

CONDUIT AND CONDUCTORS SCHEDULE																
Mark No.	OCP Device	Conductors		Conductors				Raceway Size (nominal inches)								
		60d C	75d C	Qty	Size	Type	Min E	Grd	No. Sets	EMT	IMC	RIGID	PVC	EMT	IMC	PVC
1	20/1	20	—	2	12	THHN	1	12	One	0.75	0.75	0.75	0.75	0.75	0.75	0.75
2	20/2	20	—	3	12	THHN	1	12	One	0.75	0.75	0.75	0.75	0.75	0.75	0.75
3	20/3	20	—	4	12	THHN	1	12	One	0.75	0.75	0.75	0.75	0.75	0.75	0.75
4	25/1	30	—	2	10	THHN	1	10	One	0.75	0.75	0.75	0.75	0.75	0.75	0.75
5	25/2	30	—	3	10	THHN	1	10	One	0.75	0.75	0.75	0.75	0.75	0.75	0.75
6	25/3	30	—	4	10	THHN	1	10	One	0.75	0.75	0.75	0.75	0.75	0.75	0.75
7	30/1	30	—	2	10	THHN	1	10	One	0.75	0.75	0.75	0.75	0.75	0.75	0.75
8	30/2	30	—	3	10	THHN	1	10	One	0.75	0.75	0.75	0.75	0.75	0.75	0.75
9	30/3	30	—	4	10	THHN	1	10	One	0.75	0.75	0.75	0.75	0.75	0.75	0.75
10	40/1	40	—	2	8	THHN	1	10	One	0.75	0.75	0.75	0.75	0.75	0.75	0.75
11	40/2	40	—	3	8	THHN	1	10	One	0.75	0.75	0.75	0.75	0.75	0.75	0.75
12	40/3	40	—	4	8	THHN	1	10	One	0.75	0.75	0.75	0.75	0.75	0.75	1.00
13	50/1	55	—	2	6	THHN	1	10	One	0.75	0.75	0.75	0.75	0.75	0.75	0.75
14	50/2	55	—	3	6	THHN	1	10	One	0.75	0.75	0.75	0.75	1.00	1.00	1.00
15	50/3	55	—	4	6	THHN	1	10	One	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	60/1	70	—	2	4	THW	1	8	One	1.00	1.00	1.00	1.00	1.25	1.00	1.25
17	60/2	70	—	3	4	THW	1	8	One	1.25	1.00	1.25	1.25	1.25	1.25	1.25
18	60/3	70	—	4	4	THW	1	8	One	1.25	1.25	1.25	1.25	1.25	1.25	1.25
19	70/1	70	—	2	4	THW	1	8	One	1.00	1.00	1.00	1.00	1.25	1.00	1.25
20	70/2	70	—	3	4	THW	1	8	One	1.25	1.00	1.25	1.25	1.25	1.25	1.25
21	70/3	70	—	4	4	THW	1	8	One	1.25	1.25	1.25	1.25	1.25	1.25	1.25
22	80/2	85	—	3	3	THW	1	8	One	1.25	1.25	1.25	1.25	1.25	1.25	1.25
23	80/3	85	—	4	3	THW	1	8	One	1.25	1.25	1.25	1.25	1.50	1.25	1.50
24	90/2	95	—	3	2	THW	1	8	One	1.25	1.25	1.25	1.25	1.50	1.25	1.50
25	90/3	95	—	4	2	THW	1	8	One	1.50	1.25	1.50	1.50	1.50	1.50	1.50
26	100/2	110	—	3	1	THW	1	6	One	1.50	1.50	1.50	1.50	2.00	2.00	2.00
27	100/3	110	—	4	1	THW	1	6	One	2.00	2.00	2.00	2.00	2.00	2.00	2.00
28	110/2	—	115	3	2	THW	1	6	One	1.25	1.25	1.25	1.25	1.50	1.25	1.50
29	110/3	—	115	4	2	THW	1	6	One	1.50	1.25	1.50	1.50	1.50	1.50	1.50
30	125/2	—	130	3	1	THW	1	6	One	1.50	1.50	1.50	1.50	2.00	2.00	2.00
31	125/3	—	130	4	1	THW	1	6	One	2.00	2.00	2.00	2.00	2.00	2.00	2.00
32	150/2	—	150	3	1/0	THW	1	6	One	2.00	1.50	2.00	2.00	2.00	2.00	2.00
33	150/3	—	150	4	1/0	THW	1	6	One	2.00	2.00	2.00	2.00	2.00	2.00	2.00
34	175/2	—	175	3	2/0	THW	1	6	One	2.00	2.00	2.00	2.00	2.00	2.00	2.00
35	175/3	—	175	4	2/0	THW	1	6	One	2.00	2.00	2.00	2.00	2.50	2.50	2.50
36	200/2	—	200	3	3/0	THW	1	6	One	2.00	2.00	2.00	2.00	2.50	2.50	2.50
37	200/3	—	200	4	3/0	THW	1	6	One	2.50	2.50	2.50	2.50	2.50	2.50	2.50
38	225/2	—	230	3	4/0	THW	1	4	One	2.50	2.00	2.50	2.50	2.50	2.50	2.50
39	225/3	—	230	4	4/0	THW	1	4	One	2.50	2.50	2.50	2.50	2.50	3.00	3.00
40	250/3	—	255	4	250	THW	1	4	One	2.50	3.00	3.00	3.00	3.00	3.00	3.00
41A	300/3	—	285	4	300	THW	1	4	One	3.00	3.00	3.00	3.00	3.00	3.00	3.00
41B	300/3	—	310	4	350	THW	1	4	One	3.00	3.00	3.00	3.00	3.00	3.00	3.00
42A	350/3	—	335	4	400	THW	1	4	One	3.00	3.50	3.50	3.50	3.50	3.50	3.50
42B	350/3	—	380	4	500	THW	1	4	One	3.50	3.50	3.50	3.50	3.50	3.50	3.50
43A	400/3	—	380	4	500	THW	1	3	One	3.50	3.50	3.50	3.50	3.50	3.50	3.50
43B	400/3	—	400	4	3/0	THW	2	3	Two	2.50	2.50	2.50	2.50	2.50	2.50	2.50
44A	600/3	—	570	4	300	THW	2	1	Two	3.00	3.00	3.00	3.00	3.00	3.00	3.00
44B	600/3	—	620	4	350	THW	2	1	Two	3.00	3.00	3.00	3.00	3.00	3.00	3.50
45A	800/3	—	760	4	500	THW	2	1/0	Two	3.50	3.50	3.50	3.50	3.50	3.50	3.50
45B	800/3	—	820	4	600	THW	2	1/0	Two	4.00	4.00	4.00	4.00	4.00	4.00	4.00
46	1000/3	—	1005	4	400	THW	3	2/0	Three	3.50	3.50	3.50	3.50	3.50	3.50	3.50
47	1200/3	—	1240	4	350	THW	4	3/0	Four	3.50	3.50	3.50	3.50	3.50	3.50	4.00
48	1600/3	—	1675	4	400	THW	5	4/0	Five	4.00	4.00	4.00	4.00	4.00	4.00	4.00

Notes:

Conductors are rated at 600 volt or below and are to be copper.

NEC Table 310.15(B)(16) is used for the basis of the conductor ampacities, which is not more than three current carrying conductors in a raceway at an ambient temperature of 30 deg C with 60 deg C rated conductors and connectors per 110.14-C-1 for up to 100 amp rated and up to #1 AWG conductors for equipment terminations and 75 deg C rated conductors and termination connectors for larger than 100 amp or above #1 AWG conductors.

NEC Tables 4, 5, and Appendix C is used for the basis of the conduit sizes. Table C1 for EMT, Table C4 for IMC, Table C8 for Rigid, and Table C10 for PVC (Sch 40).

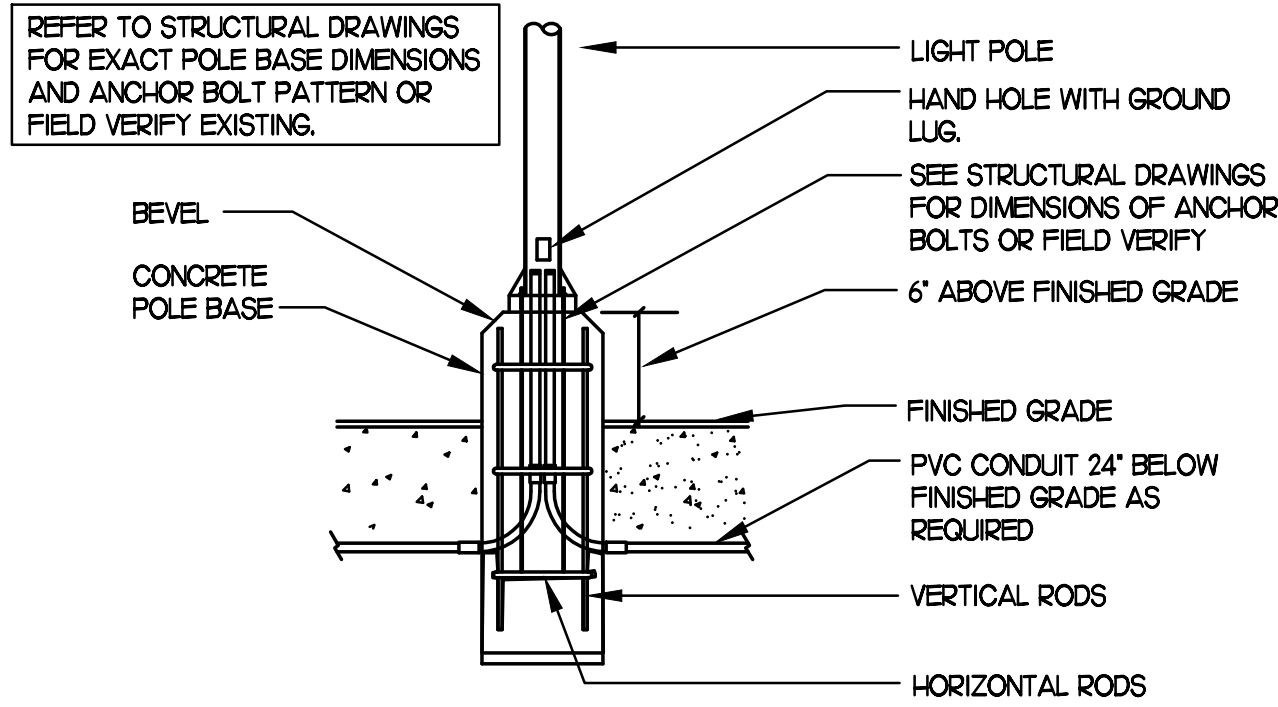
All Branch Feeders and Branch Circuits shall include a green Equipment Grounding Conductor.

Omit Grounding conductor on Service Entrance Feeders.

Omit Neutral conductor on all Delta primary transformer feeders or 3 phase loads not requiring a neutral.

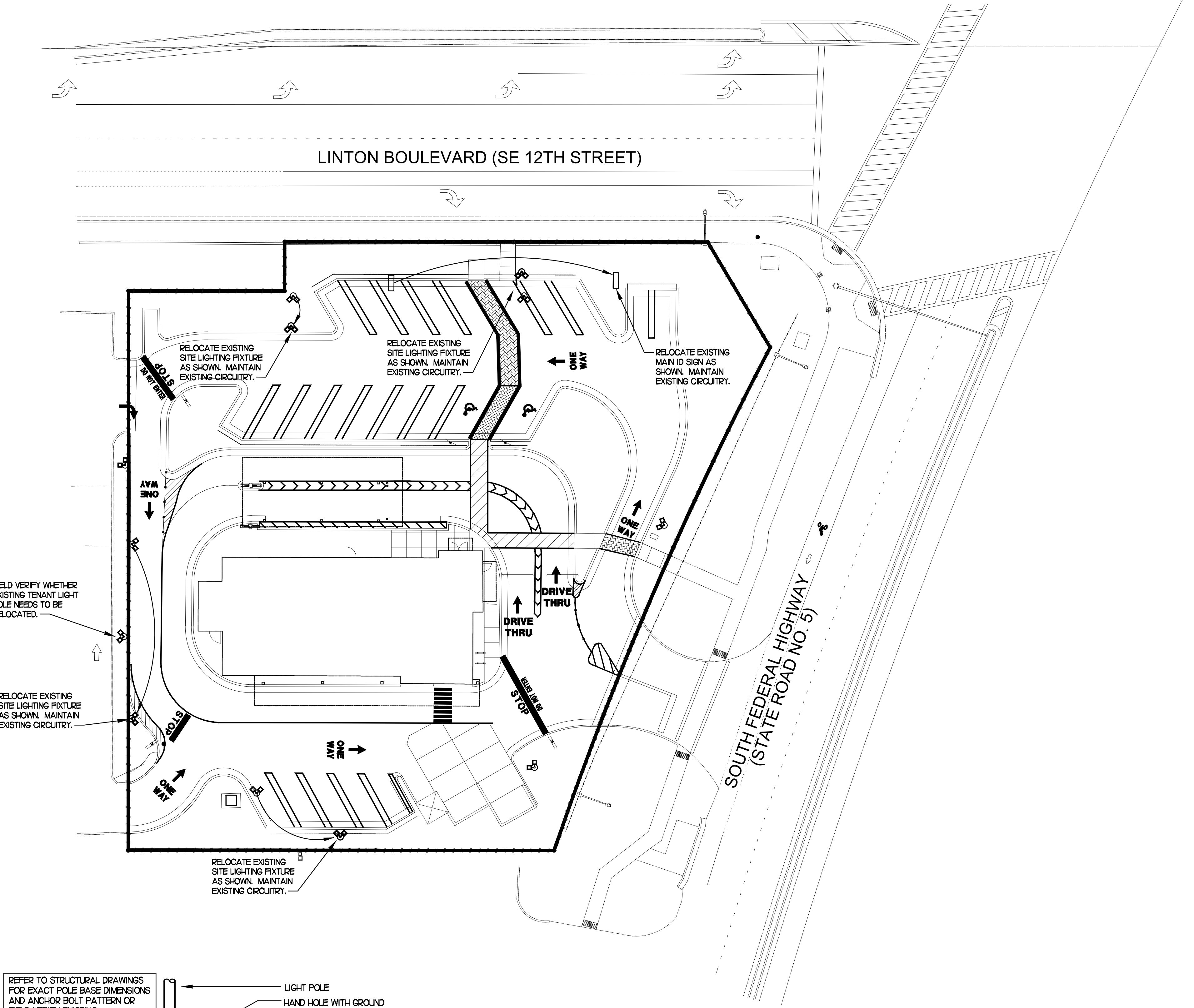
The above conductors are not calculated for Voltage Drop. Any circuits that exceed 100 feet shall be calculated by the Installer to have less than a three percent voltage drop on feeders and five percent on branch circuits per the NEC.

NOTE: EXISTING LIGHTING POLES AND FIXTURES TO REMAIN IN EXISTING LOCATIONS UNLESS OTHERWISE SPECIFIED. FIELD VERIFY ALL EXISTING UNDERGROUND UTILITY LOCATIONS PRIOR TO ANY EXCAVATION WORK. RELOCATE/ADJUST POLE-MOUNTED AND BUILDING-MOUNTED SECURITY CAMERAS AS REQUIRED.



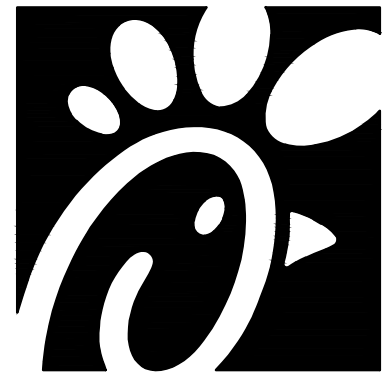
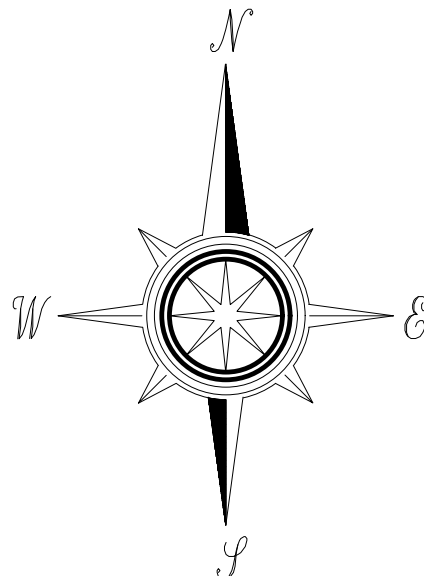
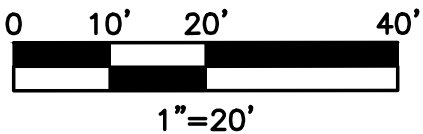
TYPICAL POLE BASE DETAIL

NOT TO SCALE - FIELD VERIFY EXISTING POLE BASE BEFORE CONSTRUCTION



ELECTRICAL SITE PLAN

SCALE: 1" = 20'-0"



5200 Buffington Road  
Atlanta, Georgia  
30349-2998



SEAL: MARK T. KURZYSKE  
FLORIDA LICENSE # 53568



3-15-22

**CHICK-FIL-A**  
**DELRAY**  
**1800 S. FEDERAL HIGHWAY**  
**DELRAY BEACH, FL 33830**  
**FSU# 3146**

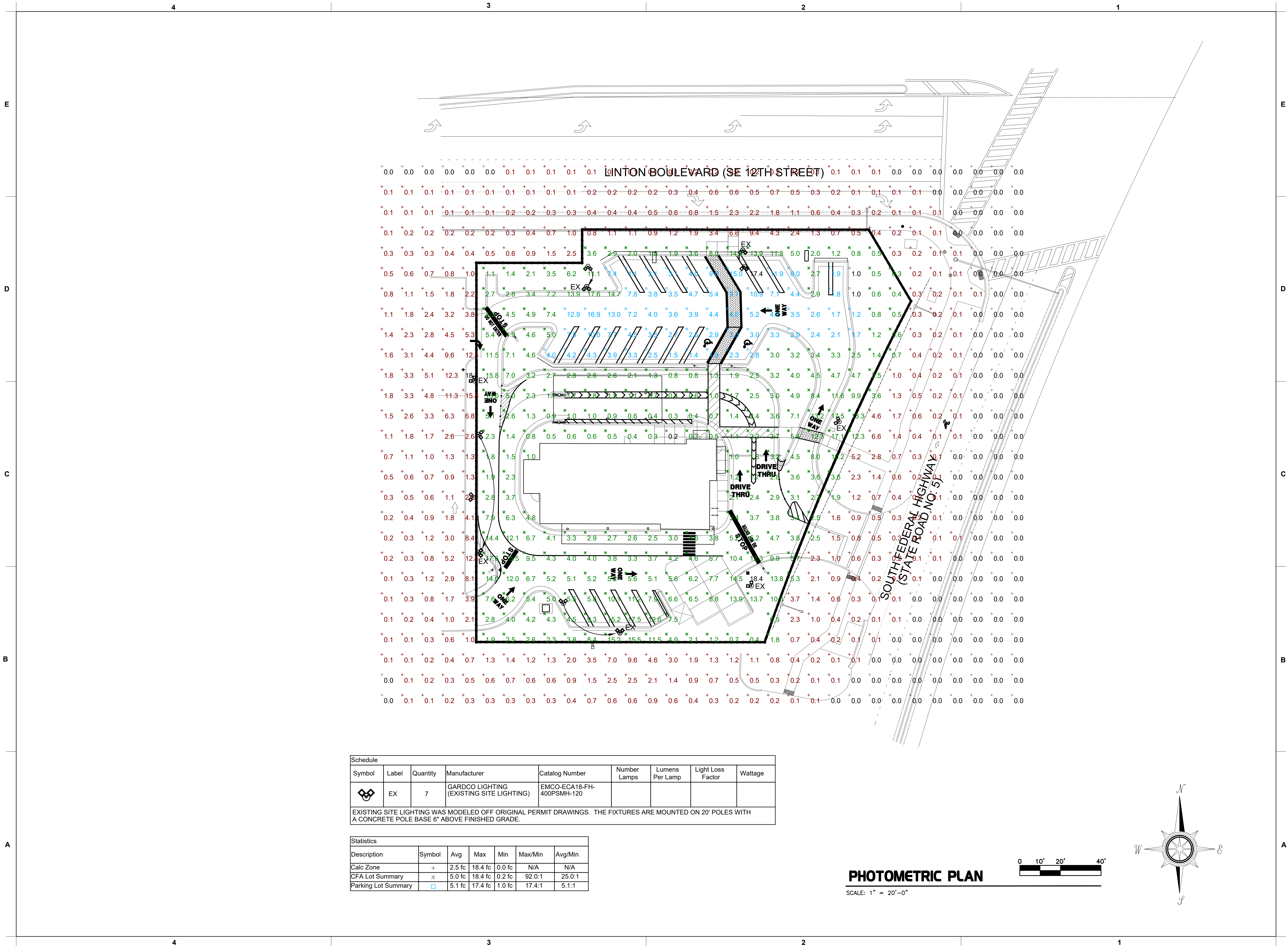
REVISION SCHEDULE		
NO.	DATE	DESCRIPTION

CONSULTANT PROJECT #	RO.21039
PRINTED FOR	Permit
DATE	10/27/2021
DRAWN BY	
SHEET	
ELECTRICAL SITE PLAN & DETAILS	
SHEET NUMBER	

Permit

E1.1



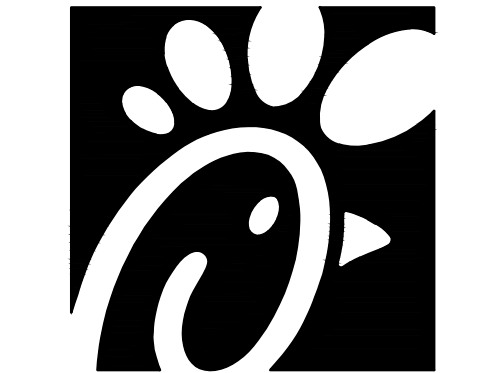
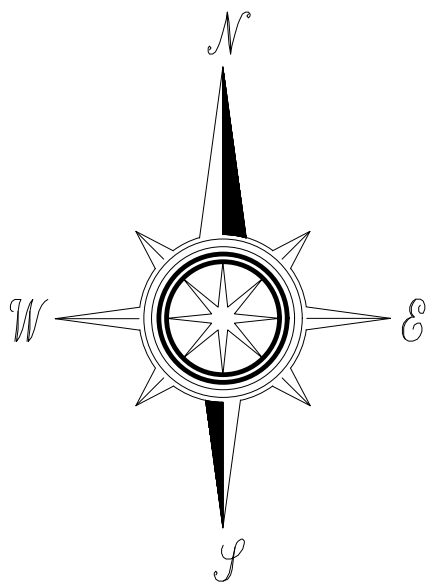
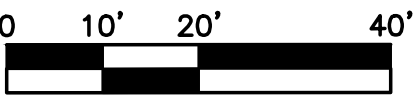


Schedule								
Symbol	Label	Quantity	Manufacturer	Catalog Number	Number Lamps	Lumens Per Lamp	Light Loss Factor	Wattage
	EX	7	GARDCO LIGHTING (EXISTING SITE LIGHTING)	EMCO-ECA18-FH-400PSMH-120				
EXISTING SITE LIGHTING WAS MODELED OFF ORIGINAL PERMIT DRAWINGS. THE FIXTURES ARE MOUNTED ON 20' POLES WITH A CONCRETE POLE BASE 6" ABOVE FINISHED GRADE.								

Statistics						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Calc Zone	+	2.5 fc	18.4 fc	0.0 fc	N/A	N/A
CFA Lot Summary	x	5.0 fc	18.4 fc	0.2 fc	92.0:1	25.0:1
Parking Lot Summary	□	5.1 fc	17.4 fc	1.0 fc	17.4:1	5.1:1

PHOTOMETRIC PLAN

SCALE: 1" = 20'-0"



5200 Buffington Road  
Atlanta, Georgia  
30349-2998

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2705 Lebanon Pike, Ste 1  
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SEAL: MARK T. KURZYSKE  
FLORIDA LICENSE # 53568



3-15-22

**CHICK-FIL-A**  
**DELRAY**  
1800 S. FEDERAL HIGHWAY  
DELRAY BEACH, FL 33830  
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REVISION SCHEDULE		
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CONSULTANT PROJECT #	RO.21039
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DRAWN BY	
SHEET	PHOTOMETRIC PLAN
SHEET NUMBER	

Permit

E1.2



	4		3		2		1		
	<div>SECTION C16100 ELECTRICAL GENERAL PROVISIONS</div> <div>PART 1- GENERAL</div> <div>1.01 WORK INCLUDED<div>A. Provide all materials, labor and equipment required to furnish and install a complete electrical system as indicated on drawings and as specified herein.</div></div> <div>1.02 REGULATORY REQUIREMENTS<div>A. Equipment furnished shall be UL listed where such label is available. Installation shall conform to UL standards where applicable.</div><div>B. Electrical work shall be installed in accordance with drawings and specifications, NEC and NFPA codes in effect at project location, state and local electrical and building codes and special codes having jurisdiction over specific portions within complete installation.</div><div>C. Obtain permits and certificates of approval from all authorities having jurisdiction over the installation and pay all fees required.</div></div> <div>1.03 SUBMITTALS<div>A. Submit list of materials and equipment prior to manufacture, order or installation and within twenty days after award of contract for approval. Include each item of material and equipment whether or not shop drawings are also required. List shall include name of manufacturer, catalog number and other complete identification as well as dimensions and detailed data. Submittals shall included for the following:<div>1. Lighting Fixtures</div><div>2. Panelboards/Breakers</div><div>3. Wiring Devices and Device Plates</div><div>4. Enclosed Switches</div></div></div> <div>B. Certified shop drawings and submittals shall bear stamp of approval of contractor as evidence that drawings have been checked. Drawings submitted without this stamp of approval will not be considered and will be returned for proper resubmission.</div> <div>C. If submittals show variances or substitutions from requirements of contract, contractor shall make specific mention of such variation in his letter of transmittal in order that, if acceptable, suitable action may be taken for proper adjustment. Otherwise contractor shall not be relieved of responsibility for executing work in accordance with contract even though such submittals have been approved.</div>		<div>that adjustments and apparatus setting of circuit breakers, fuses, control equipment and apparatus have been made. Correct defects discovered during tests.</div> <div>3.03 REMOVAL OF DEBRIS<div>A. Remove surplus materials and debris caused by, or incidental to, electrical work. Remove such debris at frequent intervals. Keep job clean during construction.</div></div> <div>3.04 IDENTIFICATION OF EQUIPMENT<div>A. Identify electrical distribution equipment, disconnects, and contactors with black laminated plastic name-plates, attached with two screws, engraved with 1/4" high, white letters.</div></div> <div>3.05 TEMPORARY LIGHTING AND POWER IN AREAS OF CONSTRUCTION<div>A. Provide, maintain and remove after construction is completed, temporary lighting adequate for workman safety and temporary power for all trades including any 3 phase power required.</div><div>B. Provide and maintain barricade lighting where required to adequately protect owner against liability for damage to public or personnel. All lamps used in barricade shall be 60 watt red, installed in weatherproof socket with wire guard. All wiring shall be approved for weatherproof installation.</div></div> <div>3.06 GUARANTEE-WARRANTY<div>A. Guarantee work to be free from defects of materials and workmanship for a period of one year from date of final acceptance of building. Repair and replace defective work and other work damaged thereby which becomes defective during term of guarantee-warranty. Furnish owner with three written copies of guarantee-warranty.</div></div> <div>SECTION C16120 RACEWAYS AND CONDUIT SYSTEMS</div> <div>PART 1 - PRODUCTS</div> <div>1.01 ACCEPTABLE MANUFACTURERS<div>A. Rigid IMC, and EMT conduit shall be hot-dipped, galvanized, or electro-galvanized steel by Allied, Republic, Triangle, Wheatland, or approved equal.</div><div>B. PVC conduit shall be Carlon, schedule 40, 90 degrees C. rated, unless otherwise noted.</div><div>C. MC cable shall be manufactured by AFC Cable Systems or approved equal. Type "AC-90" is not allowed. All MC Cables shall have a green equipment ground conductor and an additional isolated ground (green + yellow stripe) conductor for isolated ground circuits (POS System). Fittings used for connecting MC cable to boxes, cabinets, or other equipment shall be listed and identified for such use.</div><div>D. Associated couplings, connectors and fittings shall be steel as manufactured by Raco or equivalent. Catalog numbers used below are those of Raco.</div><div>E. Erickson Couplings, Series 1502, shall be used where neither length of conduit can be rotated.</div><div>F. Insulated bushings shall be series 1402.</div><div>G. EMT box connectors shall be compression or set-screw fittings.</div><div>H. Conduit, connectors, couplings and fittings shall be UL listed and labeled.</div></div> <div>1.02 ELECTRICAL METALLIC TUBING (EMT)<div>A. Use Electrical Metallic Tubing (EMT) where drawings call for conduit to be:<div>1. Concealed in walls.</div><div>2. Installed above suspended ceilings.</div><div>3. Installed exposed, above 6 feet.</div></div></div> <div>1.03 INTERMEDIATE METAL CONDUIT (IMC)<div>A. Use Intermediate Metal Conduit (IMC) where drawings call for conduit to be:<div>1. Installed for panelboard feeders.</div><div>2. Installed in wet locations (interior and exterior).</div><div>3. Installed exposed below 6 feet.</div></div></div> <div>1.04 POLYVINYL CHLORIDE (PVC) RACEWAY<div>A. Use PVC raceway for:<div>1. Underground service entrance conduits for telephone and power.</div><div>2. Exterior branch circuits installed underground.</div><div>3. Interior branch circuit conduits installed in or under concrete slab on ground floor.</div></div></div> <div>1.05 RIGID STEEL CONDUIT (RSC)<div>A. Use Rigid Steel Conduit for:<div>1. Install underground for power Service Entrance elbows penetrating floor slab.</div><div>2. Exposed to physical damage.</div></div></div> <div>1.06 FLEXIBLE METAL CONDUIT<div>A. Provide flexible metal conduit for termination at equipment subject to motion and vibration.</div><div>B. Length shall not exceed 6 feet in accessible ceiling areas.</div><div>C. Shall not be concealed in walls.</div><div>D. Where exposed to continuous or intermittent moisture, conduit shall be UL Type EF liquidtight or type as indicated.</div><div>E. For connection to ceiling mounted lighting fixtures from outlet boxes.</div></div> <div>1.07 MC (METAL-CLAD) CABLE<div>A. MC Cable shall be UL listed per standard 1569, color coded copper conductors (type THHN), the sheathing shall be constructed of interlocked</div></div>		<div>galvanized steel, and shall conform to the requirements of Article 330 of the National Electrical Code.</div> <div>B. MC Cable with an isolated grounding conductor shall be used, concealed above ceiling and in walls, for the connection of the Point Of Sales (POS) system equipment from the isolated ground receptacles to the panelboard serving the POS loads when allowed by local codes and Article 330 of the National Electrical Code.</div> <div>C. MC Cable may be used when allowed by local codes and Article 330 of the National Electrical Code for branch circuits (except the main homerun to the panelboard which shall be conduit with conductors) for the following:<div>1. Lighting</div><div>2. Dining area receptacles</div><div>3. Fly Lights</div><div>4. Building mounted signage</div><div>5. Office area receptacles</div></div> <div>D. MC Cable <u>shall not</u> be used for branch circuits serving Kitchen Equipment Items and similar circuits in the Kitchen, the Drive-Thru area, and the Serving area's back counter.</div> <div>PART 2 - EXECUTION</div> <div>2.01 INSTALLATION<div>A. Minimum size of conduits shall be 1/2 inch.</div><div>B. Run concealed conduits in direct line with long sweep bends or offsets. Run exposed conduits parallel to and at right angles to building lines. Group multiple conduit runs in banks.</div><div>C. Cap ends of conduits to prevent entrance of water and other foreign material during construction.</div><div>D. Provide No. 12 AWG copper pull wires or nylon cord in all empty conduits. Steel wire not acceptable as pull wire.</div><div>E. Where IMC enters a cabinet, junction box, or pull box conductors shall be protected by an insulated bushing. Locknuts shall be installed on conduit outside and inside enclosure.</div><div>F. In areas where enclosed and gasketed fixtures and weatherproof devices are specified, where Rigid Conduit enters a sheet metal enclosure, junction box and outlet box, and not terminated in a threaded hub, a steel, or malleable iron nylon insulated hub, complete with recessed sealing "O" ring or sealing locknut shall be used.</div><div>G. Provide seal-off fitting in all conduits entering a cold temperature area such as freezers and dry refrigerators.</div><div>H. In concrete slabs, block up conduit from forms and securely fasten in place. all conduits in slabs shall have a minimum of 4" inches concrete coverage above.</div><div>I. Failure to route conduit through building without interfering with other equipment, and construction shall not constitute a reason for an extra charge. Equipment, conduit, and fixtures shall fit into available spaces in building and shall not be introduced into building at such times and manner as to cause damage to structure or equipment. Equipment requiring servicing shall be readily accessible.</div></div> <div>2.02 EMT (ELECTRICAL METALLIC TUBING) RACEWAY<div>A. Do not use Electrical Metallic Tubing in cinder concrete or cinder fill or where conduit system is in contact with dissimilar metals or in wet locations.</div></div> <div>2.03 PVC RACEWAY<div>A. Use threaded fittings for all connectors and adapters.</div><div>E. Provide 1/4-inch nylon pull rope in all primary power and incoming telephone service entrance conduits.</div><div>F. PVC conduit shall convert to galvanized rigid metal per detail on drawings.</div></div> <div>2.04 FLEXIBLE METAL CONDUIT<div>A. Where fittings for liquid tight flexible conduit are brought into an enclosure with a knock-out, a gasket assembly, consisting of one piece "O" ring, with Buna-N sealing material, series 3400, shall be installed on outside of box. Fittings shall be made of either steel or malleable iron only, and shall have insulated throats or insulated bushings.</div><div>B. In dry locations, where final connections to motors and other equipment may be made with Flexible Metal Conduit, fittings shall be of steel or malleable iron only with insulated throats or insulated bushings, and shall be of wedge and screw type having an angular wedge fitting between convolutions of conduit.</div></div> <div>2.05 MC CABLE<div>A. MC Cable may be used for branch circuits as noted in Part 1 above and where the local code allows use of MC Cable. The installation shall conform to Article 330 of the National Electrical Code and shall be concealed in walls and above ceilings. (Exposed MC Cable will not be acceptable.)</div><div>B. MC Cables shall be secured and supported by the building structure per the National Electrical Code and any local code requirements. MC Cable shall not lay on ceilings.</div></div> <div>SECTION C16121 CONDUCTORS</div> <div>PART 1 - PRODUCTS</div> <div>1.01 CONDUCTORS<div>A. Provide 98% conductivity copper conductors with 600-volt insulation. For conductors No. 12 AWG and No. 10 AWG, provide solid type. For all conductors No. 8 AWG and larger, provide stranded type. All conductors shall have THHN/THWN insulation unless noted otherwise.</div></div>		<div>B. Conductors shall be manufactured by Triangle, American, Rome, Southwire or approved equal.</div> <div>C. Provide No. 14 AWG type THHN fixture conductors, for conductors entering lighting fixtures.</div> <div>D. Branch circuit conductors shall be minimum #12 AWG, copper.</div> <div>PART 2 - EXECUTION</div> <div>2.01 INSTALLATION<div>A. Install pull boxes in circuits or feeders over 100 feet long.</div><div>B. Make all splices or connections only at outlet, pull or junction boxes.</div><div>C. All conductors and connections shall test free of grounds, shorts, and opens prior to energizing circuit.</div><div>D. Provide No. 10 wire in lieu of No. 12 wire for any branch circuit in excess of 100 feet linear length to prevent excessive voltage drop.</div><div>E. Use Ideal wing nuts, Scotchlok Type Y, R, G, or B, or approved equivalent connectors for fixture connections at outlet boxes.</div><div>F. Make feeder taps and joints with OZ Type T, PT, PM or PTS, or approved equivalent clamp connectors as manufactured by Kupler, or with approved compression sleeves. Wrap connectors with No. 10 Electro-Seal or approved equivalent plastic filler and vinyl tape.</div><div>G. Leave a minimum of 8" slack wire in every outlet box.</div><div>H. Provide color coded wire and with a different color for each phase and neutral and ground as follows: Phase A, B, C: Black, Red and Blue respectively; Neutral: White; Isolated Ground: Green with Yellow Stripes. Approved color tape is acceptable for feeders using larger than #6 conductors.</div><div>I. All conductors shall be continuous from origin to panel or equipment termination without splices where possible. Where splices and taps are necessary or are required, they shall be made in splice boxes with suitable connectors.</div><div>J. Tighten all electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL486A and UL486B.</div></div> <div>SECTION C16122 OUTLET AND JUNCTION BOXES</div> <div>PART 1 - GENERAL</div> <div>1.01 PROJECT CONDITIONS<div>A. Verify field measurements are as shown on drawings.</div><div>B. Verify locations of floor boxes and outlets in work areas prior to rough-in.</div></div> <div>PART 2 - PRODUCTS</div> <div>2.01 OUTLET BOXES<div>A. Sheet metal outlet boxes: galvanized steel.</div><div>B. Cast boxes: type FS, cast fer alloy. Provide gasketed cover by box manufacturer.</div><div>C. Manufacturers: National, Appleton, General Electric, RACO, OR Steel City.</div><div>D. Provide boxes for fixtures with fixture studs in center.</div><div>E. Outlet boxes for lighting, switches and receptacles in interior areas with exposed conduit shall be pressed steel and in exterior areas with exposed conduit shall be cast metal with threaded hubs, "FS" type. Use galvanized steel for concealed boxes. Boxes shall be 1-1/2" deep minimum.</div></div> <div>2.02 PULL AND JUNCTION BOXES<div>A. Sheet metal boxes: galvanized steel.</div><div>B. Surface-mounted cast metal box: type 4; flat-flanged, surface-mounted junction box.<div>1. Material: galvanized cast iron.</div><div>2. Cover: furnish with ground flange, neoprene gasket, and stainless steel cover screws.</div></div><div>C. In-ground cast metal box: inside flanged, recessed cover box for flush mounting.<div>1. Material: galvanized cast iron.</div><div>2. Cover: nonskid cover with neoprene gasket and stainless steel cover screws.</div><div>3. Cover legend: electric.</div></div><div>D. Manufacturers: National, Appleton, General Electric, RACO, Oz-Gedney or Steel City.</div></div> <div>PART 3 - EXECUTION</div> <div>3.01 INSTALLATION<div>A. Install electrical boxes as shown on drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.</div><div>B. Install pull boxes and junction boxes above accessible ceilings.</div><div>C. Inaccessible ceiling areas: Install outlet and junction boxes no more than 6</div></div>		<div>inches from ceiling access panel or from removable recessed light fixture.</div> <div>D. Use flush mounting outlet boxes in finished areas.</div> <div>E. Use stamped steel bridges to fasten flush mounting outlet box between studs.</div> <div>F. Install flush mounted box without damaging wall insulation or reducing its effectiveness.</div> <div>G. Use adjustable steel channel fasteners for hung ceiling outlet box.</div> <div>H. Do not fasten boxes to ceiling support wires.</div> <div>I. Support boxes independently of conduit, except cast box that is connected to two Rigid Metal Conduits both supported within 12 inches of box.</div> <div>J. Use gang box where more than one device is mounted together. Do not use sectional box.</div> <div>K. Use gang box with plaster ring for single device outlets.</div> <div>L. Use cast outlet box in exterior locations and wet locations.</div> <div>3.02 OUTLET BOXES<div>A. Select boxes according to intended use and type of outlet. Ceiling outlet boxes shall be 4" octagon and 1-1/2" deep. Use 2-1/8" deep octagon boxes or 4" square boxes required. All ceiling outlet boxes shall have a fixture stud of no bolt self-locking type installed if required to hang the fixture specified at the outlet.</div></div> <div>3.03 JUNCTION BOXES<div>A. Junction boxes shall be sized according to number of conductors in box or type of service to be provided. Minimum junction box size 4-11/16" square and 2-1/8" deep. Provide screw covers for junction boxes.</div><div>B. Use code gauge steel with screw covers for pull boxes with prime coat and provide with screw cover. Size pull boxes according to the NEC.</div><div>C. Provide pull box every 100 feet of conduit run or where excessive number of bends necessitates a box for ease of wire installation.</div></div> <div>SECTION C16123 GROUNDING AND BONDING</div> <div>PART 1 - PRODUCTS</div> <div>1.01 ROD ELECTRODES<div>A. Material: copper-clad steel.</div><div>B. Diameter: 3/4 inch.</div><div>C. Length: 10 feet.</div></div> <div>1.02 MECHANICAL CONNECTORS<div>A. Material: bronze.</div></div> <div>1.03 GROUNDING CONDUCTOR (WIRE)<div>A. Material: stranded copper, sized to meet NFPA 70, Article 250 requirements.</div></div> <div>PART 2 - EXECUTION</div> <div>2.01 INSTALLATION<div>A. Install rod electrodes at locations indicated. Install additional rod electrodes as required to achieve resistance to ground of less than 25 ohms.</div><div>B. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing.</div><div>C. Provide bonding to meet regulatory requirements.</div><div>D. Bond together each metallic raceway, pipe, duct and other metal objects.</div><div>E. Provide isolated grounding conductor for circuits supplying all isolated ground outlets. Insulation shall be green with yellow stripe. Size per NEC Table 250.66. This isolated grounding conductor shall run in addition to equipment grounding conductor and along with the branch circuit conductors.</div></div> <div>2.02 GROUNDING<div>A. Ground electrical system in accordance with NEC Article 250 and local authorities having jurisdiction.</div><div>B. Install a #3/0 bare copper wire bond across the water meter attached to ground clamps on water line on each side of meter. Arrangements shall be made to do this work at the time the water meter is installed.</div><div>C. From the point of entrance of the water main into the building and on the meter side of the main inside water valve and union install a stranded copper cable #3/0 in 1-1/4" conduit to the main distribution panel. Connect the cable to the equipment ground bus.</div><div>D. Install a green equipment grounding conductor in each raceway, sized per NEC Table 250-122. Terminate on equipment ground bus within panelboard serving load.</div></div> <div>E. Install #6 awg copper grounding conductor from ground bar in main telephone box to grounded neutral bus in main distribution panel.</div> <div>F. All separate grounding electrode conductors shall be bonded together to limit potential differences between them and between their associated wiring systems. This includes the power system, telephone system, etc.</div> <div>2.03 FIELD QUALITY CONTROL<div>A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.</div></div>
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1.04 SITE VISIT

A. Visit job site prior to bid date to determine actual conditions under which work shall be done, to familiarize oneself with project and to verify total scope of work required. Failure to do so shall not constitute a reason for an extra charge.

SECTION C16101  
BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 COORDINATION

A. Obtain and review shop drawings, product data, and manufacturer's instructions for equipment furnished under other sections to determine connection locations and requirements.

B. Sequence rough-in of electrical connections to coordinate with installation and start-up of equipment furnished under other sections.

PART 2 - PRODUCTS

2.01 SUBSTITUTIONS

A. Where specifications list one or more manufacturers and do not include "or approved equal", furnish materials made by one of manufacturers listed. Where "or approved equal" is included, contractor may substitute equal products by another manufacturer subject to approval by engineer and owner.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Make electrical connections to utilization equipment in accordance with equipment manufacturer's instructions.

B. Drawings are diagramatic and shall not be scaled for exact sizes or locations, they are not intended to disclose absolute or unconditional knowledge of actual field conditions.

C. Protect work and materials from damage by weather, entrance of water and dirt. cap conduit during installation. Avoid damage to materials and equipment in place.

D. Satisfactorily repair or remove and replace damaged work with new materials. Deliver equipment and materials to job site in original, unopened, labeled containers. Store ferrous materials to prevent rusting. Store finished materials and equipment to prevent staining and discoloring.

E. Trenches shall be excavated 6" below elevation of bottom of conduit.

F. Failure to route conduit through building without interfering with other equipment and construction shall not constitute a reason for an extra charge. Equipment, conduit and fixtures shall fit into available spaces in building and shall not be introduced into building at such times and manner as to cause damage to structure. Equipment requiring service shall be readily accessible.

3.02 TESTING AND EQUIPMENT SERVICING

A. Make test to ensure that entire system is in proper operating condition, and

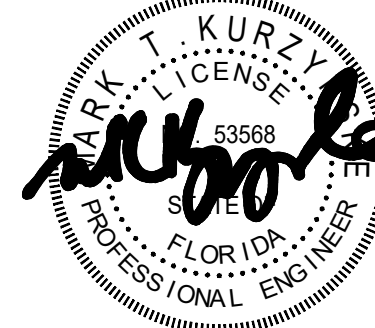


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3-15-22

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**FSU# 3146**

**REVISION SCHEDULE**  
**NO. DATE DESCRIPTION**

CONSULTANT PROJECT # RO.21039  
PRINTED FOR Permit  
DATE 10/27/2021  
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SPECIFICATIONS  
SHEET NUMBER

**E2.1**

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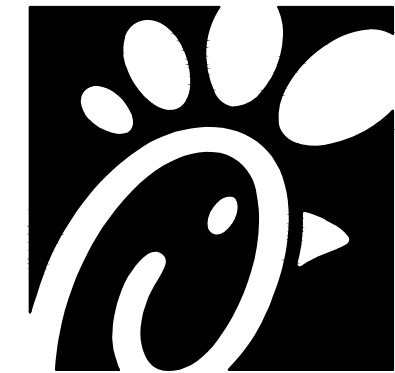
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<div>SECTION C16124 SUPPORTING DEVICES AND HANGERS</div> <div>PART 1 - PRODUCTS</div> <div>1.01 ACCEPTABLE MANUFACTURERS</div> <div>A. Supporting devices and hangers shall be manufactured by RACO Fasteners, or approved equivalent.</div> <div>PART 2 - EXECUTION</div> <div>2.01 INSTALLATION</div> <div>A. Secure conduits to within 3' of each outlet box, junction box, cabinet, fitting, etc., and at intervals not to exceed ten feet (10') and in accordance with the National Electric Code. In seismic zones, support conduits 1" and under at 6' intervals.</div> <div>B. Install clamps secured to structure for feeder and other conduits routed against the structure. Use drop rods and hangers or racks to support conduits run apart from the structure.</div> <div>C. Provide and install suitable angle iron, channel iron or steel metal framing with accessories to support or brace electrical equipment including safety switches, fixtures, panelboards, etc.</div> <div>D. Use of chains, perforated iron, baling wire, or tie wire for supporting conduit runs is not permitted.</div> <div>E. For support of low voltage wiring not required to be in conduit, bundle cables together in a neat manner using approved nylon tie wraps. Bundled cables shall be supported with "J" hooks on telephone type bridge rings, a minimum of 6 feet on centers. Clearly identify all differing types of cables being run and tag with tape tags regarding telephone, POS System, music/communication, security, etc. for various system utilizing said cable. Identification tape shall be provided at minimum intervals of 25 feet on center and within each building space.</div> <div>F. Provide a system of supporting devices and hangers to insure secure support or bracing for conduit, electrical equipment, including safety switches, fixtures, panelboards, outlet boxes, junction boxes, cabinets, etc.</div> <div>SECTION C16140 WIRING DEVICES AND PLATES</div> <div>PART 1 - PRODUCTS</div> <div>1.01 WALL SWITCHES</div> <div>a. Shall be purchased from the <u>National Accounts Vendor</u> indicated on the plans.</div> <div>B. Ratings: 20 amps, 120/277 volts a.c. or as identified on drawings.</div> <div>C. Devices: (Cooper/Arrow Hart catalog numbers are listed unless noted otherwise): 1.Single pole toggle switches: 20 AMP device - #AH1221-GY (Kitchen) or #AH1221-B (Dining) 20 AMP Pilot lights illuminated with load on - #AH1221-PL 2.Double pole toggle switches: 20 AMP device - #AH1222-GY (Kitchen) or #AH1222-B (Dining)</div> <div>1.02 RECEPTACLES</div> <div>A. Shall be purchased from the <u>National Accounts Vendor</u> indicated on the plans.</div> <div>B. Devices: (Cooper/Arrow Hart catalog numbers are listed unless otherwise noted): 1. Specification grade devices (grey device color in Kitchen, brown device color in Dining, and orange for IG type) to be 20 amp, 125 volts, a.c. receptacles: Single (simplex) device: #1877-GY (Kitchen) or #1877-B (Dining) Duplex device: #CR20-GY (Kitchen) or #CR20-B (Dining) Tamper Resistant duplex: #TRCR20-B (Vestibules &amp; Play Area) Tamper Resistant USB Charger duplex: #TR7756-B (Dining) GF (ground-fault circuit interrupter) duplex device: #VGF20-GY (Kitchen) or #VGF20-B (Dining) IG (isolated ground) duplex device: #IG5362-RN (orange face)</div> <div>1.03 SPECIAL DEVICES</div> <div>A. Manual motor starter switch: SQ, D Class 2510, Type F, for use on motors up to 3/4 horsepower. Provide NEMA 1 enclosure in dry locations; provide NEMA 3R enclosure in wet or exterior locations.</div> <div>1.04 WALL PLATES</div> <div>A. Provide Cooper/Arrow Hart, or approved equal, smooth satin stainless steel 302-SS series for switches and receptacles in the Kitchen areas. All other areas shall be brown Nylon plastic.</div> <div>B. Provide blank plates on all outlet boxes for future outlets, or outlets without devices. Plate style shall match device plates.</div> <div>C. Provide non-metallic weatherproof covers for duplex GF receptacles located outside or in wet locations that feature 'while-in-use' cover equivalent to Arrow Hart #WIU-1.</div> <div>D. Where devices installed in exposed boxes or conduit fittings; provide properly designed plates and covers equal to Arrow Hart RS-Series exposed work covers.</div> <div>E. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted boxes.</div> <div>PART 2 - EXECUTION</div> <div>2.01 INSTALLATION</div>	<div>A. Mounting</div> <div>1. Mount switches and receptacles at height above finished floor as indicated on plans, and legend.</div> <div>2. Mount switches on strike side of door maximum 8" from door frame. Outlet box for switch shall be located clear of door frame. Coordinate with architectural plans prior to rough-in.</div> <div>3. Install switches with off position down.</div> <div>4. Do not use the feed thru feature for the GF Type receptacle, unless required by the plans.</div> <div>5. Use jumbo sized plates for outlets installed in masonry walls.</div> <div>6. Each receptacle shall be provided with a #12 green grounding jumper between the ground terminal of the receptacle and the outlet box.</div> <div>7. The grounding conductor to each receptacle shall be installed such that the removal of the device will not interfere with the continuity of the ground.</div> <div>B. Testing</div> <div>1. Test each switch and verify proper operation with energized circuit.</div> <div>2. Test each receptacle for proper polarity on energized circuit.</div> <div>3. Test each GF receptacle with a GF receptacle tester and verify circuit is opened by GF device at milli-ampere ranges established by the manufacturer.</div> <div>SECTION C16440 PANELBOARDS</div> <div>PART 1 - PRODUCTS</div> <div>1.01 MANUFACTURER (via Chick-fil-A National Accounts Program)</div> <div>A. Siemens (West, Midwest, and Southwest Regions): from Suncoast Environmental Controls (SEC), Scott Dyer (877) 544-6679.</div> <div>B. Square-D (Northeast, Atlantic, and Southeast Regions): from Accu-Serv, Bob Harpring (502)961-0096.</div> <div>1.02 PANELBOARD FEATURES</div> <div>A. Panelboards shall have a minimum symmetrical interrupting rating to meet or exceed the available symmetrical interrupting fault current at the device intended to interrupt current.</div> <div>B. Bus bars shall be copper or tin plated aluminum.</div> <div>C. Provide factory-installed copper ground bus in each panelboard with lugs or connectors on bar.</div> <div>D. Provide electrically isolated, factory installed, neutral bus in each 3 phase, 4 wire or 1 phase 3 wire panelboard.</div> <div>E. In addition to the ground bus required by paragraph 1.02D (above), provide factory installed, electrically isolated, copper ground bus in each panelboard serving isolated ground receptacles.</div> <div>F. Main lugs and main circuit breaker lugs shall be UL Listed for use with both aluminum and copper conductors.</div> <div>G. Provide panelboard doors with chrome-plated locks and catches. All locks shall be keyed alike. Provide two keys for each lock.</div> <div>H. Provide thermal-magnetic circuit breakers which are rated for 40 degrees C ambient temperature. Breakers shall be quick-make, quick-break type trip with trip indication shown by handle position other than on or off. Multi-pole breakers shall have a common trip handle. Tandem type circuit breakers <u>shall not</u> be permitted.</div> <div>I. Provide typed directory card with clear holder for each panelboard.</div> <div>PART 2 - EXECUTION</div> <div>2.01 INSTALLATION</div> <div>A. Panelboards shall be mounted at height above finished floor such that the height of the top-most breaker in the panel is not more than 6-1/2 feet above finished floor in its highest position per the NEC.</div> <div>B. Where multiple panelboards are installed on walls in common areas of buildings, the panelboards shall be installed with the top of all panelboards at the same height.</div> <div>C. Provide blank filler plates over all unused spaces in panelboards.</div> <div>D. A typed directory card shall indicate devices being served and the space name where the device is located.</div> <div>E. Provide minimum of one (1) 3/4" empty spare conduit for every 3 poles of spare breaker or space in the panelboard. Stub conduit to nearest accessible ceiling space. Label conduit as spare at panelboard and termination point.</div> <div>F. Non-isolated ground bars shall be grounded to panelboard can and main service entrance ground bus with a code sized grounding conductor installed in the same conduit as the phase and neutral conductors.</div> <div>G. Circuits using a common neutral shall be installed in accordance with the National Electrical Code.</div> <div>H. Inspect each panelboard for proper installation, physical damage, tightness and installation of overcurrent devices. Verify proper color coding of conductors. Correct or repair all items found in inspection.</div> <div>I. Neutral wires, ground wires, and isolated ground wires shall be connected to the appropriate panel bus bar. Do not mix bus wire connections.</div> <div>SECTION C16441 ENCLOSED SWITCHES</div> <div>PART 1 - PRODUCTS</div> <div>1.01 MANUFACTURERS</div>	<div>A. Square D.</div> <div>B. General Electric.</div> <div>C. Siemens</div> <div>1.02 ENCLOSED SWITCHES</div> <div>A. Nonfusible switch assemblies: NEMA KS 1, General Duty Type for 208 volt load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in on position. Handle lockable in off position. Provide equipment ground lug in each switch.</div> <div>B. Enclosures: NEMA KS 1</div> <div>1. Interior dry locations: Type 1</div> <div>2. Exterior locations: Type 3R.</div> <div>SECTION C16442 UTILITY SERVICE ENTRANCE AND DISTRIBUTION SYSTEM</div> <div>PART 1 - GENERAL</div> <div>1.01 SYSTEM DESCRIPTION</div> <div>A. The underground electrical system service characteristics shall be 208Y/120 volts, Three Phase, Four Wire service and shall extend from utility company transformer secondary.</div> <div>B. Metering of electrical usage shall be located as required by local electrical utility company. Coordinate requirements with local utility company.</div> <div>C. Distribution system originates at secondary of utility transformer and includes service entrance conduit and conductors, distribution equipment, lighting panelboards, utilization equipment, overcurrent devices, disconnecting means, controls, branch and feeder circuits, etc.</div> <div>PART 2 - PRODUCTS</div> <div>2.01 MATERIALS</div> <div>A. Furnish service entrance conduit, cable, and miscellaneous hardware as required by plans and specifications for electrical service entrance and system grounding at main electrical service.</div> <div>PART 3 - EXECUTION</div> <div>3.01 EXAMINATION AND PREPARATION</div> <div>A. Coordinate exact locations of electrical service utility transformer, metering equipment, service lateral, etc. prior to commencement of installation. Contact engineer with conflicts prior to bid.</div> <div>B. Ensure pad mounted transformer is not located within roadway or sidewalk.</div> <div>C. Coordinate with local electrical utility for all utility company requirements and provide for the following items and any others required by the utility: 1. Concrete pad for utility transformer with required dimensions and details. 2. Primary underground conduit, excavation, and backfill requirements. 3. Pay for all fees associated with establishment of electrical service. 4. Furnish list of loads to the electrical utility company serving the facility. 5. Verify that utility company clearances are provided on all sides of utility equipment.</div> <div>D. Ensure proper access to utility equipment is maintained.</div> <div>E. Provide pull rope, excavation in accordance with electrical utility company requirements, backfill and concrete envelope for primary in accordance with electrical utility company requirements. Turn conduits up riser pole as required, cap spare conduits 12 inches above grade with plumbers pipe cap.</div> <div>F. Provide secondary lugs on utility transformer and perform drilling and installation of lugs in accordance with utility requirements. Type of lugs shall be in accordance with electrical utility company requirements. Connect service conductor to transformer secondary lugs as directed by electrical utility.</div> <div>SECTION C16500 LIGHTING FIXTURES (LUMINAIRES)</div> <div>PART 1 - GENERAL</div> <div>1.01 ACCEPTABLE MANUFACTURERS AND VENDORS</div> <div>A. Lighting fixtures indicated on lighting fixture schedule are to be purchased from the <u>National Account Vendor</u> for the region of the project (verify region designation with Owner's Representative):  1. Accu-Serv Lighting - Atlantic region and Southeast region. Contact at Accu-Serv: Bob Harpring at 877-707-7378, fax - 502-961-0357, email - bharpring@accu-serv.com  2. Villa Lighting - Midwest region, Northeast region, Southwest region, and West region. Contact at Villa Lighting: Dave Christanell at 800-325-0963, fax- 314-531-8720, email - dave.christanell@villalighting.com</div> <div>B. Ballasts to be electronic ballast provided with lighting fixture by the manufacturer.</div> <div>C. Lamps to be Osram-Sylvania and will typically be provided with the luminaire by the lighting manufacturer.</div> <div>1.02 FIXTURE REQUIREMENTS</div> <div>A. Provide regulating, HPF ballasts in all HID lighting fixtures. HID lamp types shall be as indicated on the drawings.</div> <div>B. Recessed fluorescent lighting fixture ballasts shall be provided with integral thermal protection.</div> <div>SECTION C16596 SPECIAL SYSTEMS</div> <div>PART 1 - GENERAL</div> <div>1.01 WORK INCLUDED</div> <div>A. Furnish and install raceway system for music/communications security, CCTV, POS, and other owner-furnished systems, consisting of empty conduits, junction boxes, outlet boxes, and device plates, etc., as specified and shown on owner selected vendor wiring schematics. Cable, equipment, and installation of the interior system will be provided by the owner's system vendor.</div> <div>B. Interior system equipment will be furnished by Owner's Vendor.</div> <div>C. Install special backboxes furnished by Owner's Vendor. Coordinate with the Vendor for the installation. Coordinate with the Vendor if backboxes are to be contractor provided in order to provide and install the appropriate item for the Vendor.</div> <div>PART 2 - PRODUCTS</div> <div>2.01 MATERIALS</div> <div>A. Provide 4-11/16" square boxes, with plaster rings. Provide device plates for system outlets as specified in Section 16141. Provide separate conduit to nearest accessible ceiling space from each outlet.</div> <div>B. Cable shall be in conduit where installed in walls or inaccessible ceilings.</div> <div>C. Minimum conduit size shall be 3/4".</div>	<div>PART 3 - EXECUTION</div> <div>3.01 INSTALLATION</div> <div>A. Furnish and install conduits, junction boxes, outlet boxes, and plates.</div> <div>B. Provide one #10 equivalent nylon pull wire in each system empty conduit.</div> <div>C. Provide a complete raceway system in accordance with interior system vendor requirements. Interior system vendor shall review the drawings. Contractor shall provide for any additional or varying requirements.</div> <div>D. Final connections and testing of systems will be provided by the system vendor. Contractor shall contact the owner's vendor and schedule the work so as to complete system installation and testing prior to occupancy of the facility.</div> <div>E. Terminate each conduit stub-up or termination with nylon insulated bushing.</div> <div>SECTION C16597 TELEPHONE SERVICE</div> <div>PART 1 - GENERAL</div> <div>1.01 WORK INCLUDED</div> <div>A. Furnish and install telephone system consisting of empty conduits, junction boxes, outlet boxes, device plates, etc., as specified and shown on owner selected vendor wiring schematics. Cable, equipment, and installation of the interior system will be provided by the owner's system vendor.</div> <div>B. Provide underground PVC, Schedule 40, service conduit as required by plans.</div> <div>C. Telephone Utility Company will provide service entrance cable.</div> <div>D. Interior telephone system will be furnished by owner's vendor.</div> <div>E. Special backboxes (unless otherwise noted) and faceplates will be furnished by the owner's vendor.</div> <div>PART 2 - PRODUCTS</div> <div>2.01 MATERIALS</div> <div>A. Provide 4-11/16" square boxes, with plaster rings. Provide device plates for telephone outlets to match those specified in wiring device section. Provide separate conduit to nearest accessible ceiling space from each outlet.</div> <div>B. Minimum conduit size shall be 3/4".</div> <div>C. Provide lightning arrester for telephone service entrance at main telephone backboard in accordance with UL96A paragraph 11.2 and NFPA 780.</div> <div>D. Cable shall be in conduit where installed in walls or above inaccessible ceiling spaces.</div> <div>PART 3 - EXECUTION</div> <div>3.01 INSTALLATION</div> <div>A. Provide one #10 equivalent nylon pull wire in each empty telephone conduit.</div> <div>B. Provide trenching, backfilling, etc., for installation of service entrance conduit in accordance with other divisions, plans, and telephone utility requirements. Provide pull wire in empty conduit.</div> <div>C. Coordinate with the local utility for point of service and type of service required. Pay for any utility company charges and fees for establishment of service.</div> <div>D. Provide a complete raceway system in accordance with telephone utility company and interior system vendor/utility requirements. Telephone utility company and interior system vendor shall review the drawings. Contractor shall provide for any additional or varying requirements.</div> <div>E. Terminate each conduit stub-up or termination with nylon insulated bushings.</div> <div>F. Final connections and testing of system will be provided by the system vendor. Contractor shall contact the owner and vendor and schedule the work.</div> <div>CLOSE OUT DOCUMENT REQUIREMENTS</div> <div>Provide the following to the building owner upon completion of construction:</div> <div>1. Submittal data stating equipment rating and selected options for each piece of equipment requiring maintenance.</div> <div>2. Operation manuals and maintenance manuals for each piece of equipment requiring maintenance. Required routine maintenance actions shall be clearly identified.</div> <div>3. Names and addresses of at least one qualified service agency.</div> <div>4. A complete narrative of how each system is intended to operate.</div>



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SHEET

ELECTRICAL

SPECIFICATIONS

SHEET NUMBER

**E2.2**

Permit

A

C

D

E