

ELECTRICAL SYMBOLS AND ABBREVIATIONS

NOTE: NOT ALL SYMBOLS MAY BE USED ON THIS PROJECT. REFER TO SPECIFICATIONS MANUAL FOR ADDITIONAL REQUIREMENTS.

POWER SYMBOLS

	MOTOR, HP AS INDICATED
	CONTROLLER TO BE FURNISHED UNDER DIVISION 15
	DISCONNECT SWITCH
	MAGNETIC MOTOR STARTER
	COMBINATION MOTOR STARTER
	CONTACTOR
	JUNCTION BOX, CEILING MOUNTED
	JUNCTION BOX, WALL MOUNTED
	RELAY
	SIMPLEX RECEPTACLE
	DUPLEX RECEPTACLE
	GFI=GROUND FAULT CIRCUIT INTERRUPTER WP=WEATHERPROOF IG=ISOLATED GROUND
	DOUBLE DUPLEX (QUADRUPLX) RECEPTACLE
	FLOOR OUTLET DUPLEX RECEPTACLE
	FLOOR OUTLET SIMPLEX RECEPTACLE
	FLOOR OUTLET QUADRUPLX RECEPTACLE
	DROP CORD RECEPTACLE
	SPECIAL PURPOSE OUTLET AS DESIGNATED
	SINGLE FACE PEDESTAL
	DOUBLE FACE PEDESTAL RECEPTACLE
	EQUIPMENT CONNECTION
	CONNECT TO EXISTING

LIGHTING CONTROL SYMBOLS

	SINGLE POLE SWITCH, SUBSCRIPT INDICATES ASSOCIATED CIRCUITRY
	DIMMABLE SWITCH
	DOUBLE POLE SWITCH
	THREE-WAY SWITCH
	FOUR-WAY SWITCH
	KEY OPERATED SWITCH
	SWITCH WITH PILOT LIGHT IN HANDLE (ON=LIGHTED UNLESS OTHERWISE NOTED)
	WEATHERPROOF SWITCH
	MANUAL MOTOR STARTER (T=THERMAL OVERLOAD, SIZED FOR MOTOR)
	DOOR SWITCH
	TIME SWITCH
	SPEED CONTROL
	PUSH BUTTON
	SWITCH, OCCUPANCY SENSOR, WALL MOUNT
	MOMENTARY CONTACT OVERRIDE SWITCH

LIGHTING CONTROL SYMBOLS (CONT.)

	OCCUPANCY SENSOR, CEILING MOUNTED, DUAL TECHNOLOGY. THE CONTRACTOR SHALL PROVIDE ALL REQUIRED POWER PACKS
	OCCUPANCY SENSOR WALL MOUNTED, DUAL TECHNOLOGY. THE CONTRACTOR SHALL PROVIDE ALL REQUIRED POWER PACKS

LIGHTING SYMBOLS

	INCANDESCENT OR HID FIXTURE, CEILING MOUNTED
	INCANDESCENT OR HID FIXTURE, WALL MOUNTED
	FLUORESCENT TROFFER, RECESSED OR SURFACE MOUNTED
	EXIT SIGN - SINGLE FACE
	EXIT SIGN - SINGLE FACE WITH ONE-WAY DIRECTIONAL ARROW
	EXIT SIGN - SINGLE FACE WITH TWO-WAY DIRECTIONAL ARROWS
	EXIT SIGN - DOUBLE FACE
	EXIT SIGN - DOUBLE FACE WITH 2 ONE-WAY DIRECTIONAL ARROWS
	EMERGENCY LIGHT, BATTERY TYPE WITH CHARGER
	EXTERIOR FLOOD LIGHT
	POLE MOUNTED LUMINAIRE (SQUARE)
	POLE MOUNTED LUMINAIRE (ROUND)
	TRACK LIGHT WITH HEADS AS INDICATED
	LIGHTING CONTACTOR
	POWER PACK

ELECTRICAL RACEWAYS

	CONDUIT CONCEALED IN WALL OR CEILING
	CONDUIT UNDER FLOOR OR UNDERGROUND
	SWITCH LEG
	SURFACE MOUNTED RACEWAY WITH ALL REQUIRED FITTINGS AND HARDWARE. PROVIDE RECEPTACLES AS INDICATED.
	SURFACE MOUNTED RACEWAY RISER SECTION WITH ALL REQUIRED FITTINGS AND HARDWARE
	BUS DUCT WITH TAKE OFF DEVICE
	UNDERGROUND ELECTRICAL (APPROXIMATE LOCATION, CONTRACTOR TO VERIFY EXACT LOCATION IN FIELD)
	UNDERGROUND TELEPHONE (APPROXIMATE LOCATION, CONTRACTOR TO VERIFY EXACT LOCATION IN FIELD)
	BRANCH CIRCUIT HOMERUN SUBSCRIPT "PIA" INDICATES PANEL AND 2,4,6 INDICATES BREAKER POSITION

CABLE TRAY AND RELATED ITEMS

	CABLE TRAY - 90 DEGREE FITTING
	CABLE TRAY - TEE FITTING
	CABLE TRAY - X FITTING
	CABLE TRAY - 90 DEGREE VERTICAL BENDS: IN & OUT FOR ELEVATION CHANGE
	CABLE TRAY - 90 DEGREE VERTICAL BEND: IN OR OUT FOR TRAY UP OR DOWN
	CABLE TRAY

FIRE ALARM SYSTEM SYMBOLS

	FIRE ALARM CONTROL PANEL
	REMOTE ANNUNCIATOR PANEL
	FIRE ALARM EXPANSION PANEL
	MANUAL PULL STATION (G=VANDAL PROOF GUARD)
	AUDIOVISUAL ANNUNCIATOR (G=VANDAL PROOF GUARD) □ = WALL MOUNT ○ = CEILING MOUNT
	VISUAL ANNUNCIATOR (G=VANDAL PROOF GUARD) □ = WALL MOUNT ○ = CEILING MOUNT
	AUDIBLE ANNUNCIATOR (G=VANDAL PROOF GUARD) □ = WALL MOUNT ○ = CEILING MOUNT
	SMOKE DETECTOR (G=VANDAL PROOF GUARD)
	SMOKE DETECTOR, DUCT MOUNTED
	HEAT DETECTOR (G=VANDAL PROOF GUARD)
	SMOKE FIRE DAMPER
	TEST SWITCH
	FLOW SWITCH
	FIRE SPRINKLER PRESSURE SWITCH
	FIRE ALARM SPEAKER ANNUNCIATOR
	FIRE FIGHTERS PHONE JACK
	FIRE FIGHTERS TELEPHONE
	MAGNETIC DOOR HOLDER
	WALL MOUNTED AUDIBLE ANNUNCIATOR (HORN) (G= VANDAL PROOF GUARD, WP=WEATHERPROOF)

CLOCKS SYSTEM SYMBOLS

	CEILING MOUNTED CLOCK
	WALL MOUNTED CLOCK HEIGHT AS DESIGNATED BY ARCHITECT
	WALL MOUNTED DOUBLE FACE HEIGHT AS DESIGNATED BY ARCHITECT

INTERCOM SYSTEM SYMBOLS

	INTERCOM SPEAKER, CEILING MOUNTED (G=VANDAL PROOF GUARD)
	INTERCOM SPEAKER, WALL MOUNTED (G=VANDAL PROOF GUARD)
	INTERCOM CALL SWITCH (V=VOLUME CONTROL)
	INTERCOM SPEAKER, EXTERIOR HORN-TYPE (G=VANDAL PROOF GUARD, WP=WEATHERPROOF)
	AMPLIFIER
	INTERCOM SYSTEM CABINET
	INTERCOM CALL-IN SWITCH
	ADMINISTRATIVE CONTROL SYSTEM
	INTERCOM PUSHBUTTON (V=VOLUME CONTROL)

SECURITY & ACCESS CONTROL SYSTEM SYMBOLS

	SECURITY MAIN CONTROL PANEL
	DURESS ALARM PUSHBUTTON
	DURESS SYSTEM WIRELESS RECEIVER/ANTENNA
	PUSH BUTTON
	EGRESS PUSHBUTTON
	CARD READER
	CLOSED CIRCUIT TELEVISION OUTLET
	DOOR CONTACT
	MAGNETIC DOOR LOCK
	MOTION DETECTOR, ROUGH-IN ONLY, 90° AFF, MAXIMUM 6" FROM NEAREST CORNER TO CENTER OF BOX, 1/2" CONDUIT TO ABOVE ACCESSIBLE CEILING WITH BUSHINGS AND PULL-STRING UNLESS INDICATED OTHERWISE.
	GLASS BREAK SENSOR ROUGH-IN ONLY, 90° AFF, MAXIMUM 6" FROM NEAREST CORNER TO CENTER OF BOX, 1/2" CONDUIT TO ABOVE ACCESSIBLE CEILING WITH BUSHINGS AND PULL-STRING UNLESS INDICATED OTHERWISE.
	REQUEST TO EXIT SENSOR
	ELECTRIC STRIKE
	CAMERA (FOI) OWNER FURNISHED, OWNER INSTALLED
	CAMERA (CFI) CONTRACTOR FURNISHED, CONTRACTOR INSTALLED
	DOMED CAMERA

TELECOM. / TELEPHONE / DATA SYSTEM SYMBOLS

	PLYWOOD TELEPHONE BACKBOARD
	TELEPHONE OUTLET IN WALL, ROUGH-IN ONLY, 1" CONDUIT TO ABOVE ACCESSIBLE CEILING WITH BUSHINGS AND PULL-STRING UNLESS INDICATED OTHERWISE.
	DATA OUTLET IN WALL, ROUGH-IN ONLY, 1" CONDUIT TO ABOVE ACCESSIBLE CEILING WITH BUSHINGS AND PULL-STRING UNLESS INDICATED OTHERWISE.
	PHONE AND DATA OUTLET IN WALL, ROUGH-IN ONLY, 1" CONDUIT TO ABOVE ACCESSIBLE CEILING WITH BUSHINGS AND PULL-STRING UNLESS INDICATED OTHERWISE.
	FLOOR TELEPHONE AND DATA OUTLET, POKE-THRU TYPE
	THERMOSTAT
	CABLE TELEVISION OUTLET, ROUGH-IN ONLY, 15" A.F.F. UNLESS INDICATED OTHERWISE.
	FLOOR CABLE TELEVISION OUTLET
	WIRELESS ACCESS POINT
	ANTENNA

ONE-LINE DIAGRAM SYMBOLS

	H-O-A SELECTOR SWITCH
	STOP/START PUSHBUTTON STATION
	LIGHTING ARRESTER AND SURGE CAPACITOR
	TRANSFORMER
	TRANSFORMER (SHIELDED)
	MOTOR STARTER RELAY AND CONTACTOR
	ELAPSED (RUNNING) TIME METER
	CONTROL POWER TRANSFORMER
	CIRCUIT BREAKER (MOTOR CIRCUIT PROTECTOR)
	DISCONNECT SWITCH
	BUS STAB
	CURRENT TRANSFORMER
	MOTOR RESISTANCE TYPE WINDING HEATER
	THERMAL OVERLOAD CIRCUIT
	BREAKER (THERMAL MAGNETIC TYPE)
	FUSE
	CONTACT (NORMALLY OPEN)
	CONTACT (NORMALLY CLOSED)
	PUSHBUTTON (NORMALLY OPEN)
	PUSHBUTTON (NORMALLY CLOSED)
	LIMIT SWITCH (NORMALLY OPEN)
	TIME DELAY CONTACT
	PILOT LIGHT W/COLOR INDICATED (A-AMBER, G-GREEN, R-RED)
	SOLENOID VALVE
	DIFFERENTIAL PRESSURE SWITCH
	AUTOMATIC TRANSFER SWITCH
	DISCONNECT SWITCH 400/3/400AF/N3R INDICATES FRAME SIZE/POLES/FUSE AMPACITY/ENCLOSURE

PANELS AND RELATED EQUIPMENT

	PANELBOARD SURFACE MOUNTED (REFER TO PANEL SCHEDULE)
	PANELBOARD FLUSH MOUNTED (REFER TO PANEL SCHEDULE)
	TRANSFORMER, WITH CONCRETE HOUSEKEEPING PAD (REFER TO ONE-LINE DIAGRAM)
	AUTOMATIC TRANSFER SWITCH (REFER TO ONE-LINE DIAGRAM)

ABBREVIATIONS

A	AMPERE
AC	ABOVE COUNTER
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AIC	AMPERE INTERRUPTING CAPACITY
BLDG	BUILDING
C	CONDUIT
CAB	CABINET
CKT	CIRCUIT
CONN	CONNECT OR CONNECTION
CT	CURRENT TRANSFORMER
EA	EACH
EF	EXHAUST FAN
ELEC	ELECTRIC
EMER	EMERGENCY
FACP	FIRE ALARM CONTROL PANEL
FLA	FULL LOAD AMPS
FLEX	FLEXIBLE CONDUIT
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GND	GROUND
HOA	HAND-OFF-AUTO
HP	HORSEPOWER
HPS	HIGH PRESSURE SODIUM
HTR	HEATER
J-BOX	JUNCTION BOX
KVA	KILOVOLT AMPERE
KVAR	KILOVOLT AMPERE REACTIVE
KCM	THOUSAND CIRCULAR MILS
KV	KILOWATT
LTG	LIGHT OR LIGHTING
MFG	MANUFACTURER
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCP	MOTOR CIRCUIT PROTECTOR
MIN	MINIMUM
MH	METAL HALIDE
MLO	MAIN LUG ONLY
MSB	MAIN SWITCHBOARD
MTD	MOUNTED
NEC	NATIONAL ELECTRICAL CODE
NTS	NOT TO SCALE
Ø	PHASE
OL	OVERLOAD
OVHD	OVERHEAD
PA	PUBLIC ADDRESS
SC	SPLIT CIRCUIT
SFD	SMOKE FIRE DAMPER
SW	SWITCH
T/D	TELEPHONE & DATA
TTB	TELEPHONE TERMINAL BOARD
TYP	TYPICAL
UC	UNDER COUNTER
UG	UNDERGROUND
UNO	UNLESS NOTED OTHERWISE
V	VOLT
W	WATTS
W/	WITH
WP	WEATHER PROOF
XFMR	TRANSFORMER

PROJECT # 16206

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F-1008

STATE OF TEXAS
LON M. CULBERTSON
105679
LICENSED PROFESSIONAL ENGINEER
EXPIRES 12-2-16
Alderson & Associates, Inc.
F-1008

FORD ENGINEERING INC.

ENGINEERING SURVEYING PLANNING
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TYPE NO. 1162 * WWW.FORDENGINEERING.COM * TBPLS NO. 10018400

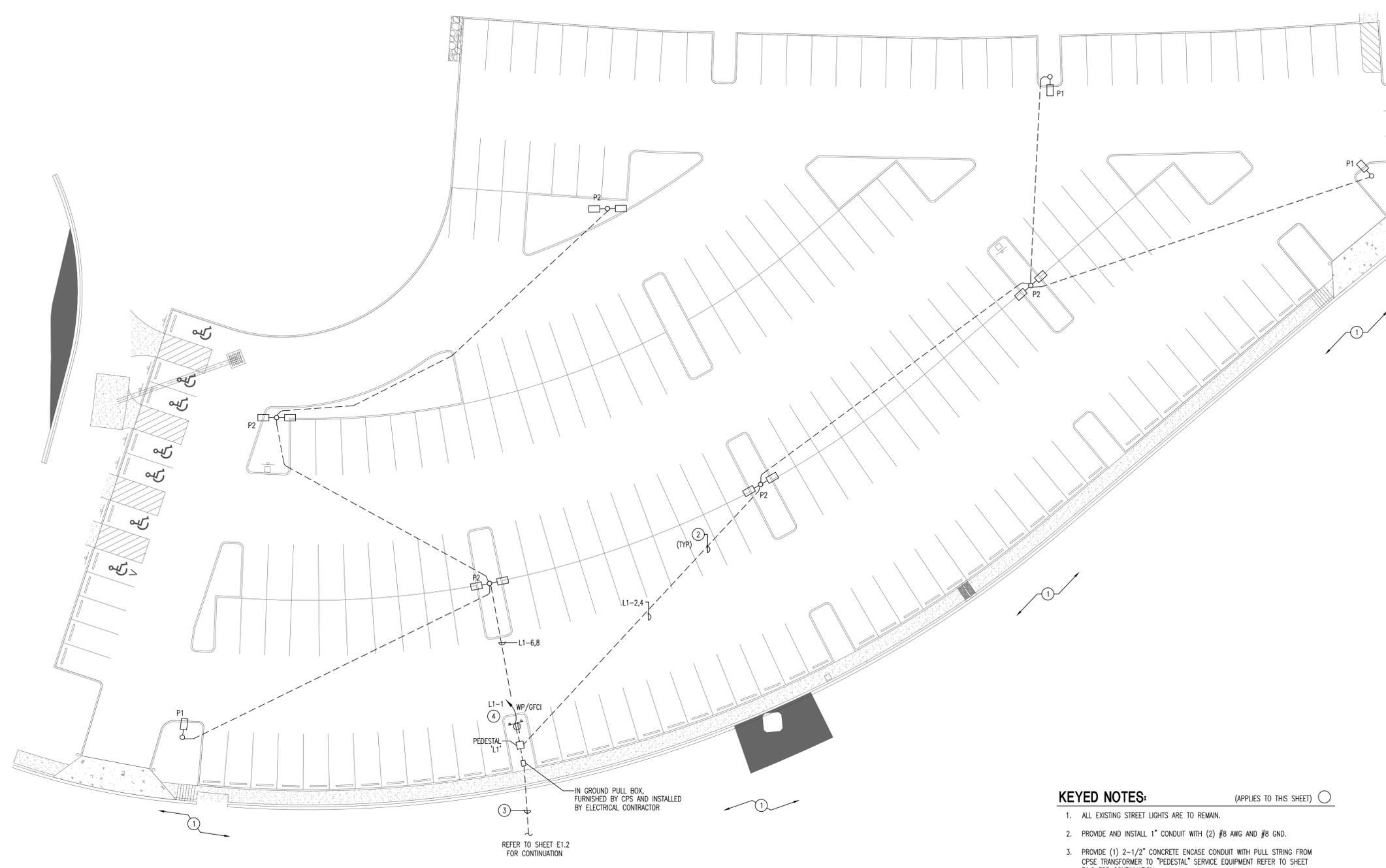
REVISIONS:		DESCRIPTION
NO.	DATE	

HBGCC SOUTH PARKING LOTS
CITY OF SAN ANTONIO
HENRY B. GONZALEZ CONVENTION CENTER
EXPANSION PROJECT
ELECTRICAL SYMBOLS AND ABBREVIATIONS

E0.0

DRAWINGS ARE AND SHALL REMAIN THE PROPERTY OF THE ARCHITECT/ENGINEER. WHETHER THE PROJECT FOR WHICH THEY ARE INTENDED IS EXECUTED OR NOT, THEY ARE NOT TO BE USED BY ANYONE OTHER THAN THE PROJECT OR EXTENDING TO THE PROJECT, NOT COVERED IN THE CONTRACT, WITHOUT WRITTEN AGREEMENT WITH AND APPROPRIATE COMPENSATION TO FORD ENGINEERING, INC.

VOLTAGE DROP CALCULATION																		
DATE	Proj No.	FROM	TO	W	FLA	No. SETS	AWG	R (ohms per 1000')	X	LENGTH	PF	SIN (acos(PF))	Line Voltage	Phase	Voltage Drop	% Volt Drop	Terminal Voltage	% Line
7/29/16	16-036 - Sheet E1.1	Service - 240V	1st Pole Ckt L1-2.4 - 6 lights	1,200	5.0	1	8 AWG	.780	.065	150	0.95	0.31	240	1	1.1	0.5	239	99.5
		1st Pole	2nd Pole - 4 lights	800	3.3	1	8 AWG	.780	.065	150	0.95	0.31	239	1	0.8	0.3	238	99.2
		2nd Pole	3rd Pole - 1 light	200	0.8	1	8 AWG	.780	.065	150	0.95	0.31	238	1	0.2	0.1	238	99.1
7/29/16	16-036 - Sheet E1.1	Service - 240V	1st Pole Ckt L1-6.8 - 7 lights	1,400	5.8	1	8 AWG	.780	.065	150	0.95	0.31	240	1	1.3	0.6	239	99.4
		1st Pole	2nd Pole - 4 lights	800	3.3	1	8 AWG	.780	.065	150	0.95	0.31	239	1	0.8	0.3	238	99.1
		2nd Pole	3rd Pole - 2 lights	400	1.7	1	8 AWG	.780	.065	150	0.95	0.31	238	1	0.4	0.2	238	99.0



PLAN NORTH
ELECTRICAL SITE PLAN - LOT 1
 SCALE: 1" = 20'-0"

- KEYED NOTES:** (APPLIES TO THIS SHEET) ○
- ALL EXISTING STREET LIGHTS ARE TO REMAIN.
 - PROVIDE AND INSTALL 1" CONDUIT WITH (2) #8 AWG AND #8 CND.
 - PROVIDE (1) 2-1/2" CONCRETE ENCASE CONDUIT WITH PULL STRING FROM CPSE TRANSFORMER TO "PEDESTAL" SERVICE EQUIPMENT REFER TO SHEET E1.2 FOR CONTINUATION.
 - PROVIDE AND INSTALL NEW ELECTRICAL RACK TO ACCOMMODATE DEDICATED MAINTENANCE RECEIPTABLE.

- GENERAL LIGHTING NOTES:**
- ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE AND THE AUTHORITY HAVING JURISDICTION.
 - COORDINATE ALL WORK WITH OTHER TRADES AS REQUIRED.
 - ALL ITEMS AND FIXTURES SHALL BE UL LISTED.
 - VOLTAGE DROP IN BRANCH CIRCUITS SHALL NOT EXCEED 3%.
 - ALL JUNCTION BOX COVERS WILL BE MARKED USING "SHARPIE" OR "MARKSALOT" INDICATING THE PANEL AND CIRCUIT #'S CONTAINED WITHIN THE JUNCTION BOX.
 - COORDINATE AND SCHEDULE ALL REQUIRED OUTAGES OF ELECTRICAL SERVICE TO EXISTING FACILITIES WITH OWNER'S REPRESENTATIVE IN ADVANCE OF OUTAGE.
 - CONTRACTOR SHALL REQUEST THE LOCATION OF ALL UNDERGROUND UTILITIES IN THE VICINITY OF ANY EXCAVATION AND UNDERGROUND TRENCHING. CONTRACTOR SHALL VERIFY WITH UTILITY LOCATING COMPANY THAT ALL UNDERGROUND UTILITY MARKING IS COMPLETE PRIOR TO BEGINNING UNDERGROUND WORK.
 - COORDINATE AND SCHEDULE ALL EXCAVATION, TRENCHING, BACKFILL, CONCRETE WORK, LIGHT POLE ERECTION, AND OTHER SITE WORK WITH OWNER'S REPRESENTATIVE IN ADVANCE OF THIS WORK. THE CONTRACTOR SHALL GIVE SPECIAL CONSIDERATION TO ANY WORK INVOLVING SITE TRENCH, EXCAVATION, AND THE ASSOCIATED CONTROLLED ACCESS TO PARKING LOTS AND OTHER WORK AREAS.
 - CONTRACTOR SHALL PROVIDE AND PLACE TEMPORARY BARRIERS, WARNING CONES AND OTHER SUITABLE DEVICES TO ADEQUATELY PROTECT THE PUBLIC AND SCHOOL POPULATION FROM ANY AND ALL HAZARDS PRESENTED BY THE CONSTRUCTION OF THIS PROJECT, INCLUDING, BUT NOT LIMITED TO THE FOLLOWING: STORAGE OF MATERIALS AND EQUIPMENT, OPERATION OF TRENCHING EQUIPMENT AND MOTOR VEHICLES, OPEN TRENCHES AND POLE BASE CORE DRILLS, EXCAVATED MATERIAL & CONCRETE DELIVERY AND POUR.
 - CONTRACTOR SHALL REVIEW PROTECTION PLAN WITH OWNER'S REPRESENTATIVE FOR APPROVAL PRIOR TO BEGINNING WORK.
 - CONTRACTOR SHALL COORDINATE AND REVIEW DELIVERY AND PLACEMENT OF ALL ELECTRICAL MATERIALS AND EQUIPMENT TO THE SITE WITH OWNER'S REPRESENTATIVE FOR APPROVAL PRIOR TO DELIVERY.
 - CONTRACTOR SHALL COORDINATE AND REVIEW SCHEDULE AND PLACEMENT FOR EQUIPMENT OPERATION FOR PROJECT CONSTRUCTION WITH OWNER'S REPRESENTATIVE FOR APPROVAL PRIOR TO PERFORMING THIS WORK. PROTECTION OF THE PUBLIC AND SCHOOL POPULATION BY LIMITING ACCESS TO THE WORK AREAS SHALL BE REVIEWED WITH THE OWNER'S REPRESENTATIVE FOR APPROVAL.
 - CONTRACTOR SHALL COORDINATE ALL WORK IN THE PARKING LOT AREA WITH OWNER'S REPRESENTATIVE, TO AVOID CONFLICT WITH ANY OTHER ACTIVITIES OR FUNCTIONS THAT REQUIRE ACCESS TO THE PARKING LOT AREA DURING THE CONSTRUCTION.
 - CONTRACTOR SHALL COORDINATE ALL WORK IN CONSTRUCTION AREAS WITH OWNER'S REPRESENTATIVE, TO AVOID CONFLICT WITH ANY OTHER ACTIVITIES OR FUNCTIONS IN OR ADJACENT TO THESE AREAS.

DRAWINGS ARE AND SHALL REMAIN THE PROPERTY OF THE ARCHITECT/ENGINEER. WHETHER THE PROJECT FOR WHICH THEY ARE INTENDED IS EXECUTED OR NOT, THEY ARE NOT TO BE USED BY ANYONE ON OTHER PROJECTS OR IN CONNECTION TO THIS PROJECT NOT COVERED BY THE CONTRACT, WITHOUT THE WRITTEN CONSENT AND APPROPRIATE COMPENSATION TO ALDERSON & ASSOCIATES, INC.

FORD ENGINEERING INC.
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 TYPE No. 1162 * WWW.FORDEENGINEERING.COM * TBPLS No. 10016400

REVISIONS:

NO.	DATE	DESCRIPTION

HBGCC SOUTH PARKING LOTS
 CITY OF SAN ANTONIO
 HENRY B. GONZALEZ CONVENTION CENTER
 EXPANSION PROJECT
 ELECTRICAL SITE PLAN - LOT 1

E1.1



VOLTAGE DROP CALCULATION																		
DATE	Proj No.	FROM	TO	W	FLA	No. SETS	AWG	R	X	LENGTH	PF	SIN (acos(PF))	Line Voltage	Phase	Voltage Drop	% Volt Drop	Terminal Voltage	% Line
7/29/16	16-036 - Sheet E1.2	Service - 240V	1st Pole Ckt L2-2.4 - 2 lights	400	1.7	1	8 AWG	.780	.065	150	0.95	0.31	240	1	0.4	0.2	240	99.8

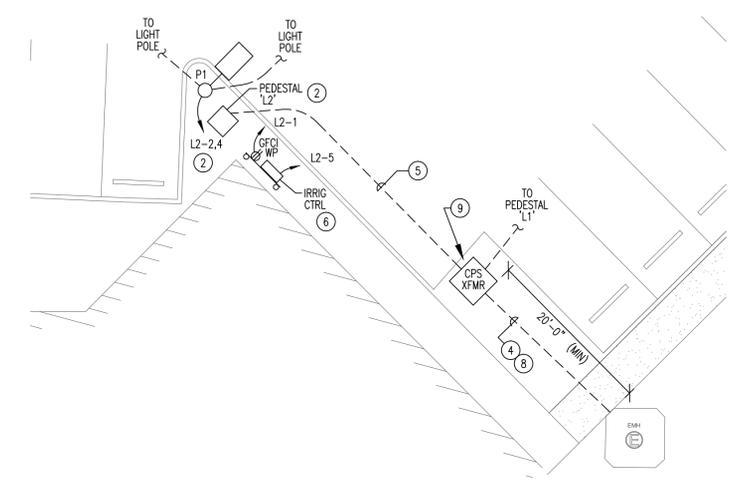
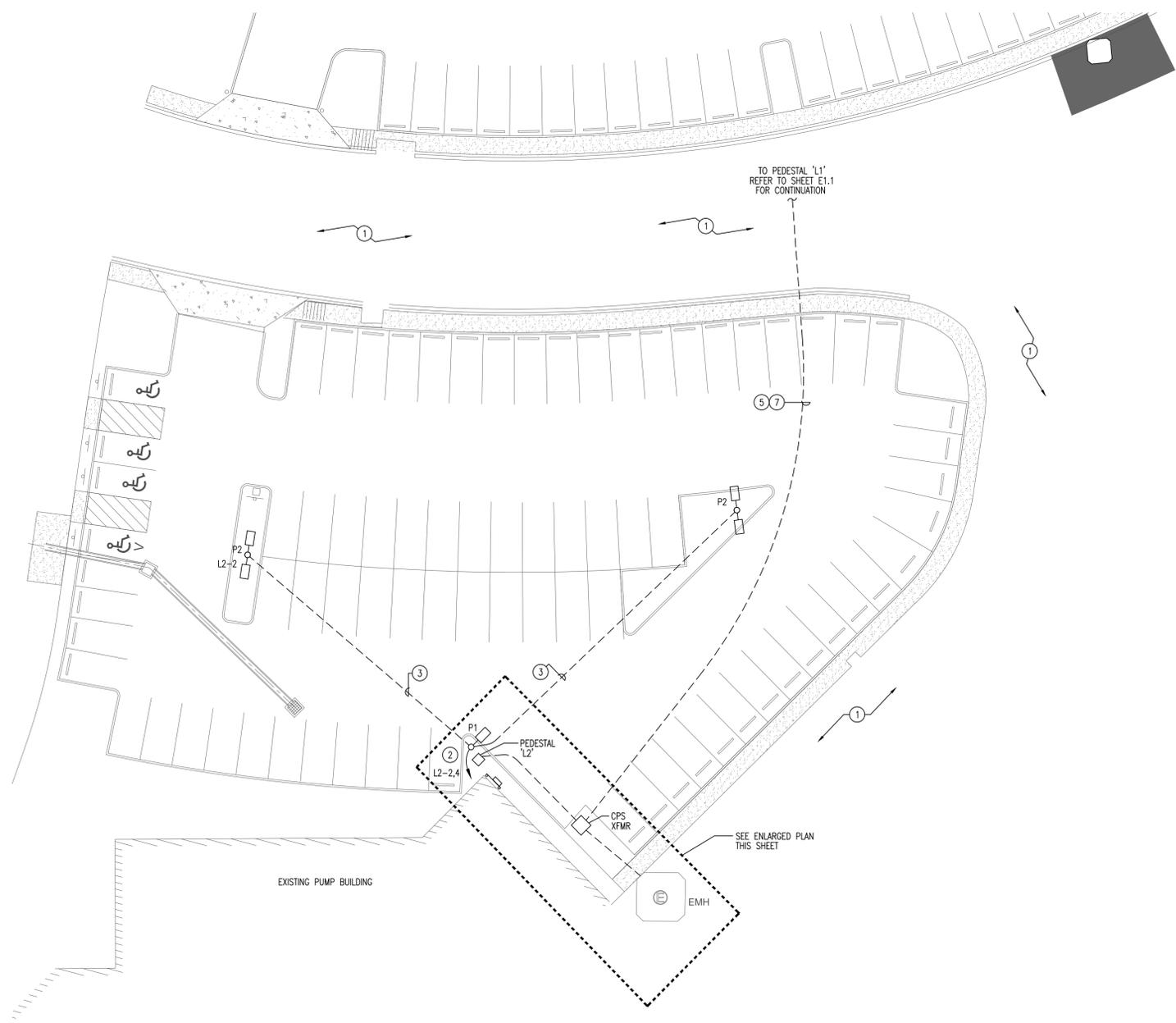
GENERAL LIGHTING NOTES:

- ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE AND THE AUTHORITY HAVING JURISDICTION.
- COORDINATE ALL WORK WITH OTHER TRADES AS REQUIRED.
- ALL ITEMS AND FIXTURES SHALL BE UL LISTED.
- VOLTAGE DROP IN BRANCH CIRCUITS SHALL NOT EXCEED 3%.
- ALL JUNCTION BOX COVERS WILL BE MARKED USING "SHARPIE" OR "MARKSALOT" INDICATING THE PANEL AND CIRCUIT #'S CONTAINED WITHIN THE JUNCTION BOX.
- COORDINATE AND SCHEDULE ALL REQUIRED OUTAGES OF ELECTRICAL SERVICE TO EXISTING FACILITIES WITH OWNER'S REPRESENTATIVE IN ADVANCE OF OUTAGE.
- CONTRACTOR SHALL REQUEST THE LOCATION OF ALL UNDERGROUND UTILITIES IN THE VICINITY OF ANY EXCAVATION AND UNDERGROUND TRENCHING. CONTRACTOR SHALL VERIFY WITH UTILITY LOCATING COMPANY THAT ALL UNDERGROUND UTILITY MARKING IS COMPLETE PRIOR TO BEGINNING UNDERGROUND WORK.
- COORDINATE AND SCHEDULE ALL EXCAVATION, TRENCHING, BACKFILL, CONCRETE WORK, LIGHT POLE ERECTION, AND OTHER SITE WORK WITH OWNER'S REPRESENTATIVE IN ADVANCE OF THIS WORK. THE CONTRACTOR SHALL GIVE SPECIAL CONSIDERATION TO ANY WORK INVOLVING SITE TRENCH, EXCAVATION, AND THE ASSOCIATED CONTROLLED ACCESS TO PARKING LOTS AND OTHER WORK AREAS.
- CONTRACTOR SHALL PROVIDE AND PLACE TEMPORARY BARRIERS, WARNING CONES AND OTHER SUITABLE DEVICES TO ADEQUATELY PROTECT THE PUBLIC AND SCHOOL POPULATION FROM ANY AND ALL HAZARDS PRESENTED BY THE CONSTRUCTION OF THIS PROJECT, INCLUDING, BUT NOT LIMITED TO THE FOLLOWING: STORAGE OF MATERIALS AND EQUIPMENT, OPERATION OF TRENCHING EQUIPMENT AND MOTOR VEHICLES, OPEN TRENCHES AND POLE BASE CORE DRILLS, EXCAVATED MATERIAL & CONCRETE DELIVERY AND POUR.
- CONTRACTOR SHALL REVIEW PROTECTION PLAN WITH OWNER'S REPRESENTATIVE FOR APPROVAL PRIOR TO BEGINNING WORK.
- CONTRACTOR SHALL COORDINATE AND REVIEW DELIVERY AND PLACEMENT OF ALL ELECTRICAL MATERIALS AND EQUIPMENT TO THE SITE WITH OWNER'S REPRESENTATIVE FOR APPROVAL PRIOR TO DELIVERY.
- CONTRACTOR SHALL COORDINATE AND REVIEW SCHEDULE AND PLACEMENT FOR EQUIPMENT OPERATION FOR PROJECT CONSTRUCTION WITH OWNER'S REPRESENTATIVE FOR APPROVAL PRIOR TO PERFORMING THIS WORK. PROTECTION OF THE PUBLIC AND SCHOOL POPULATION BY LIMITING ACCESS TO THE WORK AREAS SHALL BE REVIEWED WITH THE OWNER'S REPRESENTATIVE FOR APPROVAL.
- CONTRACTOR SHALL COORDINATE ALL WORK IN THE PARKING LOT AREA WITH OWNER'S REPRESENTATIVE, TO AVOID CONFLICT WITH ANY OTHER ACTIVITIES OR FUNCTIONS THAT REQUIRE ACCESS TO THE PARKING LOT AREA DURING THE CONSTRUCTION.
- CONTRACTOR SHALL COORDINATE ALL WORK IN CONSTRUCTION AREAS WITH OWNER'S REPRESENTATIVE, TO AVOID CONFLICT WITH ANY OTHER ACTIVITIES OR FUNCTIONS IN OR ADJACENT TO THESE AREAS.

KEYED NOTES:

(APPLIES TO THIS SHEET) ○

- ALL EXISTING STREET LIGHTS ARE TO REMAIN.
- ROUTE EXTERIOR LIGHTING CIRCUIT THRU LIGHTING CONTACTOR.
- PROVIDE AND INSTALL 1" CONDUIT WITH (2) #8 AWG AND #8 AWG GND.
- EXTEND EXISTING 4" CONDUIT & PULL STRING STUBBED OUT FROM EXISTING CPSE MANHOLE. REFER TO RISER DIAGRAM FOR ADDITIONAL INFORMATION. PROVIDE CONCRETE ENCASEMENT.
- PROVIDE (1) 2-1/2" CONCRETE ENCASE CONDUIT AND PULL STRING FORM CPSE TRANSFORMER TO "PEDESTAL" SERVICE EQUIPMENT.
- PROVIDE ELECTRICAL RACK TO ACCOMMODATE AN IRRIGATION CONTROLLERS & DUPLEX RECEPTACLE FOR MAINTENANCE. VERIFY EXACT LOCATION OF ELECTRICAL RACK PRIOR TO INSTALLATION WITH PROJECT MANAGER.
- REFER TO SHEET E1.1 TO SEE CONTINUATION.
- COORDINATE INSTALLATION OF CONDUIT FOR CPSE ENERGY PRIMARY FROM CPSE ENERGY MANHOLE TO PADMOUNT TRANSFORMER WITH IRRIGATION PIPING AND CPSE ENERGY REQUIREMENTS. PROVIDE MINIMUM 36" HORIZONTAL SEPARATION FROM WATER PIPING PER CoSA CHAPTER 10 REQUIREMENTS.
- PROVIDE REMOVABLE BOLLARDS TO PROTECT PADMOUNT TRANSFORMER. PROVIDE QUANTITY AND CONSTRUCTION PER CPSE ENERGY STANDARDS.



PLAN NORTH
1 ELECTRICAL SITE PLAN - LOT 2
 SCALE: 1" = 20'-0"

PLAN NORTH
2 ELECTRICAL SERVICE - LOT 2 - ENLARGED
 SCALE: 1" = 10'-0"

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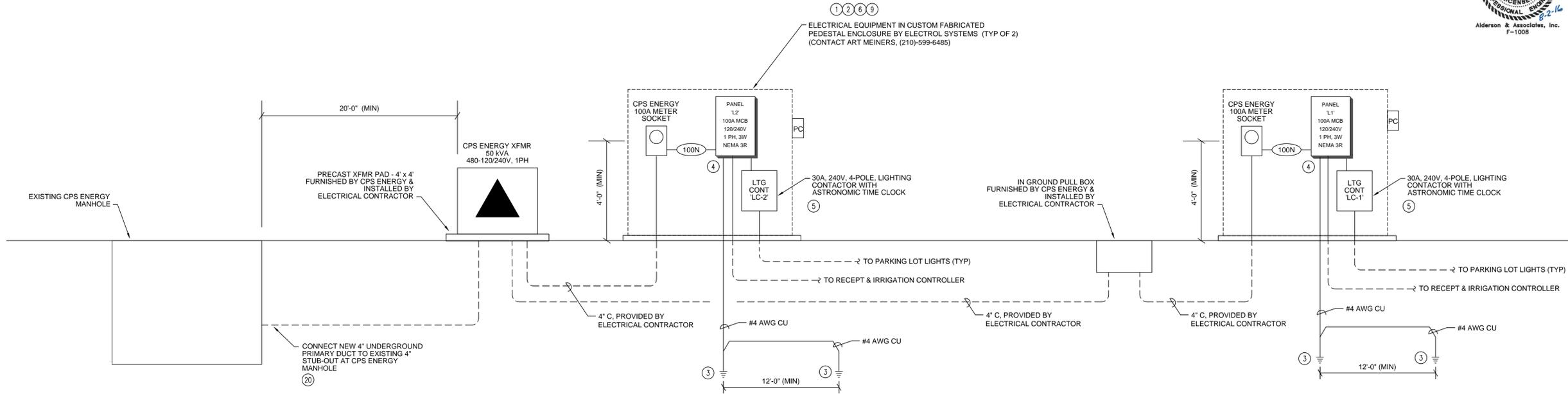
HBGCC SOUTH PARKING LOTS
 CITY OF SAN ANTONIO
 HENRY B. GONZALEZ CONVENTION CENTER
 EXPANSION PROJECT
 ELECTRICAL SITE PLAN - LOT 2

E1.2



REVISIONS :

NO.	DATE	DESCRIPTION



1 100A, 120/240V, 1PH, 3W ELECTRICAL SERVICE - SINGLE LINE DIAGRAM
NO SCALE

KEYED NOTES:

- CONTRACTOR SHALL OBTAIN AVAILABLE SHORT-CIRCUIT CURRENT FROM ELECTRICAL UTILITY COMPANY PRIOR TO PROCUREMENT OF SERVICE EQUIPMENT AND ENSURE ADEQUATE INTERRUPTING CAPACITY OF THIS EQUIPMENT.
- COORDINATE INSTALLATION OF ELECTRICAL SERVICE WITH CPS ENERGY.
- FURNISH & INSTALL INDICATED 3/4" X 10'-0" COPPER CLAD STEEL GROUND RODS.
- BOND SERVICE NEUTRAL IN SERVICE ENTRANCE RATED PANELBOARD TO GROUNDING ELECTRODE CONDUCTOR.
- CONTRACTOR SHALL FURNISH & INSTALL SQUARE D COMPANY CLASS 8903 LIGHTING CONTACTOR, 30A, 240V, 4-POLE, WITH ASTRONOMIC TIME CLOCK. LIGHTING CONTACTOR SHALL INCLUDE HAND-OFF-AUTO SELECTOR SWITCH AND LIGHTNING ARRESTOR. ALL CIRCUIT BREAKER AND H-O-A CONTROL SHALL BE ACCESSIBLE ONLY BY OPENING THE PADLOCKED ELECTRICAL SERVICE & CONTROL PEDESTAL.
- FURNISH & INSTALL GALVANIZED STEEL SUPPORT STRUCTURE FOR NOTED EQUIPMENT AT ELECTRICAL SERVICE. INSTALL ONTO, OR EXTEND EXISTING RACK TO MOUNT THIS EQUIPMENT. SEE DETAILS, SHEET E03.
- SEE ELECTRICAL DRAWING E1.1 FOR CONDUIT & CONDUCTOR TO LIGHT POLES.
- UNDERGROUND CONDUIT SHALL BE SCHEDULED 40 PVC, UNLESS OTHERWISE NOTED ON THE DRAWINGS.
- VERTICAL ELBOWS AND EXPOSED CONDUIT SHALL BE RIGID GALVANIZED STEEL TYPE. WRAP BURIED PORTIONS OF RIGID GALVANIZED STEEL CONDUIT WITH .010 PIPE WRAPPING TAPE WITH 80% OVERLAP.
- FURNISH & INSTALL NEMA 3R TERMINATION BOX FOR ENCLOSING PERMANENT COMPRESSION CONNECTIONS FROM FIELD WIRING TO SMALLER CONDUCTORS FROM LIGHTING CONTACTOR. FURNISH & INSTALL GROUND BAR IN TERMINATION BOX FOR TERMINATING ALL GROUNDING CONDUCTORS ENTERING TERMINATION BOX.
- CONDUITS FOR LIGHTING CONDUCTORS FROM PANELBOARD TO LIGHTING CONTACTOR 'LC', AND FROM 'LC' TO TERMINATION BOX SHALL BE NO LONGER THAN 24", TO COMPLY WITH THE CONDUCTOR DERATING REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE PARAGRAPH 310.15(B)(3).
- COORDINATE AND SCHEDULE ALL REQUIRED OUTAGES OF ELECTRICAL SERVICES TO EXISTING FACILITIES WITH OWNER'S REPRESENTATIVE IN ADVANCE OF OUTAGE.
- CONTRACTOR SHALL REQUEST THE LOCATION OF ALL UNDERGROUND UTILITIES IN THE VICINITY OF ANY EXCAVATION AND UNDERGROUND TRENCHING. CONTRACTOR SHALL VERIFY WITH UTILITY LOCATING COMPANY THAT ALL UNDERGROUND UTILITY MARKING IS COMPLETE PRIOR TO BEGINNING UNDERGROUND WORK.
- COORDINATE AND SCHEDULE ALL EXCAVATION, TRENCHING, BACKFILL, CONCRETE WORK, LIGHT POLE ERECTION, AND OTHER SITE WORK WITH OWNER'S REPRESENTATIVE IN ADVANCE OF THIS WORK. THE CONTRACTOR SHALL GIVE SPECIAL CONSIDERATION TO ANY WORK INVOLVING SITE TRENCHING, EXCAVATION, AND THE ASSOCIATED CONTROLLED ACCESS TO PARKING LOTS AND OTHER WORK AREAS.
- CONTRACTOR SHALL PROVIDE AND PLACE TEMPORARY BARRIERS, WARNING CONES AND OTHER SUITABLE DEVICES TO ADEQUATELY PROTECT THE PUBLIC AND SCHOOL POPULATION FROM ANY AND ALL HAZARDS PRESENTED BY THE CONSTRUCTION OF THIS PROJECT, INCLUDING, BUT NOT LIMITED TO THE FOLLOWING: STORAGE OF MATERIALS AND EQUIPMENT, OPERATION OF THE TRENCHING EQUIPMENT AND MOTOR VEHICLES, OPEN TRENCHES AND POLE BASE CORE DRILL, EXCAVATED MATERIAL & CONCRETE DELIVERY AND POUR.
- CONTRACTOR SHALL REVIEW PROTECTION PLAN WITH OWNER'S REPRESENTATIVE FOR APPROVAL, PRIOR TO BEGINNING WORK.
- CONTRACTOR SHALL COORDINATE AND REVIEW DELIVERY AND PLACEMENT OF ALL ELECTRICAL MATERIAL AND EQUIPMENT TO THE SITE WITH OWNER'S REPRESENTATIVE FOR APPROVAL PRIOR TO DELIVERY.
- CONTRACTOR SHALL COORDINATE AND REVIEW SCHEDULE BE REVIEWED WITH THE OWNER'S REPRESENTATIVE, TO AVOID CONFLICT WITH ANY OTHER ACTIVITIES OF FUNCTIONS THAT REQUIRE ACCESS TO THE PARKING LOT AREA DURING THE CONSTRUCTION.
- CONTRACTOR SHALL COORDINATE ALL WORK IN CONSTRUCTION AREA WITH OWNER'S REPRESENTATIVE, AVOID CONFLICT WITH ANY OTHER ACTIVITIES OR FUNCTIONS IN OF ADJACENT TO THESE AREAS.
- ENTRY TO CPS ENERGY MANHOLE IS NOT PERMITTED. COORDINATE EXTENSION OF EXISTING STUB OUT TO NEW CPS ENERGY PADMOUNT TRANSFORMER WITH CPS ENERGY.
- UNDERGROUND SERVICE LATERAL CONDUIT FURNISHED & INSTALLED BY ELECTRICAL CONTRACTOR. SERVICE LATERAL CONDUCTORS PROVIDED BY CPS ENERGY.

DRAWINGS ARE AND SHALL REMAIN THE PROPERTY OF THE ARCHITECT/ENGINEER. WHETHER THE PROJECT FOR WHICH THESE DRAWINGS ARE INTENDED IS EXECUTED OR NOT. THEY ARE NOT TO BE USED BY ANYONE ON OTHER PROJECTS OR EXTENSIONS TO THIS PROJECT NOT COVERED IN THE CONTRACT, WITHOUT WRITTEN AGREEMENT WITH AND APPROPRIATE CONTRIBUTION TO FORD ENGINEERING, INC.



NEW PANEL 'L1'												
PROJECT :	TOWER OF AMERICAS			ENCLOSURE : NEMA 3R								
PROJECT # :	16036	MCB : 100-AMPS		MOUNTING : SURFACE								
LOCATION :	ELECTRICAL RM 204	BUSSING : 100-AMPS		CB TYPE : BOLT-ON								
NOTES :	VOLTAGE : 240/120V, 1PH, 3W		PROVIDE : NEUTRAL BUS									
DATE :	4-Aug-2016		BRACING : 10 KAIC RMS SYM		GROUND BUS							
CKT	AMPS	POLE	CIRCUIT DESCRIPTION	LOAD	TYPE	PH	TYPE	LOAD	CIRCUIT DESCRIPTION	AMPS	POLE	CKT
1	20	1	REC GFCI/WP RACK	180	0	A	11	700	POLE LIGHTS	20	2	2
3	20	1	LIGHTING CONTACTOR (L1)	250	0	B	11	700	--	--	--	4
5	20	1	SPARE			A	11	700	POLE LIGHTS	20	2	6
7	20	1	SPARE			B	11	700	--	--	--	8
9	20	1	SPARE			A			SPARE	20	1	10
11	20	1	SPARE			B			SPARE	20	1	12
			PANEL VA	SUB FEED	FEED THRU	TOTAL CONN	TOTAL DEMAND		NOTES :			
			VA			VA	AMPS					
PHASE A			1,580	0	0	1,580	1,922	16				
PHASE B			1,650	0	0	1,650	2,008	17				
TOTAL			3,230	0	0	3,230	3,930	16	REVISIONS:			

NEW PANEL 'L2'												
PROJECT :	TOWER OF AMERICAS			ENCLOSURE : NEMA 3R								
PROJECT # :	16036	MCB : 100-AMPS		MOUNTING : SURFACE								
LOCATION :	ELECTRICAL RM 204	BUSSING : 100-AMPS		CB TYPE : BOLT-ON								
NOTES :	VOLTAGE : 240/120V, 1PH, 3W		PROVIDE : NEUTRAL BUS									
DATE :	4-Aug-2016		BRACING : 10 KAIC RMS SYM		GROUND BUS							
CKT	AMPS	POLE	CIRCUIT DESCRIPTION	LOAD	TYPE	PH	TYPE	LOAD	CIRCUIT DESCRIPTION	AMPS	POLE	CKT
1	20	1	REC GFCI/WP RACK	180	0	A	11	500	POLE LIGHTS	20	2	2
3	20	1	LIGHTING CONTACTOR (L2)	250	0	B	11	500	--	--	--	4
5	20	1	IRRIGATION CONTROLLER	300	0	A			SPARE	20	1	6
7	20	1	SPARE			B			SPARE	20	1	8
9	20	1	SPARE			A			SPARE	20	1	10
11	20	1	SPARE			B			SPARE	20	1	12
			PANEL VA	SUB FEED	FEED THRU	TOTAL CONN	TOTAL DEMAND		NOTES :			
			VA			VA	AMPS					
PHASE A			980	0	0	980	1,122	9				
PHASE B			750	0	0	750	858	7				
TOTAL			1,730	0	0	1,730	1,980	8	REVISIONS:			

SERVICE LOAD 'L1'		
DESCRIPTION	CONNECTED VA	SERVICE VA
LIGHTING LOAD		
PARKING LOT LIGHTS	2,800	
TOTAL LIGHTING LOAD	2,800	
TOTAL LIGHTING LOAD @ 125%		3,500
RECEPTACLE		180
CONTROLS		250
TOTAL CALCULATED SERVICE LOAD		3,930
SERVICE AMPERES @ 240 V, 1 PH: 16		
ELECTRICAL SERVICE RATED 100A		

SERVICE LOAD 'L2'		
DESCRIPTION	CONNECTED VA	SERVICE VA
LIGHTING LOAD		
PARKING LOT LIGHTS	1,000	
TOTAL LIGHTING LOAD	1,000	
TOTAL LIGHTING LOAD @ 125%		1,250
RECEPTACLE		180
CONTROLS		250
TOTAL CALCULATED SERVICE LOAD		1,680
SERVICE AMPERES @ 240 V, 1 PH: 7		
ELECTRICAL SERVICE RATED 100A		

LIGHTING FIXTURE SCHEDULE										
TYPE	MANUFACTURER	CATALOG NUMBER	DESCRIPTION	LAMP QTY.	LAMP TYPE	BALLAST QTY.	BALLAST TYPE	MOUNTING	VOLTAGE	WATTAGE
P1	ELITE	EL-MD-200-AL-02-XX-05-05-XX-02-XX-01-01-XX-03-XX W/ MOTION SENSOR & SMART DIM POLE: DS330500W300	LED POLE LIGHT FIXTURE, SINGLE HEAD, MOUNTED ON 30' POLE WITH 30' BASE, TYPE 5 DISTRIBUTION 60x135 DEGREE, FIXTURE TO HAVE INTEGRAL MOTION SENSOR, & SMART DIM TO REDUCE ENERGY CONSUMPTION BY AT LEAST 30% TO COMPLY WITH THE 2015 IECC. VERIFY LIGHTING REDUCTION AMOUNT ON SMART DIM WITH ENGINEER & VERIFY FINISH WITH ARCHITECT PRIOR TO ORDERING.	1	LED 4000K	N/A	DRIVER	30' POLE	240	200
P2	ELITE	EL-MD-200-AL-02-XX-05-05-XX-02-XX-01-01-XX-03-XX W/ MOTION SENSOR & SMART DIM POLE: DS330500W300	LED POLE LIGHT FIXTURE, DUAL HEAD, MOUNTED ON 30' POLE WITH 30' BASE, TYPE 4 DISTRIBUTION 120 DEGREE, FIXTURE TO HAVE INTEGRAL MOTION SENSOR & SMART DIM TO REDUCE ENERGY CONSUMPTION BY AT LEAST 30% TO COMPLY WITH THE 2015 IECC. VERIFY LIGHTING REDUCTION AMOUNT ON SMART DIM WITH ENGINEER & VERIFY FINISH WITH ARCHITECT PRIOR TO ORDERING.	2	LED 4000K	N/A	DRIVER	30' POLE	240	400

NOTES: 1. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
2. THE FIXTURES LISTED IN THE FIXTURE SCHEDULE HAVE BEEN SELECTED BASE ON A NUMBER OF FACTORS WHICH MAY OR MAY NOT BE UNIQUE TO THOSE FIXTURES. THE CONTRACTOR MAY PROPOSE SUBSTITUTIONS IN ACCORDANCE WITH THE REQUIREMENTS LISTED IN THE SPECIFICATIONS MANUAL.

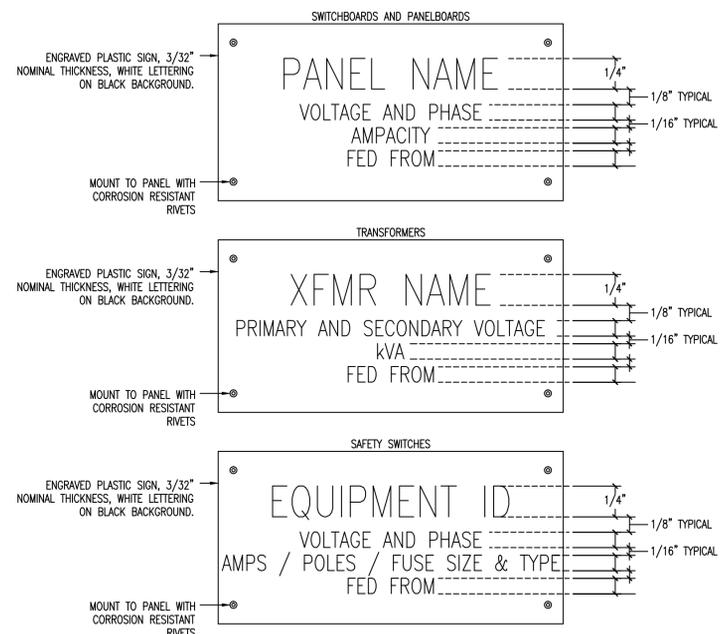
DRAWINGS ARE AND SHALL REMAIN THE PROPERTY OF THE ARCHITECT/ENGINEER. WHETHER THE PROJECT FOR WHICH THEY ARE INTENDED IS EXECUTED OR NOT, THEY ARE NOT TO BE USED BY ANYONE ON OTHER PROJECTS, OR EXTENSIONS TO THIS PROJECT, NOT CONFIDENTIAL, WITHOUT THE ARCHITECT/ENGINEER'S WRITTEN AND APPROPRIATELY LEGALIZED CONSENT TO DO SO. ALDERSON & ASSOCIATES, INC.

FORD ENGINEERING INC.
 ENGINEERING
 SURVEYING
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NO.	DATE	DESCRIPTION

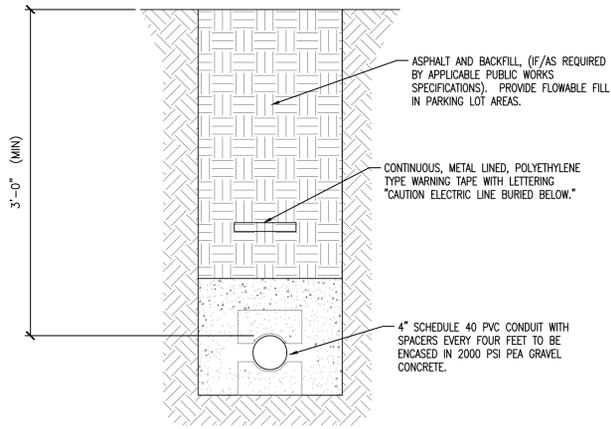
HBGCC SOUTH PARKING LOTS
 CITY OF SAN ANTONIO
 HENRY B. GONZALEZ CONVENTION CENTER
 EXPANSION PROJECT
 ELECTRICAL SCHEDULES

E3.1

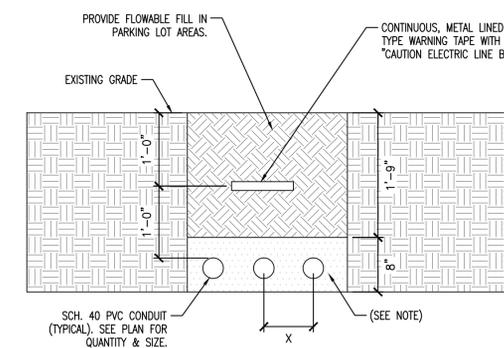


NOTE:
 PROVIDE LABELS FOR ALL ELECTRICAL EQUIPMENT BEING INSTALLED,
 INCLUDING SWITCHBOARDS, PANELBOARDS, SAFETY SWITCHES,
 TRANSFORMERS, ETC.

1 EQUIPMENT LABELING DETAIL
 SCALE: NOT TO SCALE

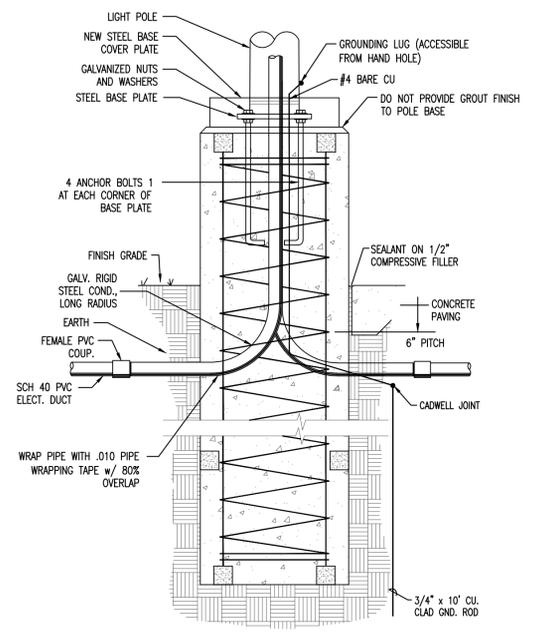


2 CPS ENERGY PRIMARY DUCTLINE DETAIL
 SCALE: NOT TO SCALE

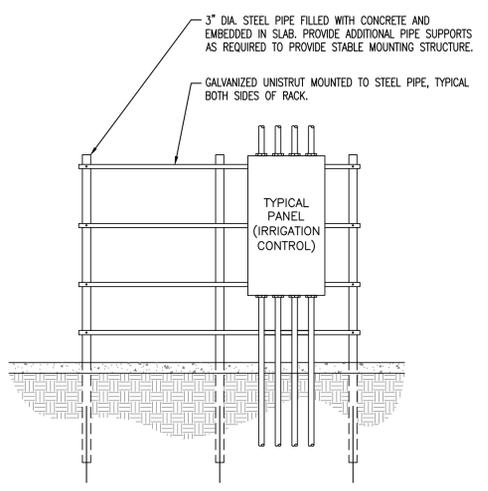


NOTES:
 1. PROVIDE RED COLORED CONCRETE ENCASEMENT FOR SERVICE CONDUITS AND FOR CONDUITS INSTALLED BELOW PAVED TRAFFIC AREAS AND ELSEWHERE AS NOTED. PROVIDE SAND BEDDING ELSEWHERE.
 2. CONDUIT SPACING SHALL BE AS FOLLOWS:
 X = 7.5" TYPICAL FOR POWER CONDUITS
 X = 24" SEPARATION BETWEEN POWER AND INSTRUMENT CONDUITS.

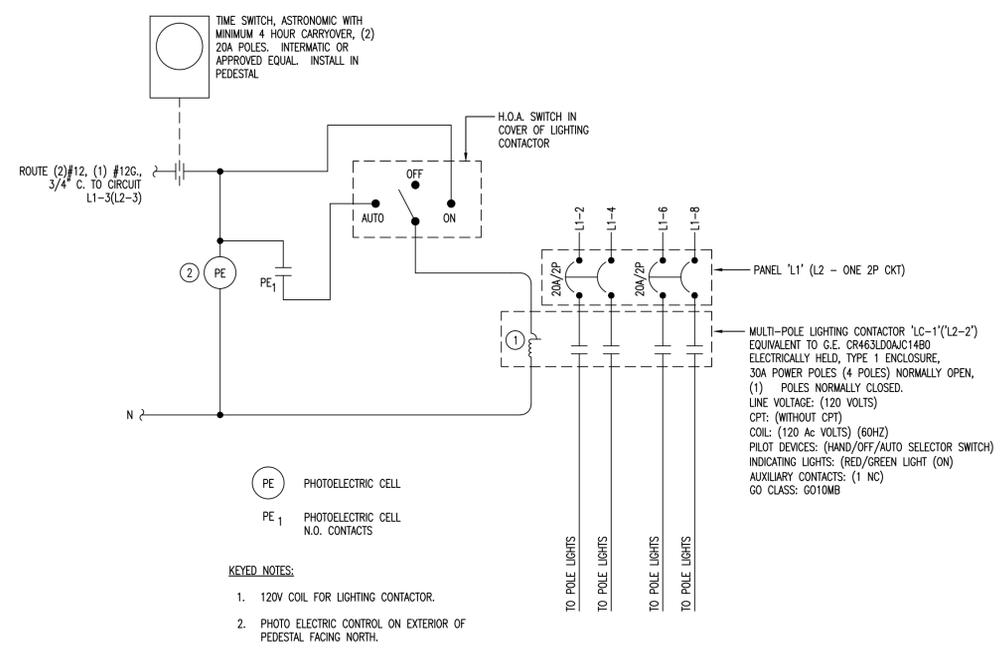
3 UG CONDUIT INSTALLATION
 SCALE: NOT TO SCALE



4 LIGHT POLE BASE
 SCALE: NOT TO SCALE



5 ELECTRICAL EQUIPMENT RACK DETAIL
 SCALE: NOT TO SCALE



KEYED NOTES:
 1. 120V COIL FOR LIGHTING CONTACTOR.
 2. PHOTO ELECTRIC CONTROL ON EXTERIOR OF PEDESTAL FACING NORTH.

6 LIGHTING CONTACTOR CONTROL CIRCUIT DETAIL
 SCALE: NOT TO SCALE

DRAWINGS ARE AND SHALL BE THE PROPERTY OF THE ARCHITECT/ENGINEER. WHETHER THE PROJECT FOR WHICH THEY ARE INTENDED IS EXECUTED OR NOT, THEY ARE NOT TO BE USED BY ANYONE ON OTHER PROJECTS OR EXTENDING TO THIS PROJECT NOT COVERED IN THE CONTRACT, WITHOUT THE WRITTEN CONSENT AND APPROPRIATE COMPENSATION TO FORD ENGINEERING, INC.

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 www.fordengineering.com * TBPLS No. 10018400

NO.	DATE	DESCRIPTION

HBGCC SOUTH PARKING LOTS
 CITY OF SAN ANTONIO
 HENRY B. GONZALEZ CONVENTION CENTER
 EXPANSION PROJECT
 ELECTRICAL DETAILS

ELECTRICAL SPECIFICATIONS

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26 0533	RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
26 0553	IDENTIFICATION FOR ELECTRICAL SYSTEMS
26 2416	PANELBOARDS
26 2726	WIRING DEVICES
26 2813	OVERCURRENT PROTECTIVE DEVICES

DIVISION 26 - ELECTRICAL

SECTION 26 0500 - GENERAL ELECTRICAL REQUIREMENTS

1.0 SCOPE OF WORK

1.1 THE WORK COVERED BY THESE DRAWINGS AND SPECIFICATIONS SHALL INCLUDE THE FURNISHING OF ALL LABOR, MATERIALS, TRANSPORTATION, TOOLS, AND APPLIANCES REQUIRED IN THE PERFORMANCE OF ALL OPERATIONS REQUIRED FOR THE INSTALLATION OF THE COMPLETE AND WORKING SYSTEMS DESCRIBED OR REQUIRED BY DRAWINGS OR SPECIFICATIONS. ALL ELECTRICAL WORK PERFORMED UNDER THIS SECTION SHALL BE IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS AND SUBJECT TO THE TERMS AND CONDITIONS OF THE CONTRACT.

1.2 THE APPROXIMATE LOCATION OF ELECTRICAL ITEMS IS INDICATED ON THE ELECTRICAL DRAWINGS. THESE DRAWINGS ARE NOT INTENDED TO GIVE COMPLETE AND ACCURATE DETAILS IN REGARD TO LOCATION OF OUTLETS, APPARATUS, ETC. EXACT LOCATIONS ARE TO BE DETERMINED BY ACTUAL MEASUREMENTS AT THE BUILDING AND WILL, IN ALL CASES, IS SUBJECT TO THE APPROVAL OF THE ENGINEER. THE ENGINEER RESERVES THE RIGHT TO MAKE ANY REASONABLE CHANGES IN THE LOCATIONS INDICATED WITHOUT ADDITIONAL COST.

1.3 PERMITS AND FEES: THE ELECTRICAL CONTRACTOR SHALL PAY FOR ALL ELECTRICAL CONSTRUCTION PERMITS AND INSPECTION FEES REQUIRED BY LOCAL ORDINANCE.

2.0 CODES AND STANDARDS

2.1 ALL WORK SHALL COMPLY WITH THE APPLICABLE RULES OF THE NATIONAL ELECTRICAL CODE, THE NATIONAL ELECTRICAL SAFETY CODE, THE NATIONAL FIRE CODE (PUBLISHED BY THE NATIONAL FIRE PROTECTION ASSOCIATION), THE LOCAL ELECTRICAL CODES AND ORDINANCES, AND THE TERMS AND CONDITIONS OF SERVICE OF THE ELECTRICAL UTILITY, AS WELL AS ANY OTHER AUTHORITIES THAT MAY HAVE LAWFUL JURISDICTION PERTAINING TO THE WORK SPECIFIED. NONE OF THE TERMS OR PROVISIONS OF THIS SPECIFICATION SHALL BE CONSTRUED AS WAIVING ANY OF THE RULES, REGULATIONS, OR REQUIREMENTS OF THESE AUTHORITIES.

2.2 ALL MATERIALS, IN GENERAL, SHALL CONFORM TO THE NATIONAL ELECTRICAL CODE REQUIREMENTS AND SHALL BE LISTED, INSPECTED, AND APPROVED BY THE UNDERWRITERS LABORATORIES (UL) AND SHALL BEAR THE UL LABEL WHERE LABELING SERVICE IS AVAILABLE.

2.3 THE CONTRACTOR SHALL REFERENCE BASE BUILDING SPECIFICATIONS FOR DEVICES, MATERIALS, AND WORKMANSHIP REQUIREMENTS NOT SPECIFIED ON THESE DRAWINGS. THERE SHALL BE NO DEVIATION FROM SPECIFICATIONS WITHOUT THE WRITTEN APPROVAL OF THE ARCHITECT AND ENGINEER.

2.4 THE CONTRACTOR SHALL DO ALL WORK REQUIRED TO PROVIDE TEMPORARY ELECTRICAL SERVICE FOR CONSTRUCTION ILLUMINATION AND POWER FOR ALL TRADES IN CONNECTION WITH THIS PROJECT. CONNECTION OF TEMPORARY ELECTRICAL SERVICE SHALL BE MADE AT SUCH POINT AS DETERMINED BY THE ARCHITECT.

2.5 UPON COMPLETION OF WORK, PREPARE LIGHTING AND POWER 'AS BUILTS' ON A SUITABLY REPRODUCIBLE MEDIUM (MYLAR OR VELLUM). PRESENT COMPLETED DRAWINGS TO OWNER AND TWO SETS OF PRINTS TO INTERIOR DESIGNER OR ARCHITECT. 'AS -BUILT' DRAWINGS SHALL INCLUDE ALL BRANCH CIRCUIT WORK, ANY PANELBOARD INFORMATION AVAILABLE, FINAL SWITCHING, ETC.

*** END OF SECTION ***

SECTION 26 0519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

1.0 GENERAL

1.1 SCOPE
THIS SECTION SPECIFIES THE FURNISHING AND INSTALLATION OF INSULATED CONDUCTORS.

1.2 REFERENCE STANDARDS

- A. ANSI/UL 83 - THERMOPLASTIC-INSULATED WIRES.
- B. ICSA S-61-402 (NEMA WC 5) - THERMOPLASTIC-INSULATED WIRE AND CABLE FOR THE TRANSMISSION AND DISTRIBUTION OF ELECTRICAL ENERGY.
- C. ICSA S-68-516 (NEMA WC 8) - ETHYLENE-PROPYLENE-RUBBER-INSULATED WIRE FOR THE TRANSMISSION AND DISTRIBUTION OF ELECTRICAL ENERGY.

1.3 APPLICABLE PROVISIONS

REFER TO SECTION 26 0500 - GENERAL ELECTRICAL REQUIREMENTS.

2.0 PRODUCTS

2.1 IDENTIFICATION

PROVIDE NEW INSULATED CONDUCTORS MARKED ACCORDING TO NEC ARTICLE 310.

2.2 600-VOLT INSULATED CONDUCTORS

- A. SIZE. AS SHOWN ON DRAWINGS.
 - 1. CONDUCTOR. SOFT-DRAWN, ANNEALED COPPER.
 - 2. INSULATION. UNLESS OTHERWISE NOTED ON THE DRAWINGS, USE THHN/THWN FOR ALL GENERAL WIRING.
- C. USE. FOR GENERAL WIRING USE #12 AWG OR #10 AWG SOLID OR STRANDED CONDUCTORS MINIMUM. #8 AWG AND LARGER STRANDED CONDUCTORS. FOR FIELD-INSTALLED CONTROL WIRING USE #14 AWG OR LARGER STRANDED CONDUCTORS UNLESS OTHERWISE SPECIFIED.

D. LISTING:

- 1. SINGLE CONDUCTOR. UL 83.
- 2. MC CABLE, WHERE ACCEPTABLE BY AHJ.

3.0 EXECUTION

3.1 INSTALLATION

- A. PROTECTION. UNLESS OTHERWISE INDICATED, MECHANICALLY PROTECT CONDUCTORS FOR SYSTEMS BY INSTALLING IN RACEWAYS. DO NOT INSTALL THE CONDUCTORS UNTIL RACEWAY SYSTEM IS COMPLETE AND PROPERLY CLEANED. USE AN APPROVED WIRE-PULLING COMPOUND WHEN PULLING LARGE CONDUCTORS. DO NOT BEND ANY CONDUCTOR EITHER PERMANENTLY OR TEMPORARILY DURING INSTALLATION TO RADII LESS THAN FOUR TIMES THE OUTER DIAMETER OF 600-VOLT INSULATED CONDUCTOR. DO NOT EXCEED MANUFACTURER'S RECOMMENDED VALUES FOR MAXIMUM PULLING TENSION.
- B. SPLICES AND TERMINATIONS. USE PRESSURE-TYPE LUGS OR CONNECTORS FOR TERMINATIONS OR SPLICES OF ALL STRANDED CONDUCTORS.
- C. APPEARANCE. NEATLY AND SECURELY BUNDLE OR CABLE ALL CONDUCTORS IN AN ENCLOSURE USING NYLON STRAPS WITH A LOCKING HUB OR HEAD ON ONE END AND A TAPER ON THE OTHER.

3.2 600-VOLT INSULATED CONDUCTORS

- A. SIZE. INSTALL CONDUCTOR SIZES AS INDICATED.
- B. COLOR CODE. USE FACTORY-COLORED INSULATED CONDUCTORS FOR #10 AWG AND SMALLER CONDUCTORS AND COLOR CODE LARGER INSULATED CONDUCTORS WITH AN APPROVED FIELD-APPLIED TAPE. USE DIFFERENT COLORS FOR CONTROL WIRING. FOLLOW THE COLOR SCHEME AS APPROVED BY THE LOCAL AUTHORITIES.

3.3 WIRE COLOR

- A. PHASE CONDUCTORS - COLOR CODE CONDUCTORS AS INDICATED IN THE WIRE COLOR CODE TABLE BELOW, PER CITY OF SAN ANTONIO STANDARDS:
 - 1. FOR WIRE SIZES 8 AWG AND LARGER, IDENTIFY WIRE WITH COLORED TAPE AT TERMINALS, SPLICES AND BOXES, WITH COLOR PER THE TABLE.
- B. NEUTRAL CONDUCTORS - COLOR CODE CONDUCTORS AS INDICATED IN THE WIRE COLOR CODE TABLE BELOW. WHEN TWO OR MORE NEUTRALS ARE LOCATED IN ONE CONDUIT, INDIVIDUALLY IDENTIFY EACH WITH PROPER CIRCUIT NUMBER
 - 1. FOR WIRE SIZES 8 AWG AND LARGER, IDENTIFY WIRE WITH COLORED TAPE AT TERMINALS, SPLICES AND BOXES, WITH COLOR PER THE TABLE.
- C. GROUND CONDUCTORS - COLOR CODE CONDUCTORS AS INDICATED IN THE WIRE COLOR CODE TABLE BELOW
 - 1. FOR WIRE SIZES 8 AWG AND LARGER, IDENTIFY WITH COLORED TAPE AT TERMINALS, SPLICES AND BOXES, WITH COLOR CODE PER THE TABLE.

CITY OF SAN ANTONIO - WIRE COLOR SCHEDULE

PHASE	480Y/277V, 3 PH	208Y/120V, 3 PH	120/240V, 1 PH	240/120V, DELTA 3 PH
A or L1	PURPLE	BLACK	BLACK	BLACK
B or L2	BROWN	RED	RED	ORANGE (HIGH LEG)
C or L3	YELLOW	BLUE	BLUE	BLUE
NEUTRAL	GRAY	WHITE	WHITE	WHITE
GROUND	GREEN	GREEN	GREEN	GREEN
ISOLATED GROUND	---	GREEN WITH YELLOW TRACER	GREEN WITH YELLOW TRACER	GREEN WITH YELLOW TRACER
SWITCHLEG	SAME COLOR AS BRANCH CIRCUIT CONDUCTOR			

NOTES:

NEUTRAL & EQUIPMENT GROUNDING CONDUCTORS

- #10 AWG & SMALLER - INSULATION COLOR PER SCHEDULE
- #8 AWG & LARGER - COLORED TAPE @ TERMINALS, SPLICES & BOXES

PHASE CONDUCTORS

- #10 AWG & SMALLER - INSULATION COLOR PER SCHEDULE
- #8 AWG & LARGER - COLORED TAPE @ TERMINALS, SPLICES & BOXES

*** END OF SECTION ***

SECTION 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

1.0 GENERAL

1.1 SCOPE

THIS SECTION SPECIFIES THE FURNISHING AND INSTALLATION OF GROUNDING AND BONDING EQUIPMENT FOR ELECTRICAL SYSTEMS.

1.2 REFERENCE STANDARDS

- A. ANSI/IEEE STD 142 - RECOMMENDED PRACTICE FOR GROUNDING OF INDUSTRIAL AND COMMERCIAL POWER SYSTEMS.
- B. ANSI/UL 467 - SAFETY STANDARD FOR GROUNDING AND BONDING EQUIPMENT.

1.3 APPLICABLE PROVISIONS

REFER TO SECTION 26 0500 - GENERAL ELECTRICAL REQUIREMENTS.

2.0 PRODUCTS

2.1 WIRING

- A. PROVIDE BARE CONDUCTORS FOR BONDING JUMPERS. PROVIDE 600-VOLT INSULATED CONDUCTORS HAVING A GREEN-COLORED INSULATION FOR GROUNDING ELECTRODE AND EQUIPMENT GROUNDING CONDUCTORS. ALL BRANCH CIRCUIT WIRING SHALL BE STRANDED COPPER.

2.2 GROUND BUS

- A. WHERE A FIELD-PROVIDED GROUND BUS IS REQUIRED, USE ROUND-EDGE COPPER BAR WITH 98 PERCENT INTERNATIONAL ANNEALED COPPER STANDARD (IACS) CONDUCTIVITY. SIZE THE BUS FOR NOT LESS THAN 25 PERCENT OF THE CROSS-SECTIONAL AREA OF THE RELATED FEEDER. A MINIMUM SIZE OF 1/4 INCH BY 2 INCHES IS REQUIRED.

2.3 ROD ELECTRODE

- A. WHERE A FIELD-PROVIDED ROD ELECTRODE IS REQUIRED, USE 3/4" X 10' COPPER CLAD STEEL. PROVIDE EXOTHERMIC WELDED CONNECTIONS TO GROUND ROD.

2.4 GROUND CONNECTIONS

- A. MECHANICAL: BRONZE CONNECTORS, SUITABLE FOR GROUNDING AND BONDING APPLICATIONS, IN CONFIGURATIONS REQUIRED FOR PARTICULAR INSTALLATIONS.
- B. EXOTHERMIC: EXOTHERMIC MATERIALS, ACCESSORIES, AND TOOLS FOR PREPARING A MAKING PERMANENT FIELD CONNECTIONS BETWEEN GROUNDING SYSTEM COMPONENTS.

3.0 EXECUTION

3.1 EXAMINATION

- A. EXAMINE SURFACES, SUBSTRATES, AND OTHER CONDITIONS FOR COMPLIANCE WITH REQUIREMENTS OF OTHER SECTIONS IN WHICH THAT RELATED WORK IS SPECIFIED, AND DETERMINE IF SUCH CONDITIONS AFFECTING PERFORMANCE OF THE WORK OF THIS SECTION ARE SATISFACTORY. DO NOT PROCEED WITH WORK OF THIS SECTION UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED IN A MANNER ACCEPTABLE TO THE INSTALLER. STARTING INSTALLATION CONSTITUTES ACCEPTANCE OF CONDITIONS.

3.2 EQUIPMENT GROUND

- A. ELECTRICAL ROOMS. PROVIDE A GROUND BUS IN ALL ELECTRICAL ROOMS. MOUNT BUS 12 INCHES ABOVE FINISHED FLOOR AND 1 INCH FROM WALL AROUND PERIMETER OF ROOM. CONNECT BUS BY A GROUNDING CONNECTOR WITH A CROSS-SECTIONAL AREA EQUIVALENT TO THE GROUND BUS TO AN ACCEPTABLE GROUNDING ELECTRODE AS DESCRIBED IN NEC ARTICLE 250. CONNECT ALL NONCURRENT-CARRYING METALLIC PARTS OF ELECTRICAL EQUIPMENT IN THE ROOM TO THE BUS.
- B. RACEWAY SYSTEMS AND EQUIPMENT ENCLOSURES.
 - 1. GROUND CABINETS, JUNCTION BOXES, OUTLET BOXES, MOTORS, CONTROLLERS, RACEWAYS, FITTINGS, SWITCHGEAR, TRANSFORMER ENCLOSURES, OTHER EQUIPMENT AND METALLIC ENCLOSURES. GROUND EQUIPMENT AND ENCLOSURES TO THE CONTINUOUS-GROUNDED, METALLIC RACEWAY SYSTEM IN ADDITION TO ANY OTHER SPECIFIC GROUNDING SHOWN.
 - 2. PROVIDE BONDING JUMPERS AND GROUND WIRE THROUGHOUT TO ENSURE ELECTRICAL CONTINUITY OF THE GROUNDING SYSTEM.

- 3. PROVIDE GROUNDING-TYPE INSULATED BUSHINGS FOR METAL CONDUITS TERMINATING IN EQUIPMENT ENCLOSURES CONTAINING A GROUND BUS AND CONNECT THE BUSHING TO THE GROUND BUS.
- 4. PROVIDE A GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR FOR EACH LIGHTING BRANCH CIRCUIT SUPPLYING FIXTURES INSTALLED LESS THAN 8-Feet ABOVE FLOOR OR GRADE, EACH RECEPTACLE BRANCH CIRCUIT, EACH POWER BRANCH CIRCUIT AND EACH FEEDER.
- 5. PROVIDE BONDING JUMPER AND BONDING BUSHING ON EACH METALLIC CONDUIT ENTERING OR LEAVING THE ENCLOSURE OF THE SERVICE EQUIPMENT.
- C. SIZE. WHEN GROUNDING AND BONDING CONDUCTORS ARE NOT SIZED ON DRAWINGS, SIZE THE GROUNDING CONDUCTORS IN ACCORDANCE WITH NEC TABLE 250-95. SIZE BONDING JUMPER SO THAT MINIMUM CROSS-SECTIONAL AREA IS GREATER THAN OR EQUAL TO THAT OF THE EQUIVALENT GROUNDING CONDUCTOR AS DETERMINED FROM NEC TABLE 250-95.

*** END OF SECTION ***

SECTION 26 0529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

1.0 GENERAL

1.1 SCOPE

THIS SECTION SPECIFIES THE FURNISHING AND INSTALLATION OF CONDUIT SUPPORTS, SLEEVES, FIRE STOPPING, EQUIPMENT SUPPORTS FOR ELECTRICAL SYSTEMS.

1.2 REFERENCE STANDARDS

- A. ASTM E84 - STANDARD TEST METHOD FOR SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS.
- B. ASTM E119 - STANDARD TEST METHODS FOR FIRE TESTS OF BUILDING CONSTRUCTION AND MATERIALS.
- C. ASTM E814 - STANDARD TEST METHOD FOR FIRE TESTS OF THROUGH-PENETRATION FIRE STOPS.
- D. ASTM E1966 - STANDARD TEST METHOD FOR FIRE-RESISTIVE JOINT SYSTEMS.
- E. FM - APPROVAL GUIDE. A GUIDE TO EQUIPMENT, MATERIALS & SERVICES APPROVED BY FACTORY MUTUAL RESEARCH FOR PROPERTY CONSERVATION.
- F. NFPA 70 - NATIONAL ELECTRICAL CODE.
- G. UL 263 - FIRE TESTS OF BUILDING CONSTRUCTION AND MATERIALS.
- H. UL 723 - TESTS FOR SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS.
- I. UL 1479 - FIRE TESTS OF THROUGH-PENETRATION FIRESTOPS.
- J. TESTS FOR FIRE RESISTANCE OF BUILDING JOINT SYSTEMS.
- K. UL - FIRE RESISTANCE DIRECTORY.

1.3 APPLICABLE PROVISIONS

REFER TO SECTION 26 0500 - GENERAL ELECTRICAL REQUIREMENTS.

2.0 PRODUCTS

2.1 MANUFACTURERS

- A. ALLIED TUBE & CONDUIT CORP.
- B. ELECTROLINE MANUFACTURING COMPANY
- C. O-2 GEDNEY
- D. B-LINE SYSTEMS
- E. UNISTRUT
- F. KINDORF
- G. THUNDERLINE LINK-SEAL
- H. NMP CORP.
- I. DOW CORNING
- J. HILTI
- K. 3M

2.2 CONDUIT SUPPORTS

- A. CONDUIT CLAMPS - GENERAL PURPOSE: ONE HOLE MALLEABLE IRON FOR SURFACE MOUNTED CONDUITS.
- B. CABLE TIES: HIGH STRENGTH NYLON TEMPERATURE RATED TO 185 DEGREES F (85 DEGREES C). SELF LOCKING.

2.3 FORMED STEEL CHANNEL

- A. PRODUCT DESCRIPTION: GALVANIZED 12 GAGE (2.8 MM) THICK STEEL WITH HOLES 1-1/2 INCHES (38 MM) ON CENTER.

3.0 EXECUTION

3.1 EXAMINATION

- A. EXAMINE SURFACES, SUBSTRATES, AND OTHER CONDITIONS FOR COMPLIANCE WITH REQUIREMENTS OF OTHER SECTIONS IN WHICH THAT RELATED WORK IS SPECIFIED, AND DETERMINE IF SUCH CONDITIONS AFFECTING PERFORMANCE OF THE WORK OF THIS SECTION ARE SATISFACTORY. DO NOT PROCEED WITH WORK OF THIS SECTION UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED IN A MANNER ACCEPTABLE TO THE INSTALLER. STARTING INSTALLATION CONSTITUTES ACCEPTANCE OF CONDITIONS.

3.2 PREPARATION

- A. CLEAN SUBSTRATE SURFACES OF DIRT, DUST, GREASE, OIL, LOOSE MATERIAL, OR OTHER MATTER AFFECTING BOND OF FIRESTOPPING MATERIAL.
- B. REMOVE INCOMPATIBLE MATERIALS AFFECTING BOND.
- C. INSTALL BACKING MATERIALS TO ARREST LIQUID MATERIAL LEAKAGE.
- D. DO NOT DRILL OR CUT STRUCTURAL MEMBERS.

3.3 INSTALLATION - HANGERS AND SUPPORTS

- A. ANCHORS AND FASTENERS:
 - 1. CONCRETE STRUCTURAL ELEMENTS: PROVIDE PRECAST INSERTS, EXPANSION ANCHORS, POWER ACTUATED ANCHORS AND PRESET INSERTS.
 - 2. STEEL STRUCTURAL ELEMENTS: PROVIDE BEAM CLAMPS, SPRING STEEL CLIPS, STEEL RAMSET FASTENERS, AND WELDED FASTENERS.
 - 3. CONCRETE SURFACES: PROVIDE SELF-DRILLING ANCHORS AND EXPANSION ANCHORS.
 - 4. HOLLOW MASONRY, PLASTER, AND GYPSUM BOARD PARTITIONS: PROVIDE TOGGLE BOLTS AND HOLLOW WALL FASTENERS.
 - 5. SOLID MASONRY WALLS: PROVIDE EXPANSION ANCHORS AND PRESET INSERTS.
 - 6. SHEET METAL: PROVIDE SHEET METAL SCREWS.
 - 7. WOOD ELEMENTS: PROVIDE WOOD SCREWS.
- B. INSERTS:
 - 1. INSTALL INSERTS FOR PLACEMENT IN CONCRETE FORMS.
 - 2. INSTALL INSERTS FOR SUSPENDING HANGERS FROM REINFORCED CONCRETE SLABS AND SIDES OF REINFORCED CONCRETE BEAMS.
 - 3. PROVIDE HOOKED ROD TO CONCRETE REINFORCEMENT SECTION FOR INSERTS CARRYING PIPE OVER 4 INCHES (100 MM).

- 4. WHERE CONCRETE SLABS FORM FINISHED CEILING, LOCATE INSERTS FLUSH WITH SLAB SURFACE.
- 5. WHERE INSERTS ARE OMITTED, DRILL THROUGH CONCRETE SLAB FROM BELOW AND PROVIDE THROUGH-BOLT WITH RECESSED SQUARE STEEL PLATE AND NUT RECESSED INTO AND GROUTED FLUSH WITH SLAB.
- C. INSTALL CONDUIT AND RACEWAY SUPPORT AND SPACING IN ACCORDANCE WITH NEC.
- D. INSTALL MULTIPLE CONDUIT RUNS ON COMMON HANGERS.
- E. SUPPORTS:
 - 1. FABRICATE SUPPORTS FROM STRUCTURAL STEEL OR FORMED STEEL CHANNEL. INSTALL HEXAGON HEAD BOLTS TO PRESENT NEAT APPEARANCE WITH ADEQUATE STRENGTH AND RIGIDITY. INSTALL SPRING LOCK WASHERS UNDER NUTS.
 - 2. INSTALL SURFACE MOUNTED CABINETS AND PANELBOARDS WITH MINIMUM OF FOUR ANCHORS.
 - 3. IN WET AND DAMP LOCATIONS INSTALL STEEL CHANNEL SUPPORTS TO STAND CABINETS AND PANELBOARDS 1 INCH (25 MM) OFF WALL.
 - 4. SUPPORT VERTICAL CONDUIT AT EVERY OTHER FLOOR.

3.4 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

- A. PROVIDE HOUSEKEEPING PADS OF CONCRETE, MINIMUM 3-1/2 INCHES (87 MM) THICK AND EXTENDING 6 INCHES (150 MM) BEYOND SUPPORTED EQUIPMENT.
 - B. USING TEMPLATES FURNISHED WITH EQUIPMENT, INSTALL ANCHOR BOLTS, AND ACCESSORIES FOR MOUNTING AND ANCHORING EQUIPMENT.
 - C. CONSTRUCT SUPPORTS OF STEEL MEMBERS. BRACE AND FASTEN WITH FLANGES BOLTED TO STRUCTURE.
- 3.5 INSTALLATION - SLEEVES
- A. EXTERIOR WATERTIGHT ENTRIES: SEAL WITH ADJUSTABLE INTERLOCKING RUBBER LINKS.
 - B. CONDUIT PENETRATIONS NOT REQUIRED TO BE WATERTIGHT: SLEEVE AND FILL WITH SILICON FOAM.
 - C. SET SLEEVES IN POSITION IN FORMS. PROVIDE REINFORCING AROUND SLEEVES.
 - D. SIZE SLEEVES LARGE ENOUGH TO ALLOW FOR MOVEMENT DUE TO EXPANSION AND CONTRACTION. PROVIDE FOR CONTINUOUS INSULATION WRAPPING.
 - E. EXTEND SLEEVES THROUGH FLOORS 1 INCH (25 MM) ABOVE FINISHED FLOOR LEVEL. CAULK SLEEVES.
 - F. WHERE CONDUIT OR RACEWAY PENETRATES FLOOR, CEILING, OR WALL, CLOSE OFF SPACE BETWEEN CONDUIT OR RACEWAY AND ADJACENT WORK WITH FIRE STOPPING INSULATION AND CAULK. PROVIDE CLOSE FITTING METAL COLLAR OR ESCUTCHEON COVERS AT BOTH SIDES OF PENETRATION.
 - G. INSTALL CHROME PLATED STEEL ESCUTCHEONS AT FINISHED SURFACES

*** END OF SECTION ***

SECTION 26 0533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

1.0 GENERAL

1.1 SCOPE

THIS SECTION SPECIFIES THE FURNISHING AND INSTALLATION OF CONDUIT. THIS SECTION SPECIFIES THE FURNISHING AND INSTALLATION OF OUTLET BOXES, FLOOR BOXES, JUNCTION BOXES AND PULL BOXES.

1.2 REFERENCE STANDARDS

- A. ANSI C80.1 - RIGID STEEL CONDUIT, ZINC COATED.
 - ANSI C80.3 - ELECTRICAL METALLIC CONDUIT, ZINC COATED.
 - B. ANSI/NEMA PUBLICATION NO. 05 2 - NON-METALLIC SUPPORTS.
 - C. ANSI/UL 514 - ELECTRICAL OUTLET BOXES AND FITTINGS.
 - D. ANSI/NEMA FB1 - FITTINGS, CAST METAL BOXES, AND CONDUIT BODIES FOR CONDUIT AND CABLE ASSEMBLIES.
 - E. NECA - "STANDARD OF INSTALLATION."
 - F. NEMA TC3 - PVC FITTINGS FOR USE WITH RIGID PVC CONDUIT AND TUBING.
- 1.3 APPLICABLE PROVISIONS
- REFER TO SECTION 26 0500 - GENERAL ELECTRICAL REQUIREMENTS.

2.0 PRODUCTS

2.1 PRODUCT DATA

- A. PROVIDE FOR METALLIC CONDUIT, FLEXIBLE METAL CONDUIT, LIQUIDTIGHT FLEXIBLE METAL CONDUIT, METALLIC TUBING, NONMETALLIC CONDUIT, FLEXIBLE NONMETALLIC CONDUIT, NONMETALLIC TUBING, FITTINGS, CONDUIT BODIES. SUBMIT SEALANTS.

2.2 CONDUIT REQUIREMENTS

- A. ACCEPTABLE MANUFACTURERS
 - 1. STEEL CONDUIT: ALLIED TUBE AND CONDUIT CORPORATION, LTV CONDUIT, REPUBLIC STEEL CORPORATION, TRIANGLE, WHEATLAND TUBE CO.
 - 2. NEOPRENE COATED FLEXIBLE STEEL CONDUIT: ANACONDA, ELECTRI-FLEX, KELLEMS
 - 3. PVC CONDUIT: CARLON ELECTRIC PRODUCTS, ETHYL CORP., CAN-TEX INDUSTRIES, CONDUX
 - B. MINIMUM SIZE: 1/2 INCH UNLESS OTHERWISE SPECIFIED.
 - EXCEPTIONS: 1/2 INCH MAY BE USED FOR CONDUITS BETWEEN PLUGS OR LIGHT FIXTURES.
 - C. UNDERGROUND INSTALLATION
 - 1. MORE THAN FIVE FEET FROM FOUNDATION WALL: USE RIGID STEEL CONDUIT OR THICK WALL NONMETALLIC CONDUIT.
 - 2. WITHIN FIVE FEET FROM FOUNDATION WALL: USE RIGID STEEL CONDUIT.
 - 3. UNDER SLAB ON GRADE: USE PVC CONDUIT. ALL TURNS UP INTO SLAB SHALL BE RIGID 90S.
 - 4. MINIMUM SIZE: 1 INCH.
 - D. OUTDOOR LOCATIONS, ABOVE GRADE: USE RIGID STEEL CONDUIT.
 - E. DRY LOCATIONS - INTERIOR: CONCEALED USE ELECTRICAL METALLIC TUBING. EXPOSED USE ELECTRICAL METALLIC TUBING EXPECT BELOW 10' AFF, WHERE RIGID CONDUIT WILL BE USED.
 - F. EQUIPMENT CONNECTIONS: USE LIQUID-TIGHT FLEXIBLE METAL CONDUIT FOR INTERIOR AND EXTERIOR EQUIPMENT (5'-0" MAX. LENGTH).
- 2.3 METAL CONDUIT
- A. RIGID STEEL CONDUIT: ANSI C80.1, HOT DIPPED, GALVANIZED AFTER FABRICATION.
 - B. INTERMEDIATE METAL CONDUIT (IMC): GALVANIZED STEEL.
 - C. FITTINGS AND CONDUIT BODIES: ANSI/NEMA FB1; MATERIAL TO MATCH CONDUIT. ALL STEEL FITTINGS.
 - D. RIGID METAL CONDUIT OR IMC BELOW GRADE OR EXPOSED TO WEATHER SHALL BE WRAPPED WITH (20 MILS) ALL-WEATHER CORROSION PROTECTION TAPE WITH 80% OVERLAP. SURFACES OF CONDUIT SHALL BE COATED WITH PIPE PRIMER PRIOR TO WRAPPING. UTILIZE 3M "SCOTCHWRAP" 51 WITH 3M "SCOTCHWRAP" PIPE PRIMER OR APPROVED EQUIVALENT.



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- 2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT
- A. DESCRIPTION: LIQUIDTIGHT FLEXIBLE CONDUIT SHALL BE ANACONDA "SEALTITE" TYPE V.A. OR APPROVED EQUIVALENT, FLEXIBLE GALVANIZED STEEL CORE WITH EXTRUDED THERMOPLASTIC COVERING, WITH SPECIAL WATER TIGHT CONNECTORS, U.L. LISTED WITH GROUND INTEGRAL, IN SIZES 1/2" TO 1-1/4", TYPE O.R. SHALL USED UNDER FLOOR, AND TYPE H.C. SHALL BE USED FOR LOCATIONS WITH TEMPERATURES EXTREME (ABOVE 40 DEGREES C).
- B. FITTINGS: ANSI/NEMA FB1
- 2.5 FLEXIBLE METAL CONDUIT
- A. DESCRIPTION: FLEXIBLE GALVANIZED STEEL.
- B. FITTINGS: ANSI/NEMA FB1
- 2.6 ELECTRICAL METALLIC TUBING
- A. DESCRIPTION: ANSI C80.3; GALVANIZED TUBING.
- B. FITTINGS AND CONDUIT BODIES: ANSI/NEMA FB1, GALVANIZED STEEL COMPRESSION TYPE OUTDOORS. STEEL SET-SCREW MAY BE USED INDOORS. STEEL CONNECTORS SHALL HAVE INSULATED THROAT.
- 2.7 RIGID PVC CONDUIT
- A. HIGH IMPACT POLYVINYL CHLORIDE, MEETING MINIMUM REQUIREMENTS OF NEC.
- B. DIRECT BURIAL TYPE: CARLON ELECTRIC PRODUCTS, TYPE 40.
- C. CONCRETE ENCASED BURIAL TYPE: CARLON ELECTRIC PRODUCTS, TYPE 40. MARK EACH LENGTH CLEARLY AND DURABLY WITH NOMINAL TRADE SIZE, TYPE OF MATERIAL, AND UL LABEL.
- D. FITTINGS: PVC, SOLVENT WELD TYPE, WITH CONNECTORS AND THREADED ADAPTERS AS REQUIRED.
- 2.8 JUNCTION, PULL AND SPLICE BOXES
- A. CONSTRUCTION. PROVIDE BOXES CONFORMING TO NEC ARTICLE 314.
- B. INTERIOR SPACES. PROVIDE NEMA 1 TYPE BOXES AT LEAST 4 INCHES DEEP.
- C. EXTERIOR SPACES. PROVIDE NEMA 3R TYPE BOXES AT LEAST 4 INCHES DEEP.
- D. EMBEDDED. PROVIDE NEMA 4 CAST IRON TYPE WITH EXTERNAL RECESSED FLANGED COVER WHEN CAST IN CONCRETE.
- E. SIZE. PROVIDE BOXES SIZED IN ACCORDANCE WITH NEC REQUIREMENTS.
- F. LISTING. UL 514.
- G. ACCEPTABLE MANUFACTURERS. HOFFMAN, KEYSTONE, OZ, STAHLIN.
- 3.0 EXECUTION
- 3.1 INSTALLATION
- A. INSTALL CONDUIT IN ACCORDANCE WITH NECA "STANDARD OF INSTALLATION." INSTALL NONMETALLIC CONDUIT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. ARRANGE SUPPORTS TO PREVENT MISALIGNMENT DURING WIRING INSTALLATION. SUPPORT CONDUIT USING COATED STEEL OR MALLEABLE IRON STRAPS, LAY-IN ADJUSTABLE HANGERS, CLEVIS HANGERS, AND SPLIT HANGERS. GROUP RELATED CONDUITS; SUPPORT USING CONDUIT RACK. CONSTRUCT RACK USING STEEL CHANNEL; PROVIDE SPACE ON EACH 25 PERCENT ADDITIONAL CONDUITS. FASTEN CONDUIT SUPPORTS TO BUILDING STRUCTURE AND SURFACES.
- B. DO NOT SUPPORT CONDUIT WITH WIRE OR PERFORATED PIPE STRAPS. REMOVE WIRE USED FOR TEMPORARY SUPPORTS.
- C. ARRANGE CONDUIT TO MAINTAIN HEADROOM AND PRESENT NEAT APPEARANCE. ROUTE EXPOSED CONDUIT PARALLEL AND PERPENDICULAR TO STRUCTURES. ROUTE CONDUIT UNDER SLAB FROM POINT-TO-POINT. IN FLOOR SLABS, SLEEVES SHALL EXTEND 1-1/2 INCH ABOVE FLOOR SLAB CEMENTED IN A WATER TIGHT MANNER. MAINTAIN ADEQUATE CLEARANCE BETWEEN CONDUIT AND PIPING.
- D. CUT CONDUIT SQUARE USING SAW PIPE CUTTER; DE-BURR CUT ENDS. BRING CONDUIT TO SHOULDER OF FITTINGS; FASTEN SECURELY. JOIN NONMETALLIC CONDUIT USING CEMENT AS RECOMMENDED BY MANUFACTURER. WIPE NONMETALLIC CONDUIT DRY AND CLEAN BEFORE JOINING. APPLY FULL EVEN COAT OF CEMENT TO ENTIRE AREA INSERTED IN FITTING. ALLOW JOINT TO CURE FOR 20 MINUTES, MINIMUM.
- E. USE CONDUIT HUBS OR SEALING LOCKNUTS TO FASTEN CONDUIT TO SHEET METAL BOXES IN DAMP AND WET LOCATIONS AND TO CAST BOXES.
- F. INSTALL NO MORE THAN EQUIVALENT OF THREE 90-DEGREE BENDS BETWEEN BOXES. USE CONDUIT BODIES TO MAKE SHARP CHANGES IN DIRECTION, AS AROUND BEAMS. USE FACTORY ELBOWS FOR BENDS IN METAL CONDUIT LARGER THAN 2 INCH SIZE.
- G. AVOID MOISTURE TRAPS; PROVIDE JUNCTION BOX WITH DRAIN FITTING AT LOW POINTS IN CONDUIT SYSTEM. PROVIDE SUITABLE FITTINGS TO ACCOMMODATE EXPANSION AND DEFLECTION WHERE CONDUIT CROSSES CONTROL AND EXPANSION JOINTS.
- H. PROVIDE SUITABLE PULL STRING IN EACH EMPTY CONDUIT EXCEPT SLEEVES AND NIPPLES.
- I. USE SUITABLE CAPS TO PROTECT INSTALLED CONDUIT AGAINST ENTRANCE OF DIRT AND MOISTURE.
- J. GROUND AND BOND CONDUIT UNDER PROVISIONS OF SECTION 26 0526.
- K. INSTALL BOXES AS REQUIRED TO FACILITATE CABLE INSTALLATION IN RACEWAY SYSTEMS. GENERALLY PROVIDE BOXES IN CONDUIT RUNS OF MORE THAN 100 FEET OR AS REQUIRED IN SECTION 26 0533. LOCATE BOXES STRATEGICALLY AND MAKE THEM OF SUCH SHAPE TO PERMIT EASY PULLING OF WIRE OR CABLES.
- L. PROVIDE BOXES SO THAT COVERS ARE READILY ACCESSIBLE AND EASILY REMOVABLE AFTER COMPLETION OF THE INSTALLATION. INCLUDE SUITABLE ACCESS DOORS FOR BOXES ABOVE SUSPENDED CEILINGS. SELECT A PRACTICAL SIZE FOR EACH BOX AND COVER.

*** END OF SECTION ***

SECTION 26 0533 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

- 1.0 GENERAL
- 1.1 SCOPE
- THIS SECTION SPECIFIES THE FURNISHING AND INSTALLATION OF NAMEPLATES, LABELS, WIRE MARKERS, CONDUIT MARKERS, STENCILS, UNDERGROUND WARNING TAPE, AND LOCKOUT DEVICES.
- 1.2 APPLICABLE PROVISIONS
- REFER TO SECTION 26 0500 - GENERAL ELECTRICAL REQUIREMENTS.
- 2.0 PRODUCTS
- 2.1 NAMEPLATES
- A. PRODUCT DESCRIPTION: LAMINATED THREE-LAYER PLASTIC WITH ENGRAVED BLACK LETTERS ON WHITE CONTRASTING BACKGROUND COLOR.
- B. LETTER SIZE:
- 1/8 INCH (3 MM) HIGH LETTERS FOR IDENTIFYING INDIVIDUAL EQUIPMENT AND LOADS.
 - 1/4 INCH (6 MM) HIGH LETTERS FOR IDENTIFYING GROUPED EQUIPMENT AND LOADS.
- C. MINIMUM NAMEPLATE THICKNESS: 1/8 INCH (3 MM).

- 2.2 WIRE MARKERS
- A. DESCRIPTION: SPLIT SLEEVE OR TUBING TYPE WIRE MARKERS.
- B. LEGEND:
1. POWER AND LIGHTING CIRCUITS: BRANCH CIRCUIT OR FEEDER NUMBER.
 2. CONTROL CIRCUITS: CONTROL WIRE NUMBER AS INDICATED ON SCHEMATIC AND INTERCONNECTION DIAGRAMS.
- 2.3 CONDUIT AND RACEWAY MARKERS
- A. DESCRIPTION: NAMEPLATE FASTENED WITH ADHESIVE LABELS FASTENED WITH ADHESIVE.
- B. COLOR:
1. MEDIUM VOLTAGE SYSTEM: BLACK LETTERING ON WHITE BACKGROUND.
 2. 480 VOLT SYSTEM: BLACK LETTERING ON WHITE BACKGROUND.
 3. 208 VOLT SYSTEM: BLACK LETTERING ON WHITE BACKGROUND.
- C. LEGEND:
1. MEDIUM VOLTAGE SYSTEM: HIGH VOLTAGE.
 2. 480 VOLT SYSTEM: 480 VOLTS.
 3. 208 VOLT SYSTEM: 208 VOLTS.

- 2.4 STENCILS
- A. STENCILS: WITH CLEAN CUT SYMBOLS AND LETTERS OF FOLLOWING SIZE:
1. UP TO 2 INCHES (50 MM) OUTSIDE DIAMETER OF RACEWAY: 1/2 INCH (13 MM) HIGH LETTERS.
 2. 2-1/2 TO 6 INCHES (64 TO 150 MM) OUTSIDE DIAMETER OF RACEWAY: 1 INCH (25 MM) HIGH LETTERS.
- B. STENCIL PAINT: AS SPECIFIED IN SECTION 09 90 00 SEMI-GLOSS ENAMEL, COLORS CONFORMING TO THE FOLLOWING:
1. BLACK LETTERING ON WHITE BACKGROUND.
 2. WHITE LETTERING ON GRAY BACKGROUND.
 3. RED LETTERING ON WHITE BACKGROUND.
 4. BLUE LETTERING ON WHITE BACKGROUND.

- 2.5 UNDERGROUND WARNING TAPE
- A. DESCRIPTION: 4 INCH (100 MM) WIDE PLASTIC TAPE, DETECTABLE TYPE, COLORED RED WITH SUITABLE WARNING LEGEND DESCRIBING BURIED ELECTRICAL LINES.

- 2.6 LOCKOUT DEVICES
- A. ANODIZED ALUMINUM HASP WITH ERASABLE LABEL SURFACE; SIZE MINIMUM 7-1/4 X 3 INCHES (184 X 75 MM).

- 3.0 EXECUTION
- 3.1 PREPARATION
- A. DEGREASE AND CLEAN SURFACES TO RECEIVE ADHESIVE FOR IDENTIFICATION MATERIALS.
- 3.2 EXISTING WORK
- A. INSTALL IDENTIFICATION ON EXISTING EQUIPMENT TO REMAIN IN ACCORDANCE WITH THIS SECTION.
- B. INSTALL IDENTIFICATION ON UNMARKED EXISTING EQUIPMENT.
- C. REPLACE LOST NAMEPLATES.
- D. RE-STENCIL EXISTING EQUIPMENT.

- 3.3 INSTALLATION
- A. INSTALL IDENTIFYING DEVICES AFTER COMPLETION OF PAINTING.
- B. NAMEPLATE INSTALLATION:
1. INSTALL NAMEPLATE PARALLEL TO EQUIPMENT LINES.
 2. INSTALL NAMEPLATE FOR EACH ELECTRICAL DISTRIBUTION AND CONTROL EQUIPMENT ENCLOSURE WITH CORROSIVE-RESISTANT MECHANICAL FASTENERS, OR ADHESIVE.
 3. INSTALL NAMEPLATES FOR EACH CONTROL PANEL AND MAJOR CONTROL COMPONENTS LOCATED OUTSIDE PANEL WITH CORROSIVE-RESISTANT MECHANICAL FASTENERS, OR ADHESIVE.
 4. SECURE NAMEPLATE TO EQUIPMENT FRONT USING SCREWS.
 5. SECURE NAMEPLATE TO INSIDE SURFACE OF DOOR ON RECESSED PANELBOARD IN FINISHED LOCATIONS.
 6. INSTALL NAMEPLATES FOR THE FOLLOWING:
 - a. SWITCHBOARDS.
 - b. PANELBOARDS.
 - c. TRANSFORMERS.
 - d. SERVICE DISCONNECTS.
- C. LABEL INSTALLATION:
1. INSTALL LABEL PARALLEL TO EQUIPMENT LINES.
 2. INSTALL LABEL FOR IDENTIFICATION OF INDIVIDUAL CONTROL DEVICE STATIONS.
 3. INSTALL LABELS FOR PERMANENT ADHESION AND SEAL WITH CLEAR LAQUER.
- D. WIRE MARKER INSTALLATION:
1. INSTALL WIRE MARKER FOR EACH CONDUCTOR AT PANELBOARD GUTTERS, PULL BOXES, OUTLET AND EACH LOAD CONNECTION.
 2. MARK DATA CABLING AT EACH END. INSTALL ADDITIONAL MARKING AT ACCESSIBLE LOCATIONS ALONG THE CABLE RUN.
 3. INSTALL LABELS AT DATA OUTLETS IDENTIFYING PATCH PANEL AND PORT DESIGNATION AS INDICATED ON DRAWINGS.

- E. CONDUIT MARKER INSTALLATION:
1. INSTALL CONDUIT MARKER FOR EACH CONDUIT LONGER THAN 12 FEET (4000 MM).
 2. CONDUIT MARKER SPACING: 20 FEET (6000 MM) ON CENTER.
 3. RACEWAY PAINTING: IDENTIFY CONDUIT USING FIELD PAINTING IN ACCORDANCE WITH THE FOLLOWING:
 - a. PAINT COLORED BAND ON EACH CONDUIT LONGER THAN 6 FEET (2000 MM).
 - b. PAINT BANDS 20 FEET (6000 MM) ON CENTER.
 - c. COLOR:
 - 1) 480 VOLT SYSTEM: BLUE.
 - 2) 208 VOLT SYSTEM: YELLOW.
- F. UNDERGROUND WARNING TAPE INSTALLATION:
1. INSTALL UNDERGROUND WARNING TAPE ALONG LENGTH OF EACH UNDERGROUND CONDUIT, RACEWAY, OR CABLE 6 TO 8 INCHES (150 TO 200 MM) BELOW FINISHED GRADE, DIRECTLY ABOVE BURIED CONDUIT, RACEWAY, OR CABLE.

*** END OF SECTION ***

SECTION 26 2416 - PANELBOARDS

- 1.0 GENERAL
- 1.1 SUMMARY
- A. DESCRIPTION OF WORK: THE WORK COVERED IN THIS SECTION OF THE SPECIFICATIONS INCLUDES FUSIBLE AND CIRCUIT BREAKER PANELBOARDS AND ACCESSORIES AS COVERED BY ARTICLE 384 OF THE NATIONAL ELECTRICAL CODE AND AS SHOWN ON THE DRAWINGS

- 2.0 PRODUCTS
- 2.1 ACCEPTABLE MANUFACTURERS:
- A. CUTLER-HAMMER.
- B. GENERAL ELECTRIC CO.
- C. SQUARE D COMPANY
- D. SIEMENS

- 2.2 THE FOLLOWING SCHEDULE DESIGNATES EQUIVALENT PRODUCTS:
- | SQUARE D | EATON | GENERAL ELECTRIC CO. | SIEMENS |
|----------------|---------------|-------------------------------|---------|
| NOOD | POW-R-LINE 1 | A-SERIES, TYPE AQ | TYPE S1 |
| --POW-R-LINE 2 | | | |
| NEMB | POW-R-LINE 3 | A-SERIES, TYPE AE OR AD | TYPE S2 |
| I-LINE | POW-R-LINE 4B | SPECTRA SERIES | TYPE S5 |
| QMB | POW-R-LINE 4F | SPECTRA SERIES W/ADS SWITCHES | TYPE F2 |

- 2.3 PANELBOARDS SHALL:
- A. BE ENCLOSED IN A CODE GAUGE STEEL CABINET.
- B. BE DEAD FRONT CONSTRUCTION.
- C. HAVE ONE-PIECE TRIM WITH NO EXPOSED HINGES.
- D. HAVE AN EQUIPMENT GROUND BUS.
- E. HAVE BUS CURRENT AND SHORT CIRCUIT RATINGS AS CALLED FOR ON THE DRAWINGS. (BUS RATINGS TO BE INTEGRATED EQUIPMENT RATING ESTABLISHED ACCORDING TO UL 67)
- F. BE UL LISTED.
- G. HAVE BUS BARS OF 98% CONDUCTIVITY COPPER AND MINIMUM CROSS-SECTIONAL AREA BASED ON UL 67 FOR HEAT RISE.
- H. DOOR-IN-DOOR COVERS WHICH ARE EQUIPPED WITH:
1. HINGES AS REQUIRED FOR PROPER SUPPORT AND ALIGNMENT.
 2. SPRING LATCH WITH A KEY LOCK. ALL LOCKS SHALL BE KEYPAD ALIKE.
 3. SPRING LATCH WITH A KEY LOCK. ALL LOCKS SHALL BE KEYPAD ALIKE.
 4. FRAMED DIRECTORY ON INSIDE WITH 1/16" THICK GLASS OR PLASTIC COVER AND TYPED DIRECTORY CARD IDENTIFYING THE LOAD FED BY EACH CIRCUIT INCLUDING ROOM AND NUMBER. SPARES AND SPACES SHALL BE NOTED IN PENCIL.
 5. PANELS SHALL BE INSTALLED PLUMB AND LEVEL WITH THE HIGHEST DEVICE HANDLE NOT MORE THAN 6'-6" ABOVE FINISHED FLOOR.
 6. FLUSH MOUNTED PANELS SHALL BE SET SO AS TO ASSURE THAT THE PANEL TRIM WILL BE FLAT AGAINST THE FINISHED WALL SURFACE.
 7. FLUSH TYPE PANELS SHALL BE SECURELY FASTENED TO STRUCTURAL MEMBERS OF THE WALL. PROVIDE ADDITIONAL SUPPORTS AS REQUIRED FOR A SECURE INSTALLATION.
 8. SURFACE MOUNTED PANELS SHALL BE SECURELY BOLTED TO THE MOUNTING SURFACE.
 9. ALL WIRING IN PANELS SHALL BE NEAT WITH ROUNDED CORNERS AND SHALL BE TIED IN BUNDLES WITH APPROVED TIES. (SEE SECTION 26 0500).
 10. CLOSE ALL UNUSED OPENINGS IN ENCLOSURES.
 11. TORQUE ALL LUGS TO MANUFACTURER'S SPECIFICATIONS.

*** END OF SECTION ***

SECTION 26 2726 - WIRING DEVICES

- 1.0 GENERAL
- 1.1 WORK INCLUDED
- THIS SECTION SPECIFIES THE FURNISHING AND INSTALLATION OF WIRING DEVICES AND DEVICE PLATES.
- 1.2 REFERENCE STANDARDS
- A. ANS/UL 20 - GENERAL-USE SNAP SWITCHES.
- B. ANS/UL498 - ELECTRICAL ATTACHMENT PLUGS AND RECEPTACLES.
- C. NEMA WD 1 - GENERAL-PURPOSE WIRING DEVICES.
- 1.3 APPLICABLE PROVISIONS
- REFER TO SECTION 26 0500 - GENERAL ELECTRICAL REQUIREMENTS.

- 2.0 PRODUCTS
- 2.1 RECEPTACLES
- A. TYPE. BACK AND SIDE WIRED RECEPTACLES, AS SHOWN.
- B. RATING. SCHEDULED ON DRAWINGS.
- C. LISTING. UL 498 AND FEDERAL SPECIFICATION W-C-596.
- D. ACCEPTABLE MANUFACTURERS. THE FOLLOWING DESIGNATIONS ARE FOR BROWN DEVICES; PROVIDE DEVICES IN THE COLOR SPECIFIED IN PARAGRAPH 2.4. OTHER RECEPTACLE TYPES ARE AS LISTED ON THE DRAWINGS.
- | NEMA | ARROW | BRYANT | HUBBELL | LEVITON | PASS & CONEIG | HART | SEYMOUR |
|-------|--------|--------|---------|---------|---------------|------|---------|
| 5-15R | 5252-S | 5252 | 5252 | 5252 | 5252 | | |
| 6-15R | 5661 | 5661 | 5661 | 5661 | 5661 | | |
| 5-20R | 5362 | 5362 | 5362 | 5362 | 5362 | | |
| 6-20R | 5861 | 5461 | 5461 | 5461 | 5871 | | |

- 2.2 DEVICE PLATES
- A. OUTDOOR AREAS. USE WEATHERPROOF-WHILE-IN-USE DEVICE PLATES. PROVIDE CAST ALUMINUM PLATES WITH GASKETED SPRING DOOR COVERS FOR PROTECTION OF DEVICE. USE HUBBELL 7420 FOR SWITCHES AND EITHER 5205 OR 5206 FOR DUPLEX RECEPTACLES.
- 2.3 DEVICE COLOR
- A. SUPPLY REGULAR SERVICE ITEMS IN COLOR APPROVED BY THE ARCHITECT.

- 3.0 EXECUTION
- 3.1 EXAMINATION
- A. EXAMINE SURFACES, SUBSTRATES, AND OTHER CONDITIONS FOR COMPLIANCE WITH REQUIREMENTS OF OTHER SECTIONS IN WHICH THAT RELATED WORK IS SPECIFIED, AND DETERMINE IF SUCH CONDITIONS AFFECTING PERFORMANCE OF THE WORK OF THIS SECTION ARE SATISFACTORY. DO NOT PROCEED WITH WORK OF THIS SECTION UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED IN A MANNER ACCEPTABLE TO THE INSTALLER. STARTING INSTALLATION CONSTITUTES ACCEPTANCE OF CONDITIONS.
- 3.2 DEVICE COORDINATION
- A. WHERE ITEMS OF EQUIPMENT ARE PROVIDED UNDER OTHER SECTIONS OF THIS SPECIFICATION OR BY THE OWNER, PROVIDE A COMPATIBLE RECEPTACLE FOR THE CAP OR PLUG AND CORD OF THE EQUIPMENT.
- 3.3 RECEPTACLES
- A. MOUNT RECEPTACLES VERTICALLY IN CENTER OF A SUITABLE STEEL OUTLET BOX. IT SHOULD BE INSTALLED 18 INCHES ABOVE FINISHED FLOOR, MEASURED FROM BOTTOM OF BOX OR AS SHOWN ON THE DRAWINGS. THE ARCHITECT RESERVES THE RIGHT TO MAKE ANY REASONABLE CHANGES IN RECEPTACLE LOCATIONS WITHOUT CHANGE IN THE CONTRACT SUM.
- 3.4 DEVICE PLATES
- A. TYPE. PROVIDE DEVICE PLATES FOR EACH OUTLET BOX OF THE TYPE REQUIRED FOR SERVICE AND DEVICE INVOLVED. PROVIDE BUILDING STANDARD.
- B. GANGED DEVICES. MOUNT GANGED DEVICES UNDER A SINGLE, ONE-PIECE, DEVICE PLATE.
- C. ENGRAVING. ENGRAVE PLATES WITH 1/8 INCH-HIGH BLACK LETTERS, IF DESIGNATED FOR ENGRAVING.
- D. TELEPHONES. PROVIDE WALL PLATES FOR TELEPHONE OUTLETS WITH A NOMINAL 5/8-INCH BUSHED OPENING IN THE CENTER.

*** END OF SECTION ***

SECTION 26 2816 - OVERCURRENT PROTECTIVE DEVICES

- 1.0 GENERAL
- 1.1 SUMMARY
- A. DESCRIPTION OF WORK: THIS SECTION COVERS FUSES AND MOLDED CASE CIRCUIT BREAKERS RATED 600 VOLTS OR LESS IN PANELBOARDS, SWITCHBOARDS, INDIVIDUAL ENCLOSURES, MOTOR CONTROL CENTERS, COMBINATION MOTOR STARTERS, BUSWAY PLUG IN UNITS, ETC.
- 2.0 PRODUCTS
- 2.1 ACCEPTABLE MANUFACTURERS:
- A. FUSES:
1. BUSSMAN MFG. DIV.
 2. GOULD-SHAMMUT
 3. LITTLE FUSE.
- B. BREAKERS:
1. CUTLER-HAMMER
 2. GENERAL ELECTRIC CO.
 3. SQUARE D COMPANY
 4. SIEMENS
- 2.2 FUSES:
- A. FUSES, 600 VOLTS AND LESS, SHALL MEET THE FOLLOWING CRITERIA:
1. BE OF THE SAME MANUFACTURER
 2. FUSES RATED 1/10 TO 600 AMPERES SHALL BE CURRENT LIMITING UL CLASS RK1
- 2.3 CIRCUIT BREAKERS:
- A. ALL CIRCUIT BREAKERS SHALL:
1. HAVE INVERSE TIME TRIPPING CHARACTERISTICS WITH FIXED THERMAL TRIP ACTION.
 2. HAVE A PERMANENT TRIP UNIT CONTAINING INDIVIDUAL THERMAL AND MAGNETIC TRIP ELEMENTS IN EACH POLE
 3. BE CALIBRATED FOR OPERATION IN A MINIMUM AMBIENT TEMPERATURE OF 40°C
 4. INDICATE THEIR CURRENT AND VOLTAGE RATING
 5. HAVE INTERRUPTING CAPACITY COMPATIBLE WITH THE PANELBOARD OR SWITCHBOARD INTEGRATED EQUIPMENT RATING
 6. HAVE A MINIMUM AIC OF 10,000A ON 120/208V WYE SYSTEMS, AND 14,000 ON 277/480V WYE SYSTEMS
 7. BE ONE, TWO, OR THREE POLE MOLDED CASE CIRCUIT BREAKERS AS SPECIFIED ON THE DRAWINGS
 8. BE COMMON TRIP TYPE.

- 2.4 PROVIDE OVERCURRENT PROTECTION FOR ALL WIRING AND EQUIPMENT IN ACCORDANCE WITH THE NEC.
- 2.5 A LABEL SHALL BE PLACED INSIDE EACH FUSED SWITCH DOOR. THE LABEL SHOULD INDICATE THE FUSE TYPE, AMPERE RATING AND INTERRUPTING RATING, AND SHOULD INDICATE THAT FUSES SHOULD BE REPLACED ONLY WITH FUSES OF THE SAME CLASS, AMPACITY, AND INTERRUPTING RATING.
- 2.6 BREAKERS MUST CLEAR PANEL DOORS AND BE MOUNTED ON FRAME ALLOWING OUTWARD AND INWARD ADJUSTMENT. THE DEPTH OF THE PANEL SHALL ALSO PERMIT ADJUSTMENT.
- 2.7 THE USE OF TANDEM "MULTI", "PUSH-O-MATIC", OR "QUICKLAG" BREAKERS WILL NOT BE PERMITTED.

*** END OF SECTION ***



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E5.2