

LIGHTING CONTACTOR SCHEDULE

MARK	EQUIPMENT SERVED	LOAD				CONTACTOR				INTERLOCK	
		VOLTAGE	TYPE	AMP	POLE	ENCLOSURE	COIL VOLTAGE	ACCESSORIES	CONTROLLED BY		
LC-1	ROADWAY LIGHTING	480	EH	30	6	NEMA 1	120	RP	PHOTOCELL & TIMECLOCK		
LC-2	SIGNAGE LIGHTING	120	EH	30	4	NEMA 1	120	RP	PHOTOCELL & TIMECLOCK		

ABBREVIATIONS

EH - ELECTRICALLY HELD
MH - MECHANICALLY HELD
RP - RED PILOT LIGHT

TRANSFORMER SCHEDULE

MARK	PANEL SERVED	KVA RATING	PHASE	PRIMARY CONNECTION		SECONDARY CONNECTION		NOTES
				VOLTAGE	CONNECTION	VOLTAGE	CONNECTION	
TS-1	PANEL 'A2'	6	3	480	DELTA	120/240	WYE	(1)

NOTES

(1) REFER TO SPECIFICATIONS FOR TRANSFORMER WINDING TYPE.

LIGHT FIXTURE SCHEDULE

FIXT. LTR.	MANUFACTURER	CATALOG NUMBER	LAMP		DRIVER	FITTURE VOLTAGE	FINISH	MOUNTING	FITTURE VA	REMARKS/DESCRIPTION	SPECIFIC NOTES		
			#	TYPE									
SA	LUMEC	DMS50-135W0LED4K-ES-LE3F-208-	[LM-009]-1A-[LG-003]-SSMBV-20-GFI-1X36-12 1/2-DEC-BRTX	-	LED	1	ELECTRONIC	480	BLACK	20' CUSTOM POLE	155	LED TYPE 3 DISTRIBUTION ROADWAY LUMINAIRE WITH CUSTOM 20' POLE.	1
SB	LUMEC	DMS50-90W49LED4K-ES-LE3F-208-	[LM-009]-1A-[LG-003]-SSMBV-14-GFI-1X36-12 1/2-DEC-BRTX	-	LED	1	ELECTRONIC	480	BLACK	14' CUSTOM POLE	95	LED TYPE 3 DISTRIBUTION ROADWAY LUMINAIRE WITH CUSTOM 14' POLE.	1

GENERAL NOTES (APPLY TO ALL LIGHTING):

A. ALL LIGHTING FIXTURES SHALL BE RATED FOR LIGHTING POWER CIRCUIT VOLTAGE. CONTRACTOR MUST VERIFY ALL LOCATIONS.

B. ELECTRICAL CONTRACTOR SHALL CHECK AND COORDINATE ALL LIGHTING FIXTURE CATALOG NUMBERS WITH THE INTENT OF FIXTURE DESCRIPTIONS, LISTED ACCESSORIES AND TYPE OF INSTALLATION.

C. ELECTRICAL CONTRACTOR SHALL PROVIDE EACH LIGHTING FIXTURE COMPLETE WITH PLASTER FRAMES AND ALL OTHER INSTALLATION AND HANGING HARDWARE AS REQUIRED FOR A COMPLETE AND FINISHED INSTALLATION AT EACH FIXTURE LOCATION.

D. ALL FIXTURES SHALL BE LISTED BY A NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL) AND LABELED. ALL LIGHTING FIXTURES EXPOSED TO WEATHER, MOISTURE, OR OTHER ENVIRONMENTS SHALL BEAR THE APPLICABLE ENVIRONMENTAL OR APPLICATION LABEL.

E. REFER TO APPLICABLE SECTIONS OF THE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS FOR LIGHTING FIXTURES.

F. ELECTRICAL CONTRACTOR TO FIELD ADJUST AIMING PATTERN OF EXTERIOR LIGHTS AT NIGHT SESSION. OWNER & ARCHITECT TO DETERMINE TIME AND DATE.

G. INSTALLATION ELEVATION SHOWN IS FROM AFF OR AFG AS OBVIOUSLY APPLICABLE, TO CENTER OF OUTLET BOX, UNLESS OTHERWISE NOTED.

H. FIXTURE SUBSTITUTIONS: ARE NOT ALLOWED.

SPECIFIC NOTES (AS REFERRED TO IN SCHEDULE):

1. FIXTURE AND POLE ARE CUSTOM TO WATERFRONT DEVELOPMENT. COORDINATE WITH LUMEC PRIOR TO SHOP DRAWING SUBMITTAL.

PANEL 'A2' (1) BRANCH PANELBOARD - NORMAL POWER

O.K.T.	LOAD DESCRIPTION	TRIP	POLE	TYPE	PHASE	A		PHASE	B	TYPE	POLE	TRIP	LOAD DESCRIPTION	O.K.T.
						AMP	VA							
1	LIGHTING CONTACTOR LC-1	20	1	L		100	180				1	20	RCPT PEDESTAL 'A'	2
3	SPARE	20	1					0	0		1	20	SPARE	4
5	SPARE	20	1			0	0				1	20	SPARE	6
7	SPARE	20	1			0	0		0		1	20	SPARE	8
9	SPARE	20	1			0	0				1	20	SPARE	10
11	SPARE	20	1					0	0		1	20	SPARE	12
TOTAL LOAD (KVA)						0.28								
TOTAL AMPS/PHASE						2.33		0.00						

NOTES:

1. PROVIDE PANELBOARD WITH HINGED FRONT COVER.

LOAD SUMMARY				
LOAD TYPES	CONNECTED LOAD (KVA)	DEMAND FACTOR	DEMAND (KVA)	PANEL TOTALS
LIGHTS	0.1	1.25 Continuous	0.1	
RECEPTACLES	0.0	Per NEC Table 220.13	0.0	TOTAL CONN. LOAD (KVA) 0.1
MOTORS	0.0	Per NEC Table 220.14	0.0	TOTAL DEMAND LOAD (KVA) 0.1
HOSPITAL	0.0	Per NEC Table 220.11	0.0	TOTAL CONN. CURRENT 0.4
KITCHEN	0.0	Per NEC Table 220.20	0.0	TOTAL DEMAND CURRENT 0.5
HEAT	0.0	Per NEC Table 220.15	0.0	
MISC	0.0	1.00	0.0	

PANEL 'A1' (0)(2)(3) BRANCH PANELBOARD - NORMAL POWER

O.K.T.	LOAD DESCRIPTION	TRIP	POLE	TYPE	PHASE	A		PHASE	B	PHASE	C	TYPE	POLE	TRIP	LOAD DESCRIPTION	O.K.T.
						AMP	VA									
1	LIGHTS LINDBERG ST.	20	2	L		590	0						1	20	SPARE	2
3	SPARE	20	2	L				590	0				1	20	SPARE	4
5	SPARE	20	2	L						140	0		1	20	SPARE	6
7	TRANSFORMER 'TS-1'	20	2	Mi		140	0						1	20	SPARE	8
9	SPARE	20	2			0	0						1	20	SPARE	10
11	SPARE	20	2					0	0		0		1	20	SPARE	12
TOTAL LOAD (KVA)						0.73		0.59		0.14						
TOTAL AMPS/PHASE						2.64		2.13		0.51						

NOTES:

1. PROVIDE PANELBOARD WITH HINGED FRONT COVER
2. PANELBOARD SHALL BE SE RATED.
3. PROVIDE PANEL WITH INTEGRAL SPD PER SPECIFICATIONS.

LOAD SUMMARY				
LOAD TYPES	CONNECTED LOAD (KVA)	DEMAND FACTOR	DEMAND (KVA)	PANEL TOTALS
LIGHTS	1.2	1.25 Continuous	1.5	
RECEPTACLES	0.0	Per NEC Table 220.13	0.0	TOTAL CONN. LOAD (KVA) 1.5
MOTORS	0.0	Per NEC Table 220.14	0.0	TOTAL DEMAND LOAD (KVA) 1.8
HOSPITAL	0.0	Per NEC Table 220.11	0.0	TOTAL CONN. CURRENT 1.8
KITCHEN	0.0	Per NEC Table 220.20	0.0	TOTAL DEMAND CURRENT 2.1
HEAT	0.0	Per NEC Table 220.15	0.0	
MISC	0.3	1.00	0.3	

PANEL 'B' (0)(2)(3) BRANCH PANELBOARD - NORMAL POWER

O.K.T.	LOAD DESCRIPTION	TRIP	POLE	TYPE	PHASE	A		PHASE	B	TYPE	POLE	TRIP	LOAD DESCRIPTION	O.K.T.		
						AMP	VA									
1	FUTURE SIGN-BONEFISH	20	1	L		640	180				R	1	20	RCPT PEDESTAL 'B'	2	
3	FUTURE SIGN-CORNER MED.	20	1	L				640	100		1	20	LIGHTING CONTACTOR 'LC-2'	4		
5	FUTURE SIGN-FRONT ADD.	20	1	L		640	0						1	20	SPARE	6
7	SPARE	20	1			0	0						1	20	SPARE	8
9	SPARE	20	1			0	0						1	20	SPARE	10
11	SPARE	20	1					0	0				1	20	SPARE	12
TOTAL LOAD (KVA)						1.46		0.74								
TOTAL AMPS/PHASE						12.17		6.17								

NOTES:

1. PROVIDE PANELBOARD WITH HINGED FRONT COVER.
2. PANELBOARD SHALL BE SE RATED.
3. PROVIDE PANEL WITH INTEGRAL SPD PER SPECIFICATIONS.

LOAD SUMMARY				
LOAD TYPES	CONNECTED LOAD (KVA)	DEMAND FACTOR	DEMAND (KVA)	PANEL TOTALS
LIGHTS	1.9	1.25 Continuous	2.4	
RECEPTACLES	0.2	Per NEC Table 220.13	0.2	TOTAL CONN. LOAD (KVA) 2.1
MOTORS	0.0	Per NEC Table 220.14	0.0	TOTAL DEMAND LOAD (KVA) 2.6
HOSPITAL	0.0	Per NEC Table 220.11	0.0	TOTAL CONN. CURRENT 8.8
KITCHEN	0.0	Per NEC Table 220.20	0.0	TOTAL DEMAND CURRENT 10.8
HEAT	0.0	Per NEC Table 220.15	0.0	
MISC	0.0	1.00	0.0	

ELECTRICAL SPECIFICATIONS

A. GENERAL:

1. **SCOPE OF SERVICES** - WORK SHALL INCLUDE THE FURNISHING AND INSTALLING OF A COMPLETE AND FUNCTIONING ELECTRICAL SYSTEMS AS INDICATED ON THE DRAWINGS AND THESE SPECIFICATIONS. THIS SHALL INCLUDE ACCESSORIES NECESSARY WHETHER SPECIFICALLY STATED OR NOT TO MAKE THE REQUIRED ELECTRICAL SYSTEMS COMPLETE AND OPERATIONAL. THIS WILL INCLUDE EVERY ARTICLE, DEVICE OR ACCESSORY NECESSARY TO FACILITATE EACH SYSTEM FUNCTIONING AS INDICATED BY THE DESIGN AND THE EQUIPMENT SPECIFIED. THE CONTRACTOR SHALL BECOME FAMILIAR WITH THE SITE AND ALL EXISTING CONDITIONS PRIOR TO BIDDING.

2. **MATERIAL AND WORKMANSHIP** - ALL EQUIPMENT AND MATERIALS PROVIDED SHALL BE NEW EXCEPT AS OTHERWISE STATED ON THE DRAWINGS. ALL EQUIPMENT PROVIDED SHALL BE UL LISTED WHEN SUCH STANDARDS EXIST FOR THE TYPE OF EQUIPMENT FURNISHED AND ACCEPTABLE FOR INSTALLATION OF THE LOCAL BUILDING AUTHORITY. ALL WORKMANSHIP SHALL BE BY LICENSED AND EXPERIENCED ELECTRICIANS OR JOURNEYMEN. ALL TOOLS, MACHINERY AND EQUIPMENT REQUIRED OF THE PERFORMANCE OF THE ELECTRICAL WORK SHALL BE FURNISHED BY THIS CONTRACTOR.

3. **COORDINATION** - THE CONTRACTOR SHALL COORDINATE ALL WORK WITH OTHER CONTRACTORS AND SUBCONTRACTORS SO THAT VARIOUS COMPONENTS OF THE ELECTRICAL SYSTEMS WILL BE INSTALLED AT THE PROPER TIME, WILL FIT THE AVAILABLE SPACE, AND WILL ALLOW PROPER SERVICE ACCESS TO ALL EQUIPMENT. THE CONTRACTOR SHALL REFER TO CIVIL DRAWINGS AND TO RELEVANT EQUIPMENT DRAWINGS TO DETERMINE THE EXTENT OF CLEAR SPACES.

4. **ORDINANCES AND CODES** - CONTRACTOR'S PERFORMANCE, WORKMANSHIP AND MATERIALS SHALL COMPLY WITH APPLICABLE NATIONAL FIRE PROTECTION ASSOCIATION CODES, STATE AND LOCAL BUILDING CODES, AND/OR ALL OTHER APPLICABLE CODES AND ORDINANCES. ALL PERMITS, LICENSES AND FEES REQUIRED BY THE GOVERNING AUTHORITIES FOR THE PERFORMANCE OF THE ELECTRICAL WORK SHALL BE OBTAINED AND PAID FOR BY THE CONTRACTOR. FILLING OUT FORMS FOR APPLICATIONS BY THE ENGINEER WILL BE BILLED HOURLY TO THE CONTRACTOR.

B. COMMON WORK AND BASIC MATERIALS/EQUIPMENT:

1. **GUARANTEE** - GUARANTEE AGAINST DEFECTIVE WORKMANSHIP AND MATERIAL FOR A PERIOD OF ONE YEAR FROM THE DATE OF COMPLETION. GUARANTEE SHALL INCLUDE MATERIAL/EQUIPMENT TO BE REPLACED AND ALL LABOR REQUIRED.

2. **TESTING, CHECK-OUT AND CLEANING** - REPLACE ALL BURNED-OUT LAMPS. THE CONTRACTOR SHALL CLEAN ALL MATERIAL AND EQUIPMENT INSTALLED UNDER THE ELECTRICAL CONTACTOR. DIRT, DUST, PLASTER, STAINS AND FOREIGN MATTER SHALL BE REMOVED FROM ALL SURFACES. ALL EQUIPMENT SHALL HAVE FINISH TOUCHED UP PRIOR TO INSPECTION. DAMAGED ELECTRICAL EQUIPMENT DURING THE CONSTRUCTION PROCESS SHALL BE REPLACED WITH NEW EQUIPMENT. ALL COSTS ASSOCIATED WITH THE DAMAGED EQUIPMENT SHALL BE ASSUMED BY THE INSTALLING CONTRACTOR.

3. **UTILITY REQUIREMENTS** - THE SECONDARY SERVICE SHALL EXTEND FROM A PAD MOUNTED TRANSFORMER TO THE MAIN SERVICE ENTRANCE PANEL. PRIMARY DUCTBANK SHALL BE PROVIDED BY THE CONTRACTOR IF REQUIRED BY THE LOCAL UTILITY COMPANY. FINAL TERMINATIONS AT THE PAD MOUNTED TRANSFORMER SHALL BE COORDINATED WITH THE UTILITY COMPANY.

THE FOLLOWING ELECTRICAL SERVICE CHARACTERISTICS SHALL BE COORDINATED WITH THE UTILITY COMPANY:

A. SERVICE VOLTAGE
B. POWER COMPANY CONNECTION CHARGES
C. AVAILABLE SHORT CIRCUIT CURRENT
D. LOAD ANALYSIS, CONNECTED AND ESTIMATED DEMAND
E. POWER COMPANY CHARGES FOR ESTABLISHING SERVICE WHICH ARE TO BE PAID BY THE OWNER.

CONTRACTOR SHALL PROVIDE PROPER TERMINATION, METERING PROVISIONS, ETC. FOR ELECTRICAL AND TELEPHONE SERVICES FOR CONNECTION BY THE SERVING UTILITY, IN STRICT COMPLIANCE WITH THE REQUIREMENTS OF ALL CODES HAVING JURISDICTION AND OF THE SERVING UTILITY INVOLVED. UTILITY COSTS SHALL BE INCLUDED IN THE BID. COORDINATE ALL INSTALLATION REQUIREMENTS WITH THE LOCAL UTILITY PRIOR TO BIDDING.

4. **CONDUIT INSTALLATION** - ALL WIRING SHALL BE ROUTED IN CONDUIT. CONDUIT SHALL BE INSTALLED CONCEALED WHEREVER POSSIBLE. EXPOSED CONDUIT SHALL BE PAINTED TO MATCH SURROUNDINGS. ALL CONDUIT BOXES SHALL BE ACCESSIBLE TO COMPLY WITH THE NEC. THE MINIMUM CONDUIT SIZE SHALL BE 1" UNLESS OTHERWISE NOTED ON THE DRAWINGS. CONDUIT TYPES SHALL BE THE FOLLOWING:

EMT - SHALL BE USED FOR INDOOR, ABOVE GRADE POWER FEEDERS, BRANCH CIRCUITS, AND IN CONCEALED LOCATIONS. SHALL ALSO BE USED FOR FIRE ALARM, TELE/DATA, SECURITY, A/V, NURSE CALL, AND PAGING SYSTEMS. ALL CONDUIT FITTINGS FOR EMT CONDUIT SHALL BE COMPRESSION TYPE FITTINGS. INDENTURE FITTINGS WILL NOT BE ALLOWED.

RMC - SHALL BE USED IN HAZARDOUS LOCATIONS, MECHANICAL AND ELECTRICAL ROOMS WHERE PHYSICAL ABUSE IS PROBABLE, UNDERGROUND CONDUIT ELBOWS AND ELBOWS EXTENDING UP THROUGH THE SLAB. SHALL ALSO BE USED IN OUTDOOR, EXPOSED APPLICATIONS.

PVC - SHALL BE USED IN UNDERGROUND CONDUIT APPLICATIONS.

5. **UNDERGROUND CONDUIT** - SCHEDULE 40 PVC WITH RMC FOR ELBOWS AND ABOVE GRADE. WHERE INSTALLED BELOW SLAB, CONDUIT SHALL BE SURROUNDED ON ALL SIDES WITH 2" OF AGGREGATE.

6. **WIRE** - ALL WIRE SHALL HAVE COPPER CONDUCTORS, WITH U.L. LISTING. SERVICE ENTRANCE CABLE SHALL BE THWN OR XHHW WITH STRANDED CONDUCTORS. ALL FEEDER AND BRANCH CIRCUIT WIRE #8 AWG AND LARGER SHALL BE TYPE THWN OR XHHW, BOTH WITH STRANDED CONDUCTORS. ALL WIRE #10 AND SMALLER AWG SHALL BE TYPE THWN (WET OR DAMP LOCATIONS, OR IN CONDUIT BELOW GRADE OR SLAB) OR THHN (DRY LOCATIONS ONLY AND ABOVE GROUND). BOTH WITH SOLID CONDUCTORS. ALL BRANCH CIRCUIT WIRING SHALL BE NOT SMALLER THAN #12 AWG WIRE.

7. **WIRING INSTALLATION** - ALL WIRING SHALL BE INSTALLED IN APPROVED RACEWAY AND ENCLOSURES. ALL SPLICES OR TAPS SHALL OCCUR IN APPROVED BOXES AND ENCLOSURES, AND SHALL BE MADE UP WITH APPROVED SOLDERLESS CONNECTORS. FOR #10 CONDUCTORS AND SMALLER THE CONDUCTORS SHALL HAVE INSULATION OF THE PROPER COLOR TO MATCH NEC COLOR CODE SYSTEM. FOR CONDUCTORS OF #8 AND LARGER THE CONTRACTOR MAY USE COLORED PRESSURE SENSITIVE PLASTIC TAPE AT EACH END TO PROPERLY IDENTIFY THE CONDUCTOR VOLTAGE PER THE NEC. ALL BRANCH CIRCUITS SHALL HAVE AN EQUIPMENT GROUNDING CONDUCTOR INSTALLED IN THE RACEWAY, SIZED IN ACCORDANCE WITH NEC 250-122. COMPLY WITH VOLTAGE DROP SECTION IN THIS SPECIFICATION.

8. **DEVICES** - DEVICES SHALL BE SPECIFICATION GRADE. COMMERCIAL OR RESIDENTIAL GRADE DEVICES ARE NOT ACCEPTABLE. COORDINATE DEVICE AND COVERPLATE COLOR WITH THE ENGINEER PRIOR TO SUBMITTAL OF EQUIPMENT. DEVICE PLATES SHALL BE NYLON. ACCEPTABLE MANUFACTURERS SHALL BE ARROW HART, BRYANT, HUBBELL, LEVITON, AND PASS & SEYMOUR.

CONVENIENCE RECEPTACLES SHALL BE NEMA 5-20R TYPE.

GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLES SHALL BE NEMA 5-20R TYPE WITH FAULT SENSOR DESIGNED TO DETECT 4-6 mA LEAKAGE IN 25 MILLISECONDS OR LESS.

RECEPTACLES INSTALLED OUTDOORS SHALL BE NEMA 5-20R WEATHER-RESISTANT, GROUND FAULT TYPE DEVICES WITH CLEAR PLASTIC IMPACT RESISTANT WEATHERPROOF COVER.

9. **BOXES** - ALL BOXES SHALL BE METALLIC TYPE UNLESS OTHERWISE NOTED ON THE DRAWINGS.

EXTERIOR BOXES SHALL BE CORROSION RESISTANT, CAST-METAL, WEATHERPROOF OUTLET WIRING BOXES.

DIVIDERS SHALL BE PROVIDED IN ALL BOXES WITH WIRING OF DIFFERENT VOLTAGE TO SEPARATE VOLTAGES.

JUNCTION BOXES AND PULL BOXES SHALL BE INSTALLED WHERE REQUIRED FOR CONDUCTOR PULLING AND BEND RADIUS REQUIREMENTS PER THE NEC.

10. **VOLTAGE DROP** - ALL BRANCH CIRCUITS SUPPLYING EQUIPMENT, LIGHTING, OR DEVICES SHALL BE SIZED NOT TO EXCEED 3% VOLTAGE DROP, AND NOT EXCEED 5% VOLTAGE DROP FROM SOURCE (E.G. TRANSFORMER, SERVICE, ETC) TO LOAD. DERATE CONDUCTORS PER NEC WHEN ROUTED IN RACEWAY CONTAINING MORE THAN THREE CURRENT CARRYING CONDUCTORS. PROVIDE BUCK-BOOST TRANSFORMERS MEETING THE REQUIREMENTS OF THE TRANSFORMER SECTION WHEN VOLTAGE DROP EXCEEDS 3% FROM OVERCURRENT DEVICE TO END DEVICE.

11. **EQUIPMENT AND DEVICE GROUNDING** - ALL CONDUCTORS, CONDUITS, MOTOR FRAMES, ETC. WHICH REQUIRE GROUNDING SHALL BE PERMANENTLY AND EFFECTIVELY GROUNDING BY THIS CONTRACTOR IN A THOROUGH AND EFFICIENT MANNER CONFORMING IN ALL PARTICULARS TO THE NATIONAL ELECTRICAL CODE. ALL CIRCUITS MUST BE PROVIDED WITH A SEPARATE GROUND CONDUCTOR. CONTRACTOR SHALL NOT UTILIZE THE RACEWAY AS A GROUND PATH UNDER ANY CIRCUMSTANCE.

CONTRACTOR SHALL ROUTE A DEDICATED #8 BARE COPPER WIRE FROM THE SERVICE ENTRANCE GROUND BUS TO THE TELEPHONE TERMINAL BOARD (TTB) IF A TTB IS INSTALLED ON THE PROJECT.

12. **SERVICE GROUNDING** - GROUND THE ELECTRICAL SERVICE PER THE ADOPTED VERSION OF THE NEC AND DETAILS INDICATED ON THE DRAWINGS. GROUND RODS UTILIZED FOR SERVICE GROUNDING SHALL BE 3/4" DIAMETER AND 10'-0" IN LENGTH. A MINIMUM OF (2) GROUND RODS SHALL BE INSTALLED WITH A COUPLER TO CREATE A 20'-0" LONG GROUND ROD. CONTRACTOR SHALL BOND THE SERVICE GROUND TO ALL AVAILABLE GROUNDING LOCATIONS PER ARTICLE 250 OF THE NEC.

13. **EXTRA MATERIALS** - PROVIDE MINIMUM 1 EACH TYPE AND 1 ADDITIONAL FOR EVERY 10 OF THE FOLLOWING: LAMPS, BALLASTS, BATTERIES FOR EMERGENCY LIGHTING, AND GLOBES/DIFFUSERS. PROVIDE IN PROTECTIVE COVERING/PACKAGING WITH LABEL OF CONTENTS.

14. **EQUIPMENT PADS AND CONCRETE BASES** -

EXTERIOR PADS AND BASES - UNLESS SPECIFIED ELSEWHERE IN THE CONTRACT DRAWINGS, PROVIDE MINIMUM 6" THICK CONCRETE PAD 28 DAY 3000 PSI WITH #6 REBAR AT 12" CENTER, EACH WAY FOR REINFORCING. PAD SHALL EXTEND MINIMUM 4" BEYOND EQUIPMENT FOOTPRINT ON ALL SIDES. COORDINATE ADDITIONAL REQUIREMENTS FOR UTILITY TRANSFORMER PAD WITH LOCAL UTILITY COMPANY.

15. **LABELING** - ALL DEVICES SHALL BE LABELED THAT ARE MODIFIED IN ANY WAY BY THIS PROJECT.

a. ALL PANELBOARDS (NEW OR THAT HAVE CIRCUITS MODIFIED) SHALL HAVE INSTALLED A NEW TYPED CIRCUIT DIRECTORY UPDATED WITH ALL AVAILABLE INFORMATION.

b. ALL NEW STARTERS, TRANSFORMERS, AND PANELS SHALL HAVE A PHENOLIC, WHITE TEXT ON BLACK, MINIMUM 1/2 INCH HIGH TEXT LABELING WITH THE DEVICES NAME, VOLTAGE AND WIRING SYSTEM (EXAMPLE: PANEL A, 120/208V, 3 PHASE, 4 WIRE) AND OTHER INFORMATION PER THE OWNER.

c. ALL NEW RECEPTACLES, SWITCHES AND OTHER DEVICES INCLUDING THOSE ABOVE SHALL BE LABELED WITH THE SOURCE OF POWER. THIS LABEL SHALL BE ON THE DEVICE COVER PLATE AND SHALL HAVE BLACK ON WHITE.

HELVETICA MEDIUM FONT LETTERING 1/4 INCH HIGH, DESIGNATING PANELBOARD AND CIRCUIT NUMBER SEPARATED BY COLON. THE SAME TYPE LABEL SHALL ALSO BE INSTALLED ON THE DEVICE BEHIND THE COVERPLATE.

C. DISTRIBUTION EQUIPMENT:

1. **MANUFACTURERS** - ALL COMPONENTS SHALL BE BY ONE OF THE FOLLOWING UNLESS OTHERWISE NOTED: EATON CUTLER HAMMER, GENERAL ELECTRIC, SIEMENS, OR SQUARE D.

2. **BUILDING SERVICE MAIN CIRCUIT BREAKER** - THE BUILDING MAIN CIRCUIT BREAKER WHETHER LOCATED IN A PANEL, DISTRIBUTION PANEL, OR SWITCHBOARD SHALL BE A GROUND FAULT TYPE CIRCUIT BREAKER IF THE SERVICE IS RATED GREATER THAN 240V AND IS 1000A AND GREATER.

3. **GROUND BUS** - ALL PANELS, DISTRIBUTION PANELS, AND SWITCHBOARDS SHALL BE PROVIDED WITH A COPPER GROUND BUS.

4. **SERIES RATING** - SERIES RATING OF CIRCUIT BREAKERS IS NOT ALLOWED.

5. **PANELBOARDS** - FURNISH AND INSTALL PANELBOARDS AS SCHEDULED AND NOTED ON THE DRAWINGS. THE PANELBOARDS SHALL BE COMPLETE WITH THERMAL MAGNETIC PLASTIC CASE CIRCUIT BREAKERS OF THE BOLT-ON TYPE ASSEMBLED IN A FINISHED CABINET. ALL 2 AND 3 POLE BREAKERS MUST BE COMMON TRIP. EACH PANEL BOARD CONTAIN A TYPEDWRITTEN OR COMPUTER PRINTED CIRCUIT DIRECTORY. ALL PANELBOARDS SHALL BE FURNISHED WITH A HINGED FRONT COVER. PANELBOARDS SHALL BE INSTALLED WITH TOP AT 6'-6" A.F.F. UNLESS OTHERWISE NOTED SUCH THAT BREAKER ACCESSIBILITY LOCATIONS COMPLY WITH NFPA 70.

PANELBOARDS 400A AND SMALLER SHALL BE LIGHTING AND APPLIANCE TYPE PANELS. PANELS 600A AND LARGER SHALL BE DISTRIBUTION TYPE.

PANELBOARDS SHALL BE DEAD FRONT TYPE AND BUS BARS SHALL BE TIN PLATED ALUMINUM.

IF 10% SPACE IS NOT INDICATED ON THE DRAWINGS, PROVISION A MINIMUM OF 10% SPARE CAPACITY (SPACE) IN THE PANELBOARD FOR ADDITIONAL DEVICES.

THE MINIMUM SHORT CIRCUIT RATING OF ANY DEVICE INSTALLED IN A PANEL SHALL BE 10,000 AIC OPERATING AT 120/208V.

6. **LOW VOLTAGE TRANSFORMERS (800V AND LESS)** - TRANSFORMERS SHALL BE RATED FOR 220 DEG C INSULATION CLASS. TRANSFORMER SHALL BE ALUMINUM OR COPPER WOUND TYPE. TRANSFORMERS LOCATED INDOORS IN DRY LOCATIONS SHALL BE PROVIDED WITH VENTILATED, NEMA TYPE 2 RATED ENCLOSURES. TRANSFORMERS SHALL BE GROUNDED AS SEPERATELY DERIVED SYSTEMS PER NFPA 70.

7. **PEDESTALS** - FURNISH AND INSTALL MILBANK OR EQUIVALENT, AS SHOWN ON THE DRAWINGS. PANELBOARD INSIDE PEDESTAL SHALL MEET THE REQUIREMENTS OF THE PANELBOARD SECTION OF THE SPECIFICATION.

8. **SAFETY SWITCHES** - FURNISH AND INSTALL FUSED OR NON-FUSED (AS REQUIRED) HEAVY DUTY SAFETY SWITCHES WHERE NOT FURNISHED WITH THE EQUIPMENT, AND AT ALL OTHER POINTS REQUIRED BY CODE. CONSTRUCTION SHALL BE OF A NEMA DESIGN SUITABLE FOR THE ENVIRONMENT INSTALLED. ALL FUSES SHALL BE BUSSMAN, LITTELFUSE OR FERRAZ-SHAWMUT, SIZE AND TYPE AS REQUIRED OR INDICATED.

9. **SURGE PROTECTIVE DEVICES** - PROVIDE SURGE PROTECTIVE DEVICES AS INDICATED ON THE DRAWINGS. SURGE PROTECTIVE DEVICES LOCATED INTEGRAL TO THE PANEL MAY BE SUPPLIED BY EATON CUTLER HAMMER, SQUARE D, SIEMENS, OR GE. SURGE PROTECTIVE DEVICES MOUNTED OUTSIDE OF THE PANEL MAY BE SUPPLIED BY LIEBERT, CURRENT TECHNOLOGY, OR ADVANCED PROTECTION TECHNOLOGIES.

SURGE PROTECTIVE DEVICES SHALL BE RATED AS FOLLOWS:
SERVICE ENTRANCE LOCATIONS: 250 KA PER PHASE AND 125 KA PER MODE.
BRANCH PANELS: 120 KA PER PHASE AND 60 KA PER MODE.
SERVICE ENTRANCE LOCATIONS: 250 KA PER PHASE AND 125 KA PER MODE.
SPD'S MOUNTED EXTERNAL TO PANELS SHALL BE LOCATED SUCH THAT THE CONDUCTOR/CONDUIT RUN BETWEEN THE EQUIPMENT IS AS SHORT AND STRAIGHT AS POSSIBLE. PROVIDE OVERCURRENT PROTECTION OF THE SPD AS REQUIRED BY THE EQUIPMENT MANUFACTURER.

13. **LIGHTING CONTACTORS** - CONTRACTOR SHALL BE ELECTRICALLY OPERATED AND MECHANICALLY HELD, COMPLYING WITH NEMA ICS 2 AND UL 508. CURRENT RATING FOR SWITCHING SHALL BE LISTED OR RATED CONSISTENT WITH TYPE OF LOAD SERVED, INCLUDING TUNGSTEN FILAMENT, INDUCTIVE, AND HIGH INRUSH BALLAST (BALLAST WITH 20 PERCENT OR LESS TOTAL HARMONIC DISTORTION OF NORMAL LOAD CURRENT), CONTROL COIL VOLTAGE SHALL MATCH CONTROL POWER SOURCE. PROVIDE ALL CONTACTORS WITH RED PILOT LIGHT.

D. LIGHTING:

1. **GENERAL** - THE LOCATIONS, NUMBERS, SIZES AND TYPES OF LIGHTING FIXTURES SHALL BE AS SHOWN ON THE CONTRACT DOCUMENTS. ALL LIGHTING FIXTURES FURNISHED UNDER THIS CONTRACT TO HAVE UL LABELS ATTACHED TO EACH FIXTURE OR AN INTEGRAL PART OF THE DEVICES FOR 120V AND 277V SOLID-STATE EQUIPMENT. FOR DEVICES WITHOUT INTEGRAL LINE VOLTAGE SURGE PROTECTION, FIELD MOUNTING SURGE PROTECTION SHALL COMPLY WITH IEEE C62.41, WITH UL 1449. METAL PARTS SHALL BE FREE FROM BURRS, SHARP CORNERS AND EDGES. DOORS, FRAMES AND OTHER INTERNAL ACCESSSES SHALL BE SMOOTH OPERATING, FREE FROM LIGHT LEAKAGE UNDER OPERATING CONDITIONS, AND ARRANGED TO PERMIT RELAMPING WITHOUT USE OF TOOLS. ARRANGE DOORS, FRAMES, LENSES, DIFFUSERS AND OTHER PIECES TO PREVENT ACCIDENTAL FALLING DURING RELAMPING AND WHEN SECURED IN OPERATING POSITION. LENSES, DIFFUSERS, COVERS AND GLOBES SHALL BE 100 PERCENT VIRGIN ACRYLIC PLASTIC OR ANNEALED CRYSTAL GLASS, UNLESS OTHERWISE INDICATED. PLASTIC SHALL BE HIGH RESISTANCE TO YELLOWING AND OTHER CHANGES DUE TO AGING, EXPOSURE TO HEAT AND ULTRAVIOLET RADIATION.

CLEAN ALL LIGHT FIXTURES AFTER INSTALLATION AND PRIOR TO OWNER ACCEPTANCE. TEST EACH FIXTURE AND REPLACE ALL MALFUNCTIONING LAMPS AND BALLASTS.

2. **LED FIXTURES AND DRIVERS** - MANUFACTURERS SHALL BE AS SHOWN ON THE CONTRACT DRAWINGS. LED DRIVER AND HEAT SINK SHALL BE MATCHED TO PROVIDE 50,000 HOURS OF LAMP LIFE.

3. **POLES** - POLES SHALL BE OF THE TYPES AND SIZES AS SHOWN ON THE CONTRACT DRAWINGS. THE POLE SHALL BE STEEL UNLESS SPECIFICALLY SHOWN AS OTHER MATERIAL ON THE CONTRACT DRAWINGS. WHERE APPLICABLE, THE POLE SHOULD BE PROVIDED WITH A HANDHOLE AND GROUND LUG, AND LOCAL FUSES. THE POLE SHALL BE INSTALLED AS SHOWN ON THE CONTRACT DRAWINGS. POLE FINISH SHOULD MATCH LIGHT FIXTURE FINISH. PROVIDE CONCRETE POLE BASES AS INDICATED ON THE DRAWINGS.

E. CONTROLS:

1. **PHOTOELECTRIC SWITCHES** - MANUFACTURERS: INTERMATIC, TORK AND WATT STOPPER.

SOLID STATE, WITH SPST DRY CONTACTS RATED FOR 1800VA TO OPERATE CONNECTED LOAD, RELAY CONTACT COILS, AND COMPLYING WITH UL 777 LIGHT LEVEL MONITORING RANGE TO BE 1.5 TO 10 FC WITH AN ADJUSTMENT FOR TURN ON AND TURN