTE 6.
2. ☐ CANTILEVER MID-SPAN BLOCKING/CANTILEVER BRACING REQUIRED, SEE S-16.

1
-
T-STRUCTURE - FRAMING PLAN
N.T.S.

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B AND C51
(775) 787-8845

ENGINEER'S APPROVAL
REGISTERED PROFESSIONAL ENGINEER
DUSTIN K. ROSEPINK
S 5885
STRUCTURAL
STATE OF CALIFORNIA
[illegible]

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T-STRUCTURE
FRAMING PLAN
& ELEVATIONS

S-6

NOTE: IF DWG. IS NOT 24 x 36, IT IS NOT FULL SIZE

T-STRUCTURE BEAM/COLUMN SCHEDULE

USE	I.D. #	MULTI SPAN PURLIN	MAX. WIDTH W	MAX. COLUMN SPACING S	MAX. COLUMN HEIGHT [4]	MAX. ROOF SLOPE	ROOF SNOW LOAD (PSF)	BEAM		BEAM TO COLUMN DETAIL	COLUMN	
								SECTION	DETAIL		SECTION	DETAIL
☐	T-601	☐	36'-3"	18'-0"	15'-0"	7°	5	HSS12 x 8 x 1/4	4/S-5	2/S-10	HSS12 x 8 x 3/8	4/S-5
☐	T-602	☐	36'-3"	21'-6"	15'-0"	7°	5	HSS12 x 8 x 1/4	4/S-5	2/S-10	HSS12 x 8 x 1/2	4/S-5
☐	T-603	☐	36'-3"	28'-6"	15'-0"	7°	5	HSS14 x 10 x 5/16	4/S-5	2/S-10	HSS14 x 10 x 1/2	4/S-5
☐	T-604	☐	43'-0"	18'-0"	15'-0"	7°	5	HSS12 x 8 x 3/8	4/S-5	2/S-10	HSS12 x 8 x 1/2	4/S-5
☐	T-605	☐	43'-0"	21'-6"	15'-0"	7°	5	HSS14 x 10 x 5/16	4/S-5	2/S-10	HSS14 x 10 x 3/8	4/S-5
☐	T-606	☐	43'-0"	28'-6"	15'-0"	7°	5	HSS14 x 10 x 5/16	4/S-5	2/S-10	HSS14 x 10 x 1/2	4/S-5
☐	T-607	☑	43'-0"	32'-6"	15'-0"	7°	5	HSS14 x 10 x 5/16	4/S-5	2/S-10	HSS14 x 10 x 1/2	4/S-5
☐	T-608	☑	43'-0"	35'-9"	15'-0"	7°	5	HSS14 x 10 x 3/8	4/S-5	2/S-10	HSS14 x 10 x 5/8	4/S-5
☐	T-609	☐	36'-3"	18'-0"	20'-0"	7°	0	HSS12 x 8 x 1/4	4/S-5	2/S-10	HSS12 x 8 x 1/2	4/S-5
☐	T-610	☐	36'-3"	21'-6"	20'-0"	7°	5	HSS14 x 10 x 1/4	4/S-5	2/S-10	HSS14 x 10 x 1/2	4/S-5
☐	T-611	☐	36'-3"	28'-6"	20'-0"	7°	5	HSS14 x 10 x 5/16	4/S-5	2/S-10	HSS14 x 10 x 1/2	4/S-5
☐	T-612	☐	43'-0"	18'-0"	20'-0"	7°	5	HSS14 x 10 x 5/16	4/S-5	2/S-10	HSS14 x 10 x 1/2	4/S-5
☐	T-613	☐	43'-0"	21'-6"	20'-0"	7°	5	HSS14 x 10 x 5/16	4/S-5	2/S-10	HSS14 x 10 x 1/2	4/S-5
☒	T-614	☐	43'-0"	28'-6"	20'-0"	5°	5	HSS14 x 10 x 5/16	4/S-5	2/S-10	HSS14 x 10 x 5/8	4/S-5
☐	T-651	☐	36'-3"	18'-0"	15'-0"	7°	20	HSS12 x 8 x 5/16	4/S-5	2/S-10	HSS12 x 8 x 1/2	4/S-5
☐	T-652	☐	36'-3"	21'-6"	15'-0"	7°	20	HSS12 x 8 x 5/16	4/S-5	2/S-10	HSS12 x 8 x 1/2	4/S-5
☐	T-653	☐	36'-3"	28'-6"	15'-0"	7°	20	HSS14 x 10 x 5/16	4/S-5	2/S-10	HSS14 x 10 x 1/2	4/S-5
☐	T-654	☐	43'-0"	18'-0"	15'-0"	7°	20	HSS14 x 10 x 5/16	4/S-5	2/S-10	HSS14 x 10 x 3/8	4/S-5
☐	T-655	☐	43'-0"	21'-6"	15'-0"	7°	20	HSS14 x 10 x 5/16	4/S-5	2/S-10	HSS14 x 10 x 1/2	4/S-5
☐	T-656	☐	43'-0"	28'-6"	15'-0"	7°	20	HSS14 x 10 x 1/2	4/S-5	2/S-10	HSS14 x 10 x 1/2	4/S-5
☐	T-657	☑	43'-0"	32'-6"	15'-0"	7°	20	HSS14 x 10 x 1/2	4/S-5	2/S-10	HSS14 x 10 x 5/8	4/S-5
☐	T-658	☐	36'-3"	18'-0"	20'-0"	7°	20	HSS14 x 10 x 5/16	4/S-5	2/S-10	HSS14 x 10 x 1/2	4/S-5
☐	T-659	☐	36'-3"	21'-6"	20'-0"	7°	20	HSS14 x 10 x 5/16	4/S-5	2/S-10	HSS14 x 10 x 1/2	4/S-5
☐	T-660	☐	36'-3"	28'-6"	20'-0"	7°	20	HSS14 x 10 x 5/16	4/S-5	2/S-10	HSS14 x 10 x 1/2	4/S-5
☐	T-661	☐	43'-0"	21'-6"	20'-0"	7°	20	HSS14 x 10 x 5/16	4/S-5	2/S-10	HSS14 x 10 x 1/2	4/S-5

1. MULTIPLE STRUCTURE ID'S MAY BE SELECTED WITHIN THE SAME SITE AND/OR STRUCTURE.

2. WHEN UTILIZING A STRUCTURE ID READ FROM WITHIN THAT ID ROW ONLY.

~~☐ MULTI SPAN PURLIN REQUIRED~~

~~3. 32'-6" AND 35'-9" COLUMN SPACING MUST UTILIZE THE MULTI-SPAN PURLIN AS SHOWN WHEN MULTI SPAN PURLINS CHECKED ABOVE. THE ACTUAL SITE SPECIFIC COLUMN SPACING WILL BE DETERMINED BY THE SOLAR PANEL LAYOUT FOR THE SITE. THE COLUMN QUANTITY, COLUMN SPACING, AND PURLIN CANTILEVER LENGTHS ON EACH ARRAY MUST COMPLY WITH THE CORRESPONDING NOTE 9 OR 10 ON 1/S-16.~~

4. MAXIMUM COLUMN HEIGHT IS MEASURED FROM 'USABLE SOIL PER GEOTECHNICAL REPORT' AS SHOWN ON SHEET S-6 AND DETERMINED ON GEOTECH REPORT.

1 / - T-STRUCTURE BEAM/COLUMN SCHEDULE

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LIC # 869960 B AND C-57 (775) 787-8845

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DATE: 10/14/2024

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ALTADENA ELEMENTARY SCHOOL
743 E CALAVERAS ST.
ALTADENA, CA 91001

REVISIONS

MARK	DATE	DESCRIPTION

4 STEL JOB #	MC02-V3-6
DATE	10-03-24
DRAWN BY	GM
CHECKED	RWS

UG 22.6.1

T-STRUCTURE BEAM/COLUMN SCHEDULE

S-7

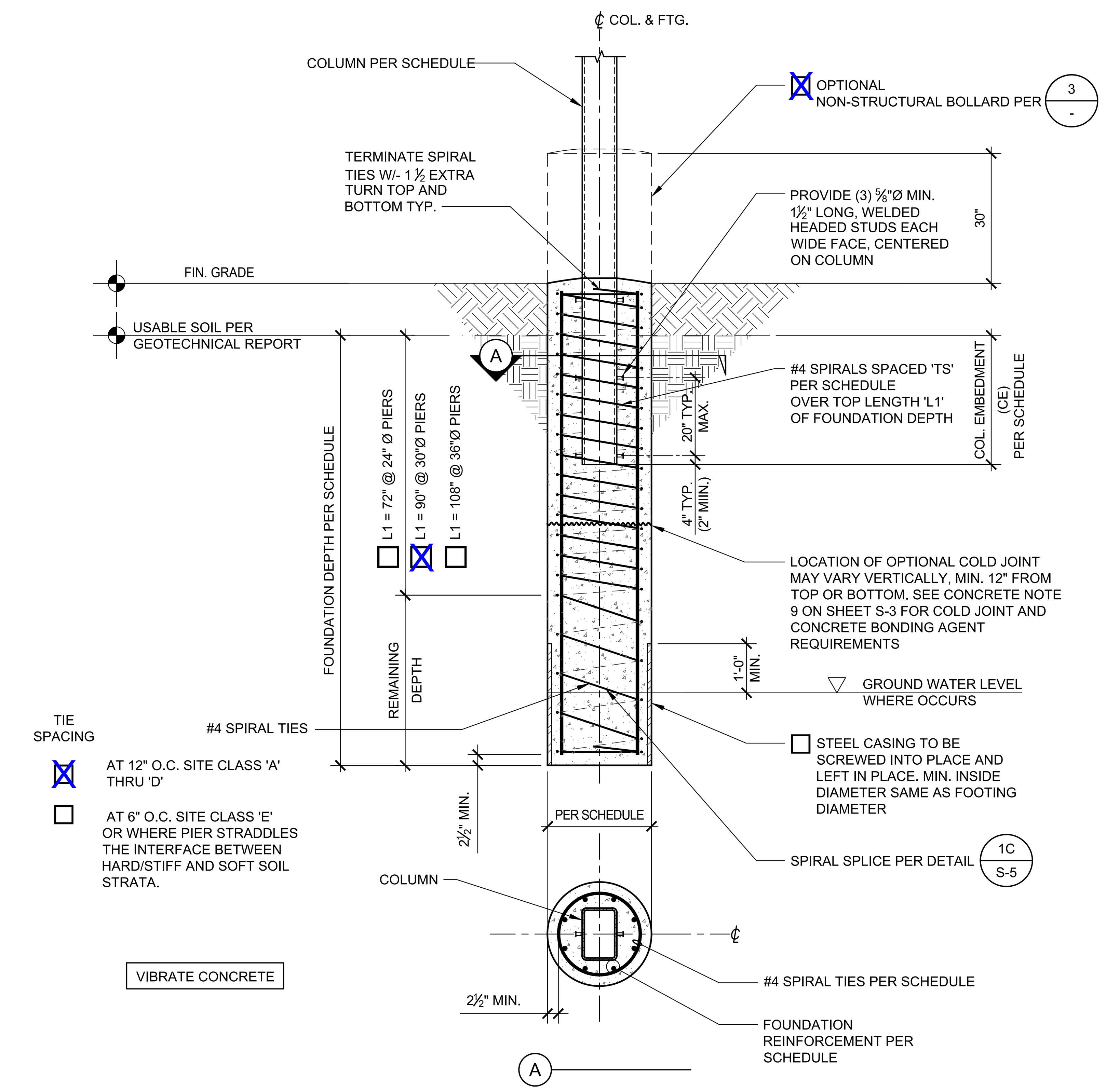
NOTE: IF DWG. IS NOT 24 x 36, IT IS NOT FULL SIZE

T-STRUCTURE PIER FOUNDATION SCHEDULE

USE	I.D. #	MAX. WIDTH W	MAX. COLUMN SPACING S	MAX. COLUMN HEIGHT	MAX. ROOF SLOPE	ROOF SNOW LOAD (PSF)	COLUMN EMBEDMENT CE	FOUNDATION DETAIL	PIER FOUNDATION DIAMETER & DEPTH — SOIL CLASS PER SOILS NOTES SHEET S-3 — [✓ W] DIAMETER	[✓ W] VERTICAL REINFT.	[✓ W] DEPTH	☐ X DIAMETER	☐ X DEPTH	☐ Y DIAMETER	☐ Y DEPTH	☐ Z DIAMETER	☐ Z DEPTH	[✓ X, Y, & Z] VERTICAL REINFT.	ALL CLASSES TIE SPACING "TS" AT TOP
☐	T-601	36'-3"	18'-0"	15'-0"	7°	5	56"	2/S-8	2'-0"	(5) - #8	15'-0"	2'-0"	12'-9"	2'-0"	11'-3"	2'-0"	9'-9"	(5) - #8	6"
☐	T-602	36'-3"	21'-6"	15'-0"	7°	5	56"	2/S-8	2'-0"	(6) - #8	15'-9"	2'-0"	13'-3"	2'-0"	12'-0"	2'-0"	10'-3"	(6) - #8	6"
☐	T-603	36'-3"	28'-6"	15'-0"	7°	5	70"	2/S-8	2'-6"	(6) - #8	16'-0"	2'-6"	13'-6"	2'-6"	12'-0"	2'-6"	10'-3"	(6) - #8	6"
☐	T-604	43'-0"	18'-0"	15'-0"	7°	5	56"	2/S-8	2'-0"	(7) - #8	16'-9"	2'-0"	14'-0"	2'-0"	12'-6"	2'-0"	10'-9"	(7) - #8	6"
☐	T-605	43'-0"	21'-6"	15'-0"	7°	5	70"	2/S-8	2'-6"	(6) - #8	15'-9"	2'-6"	13'-3"	2'-6"	12'-0"	2'-6"	10'-3"	(6) - #8	6"
☐	T-606	43'-0"	28'-6"	15'-0"	7°	5	70"	2/S-8	2'-6"	(7) - #8	17'-3"	2'-6"	14'-3"	2'-6"	12'-9"	2'-6"	11'-0"	(7) - #8	6"
☐	T-607	43'-0"	32'-6"	15'-0"	7°	5	70"	2/S-8	2'-6"	(7) - #8	18'-0"	2'-6"	14'-9"	2'-6"	13'-3"	2'-6"	11'-3"	(7) - #8	6"
☐	T-608	43'-0"	35'-9"	15'-0"	7°	5	70"	2/S-8	2'-6"	(8) - #8	19'-0"	2'-6"	15'-6"	2'-6"	13'-9"	2'-6"	11'-9"	(8) - #8	6"
☐	T-609	36'-3"	18'-0"	20'-0"	7°	0	56"	2/S-8	2'-0"	(7) - #8	16'-3"	2'-0"	13'-9"	2'-0"	12'-3"	2'-0"	10'-6"	(7) - #8	6"
☐	T-610	36'-3"	21'-6"	20'-0"	7°	5	70"	2/S-8	2'-6"	(6) - #8	15'-9"	2'-6"	13'-6"	2'-6"	12'-0"	2'-6"	10'-3"	(6) - #8	6"
☐	T-611	36'-3"	28'-6"	20'-0"	7°	5	70"	2/S-8	2'-6"	(8) - #8	17'-6"	2'-6"	14'-6"	2'-6"	13'-0"	2'-6"	11'-0"	(8) - #8	6"
☐	T-612	43'-0"	18'-0"	20'-0"	7°	5	70"	2/S-8	2'-6"	(7) - #8	16'-6"	2'-6"	14'-0"	2'-6"	12'-6"	2'-6"	10'-9"	(7) - #8	6"
☐	T-613	43'-0"	21'-6"	20'-0"	7°	5	70"	2/S-8	2'-6"	(8) - #8	17'-3"	2'-6"	14'-6"	2'-6"	13'-0"	2'-6"	11'-0"	(8) - #8	6"
[✓]	T-614	43'-0"	28'-6"	20'-0"	7° 5°	5	70"	2/S-8	2'-6"	(10) - #8	19'-0"	2'-6"	15'-6"	2'-6"	13'-9"	2'-6"	11'-9"	(10) - #8	6"
☐	T-651	36'-3"	18'-0"	15'-0"	7°	20	56"	2/S-8	2'-0"	(6) - #8	15'-6"	2'-0"	13'-0"	2'-0"	11'-9"	2'-0"	10'-0"	(6) - #8	6"
☐	T-652	36'-3"	21'-6"	15'-0"	7°	20	56"	2/S-8	2'-6"	(5) - #8	14'-6"	2'-0"	13'-6"	2'-0"	12'-0"	2'-0"	10'-3"	(6) - #8	6"
☐	T-653	36'-3"	28'-6"	15'-0"	7°	20	70"	2/S-8	2'-6"	(6) - #8	18'-0"	2'-6"	13'-6"	2'-6"	12'-3"	2'-6"	10'-6"	(6) - #8	6"
☐	T-654	43'-0"	18'-0"	15'-0"	7°	20	70"	2/S-8	2'-6"	(5) - #8	15'-0"	2'-6"	12'-9"	2'-6"	11'-6"	2'-6"	9'-9"	(5) - #8	6"
☐	T-655	43'-0"	21'-6"	15'-0"	7°	20	70"	2/S-8	2'-6"	(6) - #8	16'-3"	2'-6"	13'-6"	2'-6"	12'-0"	2'-6"	10'-3"	(6) - #8	6"
☐	T-656	43'-0"	28'-6"	15'-0"	7°	20	70"	2/S-8	3'-0"	(7) - #8	18'-0"	2'-6"	15'-0"	2'-6"	15'-0"	2'-6"	12'-9"	(8) - #8	6"
☐	T-657	43'-0"	32'-6"	15'-0"	7°	20	70"	2/S-8	3'-0"	(7) - #8	21'-6"	2'-6"	17'-9"	2'-6"	17'-9"	2'-6"	15'-3"	(9) - #8	6"
☐	T-658	36'-3"	18'-0"	20'-0"	7°	20	70"	2/S-8	2'-6"	(6) - #8	15'-6"	2'-6"	13'-3"	2'-6"	11'-9"	2'-6"	10'-3"	(6) - #8	6"
☐	T-659	36'-3"	21'-6"	20'-0"	7°	20	70"	2/S-8	2'-6"	(6) - #8	16'-3"	2'-6"	13'-9"	2'-6"	12'-3"	2'-6"	10'-6"	(6) - #8	6"
☐	T-660	36'-3"	28'-6"	20'-0"	7°	20	70"	2/S-8	2'-6"	(8) - #8	18'-3"	2'-6"	14'-6"	2'-6"	13'-0"	2'-6"	11'-0"	(8) - #8	6"
☐	T-661	43'-0"	21'-6"	20'-0"	7°	20	70"	2/S-8	2'-6"	(8) - #8	17'-3"	2'-6"	14'-6"	2'-6"	13'-0"	2'-6"	11'-0"	(8) - #8	6"

1. MULTIPLE STRUCTURE ID'S MAY BE SELECTED WITHIN THE SAME SITE AND/OR STRUCTURE.
2. WHEN UTILIZING A STRUCTURE ID READ FROM WITHIN THAT ID ROW ONLY.
3. SEE SOILS NOTES ON SHEET S-3 FOR INFORMATION ON SOILS CLASS SELECTION.
4. WHERE WATER MITIGATION IS NECESSARY, OR FOR OTHER CONDITIONS REQUIRING MITIGATION, REFER TO DETAIL 2/- FOR SLEEVED FOUNDATION OPTION.
5. FOR CONDUIT INTERACTION WITH FOUNDATION SEE S-21.

1/- T-STRUCTURE NON-CONSTRAINED PIER FOUNDATION SCHEDULE

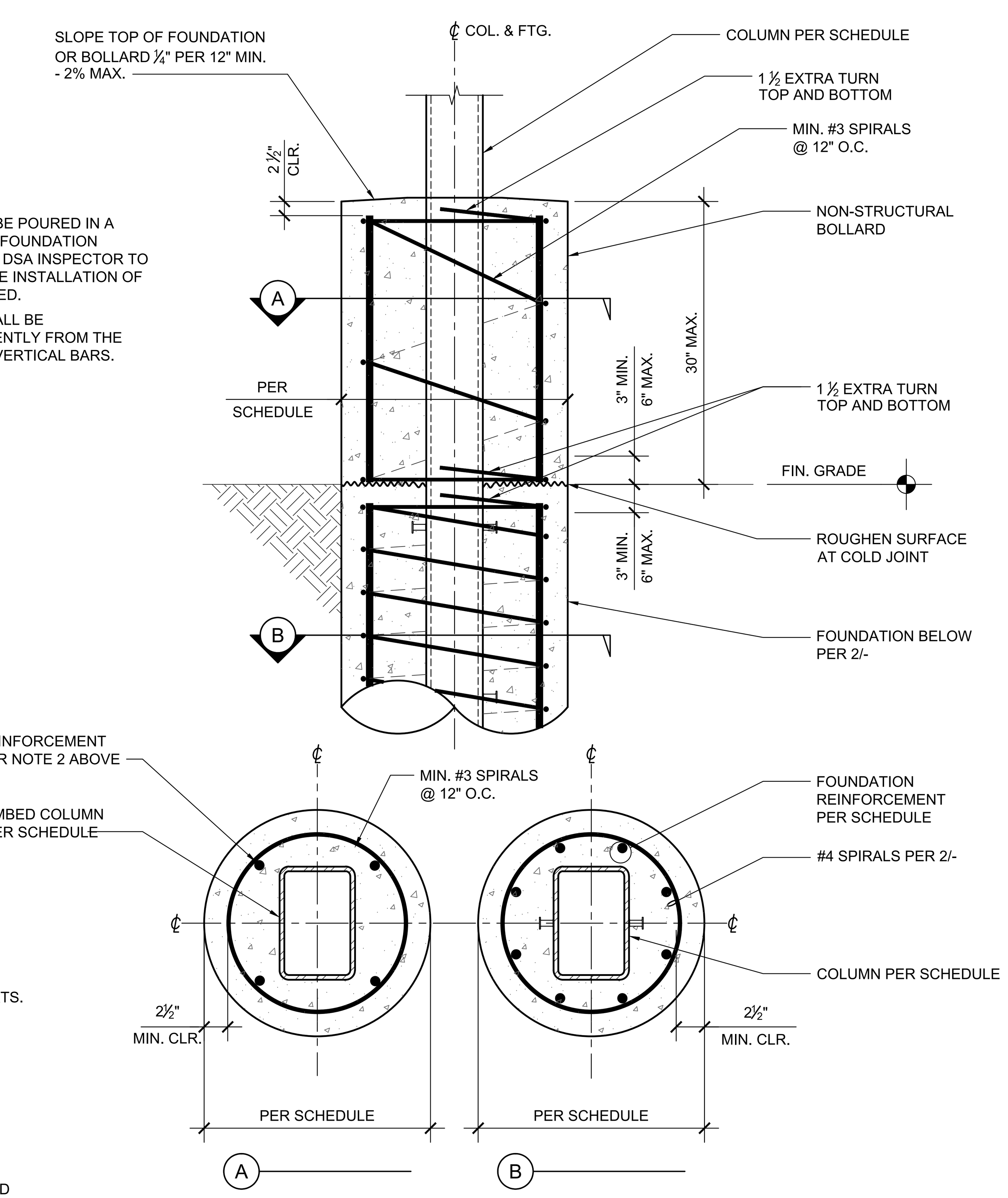


2/- PIER FOUNDATION DETAIL

1/2" = 1'-0"

NOTES:

1. CONCRETE BOLLARDS TO BE POURED IN A SECOND POUR AFTER THE FOUNDATION BELOW GRADE IS POURED. DSA INSPECTOR TO PERIODICALLY INSPECT THE INSTALLATION OF BONDING AGENT WHEN USED.
2. BOLLARD REBAR CAGE SHALL BE CONSTRUCTED INDEPENDENTLY FROM THE FOUNDATION USING 4 - #3 VERTICAL BARS.



NOTE:

NUMBER AND SIZES OF BARS VARY SEE FOUNDATION CHARTS.

[✓] BOLLARD REQUIRED

3/- OPTIONAL NON-STRUCTURAL BOLLARD

1" = 1'-0"

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M BAR C CONSTRUCTION INC.
1770 LA COSTA MEADOWS DRIVE SAN MARCOS, CA 92078 ERIK KRIVOKOPICH
PHONE: (760) 744-4131 FAX: (760) 744-4449 ERIK@MBARCONLINE.COM
LIC # 869960 B AND C51 (775) 787-8845

ENGINEER'S APPROVAL
REGISTERED PROFESSIONAL ENGINEER DUSTIN K. ROSEPINK S 5885 STRUCTURAL STATE OF CALIFORNIA
[illegible]

BID INFORMATION

THE STRUCTURES AND DESIGNS IN THIS PC ARE PROPRIETARY TO M BAR C CONSTRUCTION, INC. AND 4 S.T.E.L. ENGINEERING, INC. ALL SITES USING THIS PC: M BAR C CONSTRUCTION, INC. SHALL BE THE STEEL CONTRACTOR & 4 S.T.E.L. ENGINEERING, INC. SHALL BE THE SEOR. SEE THE STANDARD NOTES FOR PC USE ON S-1 FOR ADDITIONAL REQUIREMENTS.

PRE-CHECK (PC) DOCUMENT

CODE: 2022 CBC
A SEPARATE PROJECT APPLICATION FOR CONSTRUCTION IS REQUIRED

APPROVED
DIV. OF THE STATE ARCHITECT
APP: 04-123955 PC
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑ CG ☐
DATE: 10/14/2024

SITE SPECIFIC INFORMATION
ALTADENA ELEMENTARY SCHOOL
743 E CALAVERAS ST.
ALTADENA, CA 91001

REVISIONS

MARK	DATE	DESCRIPTION

4 STEL JOB # MC02-V3-6
DATE 10-03-24
DRAWN BY GM
CHECKED RWS
UG 22.6.1

T-STRUCTURE PIER FOUNDATION SCHEDULE

S-8

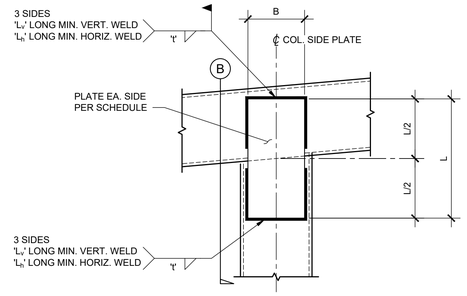
NOTE: IF DWG. IS NOT 24 x 36, IT IS NOT FULL SIZE

T-STRUCTURE BEAM-TO-COLUMN SCHEDULE

USE	I.D. #	MAX. WIDTH W	MAX. COLUMN SPACING S	MAX. COLUMN HEIGHT	MAX. ROOF SLOPE	ROOF SNOW LOAD (PSF)	BEAM TO COLUMN DETAIL	BEAM TO COLUMN SIDE PLATE 't' x 'B' x 'L' (IN)	SIDE PLATE WELDS		
									MIN. THICKNESS t	MIN. HORIZONTAL LENGTH L_h	MIN. VERTICAL LENGTH L_v
☐	T-601	36'-3"	18'-0"	15'-0"	7°	5	2/S-10	1/2 x 9 1/4 x 1'-9 7/8"	3/16"	9"	9.5"
☐	T-602	36'-3"	21'-6"	15'-0"	7°	5	2/S-10	5/8 x 8 3/4 x 1'-9 7/8"	3/16"	8.5"	9.5"
☐	T-603	36'-3"	28'-6"	15'-0"	7°	5	2/S-10	5/8 x 10 x 2'-1"	1/4"	10"	10.5"
☐	T-604	43'-0"	18'-0"	15'-0"	7°	5	2/S-10	3/4 x 8 3/4 x 1'-9 3/8"	1/4"	8.5"	9"
☐	T-605	43'-0"	21'-6"	15'-0"	7°	5	2/S-10	5/8 x 10 3/4 x 2'-0 7/8"	1/4"	10.5"	10.5"
☐	T-606	43'-0"	28'-6"	15'-0"	7°	5	2/S-10	7/8 x 10 x 2'-1"	5/16"	10"	10.5"
☐	T-607	43'-0"	32'-6"	15'-0"	7°	5	2/S-10	1 x 10 x 2'-1"	5/16"	10"	10.5"
☐	T-608	43'-0"	35'-9"	15'-0"	7°	5	2/S-10	1 1/2 x 9 1/4 x 2'-0 3/4"	3/8"	9"	10.5"
☐	T-609	36'-3"	18'-0"	20'-0"	7°	0	2/S-10	5/8 x 8 3/4 x 1'-9 7/8"	3/16"	8.5"	9.5"
☐	T-610	36'-3"	21'-6"	20'-0"	7°	5	2/S-10	5/8 x 10 x 2'-1 3/8"	3/16"	10"	11"
☐	T-611	36'-3"	28'-6"	20'-0"	7°	5	2/S-10	3/4 x 10 x 2'-1"	1/4"	10"	10.5"
☐	T-612	43'-0"	18'-0"	20'-0"	7°	5	2/S-10	5/8 x 10 x 2'-1"	3/16"	10"	10.5"
☐	T-613	43'-0"	21'-6"	20'-0"	7°	5	2/S-10	3/4 x 10 x 2'-1"	1/4"	10"	10.5"
☒	T-614	43'-0"	28'-6"	20'-0"	5°	5	2/S-10	1 1/4 x 9 1/4 x 2'-1 1/8"	5/16"	9"	11"
☐	T-651	36'-3"	18'-0"	15'-0"	7°	20	2/S-10	5/8 x 8 3/4 x 1'-9 5/8"	3/16"	8.5"	9.5"
☐	T-652	36'-3"	21'-6"	15'-0"	7°	20	2/S-10	3/4 x 8 3/4 x 1'-9 5/8"	1/4"	8.5"	9.5"
☐	T-653	36'-3"	28'-6"	15'-0"	7°	20	2/S-10	3/4 x 10 x 2'-1"	1/4"	10"	10.5"
☐	T-654	43'-0"	18'-0"	15'-0"	7°	20	2/S-10	5/8 x 10 3/4 x 2'-0 7/8"	3/16"	10.5"	10.5"
☐	T-655	43'-0"	21'-6"	15'-0"	7°	20	2/S-10	7/8 x 10 x 2'-1"	1/4"	10"	10.5"
☐	T-656	43'-0"	28'-6"	15'-0"	7°	20	2/S-10	1 1/4 x 10 x 1'-11 7/8"	3/8"	10"	9.5"
☐	T-657	43'-0"	32'-6"	15'-0"	7°	20	2/S-10	1 1/2 x 9 1/4 x 2'-0"	1/2"	9"	9.5"
☐	T-658	36'-3"	18'-0"	20'-0"	7°	20	2/S-10	5/8 x 10 x 2'-1"	3/16"	10"	10.5"
☐	T-659	36'-3"	21'-6"	20'-0"	7°	20	2/S-10	5/8 x 10 x 2'-1"	3/16"	10"	10.5"
☐	T-660	36'-3"	28'-6"	20'-0"	7°	20	2/S-10	7/8 x 10 x 2'-1"	1/4"	10"	10.5"
☐	T-661	43'-0"	21'-6"	20'-0"	7°	20	2/S-10	7/8 x 10 x 2'-1"	1/4"	10"	10.5"

1. MULTIPLE STRUCTURE ID'S MAY BE SELECTED WITHIN THE SAME SITE AND/OR STRUCTURE.
2. WHEN UTILIZING A STRUCTURE ID READ FROM WITHIN THAT ID ROW ONLY.

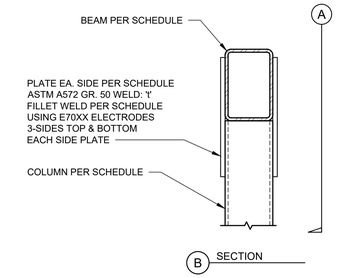
1 - T-STRUCTURE BEAM-TO-COLUMN SCHEDULE



A ELEVATION

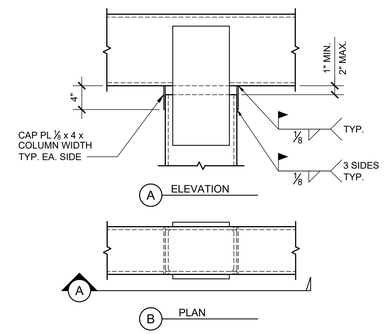
NOTES:

1. WELD TO BE ALL AROUND PLATE. PORTIONS OF THE WELD ALL AROUND JOINT ARE STRUCTURAL AND OTHER PORTIONS ARE NON STRUCTURAL. MINIMUM STRUCTURAL WELD LENGTHS 'L_v' AND 'L_h' PER SCHEDULE. WELDS BEYOND THESE MIN. LENGTHS ARE NON STRUCTURAL SEAL WELDS.
2. PURLIN, SOLAR PANEL NOT SHOWN

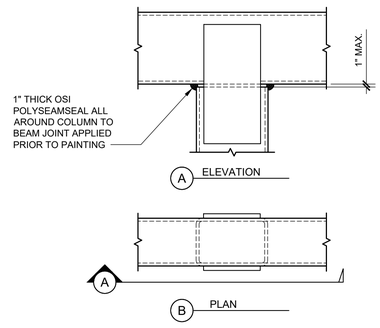


B SECTION

2 - BEAM TO COLUMN
1" = 1'-0"



3 - BEAM TO COLUMN CORROSION PROTECTION OPTION 1
1" = 1'-0"



4 - BEAM TO COLUMN CORROSION PROTECTION OPTION 2
1" = 1'-0"

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 03-125900 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 03/18/2026

4 STEL ENGINEERING
26030 ACERO
MISSION VIEJO, CA 92691
949.305.1150 | FAX 949.305.1420

M BAR C CONSTRUCTION INC.
1770 LA COSTA MEADOWS DRIVE, SAN MARCOS, CA 92078
ERIK KRIVOPOPICH
PHONE: (760) 746-4131
FAX: (760) 746-4449
ERIK@MBARCONLINE.COM
LIC # 869960
B AND C-21
(770) 787-8845

ENGINEER'S APPROVAL

REGISTERED PROFESSIONAL ENGINEER DUSTIN K. ROSENTHAL S 5885 CIVIL STATE OF CALIFORNIA

BID INFORMATION

THE STRUCTURES AND DESIGNS IN THIS PC ARE PROPRIETARY TO M BAR C CONSTRUCTION, INC. AND 4 S.T.E.L. ENGINEERING, INC. ALL SITES USING THIS PC: M BAR C CONSTRUCTION, INC. SHALL BE THE STEEL CONTRACTOR & 4 S.T.E.L. ENGINEERING, INC. SHALL BE THE SEOR. SEE THE STANDARD NOTES FOR PC USE ON S-1 FOR ADDITIONAL REQUIREMENTS.

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SITE SPECIFIC INFORMATION

ALTADENA ELEMENTARY SCHOOL
743 E CALAVERAS ST.
ALTADENA, CA 91001

REVISIONS

MARK	DATE	DESCRIPTION

4 STEL JOB #	MC02-V3-6
DATE	10-03-24
DRAWN BY	GM
CHECKED	RWS

UG 22.6.1

T-STRUCTURE BEAM-TO-COLUMN SCHEDULE

S-10

NOTE: IF DWG. IS NOT 24 x 36, IT IS NOT FULL SIZE

PURLIN SCHEDULE

USE	I.D. #	MULTI SPAN PURLIN	PURLIN[8] SPACING (PS)	MAX. COLUMN SPACING (S)	ROOF SNOW LOAD (PSF)	MAX. CANTILEVER SPAN[6] (CS)		PURLIN		BLOCKING		ALTERNATE PURLIN		ALTERNATE BLOCKING		BLOCKING TO PURLIN DETAILS			PURLIN TO BEAM DETAILS				INTERIOR CLIP ANGLE		EXTERIOR END PLATE		PURLIN BRACING DETAILS
																			INTERIOR PURLINS		EXTERIOR PURLINS						
						MIDSPAN BLOCKING	NO BLOCKING	SECTION	DETAIL	SECTION	DETAIL	SECTION	DETAIL	SECTION	DETAIL	BOLT DIA. d_3 (IN)	INTERIOR	EXTERIOR	SPLICE	CONTINUOUS	SPLICE	CONTINUOUS	THICKNESS t_1 (IN)	BOLT DIA. d_1 (IN)	THICKNESS t_2 (IN)	BOLT DIA. d_2 (IN)	
☐	P601	☐	47"	18'-0"	0	10'-0"	6'-0"	CS12 x 4 x 0.071 (14GA)	2/S-5	CS9 x 2.5 x 0.057 (16 GA)	3/S-5	CS8 x 4 x 0.071 (14GA)	2/S-5	CS5 x 2.5 x 0.057 (16 GA)	3/S-5	1/2	8/S-17	9/S-17	1/S-17	12/S-17	2/S-17	13/S-17	1/2	1/2	3/8	1/2	N/A
☐	P602	☐	47"	18'-0"	5	10'-0"	6'-6"	CS12 x 4 x 0.071 (14GA)	2/S-5	CS9 x 2.5 x 0.057 (16 GA)	3/S-5	CS8 x 4 x 0.071 (14GA)	2/S-5	CS5 x 2.5 x 0.057 (16 GA)	3/S-5	1/2	8/S-17	9/S-17	1/S-17	12/S-17	2/S-17	13/S-17	1/2	1/2	3/8	1/2	N/A
☐	P603	☐	47"	18'-0"	20	10'-0"	5'-6"	CS12 x 4 x 0.071 (14GA)	2/S-5	CS9 x 2.5 x 0.057 (16 GA)	3/S-5	CS10 x 4 x 0.071 (14GA)	2/S-5	CS7 x 2.5 x 0.057 (16 GA)	3/S-5	1/2	8/S-17	9/S-17	1/S-17	12/S-17	2/S-17	13/S-17	1/2	1/2	3/8	1/2	N/A
☐	P604	☐	47"	21'-6"	0	11'-0"	8'-0"	CS12 x 4 x 0.102 (12GA)	2/S-5	CS9 x 2.5 x 0.057 (16 GA)	3/S-5	CS10 x 4 x 0.102 (12GA)	2/S-5	CS7 x 2.5 x 0.057 (16 GA)	3/S-5	1/2	8/S-17	9/S-17	1/S-17	12/S-17	2/S-17	13/S-17	1/2	1/2	1/2	1/2	N/A
☐	P605	☐	47"	21'-6"	5	11'-0"	8'-0"	CS12 x 4 x 0.102 (12GA)	2/S-5	CS9 x 2.5 x 0.057 (16 GA)	3/S-5	CS10 x 4 x 0.102 (12GA)	2/S-5	CS7 x 2.5 x 0.057 (16 GA)	3/S-5	1/2	8/S-17	9/S-17	1/S-17	12/S-17	2/S-17	13/S-17	1/2	1/2	1/2	1/2	N/A
☐	P606	☐	47"	21'-6"	20	11'-0"	7'-6"	CS12 x 4 x 0.102 (12GA)	2/S-5	CS9 x 2.5 x 0.057 (16 GA)	3/S-5	CS10 x 4 x 0.102 (12GA)	2/S-5	CS7 x 2.5 x 0.057 (16 GA)	3/S-5	1/2	8/S-17	9/S-17	1/S-17	12/S-17	2/S-17	13/S-17	1/2	1/2	1/2	1/2	N/A
☐	P607	☐	47"	28'-6"	0	13'-0"	8'-0"	CS12 x 4 x 0.071 (14GA)	2/S-5	CS9 x 2.5 x 0.057 (16 GA)	3/S-5	CS14 x 3.5 x 0.071 (14GA)	2/S-5	CS11 x 2.5 x 0.057 (16 GA)	3/S-5	1/2	8/S-17	9/S-17	1/S-17	12/S-17	2/S-17	13/S-17	1/2	1/2	3/8	1/2	10, 11/S-17
☒	P608	☐	47"	28'-6"	5	~~13'-0"~~ 11'-9"	8'-0"	CS12 x 4 x 0.071 (14GA)	2/S-5	CS9 x 2.5 x 0.057 (16 GA)	3/S-5	CS14 x 3.5 x 0.071 (14GA)	2/S-5	CS11 x 2.5 x 0.057 (16 GA)	3/S-5	1/2	8/S-17	9/S-17	1/S-17	12/S-17	2/S-17	13/S-17	1/2	1/2	3/8	1/2	10, 11/S-17
☐	P609	☐	47"	28'-6"	20	13'-0"	7'-6"	CS12 x 4 x 0.102 (12GA)	2/S-5	CS9 x 2.5 x 0.057 (16 GA)	3/S-5	CS12 x 3.5 x 0.102 (12GA)	2/S-5	CS9 x 2.5 x 0.057 (16 GA)	3/S-5	1/2	8/S-17	9/S-17	1/S-17	12/S-17	2/S-17	13/S-17	1/2	1/2	3/8	1/2	10, 11/S-17
☐	P610[9]	☑	47"	32'-6"	0	12'-8"	n/a	CS12 x 4 x 0.071 (14GA)	2/S-5	CS9 x 2.5 x 0.057 (16 GA)	3/S-5	CS10 x 4 x 0.071 (14GA)	2/S-5	CS7 x 2.5 x 0.057 (16 GA)	3/S-5	1/2	8/S-17	9/S-17	3/S-16	12/S-17	3/S-16	13/S-17	1/2	1/2	1/2	1/2	10, 11/S-17
☐	P611[9]	☑	47"	32'-6"	5	12'-8"	n/a	CS12 x 4 x 0.071 (14GA)	2/S-5	CS9 x 2.5 x 0.057 (16 GA)	3/S-5	CS10 x 4 x 0.071 (14GA)	2/S-5	CS7 x 2.5 x 0.057 (16 GA)	3/S-5	1/2	8/S-17	9/S-17	3/S-16	12/S-17	3/S-16	13/S-17	1/2	1/2	1/2	1/2	10, 11/S-17
☐	P612[9]	☑	47"	32'-6"	20	12'-8"	n/a	CS12 x 4 x 0.102 (12GA)	2/S-5	CS9 x 2.5 x 0.057 (16 GA)	3/S-5	CS10 x 3.5 x 0.102 (12GA)	2/S-5	CS7 x 2.5 x 0.057 (16 GA)	3/S-5	1/2	8/S-17	9/S-17	3/S-16	12/S-17	3/S-16	13/S-17	1/2	1/2	1/2	1/2	10, 11/S-17
☐	P613[10]	☑	47"	35'-9"	0	12'-6"	n/a	CS12 x 4 x 0.071 (14GA)	2/S-5	CS9 x 2.5 x 0.057 (16 GA)	3/S-5	CS12 x 4 x 0.071 (14GA)	2/S-5	CS9 x 2.5 x 0.057 (16 GA)	3/S-5	1/2	8/S-17	9/S-17	3/S-16	12/S-17	3/S-16	13/S-17	1/2	1/2	1/2	1/2	10, 11/S-17
☐	P614[10]	☑	47"	35'-9"	5	12'-6"	n/a	CS12 x 4 x 0.071 (14GA)	2/S-5	CS9 x 2.5 x 0.057 (16 GA)	3/S-5	CS12 x 4 x 0.071 (14GA)	2/S-5	CS9 x 2.5 x 0.057 (16 GA)	3/S-5	1/2	8/S-17	9/S-17	3/S-16	12/S-17	3/S-16	13/S-17	1/2	1/2	1/2	1/2	10, 11/S-17
☐	P615[10]	☑	47"	35'-9"	20	12'-6"	n/a	CS12 x 4 x 0.102 (12GA)	2/S-5	CS9 x 2.5 x 0.057 (16 GA)	3/S-5	CS12 x 4 x 0.102 (12GA)	2/S-5	CS9 x 2.5 x 0.057 (16 GA)	3/S-5	1/2	8/S-17	9/S-17	3/S-16	12/S-17	3/S-16	13/S-17	1/2	1/2	1/2	1/2	10, 11/S-17

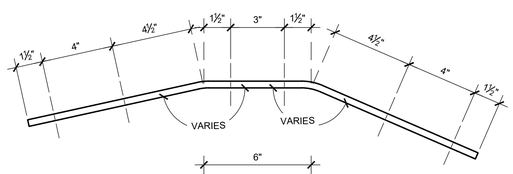
NOTES:

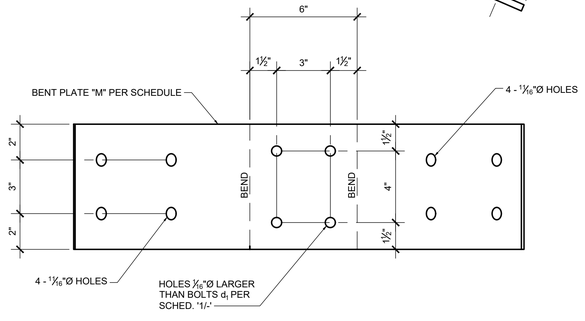
1. MULTIPLE STRUCTURE ID'S MAY BE SELECTED WITHIN THE SAME SITE AND/OR STRUCTURE.
2. WHEN UTILIZING A STRUCTURE ID READ FROM WITHIN THAT ID ROW ONLY.
3. BEAM TO PURLIN DETAIL AT SPLICE SHALL NOT OCCUR ON A PURLIN WITH A CANTILEVER SPAN.
4. WHEN THE CANTILEVER SPAN SHOWN ON THE SITE SPECIFIC SHEETS DOES NOT EXCEED THE MAX CANTILEVER SPAN NO BLOCKING, MID SPAN BLOCKING OF THE CANTILEVER IS NOT REQUIRED.
5. PURLIN SPACING MAY BE INCREASED BEYOND THE MAXIMUMS GIVEN IN THE SCHEDULE ABOVE AS LONG AS THE TRIBUTARY WIDTH TO THE PURLIN DOES NOT EXCEED PS.
6. LONG PURLIN CANTILEVERS INCREASE THE TRIBUTARY AREA TO THE END BEAM AND MAY REQUIRE THE SUPPORTING MEMBERS TO INCREASE IN SIZE PER THE PURLIN CANTILEVER SCHEDULE ADJACENT. THE LEFT COLUMN OF THE SCHEDULE REPRESENTS THE COLUMN SPACING CURRENTLY USED, AND THE CENTER COLUMN OF THE SCHEDULE REPRESENTS THE PURLIN CANTILEVER RANGE. USING THE COLUMN SPACING AND PURLIN CANTILEVER ADJACENT TO THE END BEAM, DETERMINE THE APPROPRIATE MEMBER SIZING PER THE RIGHTMOST COLUMN OF THE SCHEDULE. FOR EXAMPLES, SEE DETAIL 2/-.
7. MINIMUM PURLIN SPACING WHERE PURLIN BRACING OCCURS IS 38.5". NO MINIMUM SPACING IS REQUIRED OTHER LOCATIONS.
8. WHEN PURLIN CANTILEVER DOES NOT REQUIRE BLOCKING PURLIN BRACING ON THE CANTILEVER IS NOT REQUIRED.
9. ☐ ALL STRUCTURES UTILIZING THIS PURLIN OPTION SHALL BE GOVERNED BY THE SOLAR PANEL DIMENSIONS AND NO OTHER SITE CONDITIONS. STRUCTURES MUST HAVE A MINIMUM OF 3 COLUMNS. STRUCTURES CANNOT HAVE PANELS WIDER THAN 42". LAYOUTS REQUIRE THAT THE CANTILEVER PURLIN LENGTH BE EXACTLY 3.5x(PANEL WIDTH PLUS PANEL GAP), THE COLUMN SPACING MUST BE EXACTLY 9x(PANEL WIDTH PLUS PANEL GAP), AND PURLIN SPLICE LOCATION "L" IN DETAIL 3/S-16 EXACTLY 1.5x(PANEL WIDTH PLUS PANEL GAP). THE PURLIN MAX. CANTILEVER LENGTH, COLUMN SPACING, AND SPLICE LOCATION "L" MUST ALL BE RATIOS OF THE PANEL WIDTH, AND CANNOT DEVIATE FROM THE SPACING PREVIOUSLY STATED.
10. ☐ ALL STRUCTURES UTILIZING THIS PURLIN OPTION SHALL BE GOVERNED BY THE SOLAR PANEL DIMENSIONS AND NO OTHER SITE CONDITIONS. STRUCTURES MUST HAVE A MINIMUM OF 3 COLUMNS. STRUCTURES CANNOT HAVE PANELS WIDER THAN 42". LAYOUTS REQUIRE THAT THE CANTILEVER PURLIN LENGTH BE EXACTLY 3.5x(PANEL WIDTH PLUS PANEL GAP), THE COLUMN SPACING MUST BE EXACTLY 10x(PANEL WIDTH PLUS PANEL GAP), AND PURLIN SPLICE LOCATION "L" IN DETAIL 3/S-16 EXACTLY 1.5x(PANEL WIDTH PLUS PANEL GAP). THE PURLIN MAX. CANTILEVER LENGTH, COLUMN SPACING, AND SPLICE LOCATION "L" MUST ALL BE RATIOS OF THE PANEL WIDTH, AND CANNOT DEVIATE FROM THE SPACING PREVIOUSLY STATED.

PURLIN CANTILEVER SCHEDULE

USE	COLUMN SPACING	MAX. CANTILEVER	REQUIRED MEMBER PC I.D. # PER S-7, S-12
☐	18'-0"	CS ≤ 7'-3"	18'-0"
☐	18'-0"	7'-3" < CS ≤ 8'-9"	21'-6"
☐	18'-0"	8'-9" < CS ≤ 10'-6"	28'-6"
☐	21'-6"	CS ≤ 8'-9"	21'-6"
☐	21'-6"	8'-9" < CS ≤ 11'-6"	28'-6"
☒	28'-6"	CS ≤ 11-9"	28'-6"
☐	28'-6"	11'-9" < CS ≤ 13'-6"	32'-6"

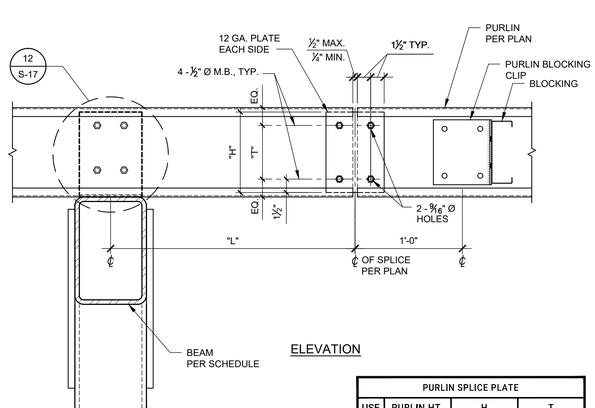
1 - PURLIN SCHEDULE





PURLIN BRACE PLATE		
USE	MAX. COLUMN SPACING "S" FROM 1/-	MATERIAL "M"
☒	"S" <= 28'-6"	12 GA 55 KSI
☐	"S" = 32'-6"	10 GA 55 KSI
☐	"S" = 35'-9"	10 GA 55 KSI

4 - PURLIN BRACE PLATE — 3"=1'-0"

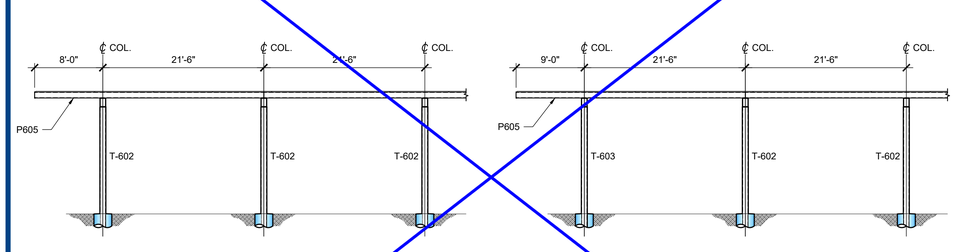


ELEVATION

PURLIN SPLICE PLATE			
USE	PURLIN HT.	H	T
☐	9"	7"	4"
☐	10"	9"	6"
☒	12"	11"	8"
☐	14"	13"	10"

NOTE:
L = 1.5 x (PANEL WIDTH + PANEL GAP)
(SEE NOTES 9 AND 10 ON 1/- FOR MULTI-SPAN PURLIN REQUIREMENTS)

3 - PURLIN SPLICE — 1-1/2"=1'-0"



PURLIN CANTILEVER DOES NOT EXCEED LIMITS SHOWN IN PURLIN SCHEDULE '1/-' NO END MEMBER SIZE INCREASE REQUIRED.

EXAMPLE 1

PURLIN CANTILEVER EXCEEDS LIMITS SHOWN IN PURLIN SCHEDULE '1/-' END MEMBER SIZE INCREASE REQUIRED PER PURLIN CANTILEVER SCHEDULE.

EXAMPLE 2

2 - PURLIN CONDITION EXAMPLES — N.T.S.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 03-125900 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 03/18/2026

4 STEEL ENGINEERING
26030 ACERO
MISSION VIEJO, CA 92691
949.305.1150 | FAX 949.305.1420

M BAR C CONSTRUCTION INC.
1770 LA COSTA MEADOWS DRIVE
SAN MARCOS, CA 92078
ERIK KRIVOHORCH
PHONE: (760) 744-4131
FAX: (760) 744-4449
ERIK@MBARCONLINE.COM
LIC # 869960
B AND C57
(770) 787-8845

ENGINEER'S APPROVAL

REGISTERED PROFESSIONAL ENGINEER
DUSTIN K. ROSENTRETER
S 5885
CIVIL
STATE OF CALIFORNIA

BID INFORMATION

THE STRUCTURES AND DESIGNS IN THIS PC ARE PROPRIETARY TO M BAR C CONSTRUCTION, INC. AND 4 S.T.E.L. ENGINEERING, INC. ALL SITES USING THIS PC: M BAR C CONSTRUCTION, INC. SHALL BE THE STEEL CONTRACTOR & 4 S.T.E.L. ENGINEERING, INC. SHALL BE THE SEOR. SEE THE STANDARD NOTES FOR PC USE ON S-1 FOR ADDITIONAL REQUIREMENTS.

PRE-CHECK (PC) DOCUMENT
CODE: 2022 CBC
A SEPARATE PROJECT APPLICATION FOR CONSTRUCTION IS REQUIRED

APPROVED
DIV. OF THE STATE ARCHITECT
APP: 04-123955 PC
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑ CG ☐
DATE: 10/14/2024

SITE SPECIFIC INFORMATION

ALTADENA ELEMENTARY SCHOOL
743 E CALAVERAS ST.
ALTADENA, CA 91001

REVISIONS

MARK	DATE	DESCRIPTION

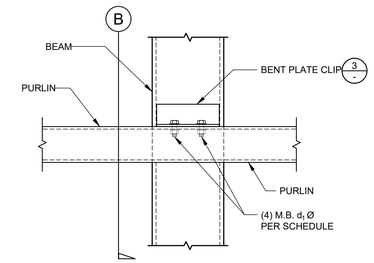
4 STEL JOB #	MC02-V3-6
DATE	10-03-24
DRAWN BY	GM
CHECKED	RWS

UG 22.6.1

PURLIN SCHEDULE

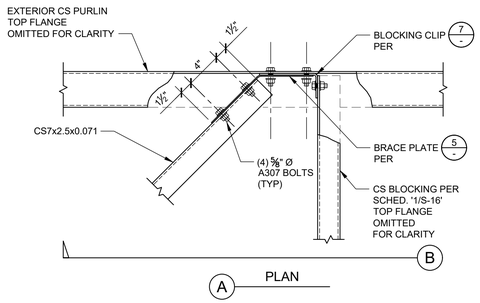
S-16

NOTE: IF DWG. IS NOT 24 x 36, IT IS NOT FULL SIZE



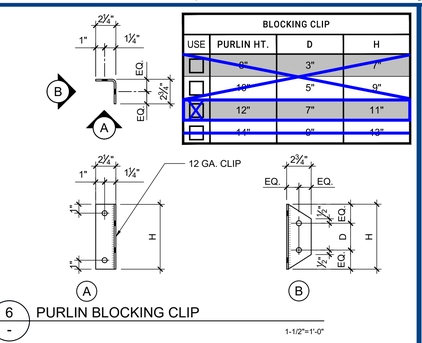
12 PURLIN TO BEAM

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



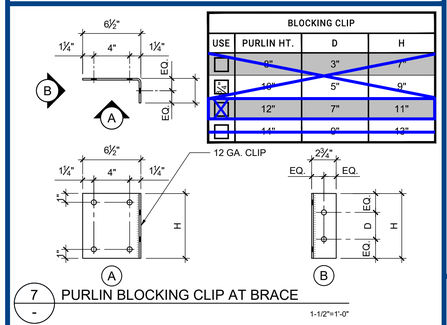
10 TYP. PURLIN BRACE AT EXTERIOR PURLIN

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



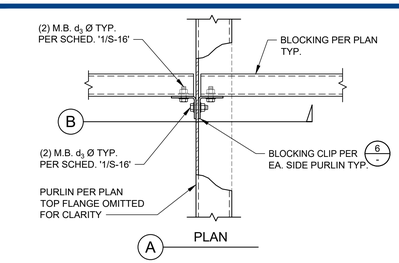
6 PURLIN BLOCKING CLIP

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



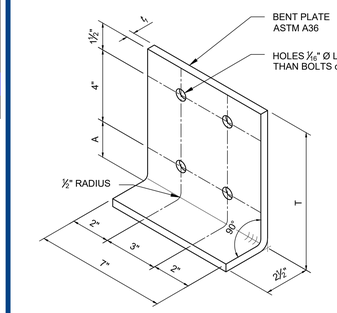
7 PURLIN BLOCKING CLIP AT BRACE

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



8 PURLIN BLOCKING CONNECTION AT INTERIOR

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

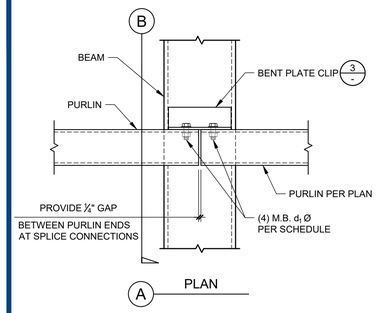


BENT PLATE CLIP			
USE	PURLIN HT.	T	A
☐	8"	7 ½"	2"
☐	10"	8 ½"	3"
☒	12"	9 ½"	4"
☐	14"	10 ½"	5"

NOTES:
1. CLIP PLATE THICKNESS 't_1' PER PURLIN SCHEDULE '1/S-16'.

3 PURLIN BEAM CLIP

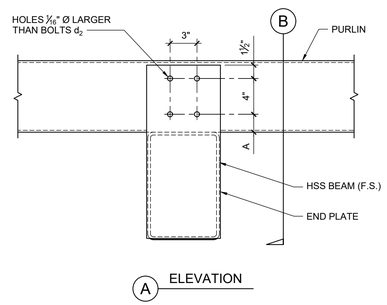
3"=1'-0"



NOTES:
1. BOLT DIAMETER d_1 PER SCHEDULE '1/S-16'

1 PURLIN TO BEAM AT SPLICE

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



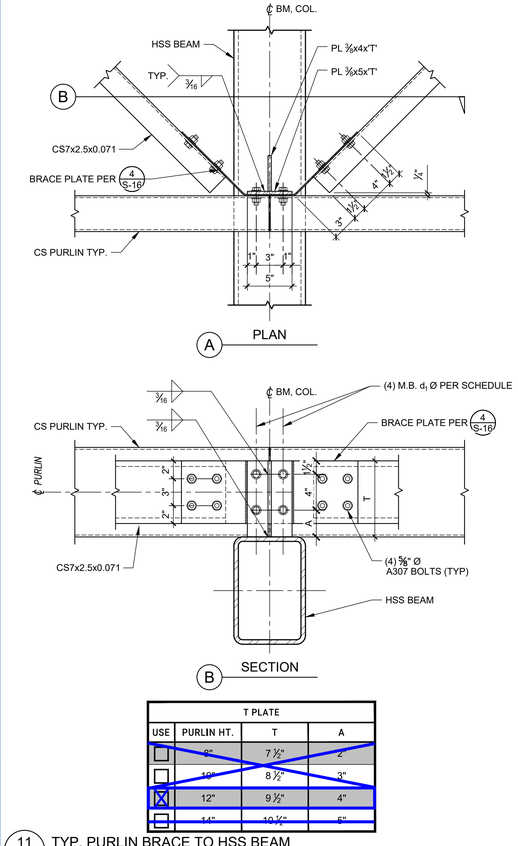
END PLATE TO BE ½" WIDER THAN BEAM.

END PLATE			
USE	PURLIN HT.	T	A
☐	8"	7 ½"	2"
☐	10"	8 ½"	3"
☒	12"	9 ½"	4"
☐	14"	10 ½"	5"

NOTES:
1. END PLATE THICKNESS 't_2' PER PURLIN SCHEDULE '1/S-16'.
2. BOLT DIAMETER d_2 PER SCHEDULE 1/S-16

13 PURLIN TO BEAM END PLATE

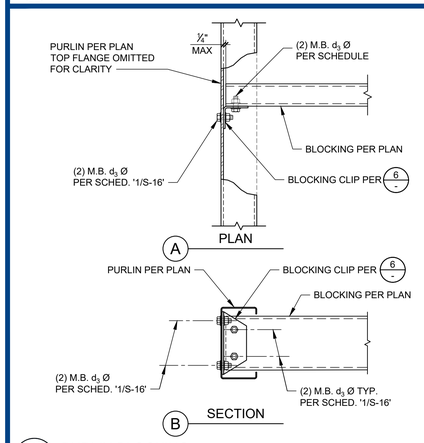
1-1/2"=1'-0"



T PLATE			
USE	PURLIN HT.	T	A
☐	8"	7 ½"	2"
☐	10"	8 ½"	3"
☒	12"	9 ½"	4"
☐	14"	10 ½"	5"

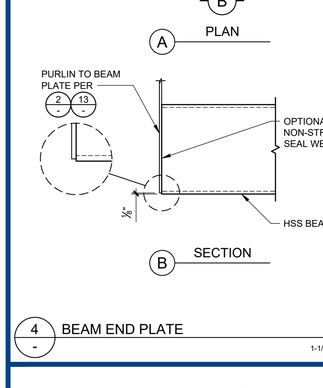
11 TYP. PURLIN BRACE AT HSS BEAM

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



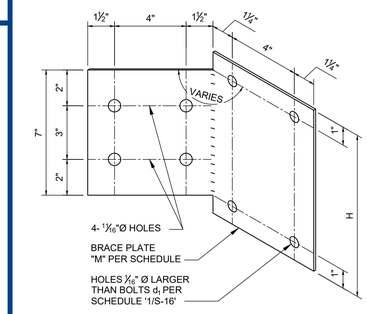
9 PURLIN BLOCKING CONNECTION AT EXTERIOR

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



4 BEAM END PLATE

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

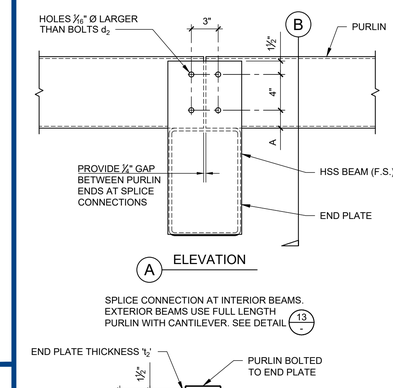


PURLIN BRACE PLATE		
USE	MAX. COLUMN SPACING "S" FROM 1/S-16	MATERIAL "M"
☒	"S" <= 28'-6"	12 GA 55 KSI
☐	"S" = 28'-6"	10 GA 55 KSI
☐	"S" = 35'-0"	10 GA 55 KSI

PURLIN BRACE PLATE		
USE	PURLIN HT.	H
☐	8"	7"
☐	10"	9"
☒	12"	11"
☐	14"	13"

5 PURLIN BRACE PLATE

3"=1'-0"



END PLATE TO BE ½" WIDER THAN BEAM.

END PLATE			
USE	PURLIN HT.	T	A
☐	8"	7 ½"	2"
☐	10"	8 ½"	3"
☒	12"	9 ½"	4"
☐	14"	10 ½"	5"

NOTES:
1. END PLATE THICKNESS 't_2' PER PURLIN SCHEDULE '1/S-16'.
2. BOLT DIAMETER d_2 PER SCHEDULE 1/S-16

2 PURLIN TO BEAM END PLATE AT SPLICE

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

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 03-125900 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 03/18/2026

4 STEEL ENGINEERING
26030 ACERO
MISSION VIEJO, CA 92691
949.305.1150 | FAX 949.305.1420

M BAR C CONSTRUCTION INC.
1770 LA COSTA MEADOWS DRIVE
SAN MARCOS, CA 92078
ERIK KRIVOPICH
PHONE: (760) 744-4131
FAX: (760) 744-4449
ERIK@MBARCONLINE.COM
LIC # 869960
B AND C-51
(770) 787-8845

ENGINEER'S APPROVAL

REGISTERED PROFESSIONAL ENGINEER
DUSTIN K. ROSENTRETER
S 5885
CIVIL
STATE OF CALIFORNIA

BID INFORMATION

THE STRUCTURES AND DESIGNS IN THIS PC ARE PROPRIETARY TO M BAR C CONSTRUCTION, INC. AND 4 S.T.E.L. ENGINEERING, INC. ALL SITES USING THIS PC: M BAR C CONSTRUCTION, INC. SHALL BE THE STEEL CONTRACTOR & 4 S. T. E. L. ENGINEERING, INC. SHALL BE THE SEOR. SEE THE STANDARD NOTES FOR PC USE ON S-1 FOR ADDITIONAL REQUIREMENTS.

PRE-CHECK (PC) DOCUMENT

CODE: 2022 CBC

A SEPARATE PROJECT APPLICATION FOR CONSTRUCTION IS REQUIRED

APPROVED
DIV. OF THE STATE ARCHITECT
APP: 04-123955 PC
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑ CG ☐
DATE: 10/14/2024

SITE SPECIFIC INFORMATION

ALTADENA ELEMENTARY SCHOOL
743 E CALAVERAS ST.
ALTADENA, CA 91001

REVISIONS

MARK	DATE	DESCRIPTION

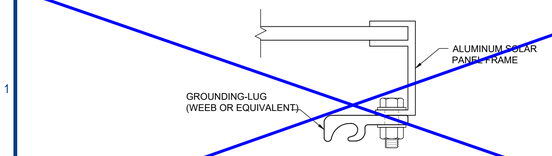
4 STEL JOB #	MC02-V3-6
DATE	10-03-24
DRAWN BY	GM
CHECKED	RWS

UG 22.6.1

TYPICAL
PURLIN DETAILS

S-17

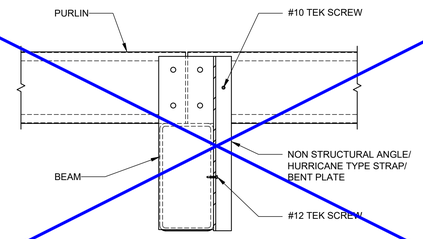
NOTE: IF DWG. IS NOT 24 x 36, IT IS NOT FULL SIZE



☐ OPTION UTILIZED

9 - OPTIONAL GROUNDING LUG

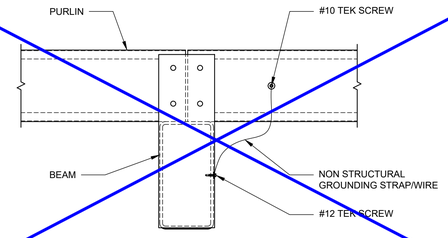
1'-0" = 1'-0"



☐ OPTION UTILIZED

10 - PURLIN GROUNDING DETAIL

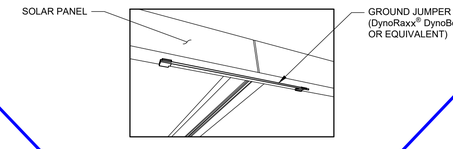
1-1/2" = 1'-0"

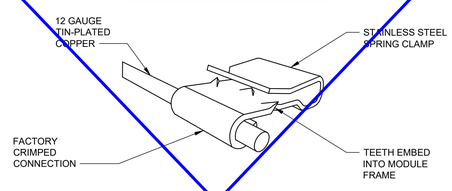


☐ OPTION UTILIZED

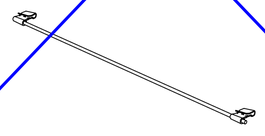
11 - PURLIN GROUNDING DETAIL

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





GROUND JUMPER (DynoRaxx® DynoBond™ OR EQUIVALENT) INSTALLATION



NOTE:
TO BE USED AS A JUMPER BETWEEN MODULES AND ROWS WHICH MAKES THE MODULE FRAME THE MEDIUM FOR THE EQUIPMENT GROUND PATH.

GROUND JUMPER (DynoRaxx® DynoBond™ OR EQUIVALENT)

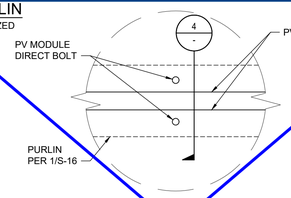
☐ OPTION UTILIZED

12 - OPTIONAL GROUND JUMPER

N.T.S.

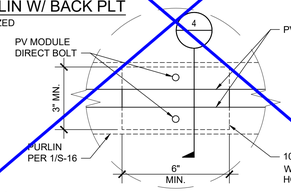
12 GA PURLIN

☐ OPTION UTILIZED



14 GA PURLIN W/ BACK PLT

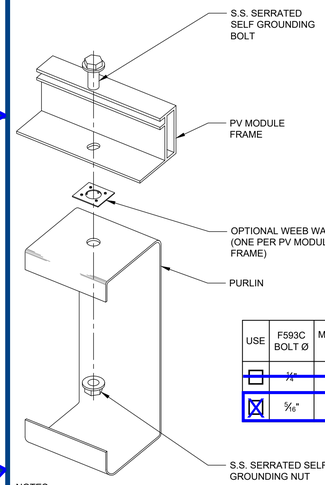
☐ OPTION UTILIZED



☐ OPTION UTILIZED

14 - LANDSCAPE CONNECTION DETAILS

3" = 1'-0"



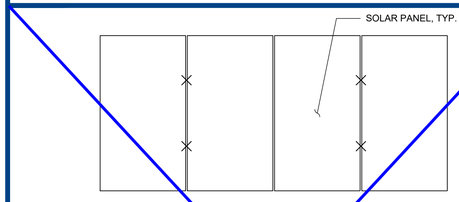
USE	F593C BOLT Ø	MIN. TORQUE (ft. lbs.)	MAX. TORQUE (ft. lbs.)
☐	¼"	8	10
☒	⅝"	12	15

NOTES:
1. REFER TO 'PV PANEL AND PV PANEL FASTENER INSTALLATION PROCEDURE' NOTES ON SHEET S-3.
2. BOLT SIZE SHALL BE SELECTED FROM THE SOLAR PANEL MANUFACTURER'S DOCUMENTATION SUBMITTED TO DSA AT PLAN REVIEW.

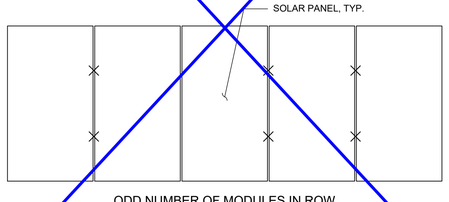
☒ OPTION UTILIZED

7 - SELF GROUNDING BOLT

6"=1'-0"



EVEN NUMBER OF MODULES IN ROW



ODD NUMBER OF MODULES IN ROW

NOTE:
✕ DENOTES WEEB-KSR OR CCR LOCATION

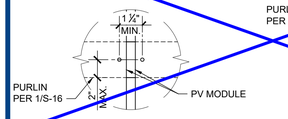
☐ OPTION UTILIZED

8 - OPTIONAL WEEB-KSR OR CCR LAYOUT

3/8" = 1'-0"

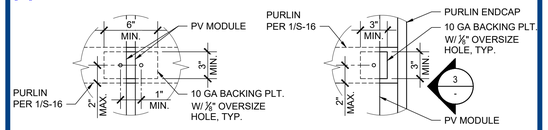
12 GA PURLIN

☐ OPTION UTILIZED



14 GA PURLIN / W BACK PLT

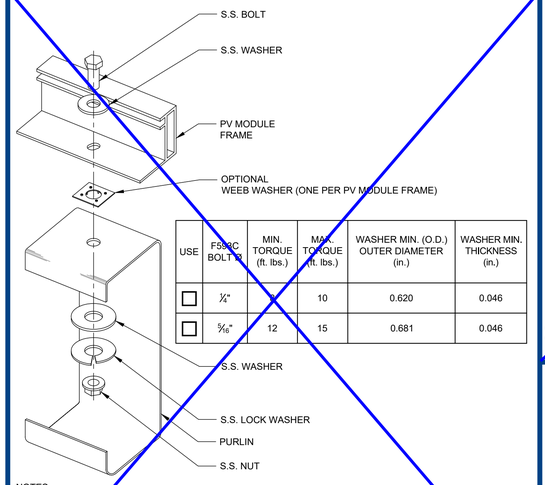
☒ OPTION UTILIZED



☒ OPTION UTILIZED

13 - PORTRAIT CONNECTION DETAILS

1 1/2" = 1'-0"



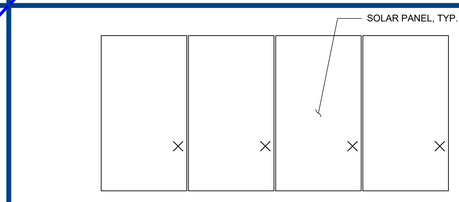
USE	F593C BOLT Ø	MIN. TORQUE (ft. lbs.)	MAX. TORQUE (ft. lbs.)	WASHER MIN. (O.D.) OUTER DIAMETER (in.)	WASHER MIN. THICKNESS (in.)
☐	¼"		10	0.620	0.046
☐	⅝"	12	15	0.681	0.046

NOTES:
1. REFER TO 'PV PANEL AND PV PANEL FASTENER INSTALLATION PROCEDURE' NOTES ON SHEET S-3.
2. BOLT SIZE SHALL BE SELECTED FROM THE SOLAR PANEL MANUFACTURER'S DOCUMENTATION SUBMITTED TO DSA AT PLAN REVIEW.

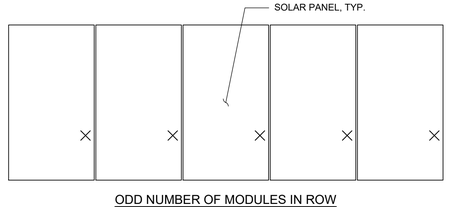
☐ OPTION UTILIZED

5 - SOLAR PANEL DIRECT BOLT ASSEMBLY

6"=1'-0"



EVEN NUMBER OF MODULES IN ROW



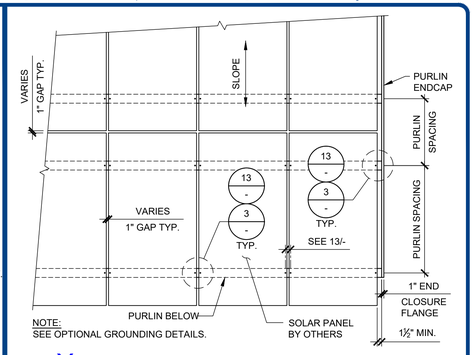
ODD NUMBER OF MODULES IN ROW

NOTE:
✕ DENOTES WEEB-ADC LOCATION

☒ OPTION UTILIZED

6 - OPTIONAL WEEB-ADC LAYOUT

3/8" = 1'-0"

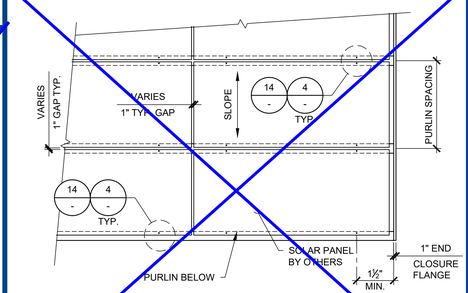


NOTE:
SEE OPTIONAL GROUNDING DETAILS.

☒ OPTION UTILIZED

1 - PORTRAIT SOLAR PANEL LAYOUT

3/8" = 1'-0"



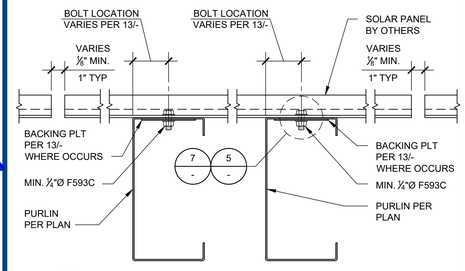
NOTE:
SEE OPTIONAL GROUNDING DETAILS.

☐ OPTION UTILIZED

2 - LANDSCAPE SOLAR PANEL LAYOUT

3/8" = 1'-0"

NOTES:
1. HOLES IN PURLIN SHALL BE ½"Ø LARGER THAN BOLTS UTILIZED.
2. FASTENERS SHALL BE TORQUED PER 5/- OR 7/-.
3. BOLT STACK SHALL BE INSTALLED PER 5/- OR 7/-.
4. BOLT SIZE SHALL BE SELECTED FROM THE SOLAR PANEL MANUFACTURER'S DOCUMENTATION SUBMITTED TO DSA AT PLAN REVIEW.

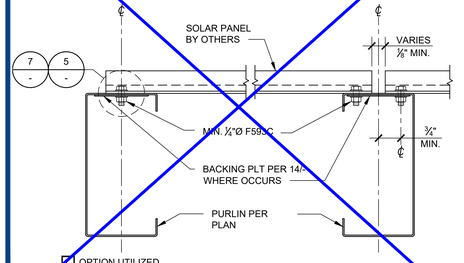


☒ OPTION UTILIZED

3 - PORTRAIT DIRECT BOLT

3" = 1'-0"

NOTES:
1. HOLES IN PURLIN SHALL BE ½"Ø LARGER THAN BOLTS UTILIZED.
2. FASTENERS SHALL BE TORQUED PER 5/- OR 7/-.
3. BOLT STACK SHALL BE INSTALLED PER 5/- OR 7/-.
4. BOLT SIZE SHALL BE SELECTED FROM THE SOLAR PANEL MANUFACTURER'S DOCUMENTATION SUBMITTED TO DSA AT PLAN REVIEW.



☐ OPTION UTILIZED

4 - LANDSCAPE DIRECT BOLT

3" = 1'-0"

IDENTIFICATION STAMP
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APP: 03-125900 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 03/18/2026

4 STEEL ENGINEERING
26030 ACERO
MISSION VIEJO, CA 92691
949.305.1150 | FAX 949.305.1420

M BAR C CONSTRUCTION INC.
1770 LA COSTA MEADOWS DRIVE, SAN MARCOS, CA 92078
ERIK KRIVOKOPICH
PHONE: (760) 744-4131
FAX: (760) 744-4449
ERIK@MBARCONLINE.COM
LIC # 869960
B AND C-21
(775) 787-8845

ENGINEER'S APPROVAL

REGISTERED PROFESSIONAL ENGINEER DUSTIN K. ROSENTRETER S 5885 STRUCTURAL STATE OF CALIFORNIA

BID INFORMATION

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REVIEWED FOR
SS ☑ FLS ☑ ACS ☑ CG ☐
DATE: 10/14/2024

SITE SPECIFIC INFORMATION

ALTADENA ELEMENTARY SCHOOL
743 E CALAVERAS ST.
ALTADENA, CA 91001

REVISIONS

MARK	DATE	DESCRIPTION

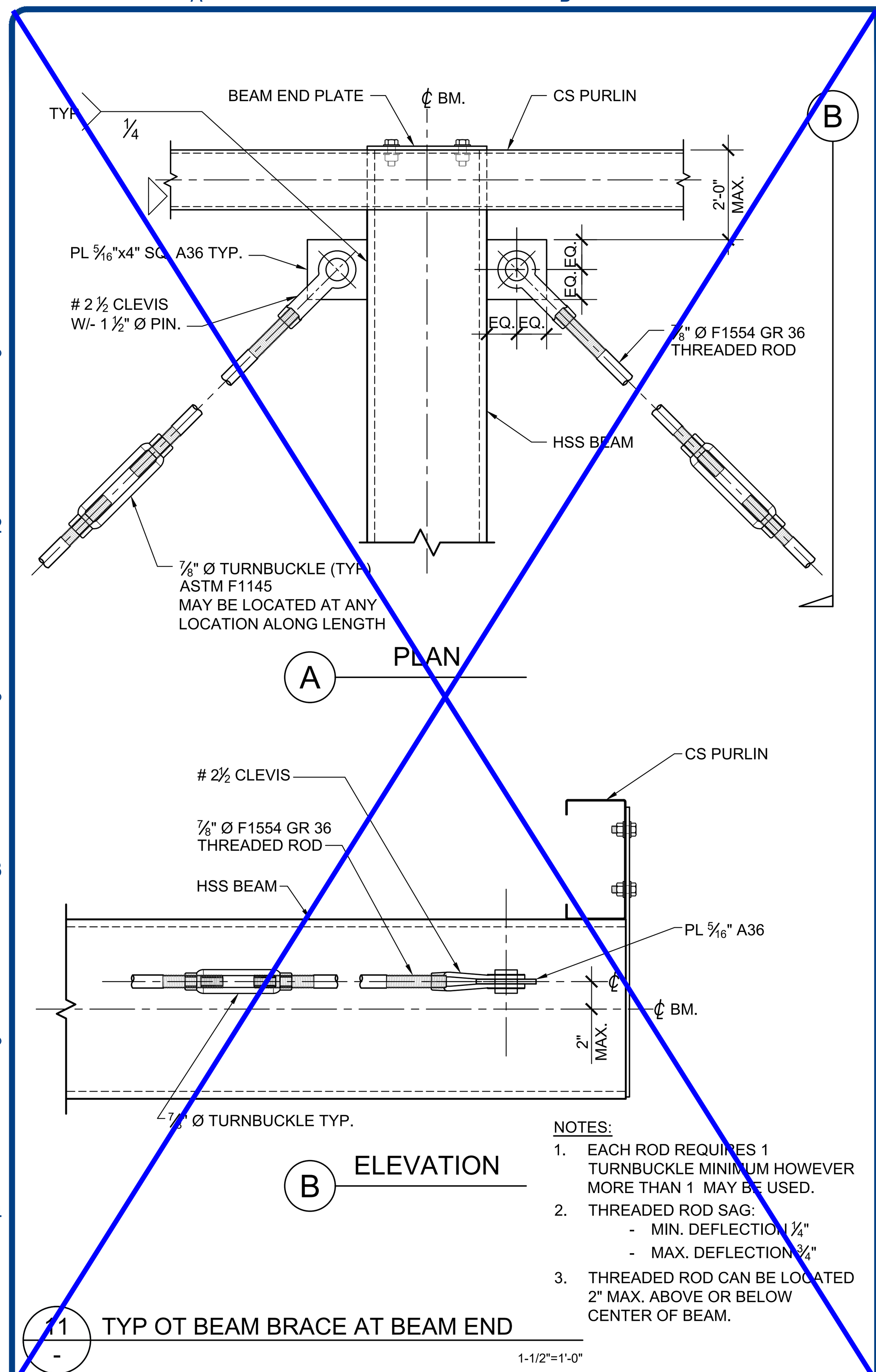
4 STEL JOB #	MC02-V3-6
DATE	10-03-24
DRAWN BY	GM
CHECKED	RWS

UG 22.6.1

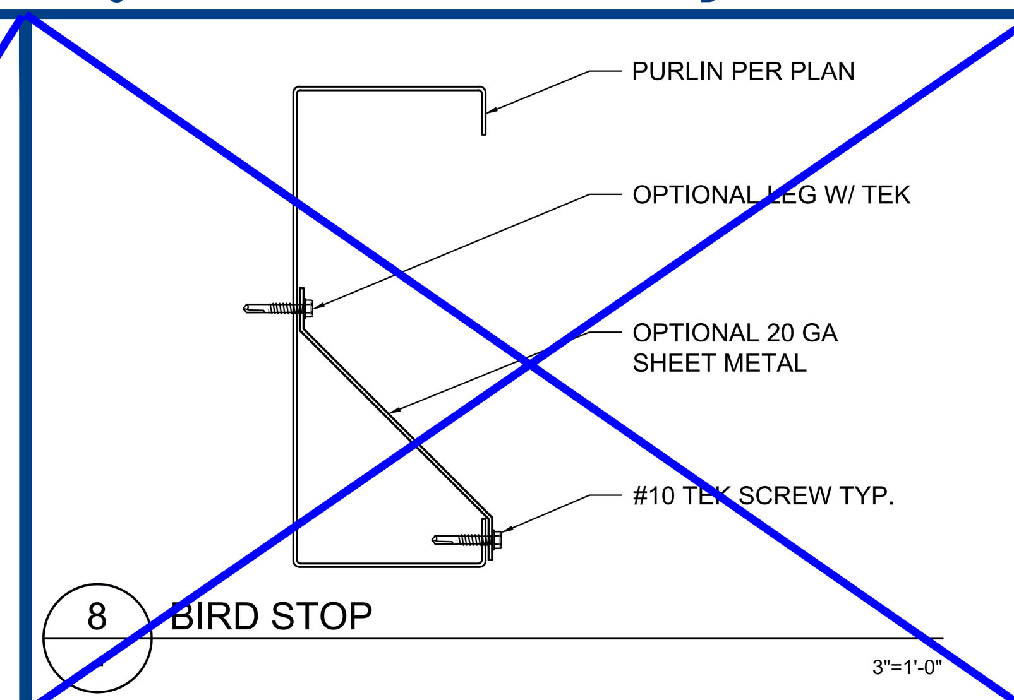
TYPICAL SOLAR PANEL DETAILS

S-18

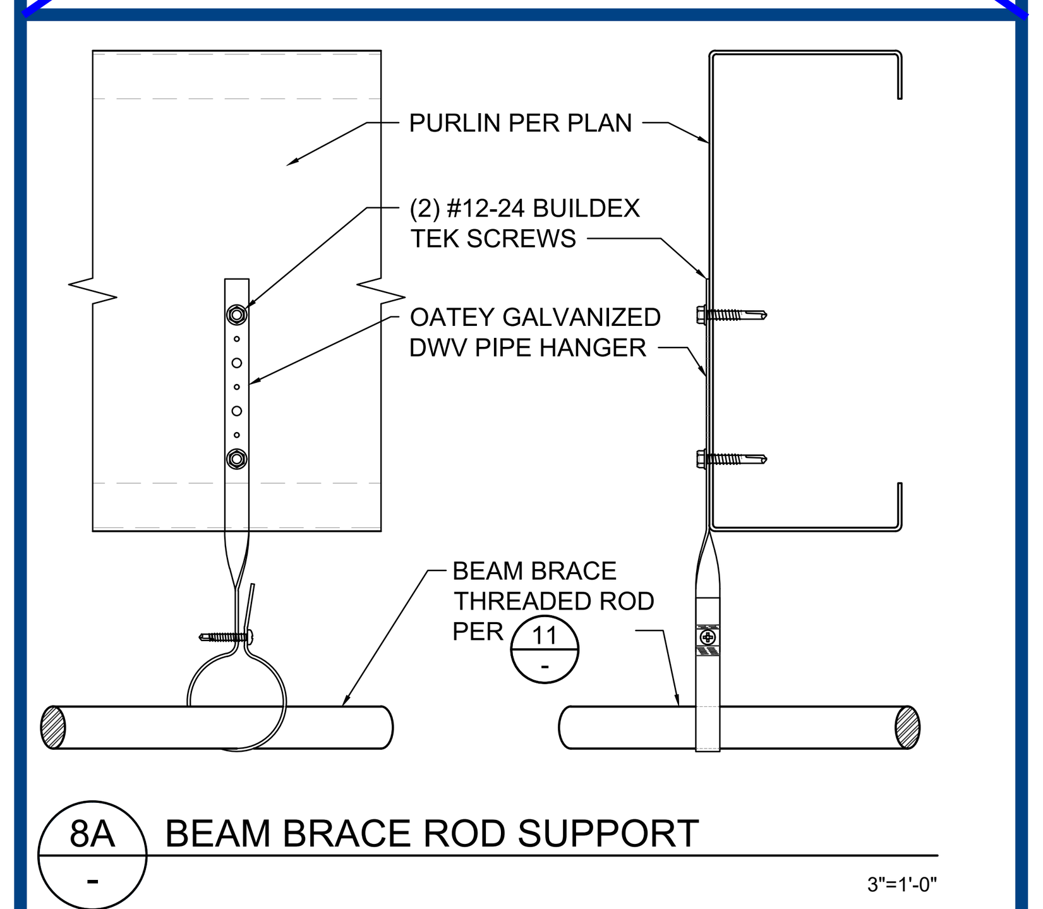
NOTE: IF DWG. IS NOT 24 x 36, IT IS NOT FULL SIZE



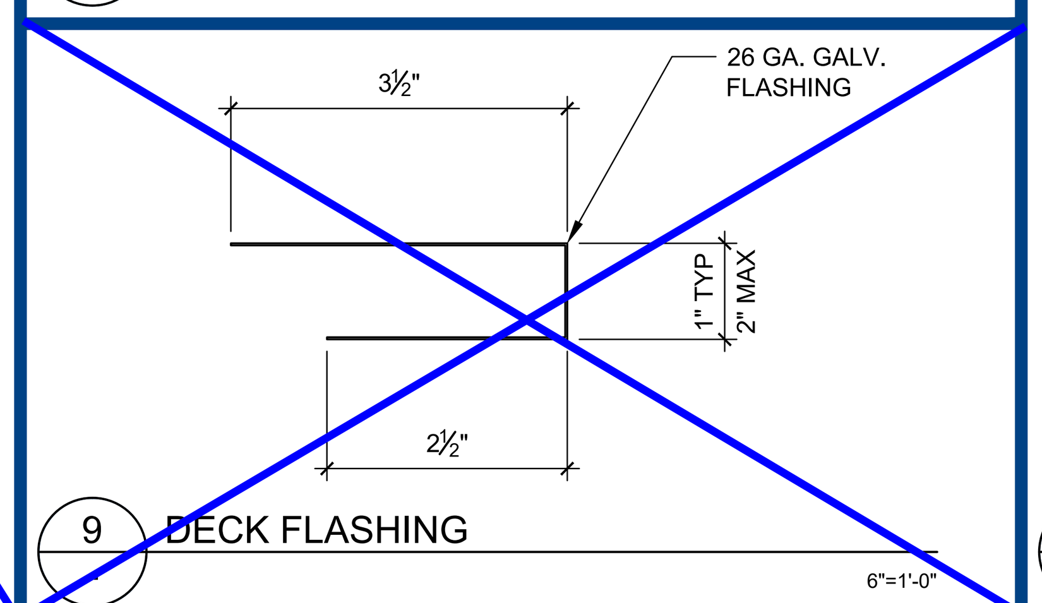
11 TYP OT BEAM BRACE AT BEAM END 1-1/2"=1'-0"



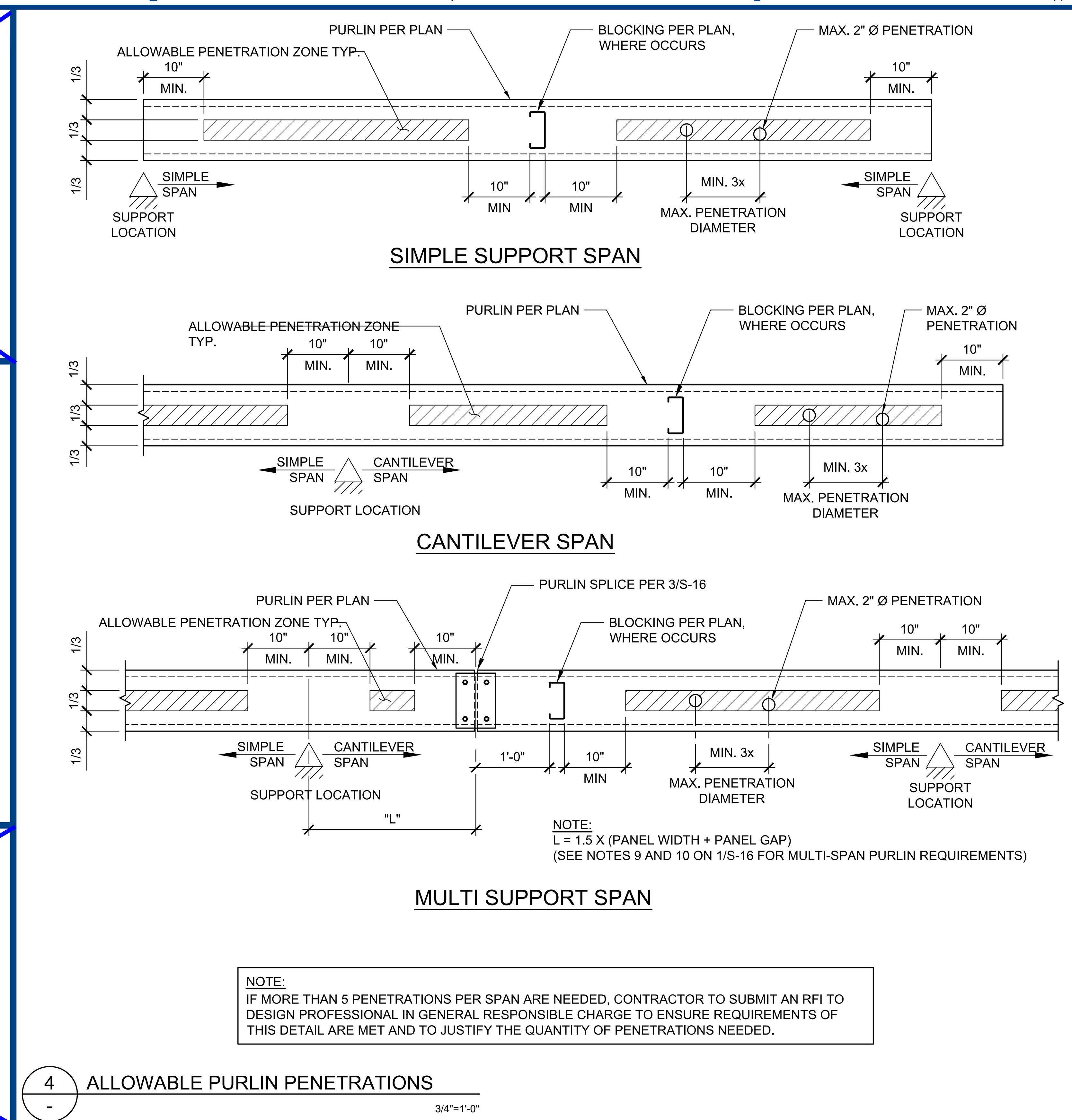
8 BIRD STOP 3"=1'-0"



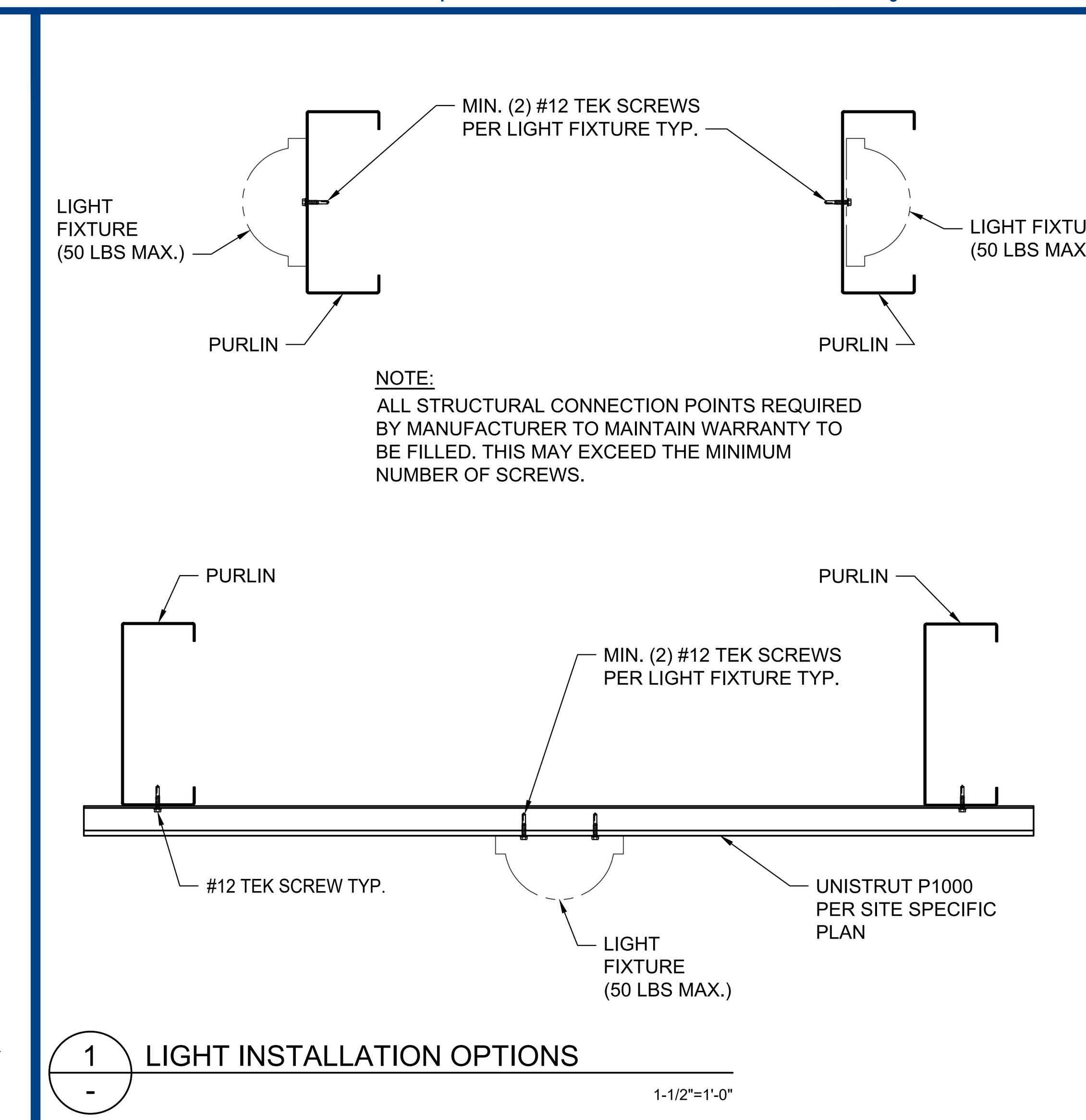
8A BEAM BRACE ROD SUPPORT 3"=1'-0"



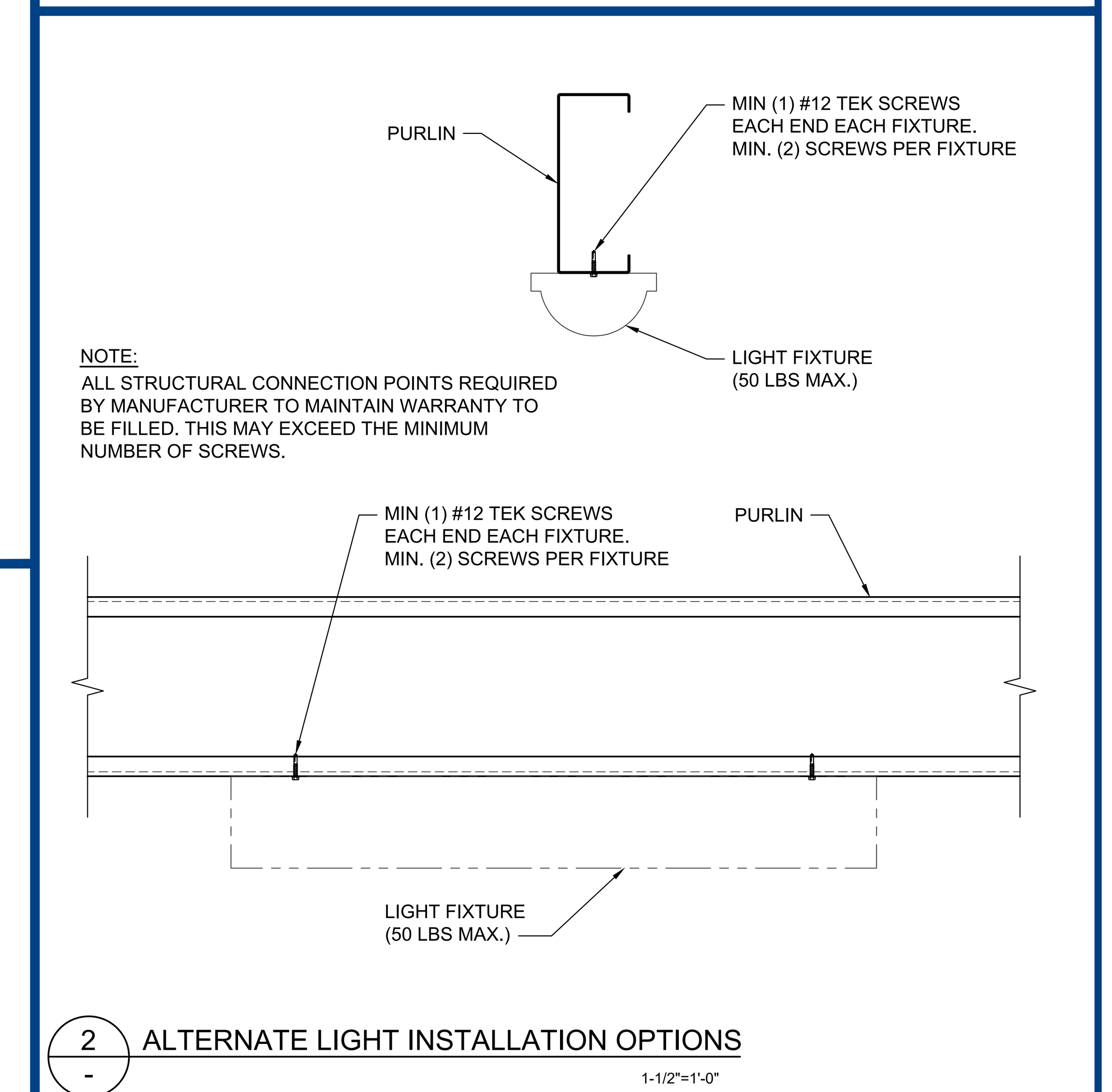
9 DECK FLASHING 6"=1'-0"



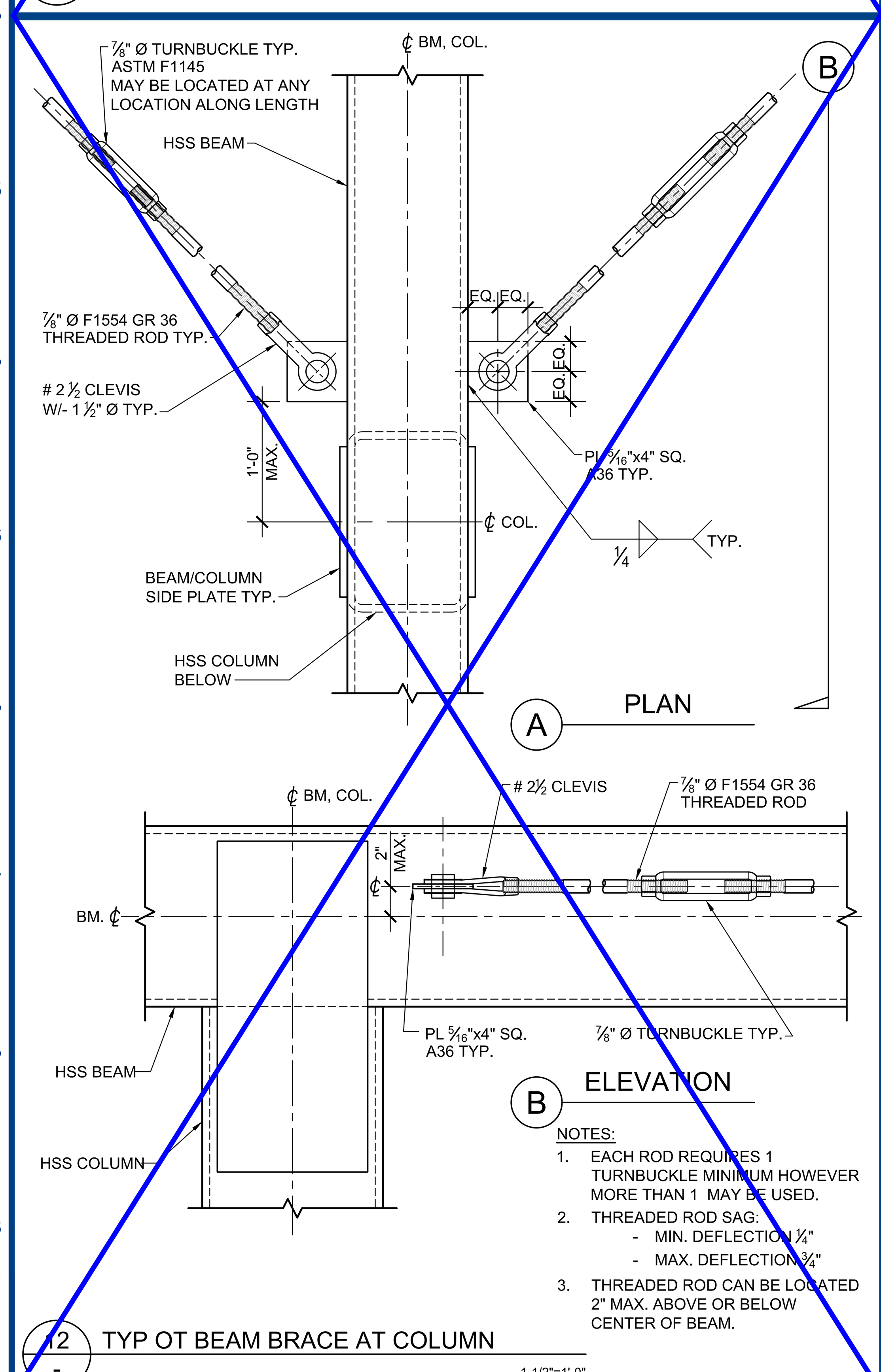
4 ALLOWABLE PURLIN PENETRATIONS 3/4"=1'-0"



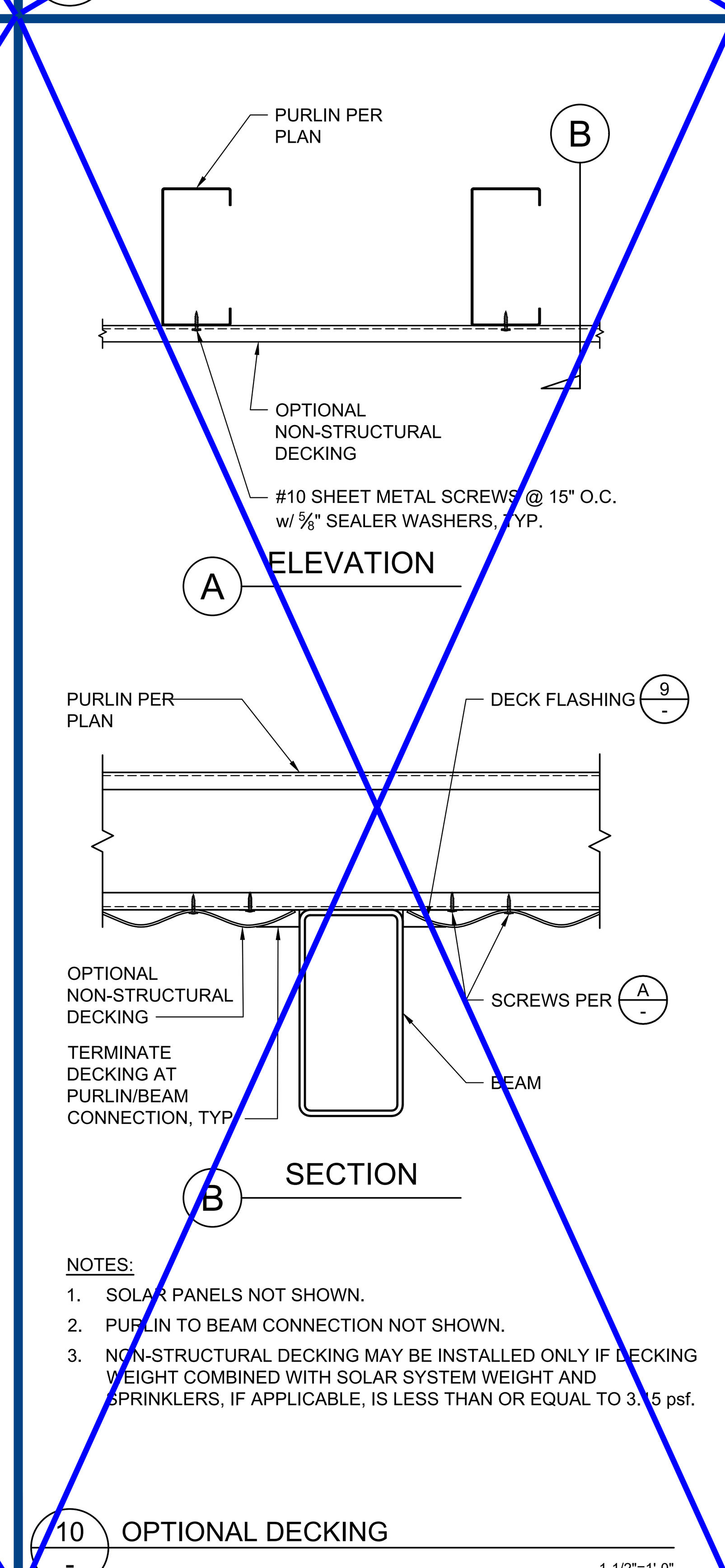
1 LIGHT INSTALLATION OPTIONS 1-1/2"=1'-0"



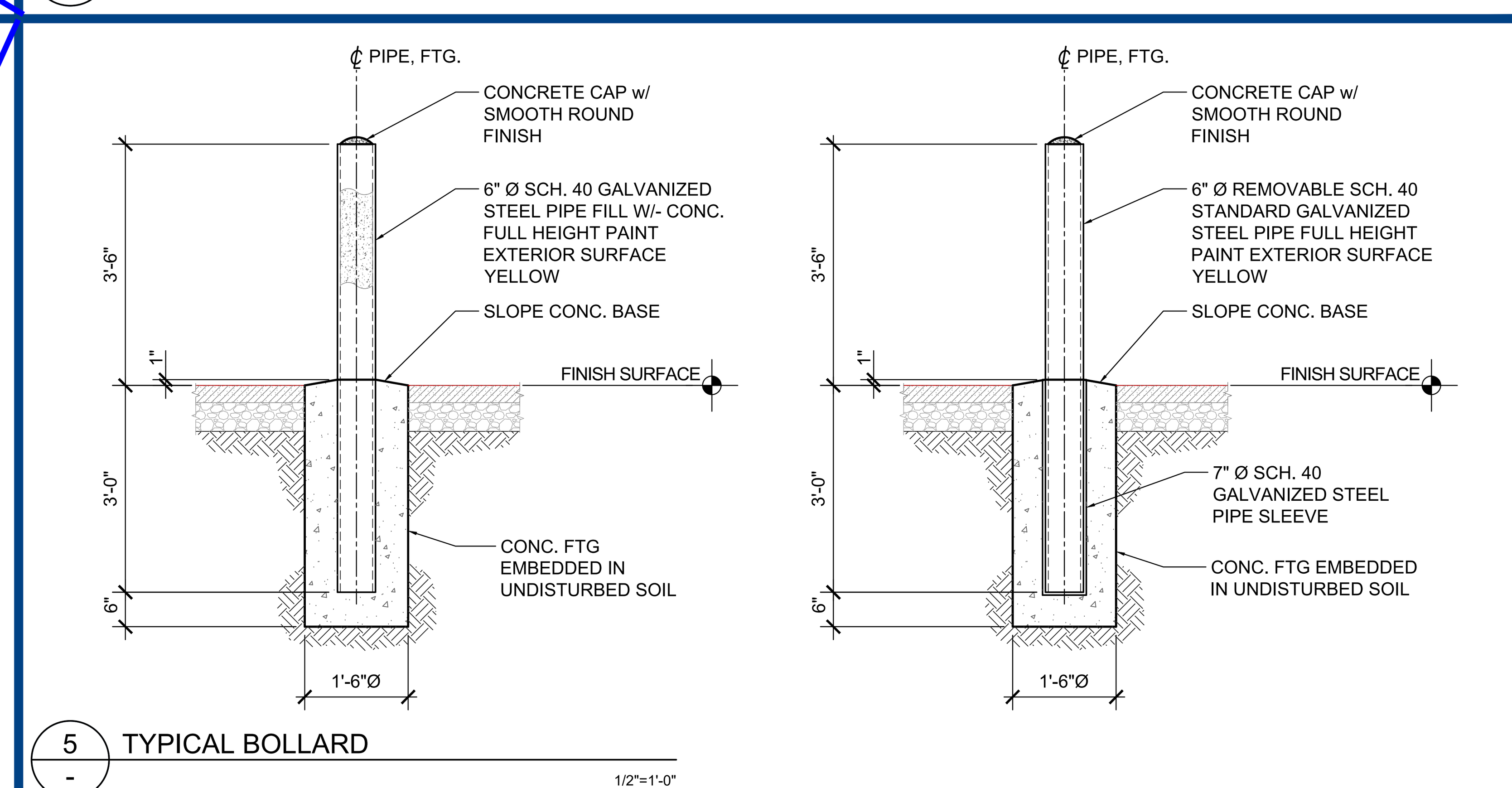
2 ALTERNATE LIGHT INSTALLATION OPTIONS 1-1/2"=1'-0"



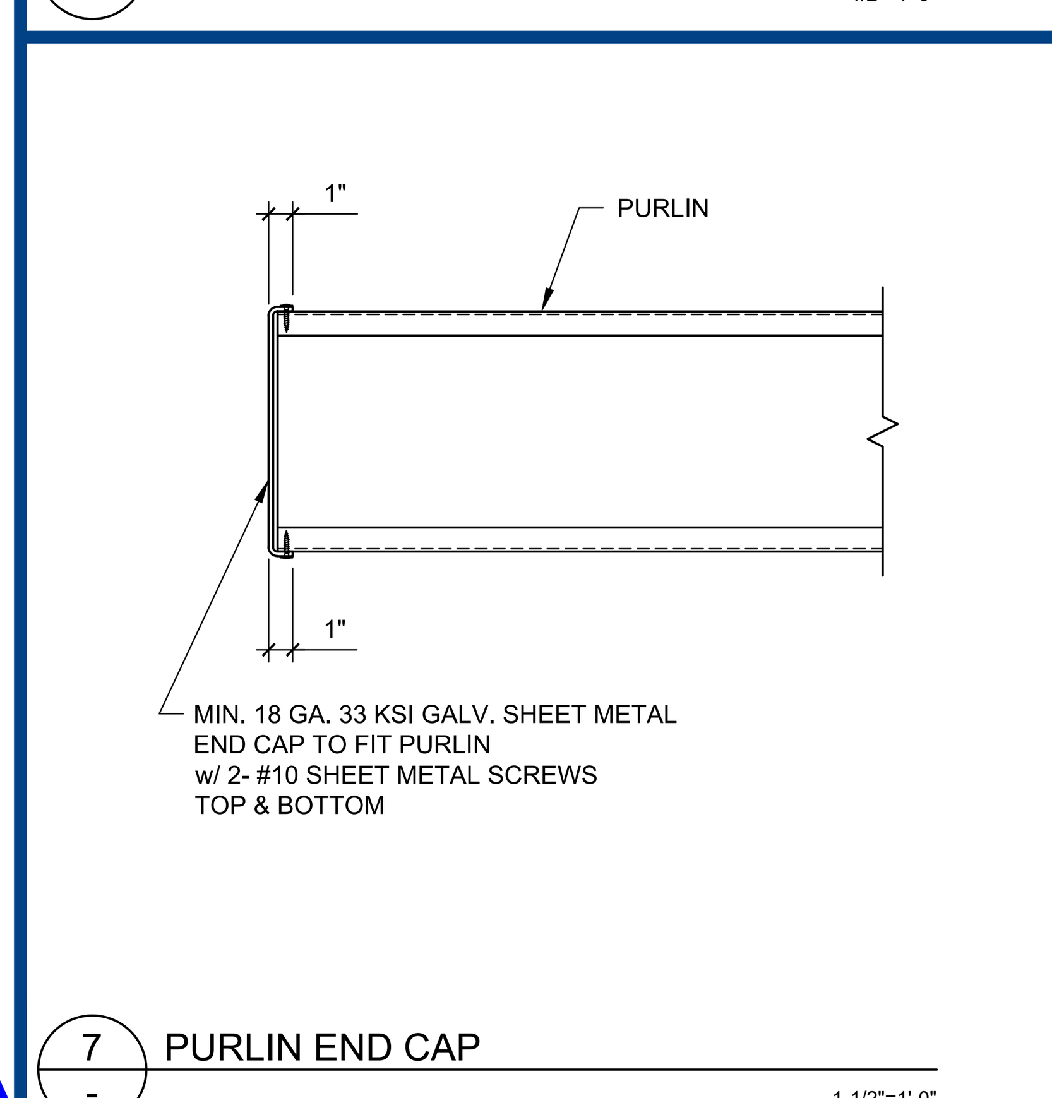
12 TYP OT BEAM BRACE AT COLUMN 1-1/2"=1'-0"



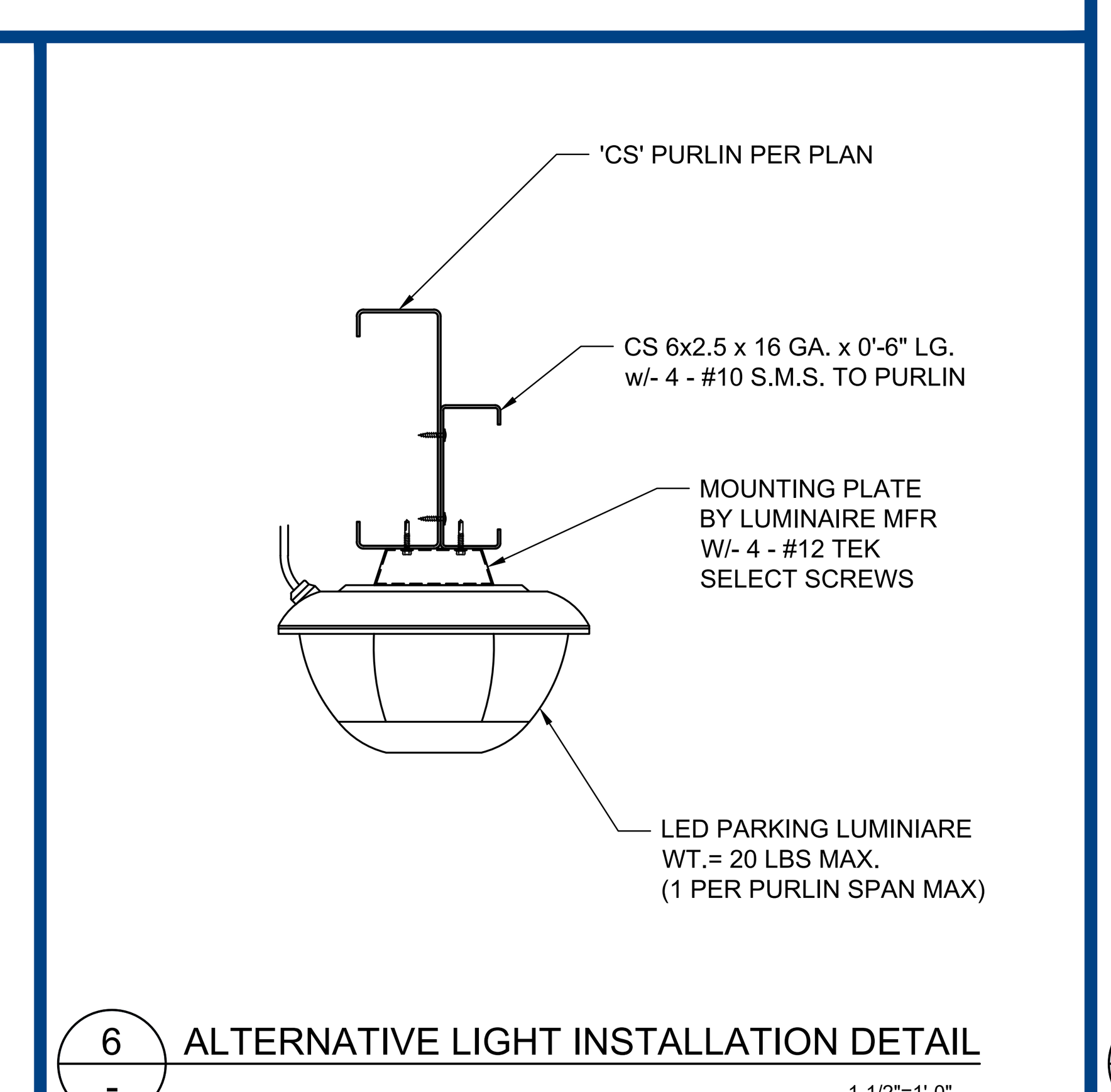
10 OPTIONAL DECKING 1-1/2"=1'-0"



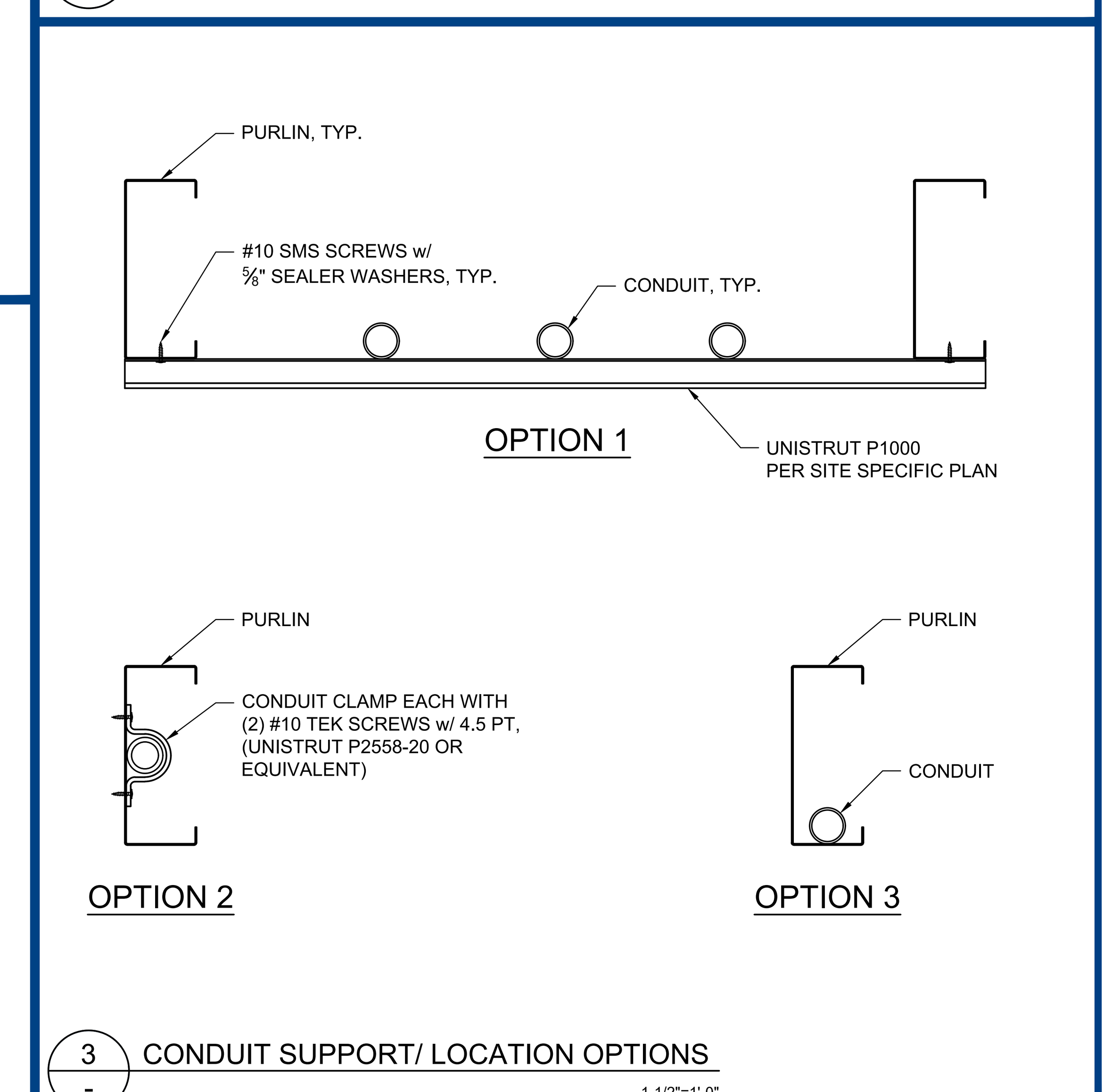
5 TYPICAL BOLLARD 1/2"=1'-0"



7 PURLIN END CAP 1-1/2"=1'-0"



6 ALTERNATIVE LIGHT INSTALLATION DETAIL 1-1/2"=1'-0"



3 CONDUIT SUPPORT/ LOCATION OPTIONS 1-1/2"=1'-0"

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949.305.1150 | FAX 949.305.1420

M BAR C CONSTRUCTION INC.

ENGINEER'S APPROVAL
REGISTERED PROFESSIONAL ENGINEER JUSTIN K. ROSENAK S 5885 STRUCTURAL STATE OF CALIFORNIA

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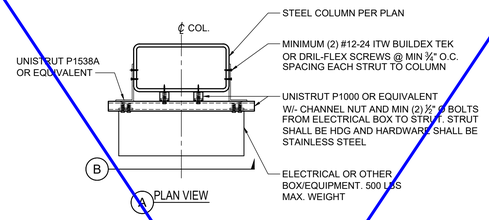
BEAM BRACING & MISC. DETAILS

S-19

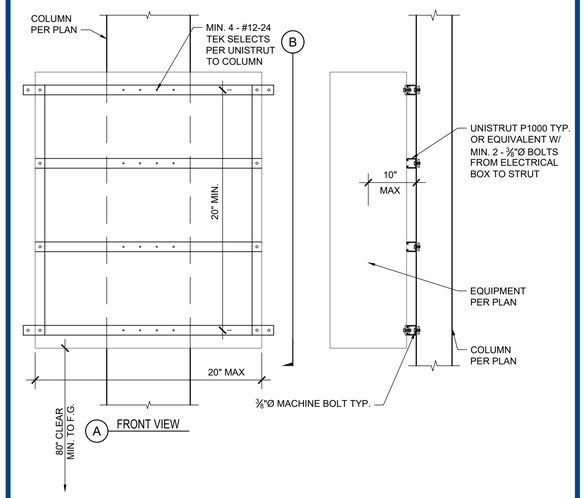
NOTE: IF DWG. IS NOT 24 x 36, IT IS NOT FULL SIZE



☐ OPTION UTILIZED

7 - COLUMN MOUNTED EQUIPMENT ANCHORAGE DETAIL

1"=1'-0"

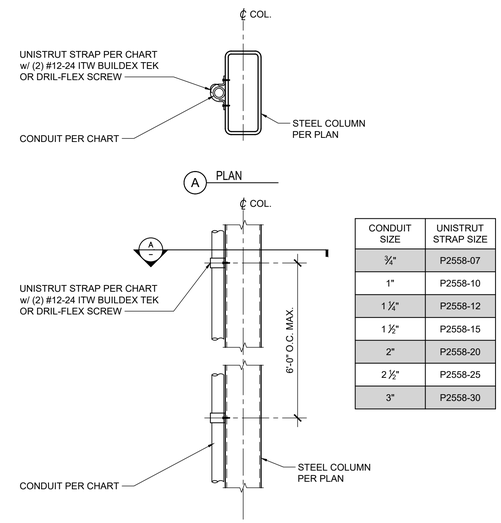


NOTES:
1. 500 lb MAX EQUIPMENT WEIGHT
2. FOR COLUMN THICKER ½" PRE DRILL COLUMN WITH DRILL BIT EQUAL TO ROOT DIAMETER OF SCREW USED. (I.E. SHAFT EXCLUDING THREADS)

☒ OPTION UTILIZED

5 - EQUIPMENT TO COLUMN CONNECTION

1"=1'-0"



CONDUIT SIZE	UNISTRUT STRAP SIZE
¾"	P2558-07
1"	P2558-10
1 ¼"	P2558-12
1 ½"	P2558-15
2"	P2558-20
2 ½"	P2558-25
3"	P2558-30

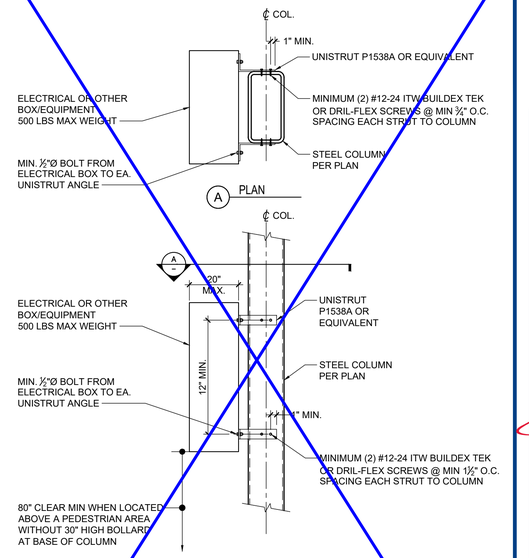
ELEVATION

NOTE:
1. FOR COLUMN THICKER ½" PRE DRILL COLUMN WITH DRILL BIT EQUAL TO ROOT DIAMETER OF SCREW USED. (I.E. SHAFT EXCLUDING THREADS)
2. PIPE CONDUIT MAY BE MOUNTED TO BOTH SIDES OF COLUMN. NOT SHOWN IN DETAIL FOR CLARITY.

☒ OPTION UTILIZED

3 - PIPE/ CONDUIT MOUNTING

1"=1'-0"



ELEVATION

NOTE:
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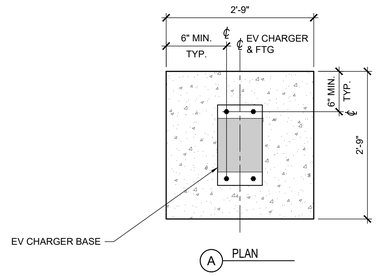
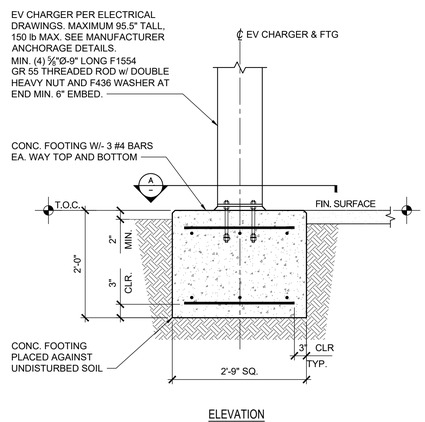
2. EQUIPMENT MAY BE MOUNTED TO BOTH SIDES OF COLUMN. NOT SHOWN IN DETAIL FOR CLARITY.

☐ OPTION UTILIZED

1 - ALTERNATE EQUIPMENT ATTACHMENT DETAIL

1" = 1'-0"

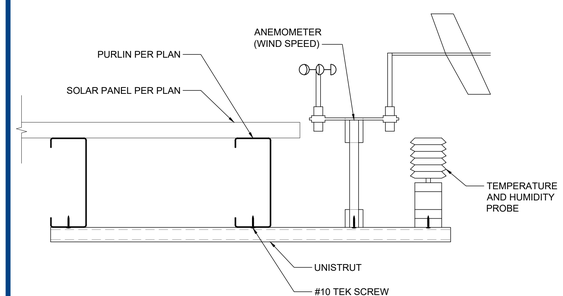




ELEVATION

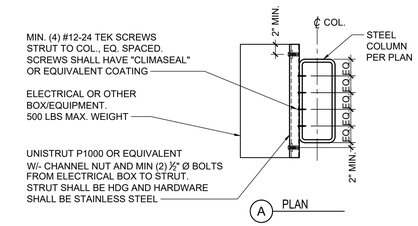
8 - EV CHARGER FOUNDATION

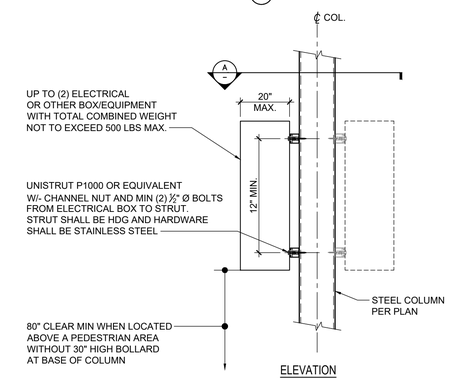
3/4"=1'-0"



6 - WEATHER STATION ATTACHMENT DETAIL

N.T.S.





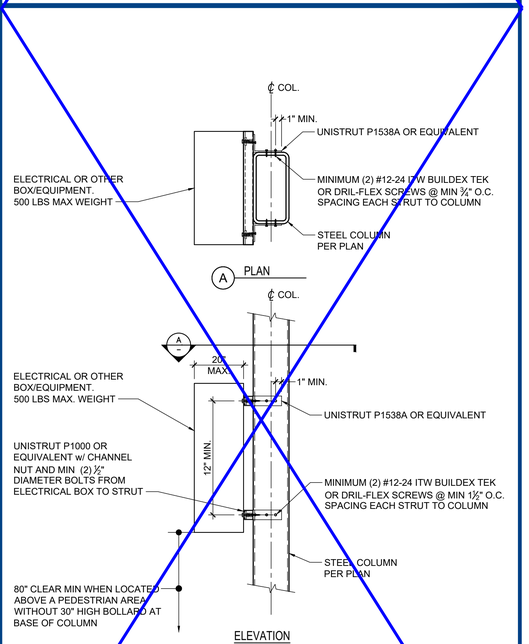
ELEVATION

NOTE:
1. FOR COLUMN THICKER ½" PRE DRILL COLUMN WITH DRILL BIT EQUAL TO ROOT DIAMETER OF SCREW USED. (I.E. SHAFT EXCLUDING THREADS)
2. EQUIPMENT MAY BE MOUNTED TO BOTH SIDES OF COLUMN. NOT SHOWN IN DETAIL FOR CLARITY.

☒ OPTION UTILIZED

4 - TYP. ELECTRICAL EQUIPMENT TO COLUMN

1"=1'-0"



ELEVATION

NOTE:
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2. EQUIPMENT MAY BE MOUNTED TO BOTH SIDES OF COLUMN. NOT SHOWN FOR CLARITY

☐ OPTION UTILIZED

2 - ALTERNATE EQUIPMENT ATTACHMENT DETAIL

1" = 1'-0"

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ENGINEER'S APPROVAL

REGISTERED PROFESSIONAL ENGINEER DUSTIN K. ROSENTRETER S 5885 STATE OF CALIFORNIA

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EQUIPMENT COLUMN CONNECTIONS

S-20

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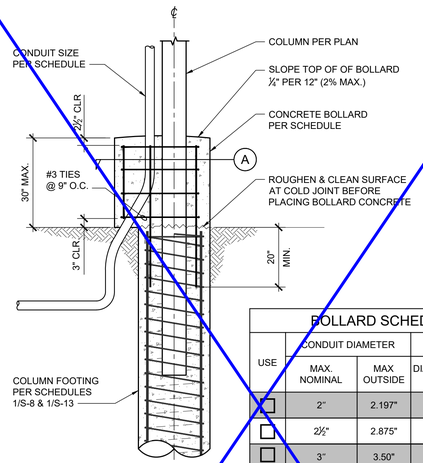
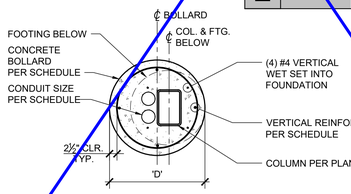


ELEVATION

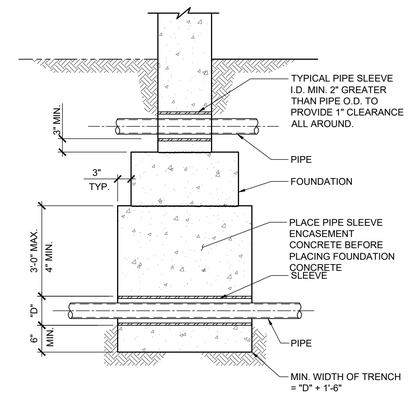
USE	CONDUIT DIAMETER MAX. NOMINAL	CONDUIT DIAMETER MAX OUTSIDE	BOLLARD DIAMETER "D"	BOLLARD VERTICAL REBAR
☐	2"	2.197"	30"	6 - #4
☐	2½"	2.875"	30"	6 - #4
☐	3"	3.50"	32"	6 - #4
☐	3½"	4.0"	32"	6 - #4
☐	4"	4.5"	32"	6 - #4



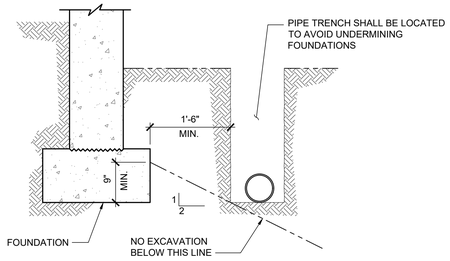
A SECTION

☐ OPTION UTILIZED

7 - OPTIONAL BOLLARD DETAIL W/ SINGLE SIDED CONDUIT 1/2"=1'-0"

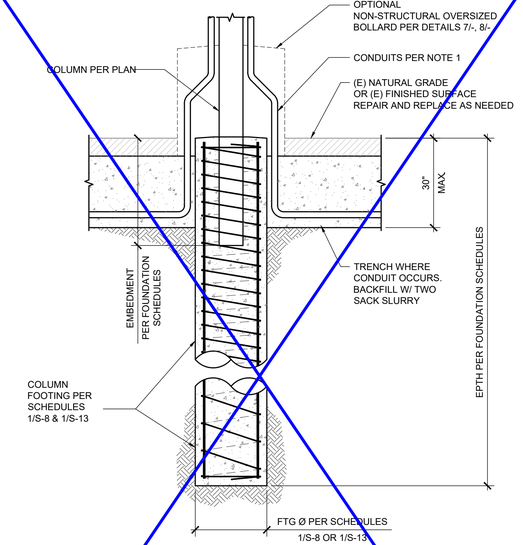


A PIPES PERPENDICULAR TO FOUNDATIONS



B PIPE TRENCH PARALLEL TO FOUNDATIONS

5 - TYPICAL UTILITY PIPES AND TRENCHES AT FOUNDATIONS N.T.S.

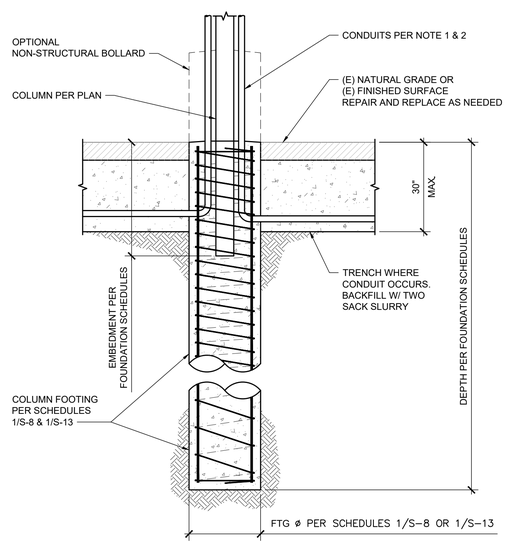


NOTES:

1 UNLIMITED NUMBER OF CONDUITS ALLOWED.

☐ OPTION UTILIZED

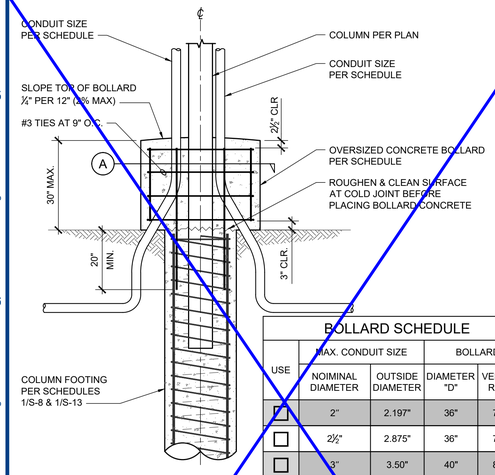
3 - CONDUIT OUTSIDE FOOTING 1/2"=1'-0"



NOTES:

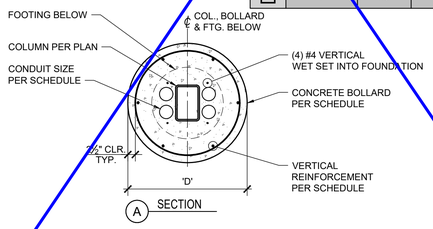
1. (2) 1" OR (1) 2" OR COMBINATION NOT TO EXCEED MAX 2" SIZE NOMINAL CONDUIT. CONDUITS MAY OCCUR ON ONE OR BOTH SIDES OF COLUMN.
2. CONTRACTOR TO SUBMIT CONDUIT LAYOUT TO ENGINEER FOR APPROVAL PRIOR TO INSTALLATION.

1 - CONDUITS IN STANDARD FOOTING 1/2"=1'-0"



ELEVATION

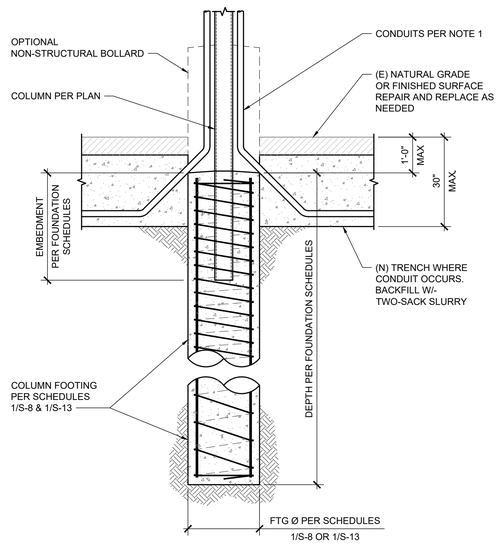
USE	MAX. CONDUIT SIZE NOIMINAL DIAMETER	MAX. CONDUIT SIZE OUTSIDE DIAMETER	BOLLARD DIAMETER "D"	BOLLARD VERTICAL REBAR
☐	2"	2.197"	36"	7 - #4
☐	2½"	2.875"	36"	7 - #4
☐	3"	3.50"	40"	8 - #4
☐	3½"	4.0"	40"	8 - #4
☐	4"	4.5"	40"	8 - #4



A SECTION

☐ OPTION UTILIZED

8 - OPTIONAL BOLLARD DETAIL W/ DUAL SIDED CONDUIT 1/2"=1'-0"

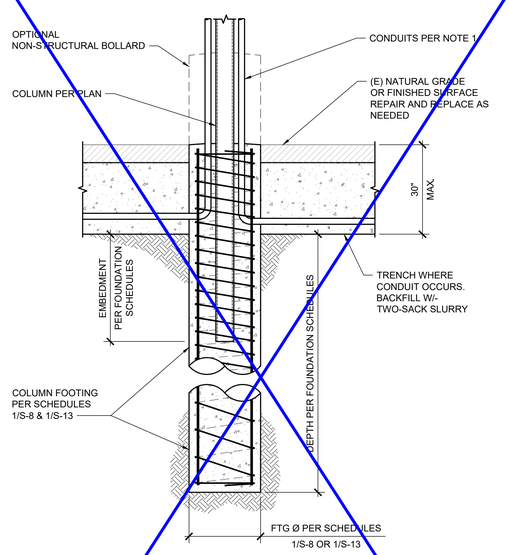


NOTES:

1. UNLIMITED NUMBER OF CONDUITS ALLOWED.

☒ OPTION UTILIZED

6 - ALTERNATIVE DEEPENED FOOTING 1/2"=1'-0"



NOTES:

1. UNLIMITED NUMBER OF CONDUITS ALLOWED IN FOUNDATIONS.

☐ OPTION UTILIZED

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

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APPROVED
DIV. OF THE STATE ARCHITECT
APP: 04-123955 PC
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑ CG ☐
DATE: 10/14/2024

SITE SPECIFIC INFORMATION
ALTADENA ELEMENTARY SCHOOL
743 E CALAVERAS ST.
ALTADENA, CA 91001

REVISIONS

MARK	DATE	DESCRIPTION

4 STEL JOB #	MC02-V3-6
DATE	10-03-24
DRAWN BY	GM
CHECKED	RWS

UG 22.6.1

FOUNDATION MISC. DETAILS

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NOTE: IF DWG. IS NOT 24 x 36, IT IS NOT FULL SIZE