LUMINAIRE SCHEDULE								
TYPE	DESCRIPTION	MANUFACTURER	MODEL	LAMP DESCRIPTION	WATTAGE	REMARKS		
L1	LINEAR LED EXTRUDED ALUMINUM TABLE MOUNTED TASK LIGHT	VODE LIGHTING	107-RR-01-58IN-58-TAE-24-2T-1-0-Z-LO-35-G1-0-AL -1-9	LED, 6.1 W/FT, 691 LUMENS/FT, 3500K, 80+ CRI	19 W	DIRECTION CONTROL WITH ROTATION, 58" LENGTH.		
L2	SAME AS L1 EXCEPT 192 INCH LENGTH AND DOUBLE RAIL.	VODE LIGHTING	107-RR-01-192IN-48-TAE-24-2T-1-0-Z-LO-35-G1-0-A L-1-9	LED, 6.1 W/FT, 691 LUMENS/FT, 3500K, 80+ CRI	61 W			
L3	SAME AS L2 EXCEPT 336 INCH LENGTH.	VODE LIGHTING	107-RR-01-336IN-48-TAE-24-2T-1-0-Z-LO-35-G1-0-A L-1-9	LED, 6.1 W/FT, 691 LUMENS/FT, 3500K, 80+ CRI	106 W			
L4	EXISTING LED WALL MOUNTED REFLECTOR				0 W			

## LUMINAIRE SCHEDULE GENERAL NOTES

- 1. REFER TO ELECTRICAL SPECIFICATIONS FOR MORE INFORMATION. 2. ALL LIGHT FIXTURES SHALL BE UL LABELED. 3. FIRST MANUFACTURER LISTED IS BASIS OF DESIGN. OTHER MANUFACTURERS LISTED ARE APPROVED MANUFACTURERS.
- ELECTRICAL TRADES SHALL PROVIDE COMPLETE SUBMITTALS (SHOP DRAWINGS) ON ALL LIGHT FIXTURES, LAMPS, CONTROLS AND ACCESSORIES, ETC. REFER TO SPECIFICATION FOR SUBMITTAL FORMAT AND PROCESS. NO EXCEPTIONS ALLOWED. NON-COMPLETE OR INCORRECT FORMAT WILL RESULT IN BACK CHARGES TO CONTRACTOR AND NOT APPROVED SUBMITTALS.
- ALL LUMINAIRES AND CONTROLS SHALL COMPLY WITH THE MICHIGAN UNIFORM ENERGY CODE AND ASHRAE 90.1. REFER TO THE BOOK SPECIFICATIONS AND DRAWINGS FOR MORE INFORMATION ON LIGHTING CONTROLS.
- 6. PROVIDE ADDITIONAL WIRING TO EMERGENCY BATTERY PACKS AS REQUIRED. FOR SWITCH AND UNSWITCHED LIGHT FIXTURES.

## ELECTRICAL ABBREVIATIONS

ABBREV.

ABBREV.	DES
AFF	ABOVE FINISHED FLOOR
A	AMPERE
AF	AMPERE FUSE/AMPERE FRA
AWG	AMERICAN WIRE GAUGE
AT	AMPERE TRIP
ATS	AUTOMATIC TRANSFER SWI
AIC	AVAILABLE INTERRUPTING
С	CONDUIT OR CEILING MOUN
СВ	CIRCUIT BREAKER
CU	COPPER
СТ	CURRENT TRANSFORMER
DIA	DIAMETER
DISC	DISCONNECT
EMT	ELECTRICAL METALLIC TUB
EWC	ELECTRIC WATER COOLER
EPO	
(E)	
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PAN
FLA	FULL LOAD AMPS
F	FUSE
G/GRD	GROUND
GFCI/GFI	GROUND FAULT CIRCUIT IN
HOA	HAND-OFF-AUTO
HP	HORSEPOWER
IG	ISOLATED GROUND
KV	KILOVOLT
KVA	KILOVOLT AMPERE
KW	KILOWATT
KWH	KILOWATT HOUR
LP	LIGHTING PANEL
МСВ	MAIN CIRCUIT BREAKER
MDP	MAIN DISTRIBUTION PANEL
MLO	MAIN LUG ONLY
MAX	MAXIMUM
MIN	MINIMUM
NEC	NATIONAL ELECTRICAL COD
NEMA	NATIONAL ELECTRICAL MAN
N/NEU	NEUTRAL
NF	NON-FUSIBLE
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NIC	NOT IN CONTRACT
PH. OR Ø	PHASE
Р	POLE
PF	POWER FACTOR
PVC	POLYVINYL CHLORIDE (PLAS
(R)	RELOCATED EXISTING ELEC
(RR)	REMOVE AND REINSTALL
RMC	RIGID METALLIC CONDUIT
RP	RECEPTACLE PANEL
TBB	TELEPHONE BACKBOARD
TYP.	TYPICAL
UC	UNDERCOUNTER
UL	UNDERWRITERS LABORATO
UPS	UNINTERRUPTIBLE POWER
USB	UNIVERSAL SERIAL BUS
V	VOLT
VA	VOLT AMPERE
	WATT
WG	WIRE GUARD
WP	WEATHERPROOF
XFMR	TRANSFORMER

FLOOR **JPERE FRAME** 

DESCRIPTION

ISFER SWITCH

RUPTING CURRENT (AMPS) ING MOUNTED 

ORMER

ALLIC TUBING R COOLER VER OFF 

RICAL EQUIPMENT OR WORK

TROL PANEL

CIRCUIT INTERRUPTER

N PANEL

ICAL CODE RICAL MANUFACTURERS ASSOC. 

RIDE (PLASTIC) TING ELECTRICAL EQUIPMENT ISTALL 

BOARD

LABORATORIES E POWER SUPPLY L BUS

### LIGHTING FIXTURE TAG L1 $\langle 1 \rangle$ CONSTRUCTION KEY NOTE NUMBER 1 DEMOLITION KEY NOTE NUMBER 1 20 COPPER FEEDER SIZE TAG (REFER TO FEEDER SCHEDULE) ALUMINUM FEEDER SIZE TAG (REFER TO FEEDER SCHEDULE) 20 EQUIPMENT EQUIPMENT TAG EXISTING DEVICES OR EQUIPMENT \_\_\_\_\_ NEW OR MODIFIED DEVICES OR EQUIPMENT ----- NEW OR MODIFIED UNDERGROUND WIRING ----- EXISTING SYSTEM COMPONENT TO BE REMOVED POINT OF NEW CONNECTION. SECTION NUMBER 4 E5.2 SHEET E5.2 ON WHICH SECTION IS DRAWN SECTION NO. 6 SECTION 6 SCALE: 1/4" = 1' - 0" E5.2 $\checkmark$ SHEET E5.2 ON WHICH SECTION IS CUT (ENLARGED PARTIAL PLAN SIMILAR) LIGHTING CONTROL TAG 1A SCENE SCHEDULE ID 'A' (MAY NOT APPEAR ON EVERY TAG) LIGHTING CONTROL SPACE TYPE '1' Z1 - DAYLIGHTING CONTROL ZONE '1' (MAY NOT APPEAR ON EVERY TAG)

DRAWING NOTATION

DESCRIPTION

SYMBOL

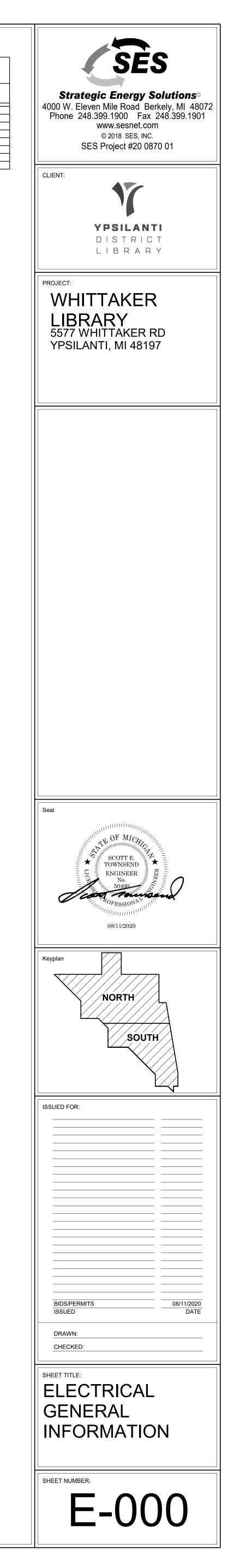
	APPLICABLE CODES AND REGULATIONS					
YEAR	CODE					
2015	MICHIGAN BUILDING CODE					
2015	MICHIGAN ENERGY CODE					
2015	MICHIGAN RESIDENTIAL CODE					
2015	MICHIGAN REHABILITATION CODE					
2017	MICHIGAN ELECTRICAL CODE RULES, PART 8					
2017	NATIONAL ELECTRICAL CODE (NFPA 70)					
2013	NFPA 20					
2013	NFPA 72					
2013	NFPA 101					
2013	NFPA 110					
2009	ICC A117.1 ACCESSIBLE AND USABLE BUILDINGS & FACILITIES					
1985	DETROIT ELEVATOR CODE					

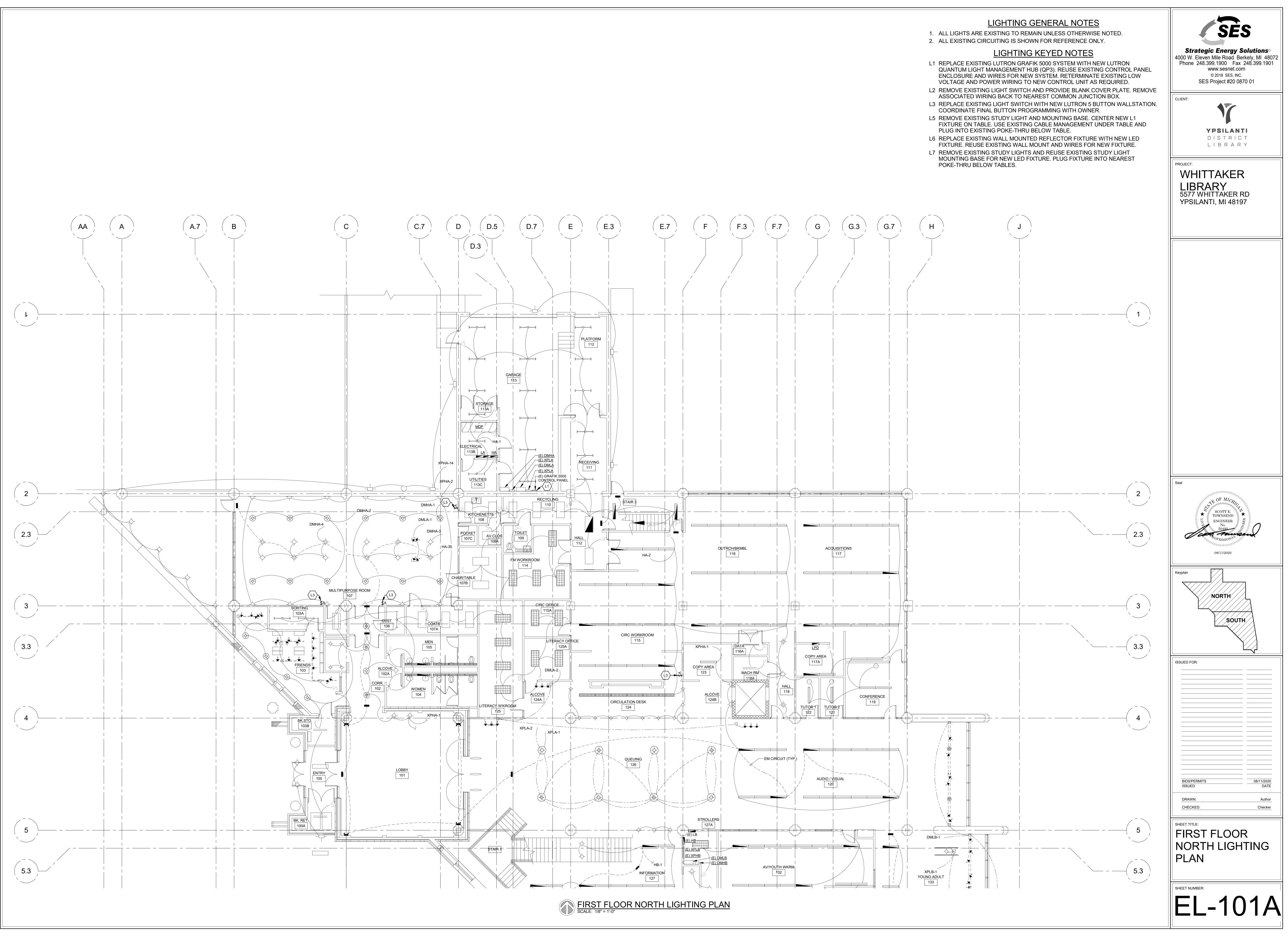
LIGH	TING CONTROLS LEGEND							
SYMBOL	DESCRIPTION							
\$	SINGLE POLE SWITCH							
\$A	LIGHTING CONTROL LOCATION - 5 BUTTONS							
\$B	LIGHTING CONTROL LOCATION - 3 BUTTONS							
\$C	LIGHTING CONTROL LOCATION - 2 BUTTONS							
\$3	THREE WAY SWITCH							
\$4	FOUR WAY SWITCH							
\$L LIGHT CONTROL LOCATION								
G	GENERATOR TRANSFER DEVICE							

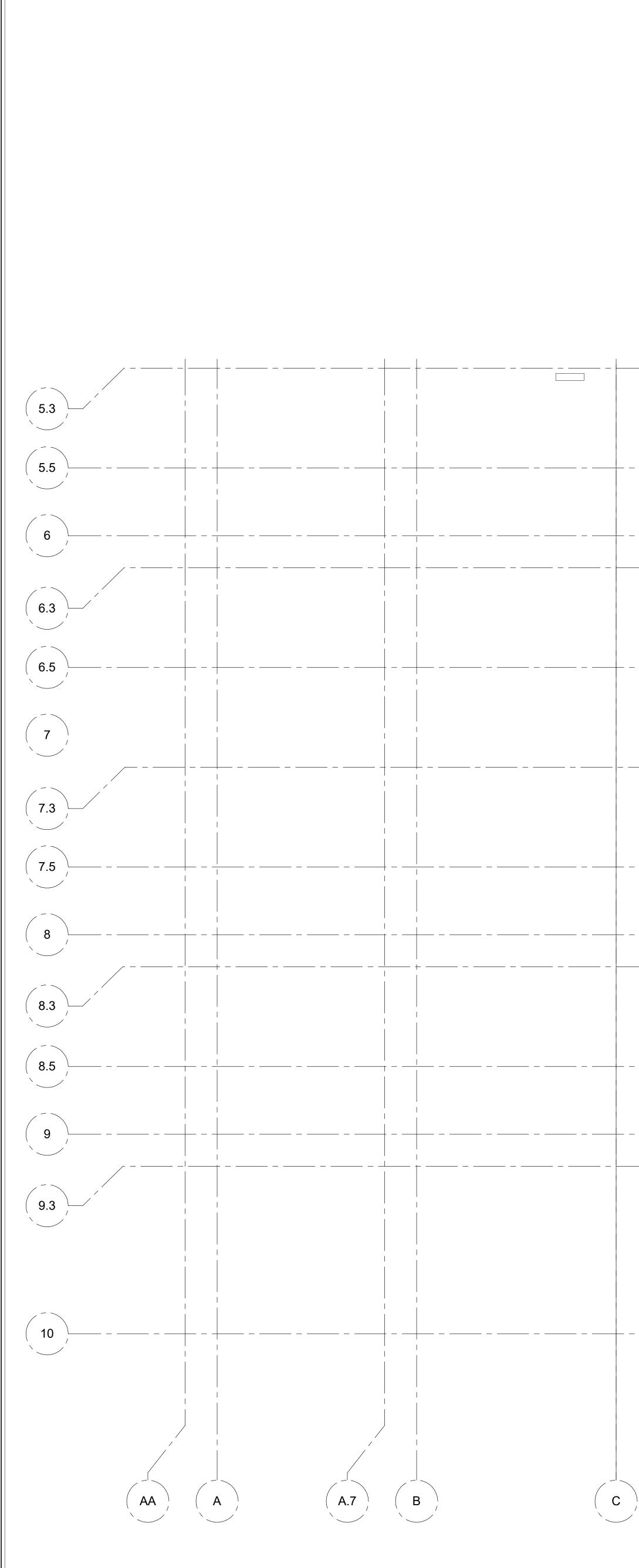
	POWER SYMBOL LIST
SYMBOL	DESCRIPTION
ТМ	TABLE MONUMENT

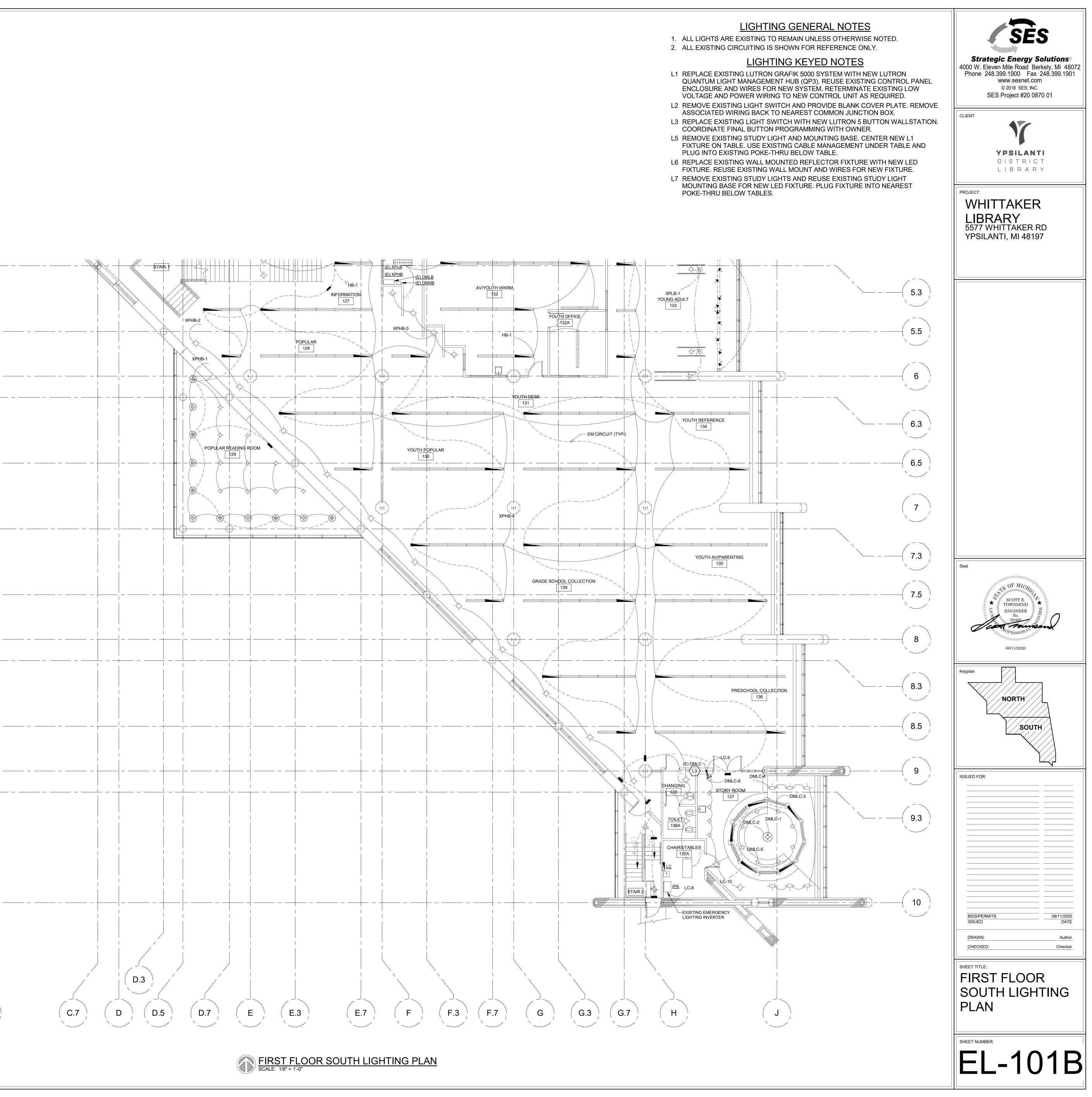
## DRAWING INDEX

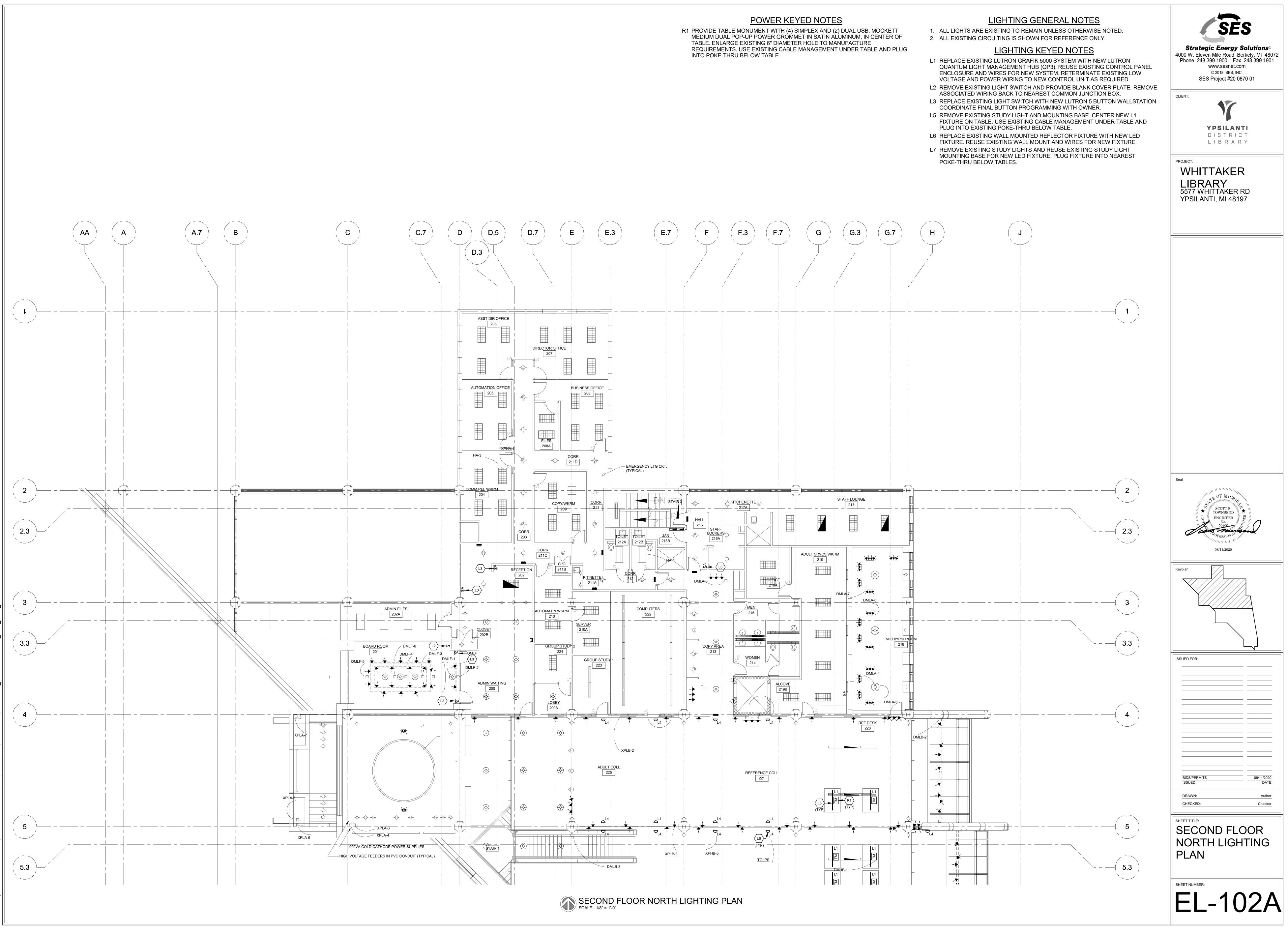
SHEET NO	DESCRIPTION
F 000	ELECTRICAL GENERAL INFORMATION
E-000	ELECTRICAL GENERAL INFORMATION
EL-101A	FIRST FLOOR NORTH LIGHTING PLAN
EL-101B	FIRST FLOOR SOUTH LIGHTING PLAN
EL-102A	SECOND FLOOR NORTH LIGHTING PLAN
EL-102B	SECOND FLOOR SOUTH LIGHTING PLAN
E-600	PANEL SCHEDULES
E-700	ELECTRICAL RISER DIAGRAM
E-800	ELECTRICAL SPECIFICATIONS

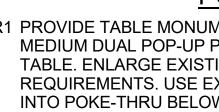


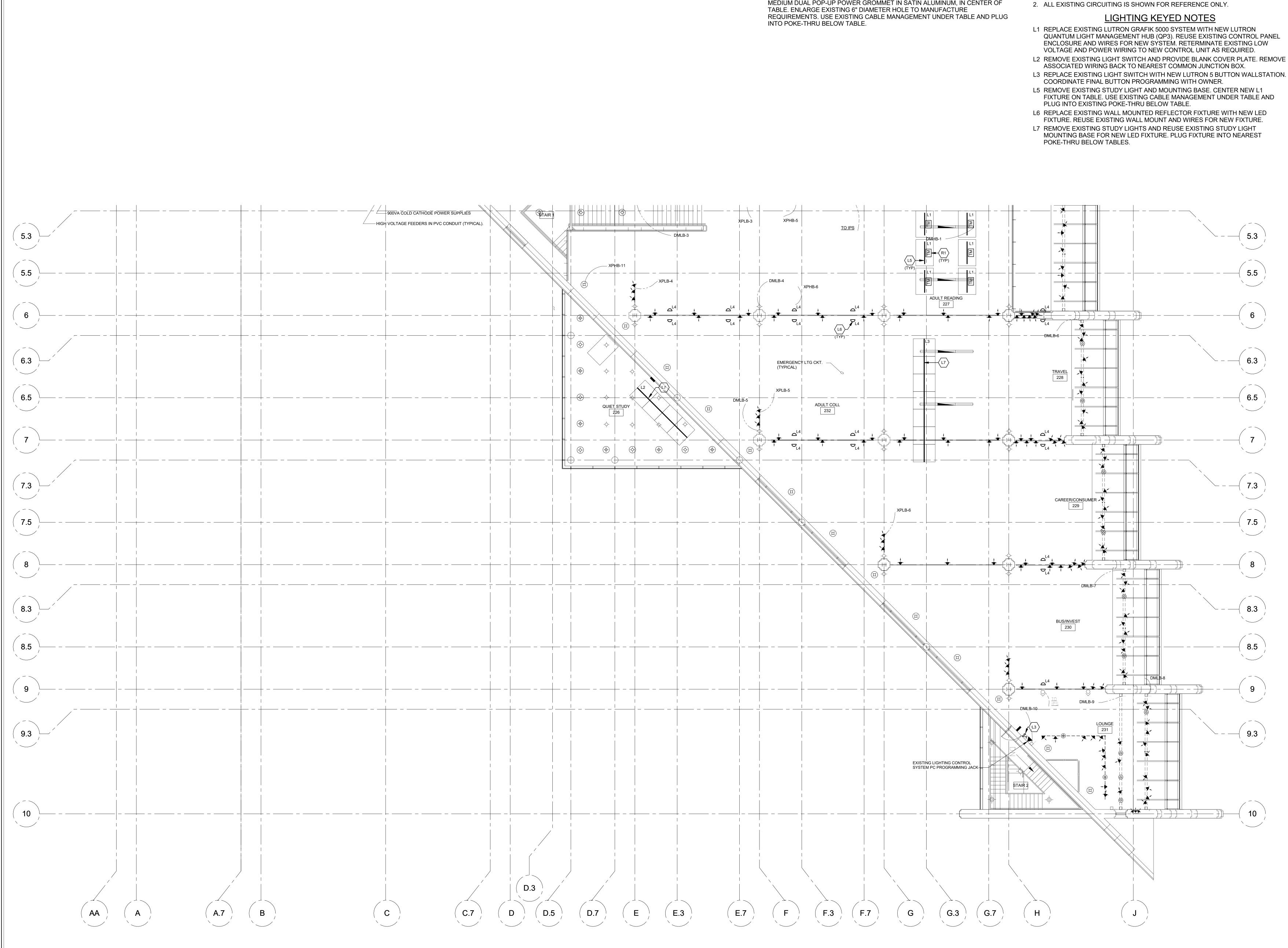












SECOND FLOOR SOUTH LIGHTING PLAN SCALE: 1/8" = 1'-0"

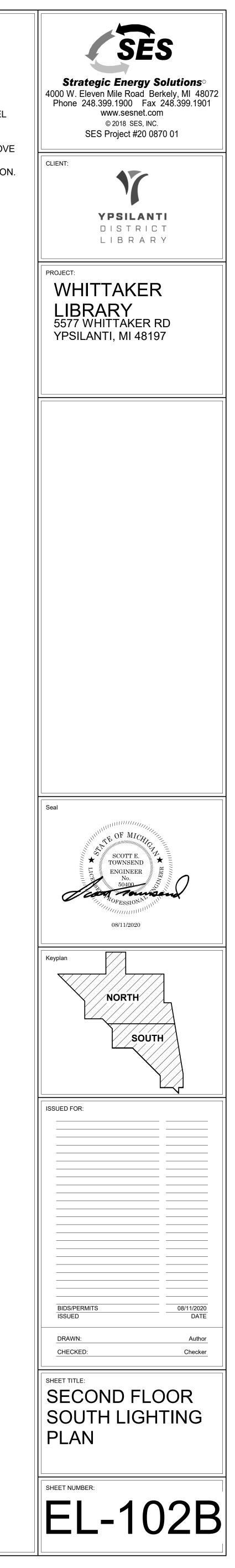
## POWER KEYED NOTES

R1 PROVIDE TABLE MONUMENT WITH (4) SIMPLEX AND (2) DUAL USB, MOCKETT MEDIUM DUAL POP-UP POWER GROMMET IN SATIN ALUMINUM, IN CENTER OF

## LIGHTING GENERAL NOTES

1. ALL LIGHTS ARE EXISTING TO REMAIN UNLESS OTHERWISE NOTED.

- QUANTUM LIGHT MANAGEMENT HUB (QP3). REUSE EXISTING CONTROL PANEL ENCLOSURE AND WIRES FOR NEW SYSTEM. RETERMINATE EXISTING LOW



	DIMMER PANEL SCHEDULE									
PANEL:	PANEL: DMLC - STORY ROOM 120V, 1PH									
ZONE	LOAD DESCRIPTION	CIRCUIT #	VOLTAGE	FEED TYPE	LOAD TYPE	FIXTURE LOAD	QUANTITY	TOTAL LOAD		
1	PENDANT MR DOWNLIGHT	1	120	NORMAL	MAGNETIC LV	62	1	62		
2	PENDANT UPLIGHT	1	120	NORMAL	FLUORESCENT	150	1	150		
3	COVE LIGHTS	1	120	NORMAL	FLUORESCENT	55	11	605		
4	WALL WASHERS	1	120	NORMAL	FLUORESCENT	42	6	252		
5	CIRCLE DOWNLIGHTS	1	120	NORMAL	FLUORESCENT	20	8	160		
6	EDGE DOWNLIGHTS	1	120	NORMAL	FLUORESCENT	22	7	154		
							KVA:	1.383		

		DIMMER PANE	L SCHEDULE				
PANEL:	: DMHA					277/480V	′, 3PH, 4W
ZONE	LOAD DESCRIPTION	LOAD TYPE	LOAD	DIMMER CIRCUIT	А	В	С
1	MULTI-PURPOSE PENDANTS - EAST	FLD	252	1	252		
2	MULTI-PURPOSE PENDANTS - WEST	FLD	252	2		252	
3	MULTI-PURPOSE DOWNLIGHTS - EAST	FLD	504	3			504
4	MULTI-PURPOSE DOWNLIGHTS - WEST	FLD	504	4	504		
5				5		0	
6				6			0
7				7	0		
8				8		0	
				TOTAL	756	252	504

	DIMMER PANEL SCHEDULE									
PANEL: DMLF - BOARD ROOM 120V, 1PH										
ZONE	LOAD DESCRIPTION	CIRCUIT #	VOLTAGE	FEED TYPE	LOAD TYPE	FIXTURE LOAD	QUANTITY	TOTAL LOAD		
1	PENDANT DOWNLIGHTS	1	120	NORMAL	FLUORESCENT	32	4	128		
2	SCREEN ACCENT LIGHTS	1	120	NORMAL	MAGNETIC LV	62	4	248		
3	TABLE ACCENT LIGHTS	1	120	NORMAL	MAGNETIC LV	62	8	496		
4	L. SIDE ACCENT LIGHTS	1	120	NORMAL	MAGNETIC LV	62	5	310		
5	R. SIDE ACCENT LIGHTS	1	120	NORMAL	MAGNETIC LV	62	3	186		
6	END ACCENT LIGHTS	1	120	NORMAL	MAGNETIC LV	62	2	124		
	·						KVA:	1.492		

PANEL:	DMLA
ZONE	LOAD DE
1	MULTI-PURPOSE ACCEN
2	QUEING ACCENT LIGHTS
3	COPY #213 ACCENT LIGI
4	MICH/YPSI PENDANT M
5	MICH/YPSI PENDANT U
6	MICH/YPSI ACCENT LIGH
7	MICH/YPSI ACCENT LIGH
8	

DIMMER PANEL SCHEDULE									
PANEL: DMHB 277/480V, 3PH, 4W							, 3PH, 4W		
ZONE	LOAD DESCRIPTION	LOAD TYPE	LOAD	DIMMER CIRCUIT	А	В	С		
1	ADULT PENDANT FLUORESCENTS	FLD	972	1	972				
2				2		0			
3				3			0		
	TOTAL 972 0 0								

		DIMMER PANE	L SCHEDULE				
PANEL	: DMLB					120/208V	, 3PH, 4W
ZONE	LOAD DESCRIPTION	LOAD TYPE	LOAD	DIMMER CIRCUIT	А	В	С
1	AV/YOUNG ADULT CABLE LIGHTS	MLV	1200	1	1200		
2	AV/YOUNG ADULT HIGH CABLE LIGHTS	MLV	1200	2		1200	
3	COLUMN 4/5 UP/DOWN ACCENTS	MLV	1200	3			1200
4	COLUMN 6 UP/DOWN ACCENTS	MLV	800	4	800		
5	COLUMN 7/8/9 UP/DOWN ACCENTS	MLV	1200	5		1200	
6	TRAVEL/CAREER CABLE LIGHTS	MLV	1200	6			1200
7	BUSINESS CABLE LIGHTS	MLV	600	7	600		
8	LOUNGE CABLE LIGHTS	MLV	600	8		600	
9	LOUNGE CABLE LIGHTS	MLV	600	9			600
10	LOUNGE LV TRACK	MLV	600	10	600		
11	LOUNGE FIREPLACE FLUO COVE	FLD	200	11		200	
12				12			0
	•			TOTAL	3200	3200	3000

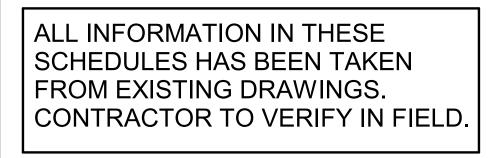
	DIMMER PANE	L SCHEDULE				
					120/208	′, 3PH, 4W
SCRIPTION	LOAD TYPE	LOAD	DIMMER CIRCUIT	А	В	С
T LIGHTS	MLV	200	1	200		
5	MLV	450	2		450	
ITS	MLV	450	3			450
R DOWNLIGHTS	MLV	150	4	150		
PLIGHTS	FLD	450	5		450	
ITS	MLV	1200	6			1200
ITS	MLV	950	7	950		
			8		0	
			TOTAL	1300	900	1650

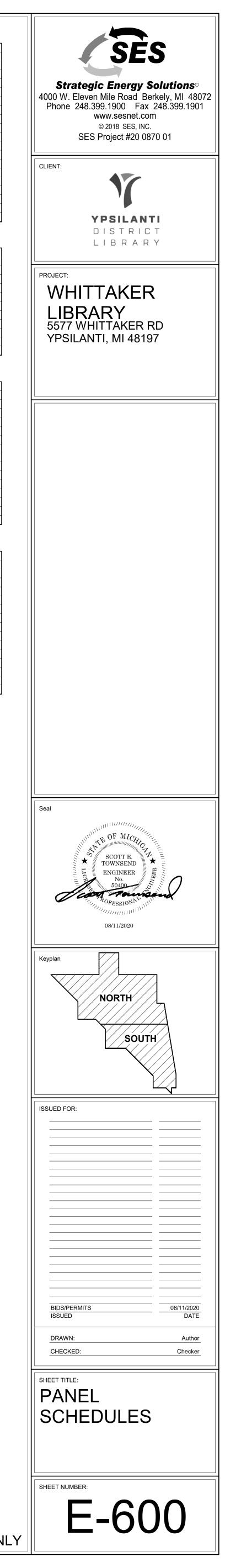
		RELAY PANEL SCHEDULE		
PANEL:	XPHA			
CONTROL ZONE	CIRCUIT	LOAD DESCRIPTION	LOAD TYPE	LOAD
	1	AUDIO/VISUAL #120 LOBBY	FLUO/HID	3040
	2	MULTI-PURPOSE SCONCE EAST	FLUORESCENT	162
	3	MULTI-PURPOSE SCONCE WEST	FLUORESCENT	162
	4	2ND FLOOR CORRIDOR/ADMIN WAIT	FLUORESCENT	1324
	5	NORTH PARKING LOT - CKT. A	HID	1500
	6	NORTH PARKING LOT - CKT. B	HID	1500
	7	ROADWAY - CKT. C	HID	500
	8	PLAZA - CKT. D	HID	1830
	9	PLAZA - CKT. E	HID	1952
	10	SOUTH PARKING - CKT. F	HID	1500
	11	SOUTH PARKING - CKT. G	HID	1320
	12	SOUTH WALL WASH - CKT. H	HID	1050
	13	BUTTRESS UPLIGHTS - CKT. K	HID	2730
	14	EXTERIOR WALL MTD. AREA LIGHTS	HID	1190
	15			
	16			

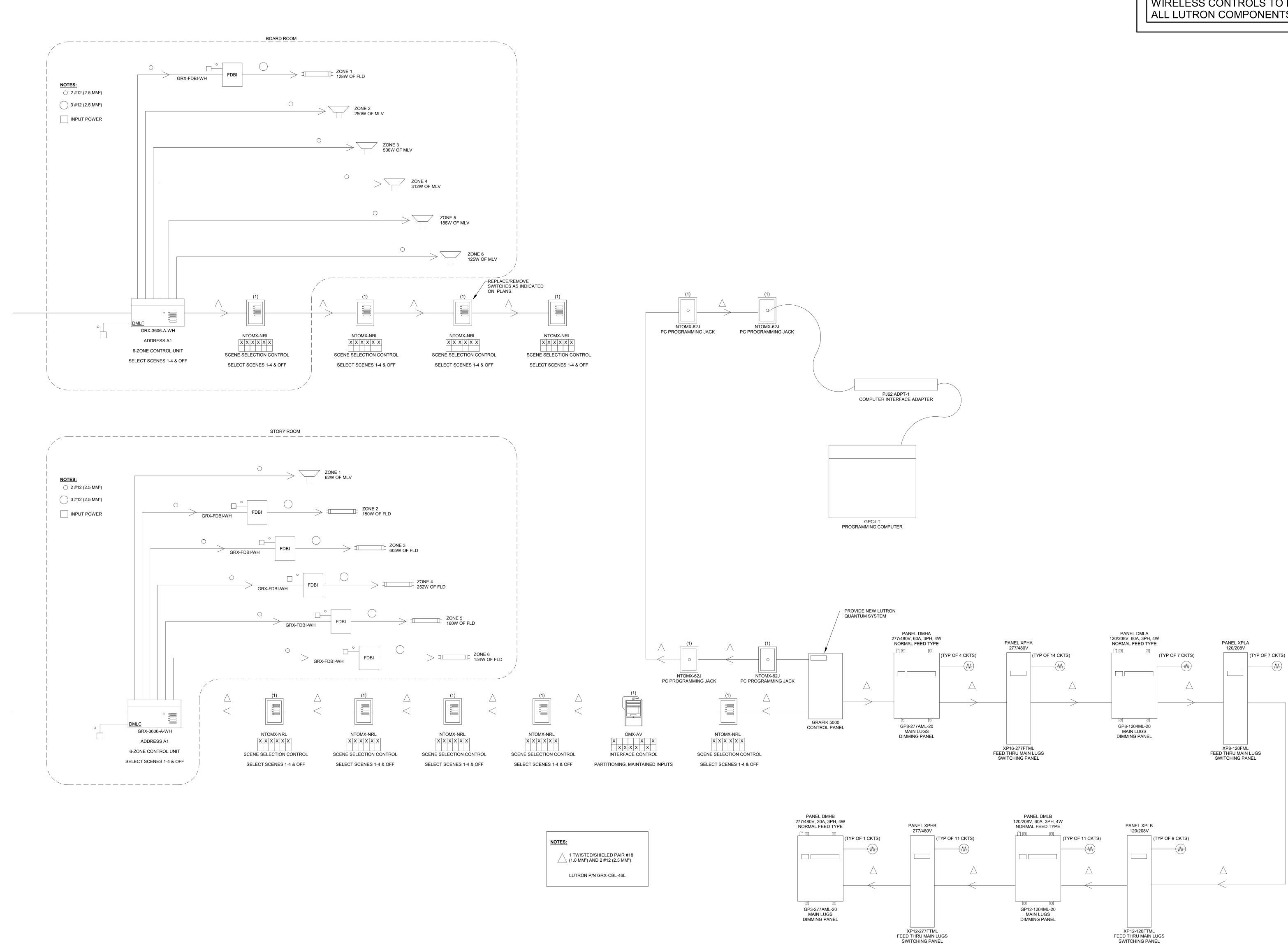
		RELAY PANEL SCHEDULE		
PANEL:	XPHA			
CONTROL ZONE	CIRCUIT	LOAD DESCRIPTION	LOAD TYPE	LOAD
	1	1ST PENDANT UPLIGHTS	FLUORESCENT	1200
	2	1ST PENDANT MR DOWNLIGHTS	MLV	400
	3	LOBBY COLD CATHODE	CC	900
	4	LOBBY COLD CATHODE	CC	900
	5	VESTIBULE COLD CATHODE	CC	1080
	6	BUTTRESS NEON	NEON	1000
	7	BUTTRESS NEON	NEON	1000
	8			

		RELAY PANEL SCHEDULE		
PANEL:	ХРНВ			
CONTROL ZONE	CIRCUIT	LOAD DESCRIPTION	LOAD TYPE	LOAD
	1	TRIANGULAR BAYS #129/229 LTG	FL	1768
	2	1ST FLOOR ANGULAR WALL DWN LTS	FL	352
	3	POPULAR/YOUTH POP/YOUTH REF	FL	3450
	4	GRADE SCHOOL/PARENT/PRESCH	FL	2968
	5	COLUMN 4/5 HID INDIRECT/PENDANTS	HID/FL	2779
	6	COLUMN 6/7/8/9 HID INDIRECT	HID/FL	3500
	7	NW STACK LIGHTING	FL	2730
	8	MIDDLE STACK LIGHTING	FL	3432
	9	SE STACK LIGHTING	FL	3432
	10	ADULT STACK LIGHTING	FL	1755
	11	2ND FLOOR ANGLED WALL PENDANTS	FL	546
	12			

		RELAY PANEL SCHEDULE		
PANEL:	XPLB			
CONTROL ZONE	CIRCUIT	LOAD DESCRIPTION	LOAD TYPE	LOAD
	1	YOUNG ADULT SHELF/TASK LIGHTING	FL	330
	2	COLUMN 4 TRACK LIGHTING	HID	675
	3	COLUMN 5 TRACK LIGHTING	HID	1170
	4	COLUMN 6 TRACK LIGHTING	HID	1260
	5	COLUMN 7 TRACK LIGHTING	HID	1080
	6	COLUMN 8/9/10 TRACK LIGHTING	HID	1170
	7	REFERENCE SHELF LIGHTING	FL	1280
	8	ADULT READING SHELF LIGHTING	FL	785
	9	ADULT READING TABLE LIGHTING	FL	1480
	10			
	11			
	12			

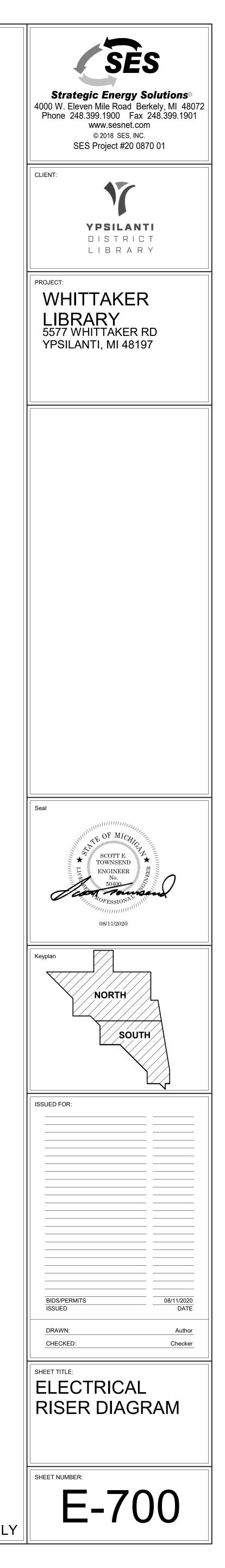






# EXISTING ELECTRICAL ONE-LINE/RISER DIAGRAM

## CONTRACTOR MAY PROPOSE TO PROVIDE A COMPLETELY NEW SYSTEM UTILIZING ACUITY NLIGHT WIRELESS CONTROLS TO REPLACE ALL LUTRON COMPONENTS.



### BASIC ELECTRICAL REQUIREMENTS PART 1 GENERAL

- 1.01 RELATED DOCUMENTS A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS, SPECIAL CONDITIONS AND DIVISION 1
- SPECIFICATION SECTIONS, APPLY TO WORK OF THIS SECTION. B. PROVIDE ALL ITEMS, ARTICLES, MATERIALS, OPERATIONS OR METHODS LISTED, MENTIONED OR SCHEDULED ON DRAWINGS AND/OR HEREIN, INCLUDING ALL LABOR, MATERIALS, EQUIPMENT AND INCIDENTALS NECESSARY AND REQUIRED FOR THEIR COMPLETION.
- 1 02 DRAWINGS A. THE DRAWINGS SHOW THE LOCATION AND GENERAL ARRANGEMENT OF EQUIPMENT, ELECTRICAL SYSTEMS AND RELATED ITEMS. THEY SHALL BE
- FOLLOWED AS CLOSELY AS ELEMENTS OF THE CONSTRUCTION WILL PERMIT B DEVIATIONS FROM THE DRAWINGS WITH THE EXCEPTION OF MINOR CHANGES IN ROUTING AND OTHER SUCH INCIDENTAL CHANGES THAT DO NOT AFFECT THE FUNCTIONING OR SERVICEABILITY OF THE SYSTEMS, SHALL NOT BE MADE WITHOUT THE WRITTEN APPROVAL OF THE ARCHITECT/ENGINEER.
- 1.03 CODES, PERMITS AND FEES A. UNLESS OTHERWISE INDICATED, ALL REQUIRED PERMITS, LICENSES, INSPECTIONS, APPROVALS AND FEES FOR ELECTRICAL WORK SHALL BE SECURED AND PAID FOR BY THE CONTRACTOR. ALL WORK SHALL CONFORM TO ALL APPLICABLE CODES, RULES AND REGULATIONS. B. RULES OF LOCAL UTILITY COMPANIES SHALL BE COMPLIED WITH.
- C. ALL WORK SHALL BE EXECUTED IN ACCORDANCE WITH THE RULES AND REGULATIONS SET FORTH IN LOCAL AND STATE CODES. PREPARE ANY DETAILED DRAWINGS OR DIAGRAMS WHICH MAY BE REQUIRED BY THE GOVERNING AUTHORITIES. WHERE THE DRAWINGS AND/OR SPECIFICATIONS INDICATE MATERIALS OR CONSTRUCTION IN EXCESS OF CODE REQUIREMENTS. THE DRAWINGS AND/OR SPECIFICATIONS SHALL GOVERN.
- 1.04 STANDARDS OF MATERIAL AND WORKMANSHIP A. ALL MATERIALS SHALL BE NEW. THE ELECTRICAL AND PHYSICAL PROPERTIES OF ALL MATERIALS, AND THE DESIGN, PERFORMANCE CHARACTERISTICS, AND METHODS OF CONSTRUCTION OF ALL ITEMS OF EQUIPMENT. SHALL BE IN ACCORDANCE WITH THE LATEST ISSUE OF THE VARIOUS. APPLICABLE STANDARD SPECIFICATIONS OF THE FOLLOWING RECOGNIZED AUTHORITIES: 1. A.N.S.I.AMERICAN NATIONAL STANDARDS INSTITUTE 2. A.S.T.M.AMERICAN SOCIETY FOR TESTING MATERIALS
- . I.C.E.A.INSULATED CABLE ENGINEERS ASSOCIATION 4. I.E.E.INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS 5. N.E.C.NATIONAL ELECTRICAL CODE
- 6. N.E.M.A.NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION 7. U.L.UNDERWRITERS LABORATORIES, INC. B. ALL EQUIPMENT OF THE SAME OR SIMILAR SYSTEMS SHALL BE BY THE SAME MANUFACTURER. 1.05 RECORD DRAWINGS
- A. PROVIDE COMPLETE OPERATING AND MAINTENANCE INSTRUCTION MANUALS COVERING ALL ELECTRICAL EQUIPMENT HEREIN SPECIFIED, TOGETHER WITH PARTS LISTS. ALL LITERATURE SHALL BE SUBMITTED TO THE ENGINEER IN AN
- FI FCTRONIC FORMAT B. THE OPERATING AND MAINTENANCE INSTRUCTIONS SHALL INCLUDE A BRIEF, GENERAL DESCRIPTION FOR ALL ELECTRICAL SYSTEMS INCLUDING, BUT NOT LIMITED TO; ROUTINE MAINTENANCE PROCEDURES, TROUBLE-SHOOTING PROCEDURES AND SHOP DRAWINGS. C. ANY EQUIPMENT OFFERED AS A SUBSTITUTION SHALL BE EQUAL IN QUALITY
- DURABILITY, APPEARANCE, AMPACITY, AND EFFICIENCY THROUGH ALL RANGES OF OPERATION, SHALL CONFORM WITH ARRANGEMENTS AND SPACE LIMITATIONS OF THE EQUIPMENT SHOWN ON THE PLANS AND/OR SPECIFIED, SHALL BE COMPATIBLE WITH THE OTHER COMPONENTS OF THE SYSTEM. ALL COSTS TO MAKE THESE ITEMS OF EQUIPMENT COMPLY WITH THESE REQUIREMENTS INCLUDING, BUT NOT LIMITED TO, CONDUIT, WIRING, BUS WORK, ENCLOSURES AND BUILDING ALTERATIONS SHALL BE INCLUDED IN THE ORIGINAL BID. SIMILAR EQUIPMENT SHALL BE BY ONE MANUFACTURER. 1.06 SHOP DRAWINGS/SUBMITTALS
- A. ALL SHOP DRAWINGS SHALL BE SUBMITTED IN GROUPINGS OF SIMILAR AND/OR RELATED ITEMS (LIGHTING FIXTURES, SWITCHGEAR, ETC.). INCOMPLETE SUBMITTAL GROUPINGS WILL BE RETURNED UNCHECKED. B. SUBMIT FOR APPROVAL SHOP DRAWINGS FOR ALL ELECTRICAL SYSTEMS OR EQUIPMENT BUT NOT LIMITED TO THE SECTIONS OF SPECIFICATIONS. WHERE ITEMS ARE REFERRED TO BY SYMBOLIC DESIGNATION ON THE DRAWINGS AND SPECIFICATIONS, ALL SUBMITTALS SHALL BEAR THE SAME DESIGNATION (LIGHT FIXTURES). REFER TO OTHER SECTIONS OF THE ELECTRICAL SPECIFICATIONS
- FOR ADDITIONAL REQUIREMENTS. 1.07 MANUFACTURERS LISTED A. THE LISTING OF SPECIFIC MANUFACTURERS DOES NOT IMPLY ACCEPTANCE OF THEIR PRODUCTS THAT DO NOT MEET THE SPECIFIED RATINGS, FEATURES AND FUNCTIONS. MANUFACTURERS LISTED ARE NOT RELIEVED FROM MEETING THESE SPECIFICATIONS IN THEIR ENTIRETY
- B. PRODUCTS IN COMPLIANCE WITH THE SPECIFICATION AND MANUFACTURED BY OTHERS NOT NAMED WILL BE CONSIDERED ONLY IF PRE-APPROVED BY THE ENGINEER TEN (10) DAYS PRIOR TO BID DATE. 1.08 USE OF EQUIPMENT A. THE USE OF ANY EQUIPMENT, OR ANY PART THEREOF FOR PURPOSES OTHER THAN TESTING EVEN WITH THE OWNER'S CONSENT, SHALL NOT BE CONSTRUED
- TO BE AN ACCEPTANCE OF THE WORK ON THE PART OF THE OWNER, NOR BE CONSTRUED TO OBLIGATE THE OWNER IN ANY WAY TO ACCEPT IMPROPER WORK OR DEFECTIVE MATERIALS. B. DO NOT USE OWNER'S LAMPS FOR TEMPORARY LIGHTING EXCEPT AS ALLOWE AND DIRECTED BY THE OWNER. EQUIP LIGHTING FIXTURES WITH NEW LAMPS WHEN THE PROJECT IS TURNED OVER TO THE OWNER. PART 2 EXECUTION
- 2.01 INSTALLATION OF EQUIPMENT A. INSTALL ALL EQUIPMENT IN STRICT ACCORDANCE WITH ALL DIRECTIONS AND RECOMMENDATIONS FURNISHED BY THE MANUFACTURER WHERE SUCH DIRECTIONS ARE IN CONFLICT WITH THE DRAWINGS AND SPECIFICATIONS REPORT SUCH CONFLICTS TO THE ENGINEER FOR RESOLUTION.
- B. DO NOT PENETRATE OR OTHERWISE NOTCH OR CUT STRUCTURAL MEMBERS INCLUDING FOOTINGS AND GRADE BEAMS. C. MAKE PENETRATIONS PERPENDICULAR TO SURFACES UNLESS OTHERWISE
- D. PROVIDE SLEEVES FOR PENETRATIONS AS INDICATED OR AS REQUIRED TO FACILITATE INSTALLATION. SET SLEEVES FLUSH WITH EXPOSED SURFACES
- UNLESS OTHERWISE INDICATED OR REQUIRED. 2.02 COORDINATION A. INSTALL WORK TO AVOID INTERFERENCE WITH WORK OF OTHER TRADES. REMOVE AND RELOCATE ANY WORK THAT CAUSES AN INTERFERENCE AT CONTRACTOR'S EXPENSE. DISPUTES REGARDING THE CAUSE OF AN INTERFERENCE WILL BE
- RESOLVED BY THE CONSTRUCTION MANAGER OR ARCHITECT/ENGINEER. 2.03 CUTTING PATCHING AND DAMAGE TO OTHER WORK A. REFER TO GENERAL CONDITIONS FOR REQUIREMENTS. B ALL CUTTING PATCHING AND REPAIR WORK SHALL BE PERFORMED BY THE CONTRACTOR THROUGH APPROVED, QUALIFIED SUBCONTRACTORS. CONTRACTOR SHALL INCLUDE FULL COST OF SAME IN BID.
- 2.04 EQUIPMENT FOUNDATION AND SUPPORTS A. SHALL BE AS REQUIRED OR AS SHOWN ON PLANS OR SPECIFIED. B. FOR EQUIPMENT SUSPENDED FROM CEILINGS OR WALLS, FURNISH AND INSTALL ALL INSERTS, RODS, STRUCTURAL STEEL FRAMES, BRACKETS AND PLATFORMS 2.05 EQUIPMENT CONNECTIONS
- A. MAKE CONNECTIONS TO EQUIPMENT, MOTORS, LIGHTING FIXTURES, AND OTHER TEMS INCLUDED IN THE WORK IN ACCORDANCE WITH THE APPROVED SHOP DRAWINGS AND ROUGH-IN MEASUREMENTS FURNISHED BY THE MANUFACTURERS OF THE PARTICULAR EQUIPMENT FURNISHED. ALL ADDITIONAL CONNECTIONS NOT SHOWN ON THE DRAWINGS, BUT CALLED OUT BY THE EQUIPMENT MANUFACTURER'S SHOP DRAWINGS SHALL BE PROVIDED. 2.06 CLEANING
- A. ALL DEBRIS SHALL BE REMOVED DAILY AS REQUIRED TO MAINTAIN THE WORK AREA IN A NEAT, ORDERLY CONDITION B. FINAL CLEANUP SHALL INCLUDE. BUT NOT BE LIMITED TO. WASHING OF FIXTURE LENSES OR LOUVERS, SWITCHBOARDS, SUBSTATIONS, MOTOR CONTROL CENTERS, PANELS, ETC. FIXTURE REFLECTORS AND LENSES OR LOUVERS SHALL BE LEFT WITH NO WATER MARKS OR CLEANING STREAKS. 2.07 PROTECTION AND HANDLING OF EQUIPMENT AND MATERIALS
- A. EQUIPMENT AND MATERIALS SHALL BE PROTECTED FROM THEFT, INJURY OR B. PROTECT CONDUIT OPENINGS WITH TEMPORARY PLUGS OR CAPS. . PROVIDE ADEQUATE STORAGE FOR ALL EQUIPMENT AND MATERIALS DELIVERED TO THE JOB SITE. LOCATION OF THE SPACE WILL BE DESIGNATED BY THE CONSTRUCTION MANAGER OR ARCHITECT/ENGINEER. EQUIPMENT SET IN PLACE IN UNPROTECTED AREAS MUST BE PROVIDED WITH TEMPORARY PROTECTION.
- 2.08 EXTRA WORK A. FOR ANY EXTRA ELECTRICAL WORK WHICH MAY BE PROPOSED. THIS CONTRACTOR SHALL FURNISH TO THE CONSTRUCTION MANAGER AN ITEMIZED BREAKDOWN OF THE ESTIMATED COST OF THE MATERIALS AND LABOR REQUIRED TO COMPLETE THIS WORK. THE CONTRACTOR SHALL PROCEED ONLY AFTER RECEIVING A WRITTEN ORDER FROM THE CONSTRUCTION MANAGER ESTABLISHING THE AGREED PRICE AND DESCRIBING THE WORK TO BE DONE. 2.09 DRAWINGS AND MEASUREMENTS
- A. THESE SPECIFICATIONS AND ACCOMPANYING DRAWINGS ARE INTENDED TO DESCRIBE AND PROVIDE FOR FINISHED WORK. THEY ARE INTENDED TO BE COOPERATIVE, AND WHAT IS CALLED FOR BY EITHER SHALL BE AS BINDING AS IF CALL FOR BY BOTH. THE CONTRACTOR WILL UNDERSTAND THAT THE WORK HEREIN DESCRIBED SHALL BE COMPLETE IN EVERY DETAIL B. THE DRAWINGS ARE NOT INTENDED TO BE SCALED FOR ROUGH-IN MEASUREMENTS NOR TO SERVE AS SHOP DRAWINGS. FIELD MEASUREMENTS NECESSARY FOR ORDERING MATERIALS AND FITTING THE INSTALLATION TO THE
- BUILDING CONSTRUCTION AND ARRANGEMENT SHALL BE TAKEN BY THE CONTRACTOR. THE CONTRACTOR SHALL CHECK LATEST ARCHITECTURAL DRAWINGS AND LOCATE LIGHT SWITCHES FROM SAME WHERE DOOR SWINGS ARE DIFFERENT FROM ELECTRICAL DRAWINGS.

### MINOR ELECTRICAL DEMOLITION PART 1 GENERAL

1.01 SUMMARY

- A. THE WORK COVERED UNDER THIS SECTION CONSISTS OF THE FURNISHING OF ALL NECESSARY LABOR, SUPERVISION, MATERIALS, EQUIPMENT, AND SERVICES TO COMPLETELY EXECUTE THE SYSTEM OF MINOR ELECTRICAL DEMOLITION AS DESCRIBED IN THIS SPECIFICATION.
- B. IT IS THE CONTRACTORS OBLIGATION TO BECOME FAMILIAR WITH THE EXTENT OF DEMOLITION AND THE EXISTING CONDITION BEFORE SUBMITTING THEIR BID.
- . DURING DEMOLITION IF THE CONTRACTOR DISCOVERS UNFORSEEN SIGNIFICANT NON CODE COMPLIANCE CONDITIONS OF THE EXISTING INSTALLATION THEY SHALL NOTIFY THE ARCHITECT AND ENGINEER IMMEDIATELY IN WRITING D. DURING DEMOLITION THE CONTRACTOR SHALL RECORD ON THE AS-BUILTS ALL
- DEMOLISHED CIRCUITS NUMBERS THAT CAN BE USED FOR NEW CIRCUITING. PART 2 EXECUTION 2.01 EXAMINATION A. VERIFY THAT ABANDONED WIRING AND EQUIPMENT SERVE ONLY ABANDONED
- FACILITIES B. DEMOLITION DRAWINGS ARE BASED ON CASUAL FIELD OBSERVATION AND EXISTING RECORD DOCUMENTS. C. REPORT DISCREPANCIES TO OWNER BEFORE DISTURBING EXISTING NSTALLATION D. BEGINNING OF DEMOLITION MEANS INSTALLER ACCEPTS EXISTING CONDITIONS.
- 2.02 PREPARATION A. DISCONNECT ELECTRICAL SYSTEMS IN WALLS, FLOORS, AND CEILINGS TO BE REMOVED. B. PROVIDE TEMPORARY WIRING AND CONNECTIONS TO MAINTAIN EXISTING SYSTEMS IN SERVICE DURING CONSTRUCTION WHEN WORK MUST BE PERFORMED ON ENERGIZED EQUIPMENT OR CIRCUITS, USE PERSONNEL EXPERIENCED IN SUCH OPERATIONS.
- 2.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK A. REMOVE, RELOCATE, AND EXTEND EXISTING INSTALLATIONS TO ACCOMMODATE
- NEW CONSTRUCTION. B. REMOVE ABANDONED WIRING TO SOURCE OF SUPPLY. . REMOVE EXPOSED ABANDONED CONDUIT, INCLUDING ABANDONED CONDUIT ABOVE ACCESSIBLE CEILING FINISHES. CUT CONDUIT FLUSH WITH WALLS AND
- FLOORS, AND PATCH SURFACES. . DISCONNECT ABANDONED OUTLETS AND REMOVE DEVICES. REMOVE ABANDONED OUTLETS IF CONDUIT SERVICING THEM IS ABANDONED AND REMOVED. PROVIDE
- BLANK COVER FOR ABANDONED OUTLETS THAT ARE NOT REMOVED E. DISCONNECT AND REMOVE ABANDONED PANELBOARDS AND DISTRIBUTION EQUIPMENT.
- F. DISCONNECT AND REMOVE ABANDONED LUMINAIRES. REMOVE BRACKETS, STEMS, HANGERS AND OTHER ACCESSORIES G. REPAIR ADJACENT CONSTRUCTION AND FINISHES DAMAGED DURING DEMOLITION
- AND EXTENSION WORK H. MAINTAIN ACCESS TO EXISTING ELECTRICAL INSTALLATIONS THAT REMAIN ACTIVE. MODIFY INSTALLATION OR PROVIDE ACCESS PANEL AS APPROPRIATE
- I. EXTEND EXISTING INSTALLATIONS USING MATERIALS AND METHODS COMPATIBLE WITH EXISTING ELECTRICAL INSTALLATIONS, OR AS SPECIFIED. 2.04 CLEANING AND REPAIR A. CLEAN AND REPAIR EXISTING MATERIALS AND EQUIPMENT THAT REMAIN OR THAT

ARE TO BE REUSED.

### <u>CABLES</u> PART 1 PRODUCTS 1.01 CONDUCTOR AND CABLE APPLICATIONS A. DO NOT USE CONDUCTORS AND CABLES FOR APPLICATIONS OTHER THAN AS PERMITTED BY NFPA 70 AND PRODUCT LISTING. B. PROVIDE SINGLE CONDUCTOR BUILDING WIRE INSTALLED IN SUITABLE RACEWAY UNLESS OTHERWISE INDICATED. PERMITTED. OR REQUIRED. C. METAL-CLAD CABLE IS PERMITTED ONLY AS FOLLOWS: 1 WHERE NOT OTHERWISE RESTRICTED, MAY BE USED a. WHERE CONCEALED ABOVE ACCESSIBLE CEILINGS FOR FINAL CONNECTIONS FROM JUNCTION BOXES TO LUMINAIRES 1) MAXIMUM I ENGTH: 6 FEFT b. WHERE CONCEALED IN HOLLOW STUD WALLS, ABOVE ACCESSIBLE CEILINGS. AND UNDER RAISED FLOORS FOR BRANCH CIRCUITS UP TO 20 A. 1) EXCEPTION: PROVIDE SINGLE CONDUCTOR BUILDING WIRE IN RACEWAY FOR CIRCUIT HOMERUN FROM FIRST OUTLET TO PANELBOARD. 2. IN ADDITION TO OTHER APPLICABLE RESTRICTIONS, MAY NOT BE USED

- a. WHERE EXPOSED TO DAMAGE. b. FOR DAMP, WET, OR CORROSIVE LOCATIONS, UNLESS PROVIDED WITH A PVC JACKET LISTED AS SUITABLE FOR THOSE LOCATIONS. . MANUFACTURED WIRING SYSTEMS ARE NOT PERMITTED 1.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS
- A PROVIDE PRODUCTS THAT COMPLY WITH REQUIREMEN B. PROVIDE PRODUCTS LISTED, CLASSIFIED, AND LABELED AS SUITABLE FOR THE PURPOSE INTENDED C. UNLESS SPECIFICALLY INDICATED TO BE EXCLUDED, PROVIDE ALL REQUIRED CONDUIT, BOXES, WIRING, CONNECTORS, ETC. AS REQUIRED FOR A COMPLETE
- OPERATING SYSTEM D. COMPLY WITH NEMA WC 70 . THERMOPLASTIC-INSULATED CONDUCTORS AND CABLES: LISTED AND LABELED AS COMPLYING WITH UL 83.
- COMPLYING WITH UL 44. G. CONDUCTOR MATERIAL I. PROVIDE COPPER CONDUCTORS. SUBSTITUTION OF ALUMINUM CONDUCTORS FOR COPPER IS NOT PERMITTED. CONDUCTOR SIZES INDICATED ARE BASED ON COPPER UNLESS SPECIFICALLY INDICATED AS ALUMINUM. CONDUCTORS
- DESIGNATED WITH THE ABBREVIATION "AL" INDICATE ALUMINUM. 2 COPPER CONDUCTORS SOFT DRAWN ANNEALED 98 PERCENT CONDUCTIVITY UNCOATED COPPER CONDUCTORS COMPLYING WITH ASTM B3. ASTM B8. OR ASTM B787/B787M UNI ESS OTHERWISE INDICATED 3. TINNED COPPER CONDUCTORS: COMPLY WITH ASTM B33
- H. CONDUCTOR COLOR CODING: 1. COLOR CODE CONDUCTORS AS INDICATED UNLESS OTHERWISE REQUIRED BY THE AUTHORITY HAVING JURISDICTION. MAINTAIN CONSISTENT COLOR CODING THROUGHOUT PROJECT 2. COLOR CODING METHOD: INTEGRALLY COLORED INSULATION. 3. COLOR CODE:
- a. 480Y/277 V, 3 PHASE, 4 WIRE SYSTEM: 1) PHASE A: BROWN 2) PHASE B: ORANGE.
- 3) PHASE C: YELLOW. 4) NEUTRAL/GROUNDED: GRAY b. 208Y/120 V. 3 PHASE, 4 WIRE SYSTEM: 1) PHASE A. BLACK 2) PHASE B. RED
- 3) PHASE C: BI UE 4) NEUTRAL/GROUNDED: WHITE c. EQUIPMENT GROUND, ALL SYSTEMS: GREEN 1.03 SINGLE CONDUCTOR BUILDING WIRE A. DESCRIPTION: SINGLE CONDUCTOR INSULATED WIRE. B. CONDUCTOR STRANDING: . FEEDERS AND BRANCH CIRCUITS:
- a. SIZE 12 AWG AND SMALLER: STRANDED b. SIZE 10 AWG AND LARGER: STRANDED. INSULATION VOLTAGE RATING: 600 V. INSULATION. 1. COPPER BUILDING WIRE: TYPE THHN/THWN OR THHN/THWN-2, EXCEPT AS INDICATED BELOW.
- 1.04 METAL-CLAD CABLE A. DESCRIPTION: NFPA 70, TYPE MC CABLE LISTED AND LABELED AS COMPLYING WITH UL 1569, AND LISTED FOR USE IN CLASSIFIED FIRESTOP SYSTEMS TO BE B. CONDUCTOR STRANDING: 1. SIZE 12 AWG AND SMALLER: STRANDED.
- 2. SIZE 10 AWG AND LARGER: STRANDED INSULATION VOLTAGE RATING: 600 V. INSULATION: TYPE THHN, THHN/THWN, OR THHN/THWN-2 . GROUNDING: FULL-SIZE INTEGRAL EQUIPMENT GROUNDING CONDUCTOR. ARMOR: STEEL, INTERLOCKED TAPE. G. PROVIDE PVC JACKET APPLIED OVER CABLE ARMOR WHERE INDICATED OR
- REQUIRED FOR ENVIRONMENT OF INSTALLED LOCATION. 1.05 WIRING CONNECTORS A. DESCRIPTION: WIRING CONNECTORS APPROPRIATE FOR THE APPLICATION, SUITABLE FOR USE WITH THE CONDUCTORS TO BE CONNECTED, AND LISTED AS COMPLYING WITH UL 486A-486B OR UL 486C AS APPLICABLE. PART 2 EXECUTION
- 2.01 INSTALLATION A CIRCUITING REQUIREMENTS 1. UNLESS DIMENSIONED, CIRCUIT ROUTING INDICATED IS DIAGRAMMATIC. WHEN CIRCUIT DESTINATION IS INDICATED WITHOUT SPECIFIC ROUTING. DETERMINE EXACT ROUTING REQUIRED. 3. ARRANGE CIRCUITING TO MINIMIZE SPLICES. 4. INCLUDE CIRCUIT LENGTHS REQUIRED TO INSTALL CONNECTED DEVICES WITHIN 10 FT OF LOCATION INDICATED 5. MAINTAIN SEPARATION OF CLASS 1, CLASS 2, AND CLASS 3 REMOTE-CONTROL
- SIGNALING, AND POWER-LIMITED CIRCUITS IN ACCORDANCE WITH NFPA 70. 6. MAINTAIN SEPARATION OF WIRING FOR EMERGENCY SYSTEMS IN ACCORDANCE WITH NFPA 70 B. PERFORM WORK IN ACCORDANCE WITH NECA 1 (GENERAL WORKMANSHIP). . INSTALL ALUMINUM CONDUCTORS IN ACCORDANCE WITH NECA 104. D. INSTALL METAL-CLAD CABLE (TYPE MC) IN ACCORDANCE WITH NECA 120. INSTALLATION IN RACEWAY 1. TAPE ENDS OF CONDUCTORS AND CABLES TO PREVENT INFILTRATION OF
- MOISTURE AND OTHER CONTAMINANTS 2. PULL ALL CONDUCTORS AND CABLES TOGETHER INTO RACEWAY AT SAME TIME 3 DO NOT DAMAGE CONDUCTORS AND CABLES OR EXCEED MANUFACTURER'S RECOMMENDED MAXIMUM PULLING TENSION AND SIDEWALL PRESSURE 4 USE SUITABLE WIRE PULLING LUBRICANT WHERE NECESSARY EXCEPT WHEN LUBRICANT IS NOT RECOMMENDED BY THE MANUFACTURER.
- JSING SUITABLE SUPPORTS AND METHODS APPROVED BY THE AUTHORITY HAVING JURISDICTION. PROVIDE INDEPENDENT SUPPORT FROM BUILDING STRUCTURE. DO NOT PROVIDE SUPPORT FROM RACEWAYS, PIPING, DUCTWORK, OR OTHER SYSTEMS G. TERMINATE CABLES USING SUITABLE FITTINGS. 1. METAL-CLAD CABLE (TYPE MC):
- a. USE LISTED FITTINGS. b. CUT CABLE ARMOR ONLY USING SPECIALIZED TOOLS TO PREVENT DAMAGING CONDUCTORS OR INSULATION. DO NOT USE HACKSAW OR WIRE CUTTERS TO H INSTALL CONDUCTORS WITH A MINIMUM OF 12 INCHES OF SLACK AT EACH OUTLET. I. NEATLY TRAIN AND BUNDLE CONDUCTORS INSIDE BOXES, WIREWAYS,
- PANEL BOARDS AND OTHER EQUIPMENT ENCLOSURES J. GROUP OR OTHERWISE IDENTIFY NEUTRAL/GROUNDED CONDUCTORS WITH ASSOCIATED UNGROUNDED CONDUCTORS INSIDE ENCLOSURES IN ACCORDANCE WITH NFPA 70. K. MAKE WIRING CONNECTIONS USING SPECIFIED WIRING CONNECTORS.
- I. MAKE SPLICES AND TAPS ONLY IN ACCESSIBLE BOXES. DO NOT PULL SPLICES INTO RACEWAYS OR MAKE SPLICES IN CONDUIT BODIES OR WIRING GUTTERS 2. REMOVE APPROPRIATE AMOUNT OF CONDUCTOR INSULATION FOR MAKING CONNECTIONS WITHOUT CUTTING, NICKING OR DAMAGING CONDUCTORS. 3. DO NOT REMOVE CONDUCTOR STRANDS TO FACILITATE INSERTION INTO
- CONNECTOR 4. CLEAN CONTACT SURFACES ON CONDUCTORS AND CONNECTORS TO SUITABLE REMOVE CORROSION, OXIDES, AND OTHER CONTAMINATES. DO NOT USE WIRE BRUSH ON PLATED CONNECTOR SURFACES 5. CONNECTIONS FOR ALUMINUM CONDUCTORS: FILL CONNECTORS WITH OXIDE

INHIBITING COMPOUND WHERE NOT PRE-FILLED BY MANUFACTURER.

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND

F. THERMOSET-INSULATED CONDUCTORS AND CABLES: LISTED AND LABELED AS

F. SECURE AND SUPPORT CONDUCTORS AND CABLES IN ACCORDANCE WITH NFPA 70

M. INSULATE SPLICES AND TAPS THAT ARE MADE WITH UNINSULATED CONNECTORS USING METHODS SUITABLE FOR THE APPLICATION, WITH INSULATION AND MECHANICAL STRENGTH AT LEAST FOUNDALENT TO UNSPLICED CONDUCTORS N. INSULATE ENDS OF SPARE CONDUCTORS USING VINYL INSULATING ELECTRICAL O. INSTALL FIRESTOPPING TO PRESERVE FIRE RESISTANCE RATING OF PARTITIONS AND OTHER ELEMENTS. P. UNLESS SPECIFICALLY INDICATED TO BE EXCLUDED, PROVIDE FINAL CONNECTIONS TO ALL EQUIPMENT AND DEVICES, INCLUDING THOSE FURNISHED BY OTHERS, AS REQUIRED FOR A COMPLETE OPERATING SYSTEM. HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS PART 1 GENERAL 1.01 SUMMARY A. THE WORK COVERED UNDER THIS SECTION CONSISTS OF THE FURNISHING OF ALL NECESSARY LABOR, SUPERVISION, MATERIALS, EQUIPMENT, AND SERVICES TO COMPLETELY EXECUTE THE SYSTEM OF CONDUIT HANGERS AND SUPPORTS AS DESCRIBED IN THIS SPECIFICATION. B. RATED STRENGTH: ADEQUATE IN TENSION, SHEAR, AND PULLOUT FORCE TO RESIST MAXIMUM LOADS CALCULATED OR IMPOSED FOR THIS PROJECT, WITH A MINIMUM STRUCTURAL SAFETY FACTOR OF FIVE TIMES THE APPLIED FORCE.

1 02 COORDINATION A. COORDINATE INSTALLATION OF ROOF CURBS, EQUIPMENT SUPPORTS, AND ROOF PENETRATIONS PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS A. GENERAL REQUIREMENTS: 1. PROVIDE ALL REQUIRED HANGERS, SUPPORTS, ANCHORS, FASTENERS, FITTINGS, ACCESSORIES, AND HARDWARE AS NECESSARY FOR THE COMPLETE INSTALLATION OF ELECTRICAL WORK. 2. PROVIDE PRODUCTS LISTED, CLASSIFIED, AND LABELED AS SUITABLE FOR THE PURPOSE INTENDED, WHERE APPLICABLE. 3. WHERE SUPPORT AND ATTACHMENT COMPONENT TYPES AND SIZES ARE NOT INDICATED, SELECT IN ACCORDANCE WITH MANUFACTURER'S APPLICATION CRITERIA AS REQUIRED FOR THE LOAD TO BE SUPPORTED. INCLUDE CONSIDERATION FOR VIBRATION, EQUIPMENT OPERATION, AND SHOCK LOADS WHERE APPLICABLE 4. DO NOT USE PRODUCTS FOR APPLICATIONS OTHER THAN AS PERMITTED BY NFPA 70 AND PRODUCT LISTING. 5. STEEL COMPONENTS: USE CORROSION RESISTANT MATERIALS SUITABLE FOR

THE ENVIRONMENT WHERE INSTALLED. a. ZINC-PLATED STEEL: ELECTROPLATED IN ACCORDANCE WITH ASTM B633. b. GALVANIZED STEEL: HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123/A123M OR ASTM A153/A153M. B. CONDUIT AND CABLE SUPPORTS: STRAPS, CLAMPS, ETC. SUITABLE FOR THE CONDUIT OR CABLE TO BE SUPPORTED CONDUIT STRAPS: ONE-HOLE OR TWO-HOLE TYPE; STEEL OR MALLEABLE IRON. . CONDUIT CLAMPS: BOLTED TYPE UNLESS OTHERWISE INDICATED.

C. OUTLET BOX SUPPORTS: HANGERS, BRACKETS, ETC. SUITABLE FOR THE BOXES O BE SUPPORTED D. METAL CHANNEL (STRUT) FRAMING SYSTEMS: FACTORY-FABRICATED CONTINUOUS-SLOT METÁL CHANNEL (STRUT) AND ASSOCIATED FITTINGS, ACCESSORIES, AND HARDWARE REQUIRED FOR FIELD-ASSEMBLY OF SUPPORTS. 1 COMPLY WITH MFMA-4

2. CHANNEL (STRUT) USED AS RACEWAY (ONLY WHERE SPECIFICALLY INDICATED): LISTED AND LABELED AS COMPLYING WITH UL 5B. E. HANGER RODS: THREADED ZINC-PLATED STEEL UNLESS OTHERWISE INDICATED. 1. MINIMUM SIZE, UNLESS OTHERWISE INDICATED OR REQUIRED: a. EQUIPMENT SUPPORTS: 1/2 INCH DIAMETER. b. SINGLE CONDUIT UP TO 1 INCH (27 MM) TRADE SIZE: 1/4 INCH DIAMETER.

-. ANCHORS AND FASTENERS: 1. UNLESS OTHERWISE INDICATED AND WHERE NOT OTHERWISE RESTRICTED, USE THE ANCHOR AND FASTENER TYPES INDICATED FOR THE SPECIFIED APPLICATIONS. G. HANGERS, SUPPORTS, ANCHORS, AND FASTENERS - GENERAL:

1. PROTECTIVE ZINC COATING EITHER ELECTRO-PLATED (ASTM B633 SCI OR SC3), PRE-GALVANIZED (ASTM A525 COATING DESIGNATION G90) OR HOT-DIP GALVANIZED AFTER FABRICATION (ASTM A123). THE MINIMUM THICKNESS OF ZINC COATING SHALL BE 0.2 MILL (5 MICROMETERS) H. PROVIDE MATERIALS OF SIZE AND TYPE ADEQUATE TO CARRY THE LOADS OF EQUIPMENT AND CONDUIT, INCLUDING WEIGHT OF WIRE IN CONDUIT.

I CONDUIT HANGERS<sup>1</sup> 1. SHALL HAVE A VERTICAL LOAD LIMIT OF 100 LBS, AND A HORIZONTAL LOAD LIMIT 2. SHALL BE AVAILABLE WITH EITHER A PLAIN HOLE FOR 1/4" BOLT OR A 1/4-20 THREAD IMPRESSION.

3. SHALL BE AVAILABLE FOR 3/8" THROUGH 2" EMT, RIGID, AND ALUMINUM CONDUIT 4. SHALL BE AVAILABLE PRE-ASSEMBLED WITH MANUFACTURER'S SPECIALTY FASTENERS FOR CONNECTION TO BUILDING STRUCTURES LIKE BEAM, FLANGE, DROP WIRE/ROD, WOOD STRUCTURE, CONCRETE AND ACOUSTICAL TEE GRID. J. WIRE ROPE HANGERS:

1. WIRE ROPE HANGER ASSEMBLIES SHALL BE MADE OF GALVANIZED STEEL. 2. HANGER SHALL MEET THE FIRE RATING REQUIREMENTS FOR DIN 4102-2 FOR 30 MINUTES AT 30 PERCENT OF RATED LOAD. 3. ROPE HANGERS SHALL HAVE A MINIMUM SAFETY FACTOR OF 5:1. 4 ROPE HANGERS ARE NOT PERMITTED TO SUPPORT CONDUITS ROPE HANGERS ARE PERMITTED TO HANG LIGHT FIXTURES, WERE APPLICABLE.

6. HANGERS SHALL BE FULLY ADJUSTABLE. PART 3 EXECUTION 3.01 INSTALLATION A. PROVIDE INDEPENDENT SUPPORT FROM BUILDING STRUCTURE. DO NOT PROVIDE SUPPORT FROM PIPING, DUCTWORK, OR OTHER SYSTEMS.

B. UNLESS SPECIFICALLY INDICATED OR APPROVED BY STRATEGIC ENERGY SOLUTIONS, INC., DO NOT PROVIDE SUPPORT FROM SUSPENDED CEILING SUPPORT SYSTEM OR CEILING GRID. C. UNLESS SPECIFICALLY INDICATED OR APPROVED BY STRATEGIC ENERGY SOLUTIONS, INC., DO NOT PROVIDE SUPPORT FROM ROOF DECK.

D. EQUIPMENT SUPPORT AND ATTACHMENT: 1. USE METAL FABRICATED SUPPORTS OR SUPPORTS ASSEMBLED FROM METAL CHANNEL (STRUT) TO SUPPORT EQUIPMENT AS REQUIRED. 2. USE METAL CHANNEL (STRUT) SECURED TO STUDS TO SUPPORT EQUIPMENT SURFACE-MOUNTED ON HOLLOW STUD WALLS WHEN WALL STRENGTH IS NOT SUFFICIENT TO RESIST PULL-OUT 3. USE METAL CHANNEL (STRUT) TO SUPPORT SURFACE-MOUNTED EQUIPMENT IN

WET OR DAMP LOCATIONS TO PROVIDE SPACE BETWEEN EQUIPMENT AND MOUNTING SURFACE 4. SECURELY FASTEN FLOOR-MOUNTED EQUIPMENT. DO NOT INSTALL EQUIPMENT SUCH THAT IT RELIES ON ITS OWN WEIGHT FOR SUPPORT E. SECURE FASTENERS ACCORDING TO MANUFACTURER'S RECOMMENDED TORQUE F. REMOVE TEMPORARY SUPPORTS

CONDUIT PART 1 GENERAL

1.01 DELIVERY, STORAGE, AND HANDLING A. RECEIVE, INSPECT, HANDLE, AND STORE CONDUIT AND FITTINGS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. B. PROTECT CONDUIT FROM CORROSION AND ENTRANCE OF DEBRIS BY STORING ABOVE GRADE. PROVIDE APPROPRIATE COVERING. C. PROTECT PVC CONDUIT FROM SUNLIGHT. PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS A. DO NOT USE CONDUIT AND ASSOCIATED FITTINGS FOR APPLICATIONS OTHER THAN AS PERMITTED BY NEPA 70 AND PRODUCT LISTING B. UNLESS OTHERWISE INDICATED AND WHERE NOT OTHERWISE RESTRICTED. USE THE CONDUIT TYPES INDICATED FOR THE SPECIFIED APPLICATIONS. WHERE MORE THAN ONE LISTED APPLICATION APPLIES, COMPLY WITH THE MOST RESTRICTIVE REQUIREMENTS. WHERE CONDUIT TYPE FOR A PARTICULAR APPLICATION IS NOT SPECIFIED, USE GALVANIZED STEEL RIGID METAL CONDUIT.

2.02 CONDUIT REQUIREMENTS A. PROVIDE PRODUCTS LISTED, CLASSIFIED, AND LABELED AS SUITABLE FOR THE PURPOSE INTENDED. B. WHERE CONDUIT SIZE IS NOT INDICATED, SIZE TO COMPLY WITH NFPA 70 BUT NOT LESS THAN APPLICABLE MINIMUM SIZE REQUIREMENTS SPECIFIED. 2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. DESCRIPTION: NFPA 70, TYPE RMC GALVANIZED STEEL RIGID METAL CONDUIT COMPLYING WITH ANSI C80.1 AND LISTED AND LABELED AS COMPLYING WITH UL 6 B FITTINGS 1. NON-HAZARDOUS LOCATIONS: USE FITTINGS COMPLYING WITH NEMA FB 1 AND LISTED AND LABELED AS COMPLYING WITH UL 514B.

2. MATERIAL: USE STEEL OR MALLEABLE IRON. 3. CONNECTORS AND COUPLINGS: USE THREADED TYPE FITTINGS ONLY. THREADLESS SET SCREW AND COMPRESSION (GLAND) TYPE FITTINGS ARE NOT PFRMITTED 2.04 FLEXIBLE METAL CONDUIT (FMC)

A. DESCRIPTION: NFPA 70, TYPE FMC STANDARD WALL STEEL FLEXIBLE METAL CONDUIT LISTED AND LABELED AS COMPLYING WITH UL 1, AND LISTED FOR USE IN CLASSIFIED FIRESTOP SYSTEMS TO BE USED. B FITTINGS

1. DESCRIPTION: FITTINGS COMPLYING WITH NEMA FB 1 AND LISTED AND LABELED AS COMPLYING WITH UL 514B. 2. MATERIAL: USE STEEL OR MALLEABLE IRON. C. DESCRIPTION: INTERLOCKED STEEL CONSTRUCTION.

D FITTINGS: NEMA FB 1 2.05 ELECTRICAL METALLIC TUBING (FMT) A. DESCRIPTION: NFPA 70, TYPE EMT STEEL ELECTRICAL METALLIC TUBING COMPLYING WITH ANSI C80.3 AND LISTED AND LABELED AS COMPLYING WITH UL B. FITTINGS

1. DESCRIPTION: FITTINGS COMPLYING WITH NEMA FB 1 AND LISTED AND LABELED AS COMPLYING WITH UL 514B. 2. MATERIAL: USE STEEL OR MALLEABLE IRON. 3. CONNECTORS AND COUPLINGS: USE COMPRESSION (GLAND) OR SET-SCREW a. DO NOT USE INDENTER TYPE CONNECTORS AND COUPLINGS. . DESCRIPTION: ANSI C80.3; GALVANIZED TUBING.

D. FITTINGS AND CONDUIT BODIES. NEMA EB 1. STEEL OR MALLEABLE IRON COMPRESSION TYPE PART 3 EXECUTION 3.01 EXAMINATION A VERIEV THAT MOUNTING SURFACES ARE READY TO RECEIVE CONDUITS

B. VERIFY THAT CONDITIONS ARE SATISFACTORY FOR INSTALLATION PRIOR TO STARTING WORK C. VERIFY ROUTING AND TERMINATION LOCATIONS OF CONDUIT PRIOR TO ROUGH-

D. CONDUIT ROUTING IS SHOWN ON DRAWINGS IN APPROXIMATE LOCATIONS UNLESS DIMENSIONED. ROUTE AS REQUIRED TO COMPLETE WIRING SYSTEM. 3.02 INSTALLATION A. INSTALL GALVANIZED STEEL RIGID METAL CONDUIT (RMC) IN ACCORDANCE WITH

NFCA 101 B. CONDUIT SUPPORT: 1. SECURE AND SUPPORT CONDUITS IN ACCORDANCE WITH NFPA 70 AND SECTION 26 0529 USING SUITABLE SUPPORTS AND METHODS APPROVED BY THE AUTHORITY HAVING JURISDICTIC

2. PROVIDE INDEPENDENT SUPPORT FROM BUILDING STRUCTURE, DO NOT PROVIDE SUPPORT FROM PIPING, DUCTWORK, OR OTHER SYSTEMS. C. CONNECTIONS AND TERMINATIONS: 1 USE APPROVED ZINC-RICH PAINT OR CONDUIT JOINT COMPOUND ON FIELD-CUT THREADS OF GALVANIZED STEEL CONDUITS PRIOR TO MAKING CONNECTIONS.

2. WHERE TWO THREADED CONDUITS MUST BE JOINED AND NEITHER CAN BE ROTATED, USE THREE-PIECE COUPLINGS OR SPLIT COUPLINGS. DO NOT USE RUNNING THREADS. 3. USE SUITABLE ADAPTERS WHERE REQUIRED TO TRANSITION FROM ONE TYPE

OF CONDUIT TO ANOTHER. 4. TERMINATE THREADED CONDUITS IN BOXES AND ENCLOSURES USING THREADED HUBS OR DOUBLE LOCK NUTS FOR DRY LOCATIONS AND RAINTIGHT

HUBS FOR WET LOCATIONS. 5. PROVIDE INSULATING BUSHINGS OR INSULATED THROATS AT ALL CONDUIT TERMINATIONS TO PROTECT CONDUCTORS 6. SECURE JOINTS AND CONNECTIONS TO PROVIDE MAXIMUM MECHANICAL

STRENGTH AND ELECTRICAL CONTINUITY.

101 BOXES A GENERAL REQUIREMENTS 1. DO NOT USE BOXES AND ASSOCIATED ACCESSORIES FOR APPLICATIONS OTHER THAN AS PERMITTED BY NEPA 70 AND PRODUCT LISTING 2. PROVIDE PRODUCTS LISTED, CLASSIFIED, AND LABELED AS SUITABLE FOR THE PURPOSE INTENDED 3. WHERE BOX SIZE IS NOT INDICATED, SIZE TO COMPLY WITH NFPA 70 BUT NOT LESS THAN APPLICABLE MINIMUM SIZE REQUIREMENTS SPECIFIED. 4. PROVIDE GROUNDING TERMINALS WITHIN BOXES WHERE EQUIPMENT GROUNDING CONDUCTORS TERMINATE. B. OUTLET AND DEVICE BOXES UP TO 100 CUBIC INCHES, INCLUDING THOSE USED AS JUNCTION AND PULL BOXES: 1. USE SHEET-STEEL BOXES FOR DRY LOCATIONS UNLESS OTHERWISE INDICATED OR REQUIRED. 2. USE RAISED COVERS SUITABLE FOR THE TYPE OF WALL CONSTRUCTION AND DEVICE CONFIGURATION WHERE REQUIRED 3. USE SHALLOW BOXES WHERE REQUIRED BY THE TYPE OF WALL CONSTRUCTION 4. DO NOT USE "THROUGH-WALL" BOXES DESIGNED FOR ACCESS FROM BOTH SIDES OF WALL 5. SHEET-STEEL BOXES: COMPLY WITH NEMA OS 1. AND LIST AND LABEL AS COMPLYING WITH UL 514A. 6. CAST METAL BOXES: COMPLY WITH NEMA FB 1, AND LIST AND LABEL AS COMPLYING WITH UL 514A: FURNISH WITH THREADED HUBS. 7. BOXES FOR SUPPORTING LUMINAIRES AND CEILING FANS: LISTED AS SUITABLE FOR THE TYPE AND WEIGHT OF LOAD TO BE SUPPORTED; FURNISHED WITH FIXTURE STUD TO ACCOMMODATE MOUNTING OF LUMINAIRE WHERE REQUIRED 8. BOXES FOR GANGED DEVICES: USE MULTIGANG BOXES OF SINGLE-PIECE CONSTRUCTION. DO NOT USE FIELD-CONNECTED GANGABLE BOXES. C. CABINETS AND ENCLOSURES, INCLUDING JUNCTION AND PULL BOXES LARGER THAN 100 CUBIC INCHES. 1. COMPLY WITH NEMA 250, AND LIST AND LABEL AS COMPLYING WITH UL 50 AND UL 50F OR UL 508A 2. NEMA 250 ENVIRONMENT TYPE, UNLESS OTHERWISE INDICATED: 3. JUNCTION AND PULL BOXES LARGER THAN 100 CUBIC INCHES: a. PROVIDE SCREW-COVER OR HINGED-COVER ENCLOSURES UNLESS OTHERWISE INDICATED. PART 2 EXECUTION 2.01 EXAMINATION A. VERIFY THAT FIELD MEASUREMENTS ARE AS INDICATED. B. VERIFY THAT MOUNTING SURFACES ARE READY TO RECEIVE BOXES. C. VERIFY THAT CONDITIONS ARE SATISFACTORY FOR INSTALLATION PRIOR TO STARTING WORK 2.02 INSTALLATION A. INSTALL BOXES IN ACCORDANCE WITH NECA 1 (GENERAL WORKMANSHIP) AND, WHERE APPLICABLE, NECA 130, INCLUDING MOUNTING HEIGHTS SPECIFIED IN THOSE STANDARDS WHERE MOUNTING HEIGHTS ARE NOT INDICATED B. ARRANGE EQUIPMENT TO PROVIDE MINIMUM CLEARANCES IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND NEPA 70 C. PROVIDE SEPARATE BOXES FOR EMERGENCY POWER AND NORMAL POWER SYSTEMS D. UNLESS OTHERWISE INDICATED, PROVIDE SEPARATE BOXES FOR LINE VOLTAGE AND LOW VOLTAGE SYSTEMS E. FLUSH-MOUNT BOXES IN FINISHED AREAS UNLESS SPECIFICALLY INDICATED TO BE SURFACE-MOUNTED F. BOX LOCATIONS: 1. LOCATE BOXES TO BE ACCESSIBLE 2. UNLESS DIMENSIONED, BOX LOCATIONS INDICATED ARE APPROXIMATE. 3. LOCATE BOXES SO THAT WALL PLATES DO NOT SPAN DIFFERENT BUILDING 4. LOCATE BOXES SO THAT WALL PLATES DO NOT CROSS MASONRY JOINTS. 5. UNLESS OTHERWISE INDICATED, WHERE MULTIPLE OUTLET BOXES ARE

E. CONDUIT MOVEMENT PROVISIONS: WHERE CONDUITS ARE SUBJECT TO

INCLUDES, BUT IS NOT LIMITED TO:

BOXES

PART 1 PRODUCTS

CONTRACTION. OR DEFLECTION.

MOVEMENT, PROVIDE EXPANSION AND EXPANSION/DEFLECTION FITTINGS TO

1. WHERE CONDUITS CROSS STRUCTURAL JOINTS INTENDED FOR EXPANSION,

2. WHERE CONDUITS ARE SUBJECT TO EARTH MOVEMENT BY SETTLEMENT OR

PREVENT DAMAGE TO ENCLOSED CONDUCTORS OR CONNECTED EQUIPMENT. THIS

INSTALLED AT THE SAME LOCATION AT DIFFERENT MOUNTING HEIGHTS. INSTALL ALONG A COMMON VERTICAL CENTER LINE 6. FIRE RESISTANCE RATED WALLS: INSTALL FLUSH-MOUNTED BOXES SUCH THAT THE REQUIRED FIRE RESISTANCE WILL NOT BE REDUC G BOX SUPPORTS 1. SECURE AND SUPPORT BOXES IN ACCORDANCE WITH NFPA 70 AND SECTION 26 0529 USING SUITABLE SUPPORTS AND METHODS APPROVED BY THE AUTHORITY HAVING JURISDICTION. 2. PROVIDE INDEPENDENT SUPPORT FROM BUILDING STRUCTURE EXCEPT FOR CAST METAL BOXES (OTHER THAN BOXES USED FOR FIXTURE SUPPORT) SUPPORTED BY THREADED CONDUIT CONNECTIONS IN ACCORDANCE WITH

NFPA 70. DO NOT PROVIDE SUPPORT FROM PIPING, DUCTWORK, OR OTHER SYSTEMS H. INSTALL BOXES PLUMB AND LEVEL. FLUSH-MOUNTED BOXES: 1. INSTALL BOXES IN NONCOMBUSTIBLE MATERIALS SUCH AS CONCRETE, TILE, GYPSUM. PLASTER, ETC. SO THAT FRONT EDGE OF BOX OR ASSOCIATED RAISED COVER IS NOT SET BACK FROM FINISHED SURFACE MORE THAN 1/4 INCH OR DOES NOT PROJECT BEYOND FINISHED SURFACE 2. INSTALL BOXES IN COMBUSTIBLE MATERIALS SUCH AS WOOD SO THAT FRONT EDGE OF BOX OR ASSOCIATED RAISED COVER IS FLUSH WITH FINISHED

SURFACE 3. REPAIR ROUGH OPENINGS AROUND BOXES IN NONCOMBUSTIBLE MATERIALS SUCH AS CONCRETE, TILE, GYPSUM, PLASTER, ETC. SO THAT THERE ARE NO GAPS OR OPEN SPACES GREATER THAN 1/8 INCH AT THE EDGE OF THE BOX. INSTALL BOXES AS REQUIRED TO PRESERVE INSULATION INTEGRITY K. INSTALL PERMANENT BARRIER BETWEEN GANGED WIRING DEVICES WHEN VOLTAGE BETWEEN ADJACENT DEVICES EXCEEDS 300 V

L. INSTALL FIRESTOPPING TO PRESERVE FIRE RESISTANCE RATING OF PARTITIONS AND OTHER ELEMENTS. M. CLOSE UNUSED BOX OPENINGS N. INSTALL BLANK WALL PLATES ON JUNCTION BOXES AND ON OUTLET BOXES WITH NO DEVICES OR EQUIPMENT INSTALLED OR DESIGNATED FOR FUTURE USE.

DISTRIBUTED DIGITAL LIGHTING CONTROL SYSTEM PART 1 GENERAL 1.01 DESIGN / PERFORMANCE REQUIREMENTS A. DIGITAL LIGHTING CONTROL SYSTEM SHALL ACCOMMODATE THE SQUARE-FOOTAGE COVERAGE REQUIREMENTS FOR EACH AREA CONTROLLED, UTILIZING ROOM CONTROLLERS, DIGITAL OCCUPANCY SENSORS, SWITCHES, DAYLIGHTING SENSORS AND ACCESSORIES THAT SUIT THE REQUIRED LIGHTING AND FLECTRICAL SYSTEM PARAMETERS 1.02 PRF-INSTALLATION MEETINGS A CONVENE MINIMUM TWO WEEKS PRIOR TO COMMENCING WORK OF THIS SECTION. MEETING TO BE ATTENDED BY CONTRACTOR, SYSTEM INSTALLER, FACTORY

AUTHORIZED MANUFACTURER'S REPRESENTATIVE, AND REPRESENTATIVE OF ALL TRADES RELATED TO THE SYSTEM INSTALLATION. B. REVIEW INSTALLATION PROCEDURES AND COORDINATION REQUIRED WITH RELATED WORK AND THE FOLLOWING: 1. CONFIRM THE LOCATION AND MOUNTING OF ALL DEVICES, WITH SPECIAL ATTENTION TO PLACEMENT OF SWITCHES, DIMMERS, AND ANY SENSORS 2. REVIEW THE SPECIFICATIONS FOR LOW VOLTAGE CONTROL WIRING AND FRMINATION 3. DISCUSS THE FUNCTIONALITY AND CONFIGURATION OF ALL PRODUCTS,

INCLUDING SEQUENCES OF OPERATION, PER DESIGN REQUIREMENTS. 4. DISCUSS REQUIREMENTS FOR INTEGRATION WITH OTHER TRADES 103 WARRANTY A. MANUFACTURER SHALL PROVIDE A 5 YEAR LIMITED WARRANTY ON PRODUCTS WITHIN THIS INSTALLATION. EXCEPT WHERE OTHERWISE NOTED, AND CONSISTING OF A ONE FOR ONE DEVICE REPLACEMENT PART 2 PRODUCTS

2 01 MANUFACTURERS A. ACCEPTABLE MANUFACTURERS: . LUTRON - QUANTUM 2. NLIGHT (ACUITY BRANDS)

3. ENGINEER PRE-APPROVED EQUAL 2.02 DISTRIBUTED DIGITAL LIGHTING CONTROL SYSTEM A. SYSTEM GENERAL: PROVIDE DIGITAL LIGHTING CONTROL SYSTEM COMPLETE WITH ALL NECESSARY ENCLOSURES. WIRING, AND SYSTEM COMPONENTS TO ENSURE A COMPLETE AND PROPERLY FUNCTIONING SYSTEM AS INDICATED ON THE DRAWINGS AND SPECIFIED HEREIN, IF A CONFLICT IS IDENTIFIED, BETWEEN THE DRAWING. THIS SPECIFICATION, CONTACT THE ENGINEER FOR CLARIFICATION PRIOR TO PROCEEDING 1. SPACE CONTROL REQUIREMENTS: PROVIDE OCCUPANCY/VACANCY SENSORS WITH MANUAL OR PARTIAL ON FUNCTIONALITY AS INDICATED IN ALL SPACES. EXCEPT TOILET ROOMS. STOREROOMS, LIBRARY STACKS, OR OTHER

APPLICATIONS WHERE HANDS-FREE OPERATION IS DESIRABLE AND AUTOMATIC ON OCCUPANCY SENSORS ARE MORE APPROPRIATE PROVIDE MANUAL-ON OCCUPANCY/VACANCY SENSORS FOR ANY ENCLOSED OFFICE. CONFERENCE ROOM, MEETING ROOM, OPEN PLAN SYSTEM AND TRAINING ROOM. FOR SPACES WITH MULTIPLE OCCUPANTS, OR WHERE LINE-OF-SIGHT MAY BE OBSCURED, PROVIDE CEILING- OR CORNER-MOUNTED SENSORS AND MANUAL-ON SWITCHES 2. CONFERENCE, MEETING, TRAINING, AUDITORIUMS, AND MULTIPURPOSE ROOMS

SHALL HAVE CONTROLS THAT ALLOW FOR INDEPENDENT CONTROL OF EACH LOCAL CONTROL ZONE. ROOMS LARGER THAN 300 SQUARE FEET SHALL INSTEAD HAVE AT LEAST FOUR PRESET LIGHTING SCENES UNLESS OTHERWISE SPECIFIED OCCUPANCY / VACANCY SENSORS SHALL BE PROVIDED TO TURN OFF ALL LIGHTING IN THE SPACE SPACES WITH UP TO FOUR MOVEABLE WALLS SHALL INCLUDE CONTROLS THAT CAN BE RECONFIGURED WHEN THE ROOM IS PARTITIONED B. EQUIPMENT REQUIRED: LIGHTING CONTROL AND AUTOMATION SYSTEM AS DEFINED 1. LIGHTING MANAGEMENT LOCAL NETWORK: FREE TOPOLOGY, PLUG-IN WIRING

SYSTEM FOR POWER AND DATA TO ROOM DEVICES. 2. FIXTURE CONTROLLERS: SELF-CONFIGURING, DIGITALLY ADDRESSABLE ONE RELAY FIXTURE-INTEGRATED CONTROLLERS FOR ON/OFF/0-10V DIMMING CONTROL 3. OCCUPANCY SENSORS: SELF-CONFIGURING, DIGITALLY ADDRESSABLE, CALIBRATED OCCUPANCY SENSORS WITH LCD DISPLAY AND TWO-WAY ACTIVE

INFRARED (IR) COMMUNICATIONS. 4. SWITCHES: SELF-CONFIGURING, DIGITALLY ADDRESSABLE PUSHBUTTON ON/OFF, DIMMING, AND SCENE SWITCHES WITH TWO-WAY ACTIVE INFRARED (IR) COMMUNICATIONS.

C. LOCAL NETWORK: DIGITAL LIGHTING CONTROL LOCAL NETWORK IS A FREE	
TOPOLOGY LIGHTING CONTROL PHYSICAL CONNECTION AND COMMUNICATION PROTOCOL DESIGNED TO CONTROL A SMALL AREA OF A BUILDING.	
<ol> <li>FEATURES OF THE DIGITAL LIGHTING CONTROL LOCAL NETWORK INCLUDE: a. AUTOMATIC CONFIGURATION AND BINDING OF OCCUPANCY SENSORS,</li> </ol>	
SWITCHES AND LIGHTING LOADS TO THE MOST ENERGY-EFFICIENT SEQUENCE OF OPERATION BASED UPON THE DEVICE ATTACHED.	
b. SIMPLE REPLACEMENT OF ANY DEVICE IN THE LOCAL DIGITAL LIGHTING CONTROL NETWORK WITH A STANDARD OFF THE SHELF UNIT WITHOUT	
REQUIRING SIGNIFICANT COMMISSIONING, CONFIGURATION OR SETUP. c. ABILITY TO CHANGE THE AUTOMATIC CONFIGURATION, INCLUDING BINDING	
AND LOAD PARAMETERS WITHOUT TOOLS, USING ONLY THE BUTTONS ON THE DIGITAL DEVICES IN THE LOCAL NETWORK.	Ē
d. TWO-WAY INFRARED COMMUNICATIONS FOR CONTROL BY HANDHELD REMOTES, AND CONFIGURATION BY A HANDHELD TOOL INCLUDING	
ADJUSTING LOAD PARAMETERS, SENSOR CONFIGURATION AND BINDING, WITHIN A LINE OF SIGHT OF UP TO 30 FEET FROM A SENSOR, WALL SWITCH	
OR IR RECEIVER. 2. DIGITAL ROOM DEVICES CONNECT TO THE LOCAL NETWORK USING PRE-	
TERMINATED LOW VOLTAGE CABLES WITH RJ-45 CONNECTORS, WHICH PROVIDE BOTH DATA AND POWER TO ROOM DEVICES. SYSTEMS THAT UTILIZE RJ-45	Ξ
PATCH CORDS BUT DO NOT PROVIDE SERIAL COMMUNICATION DATA FROM INDIVIDUAL END DEVICES ARE NOT ACCEPTABLE.	
3. IF MANUFACTURER'S PRE-TERMINATED LOW VOLTAGE CABLES ARE NOT USED FOR THE INSTALLATION EACH CABLE MUST BE INDIVIDUALLY TESTED AND	
OBSERVED BY AUTHORIZED SERVICE REPRESENTATIVE FOLLOWING INSTALLATION.	
2.03 LOAD CONTROLLERS (ROOM AND FIXTURE CONTROLLERS) A. LOAD CONTROLLERS: CONTROLLERS FOR LIGHTING ZONES, FIXTURES AND/OR	
PLUG LOADS AUTOMATICALLY BIND ROOM LOADS TO THE CONNECTED CONTROL DEVICES IN THE SPACE WITHOUT COMMISSIONING OR THE USE OF ANY TOOLS.	
PROVIDE CONTROLLERS TO MATCH THE ROOM LIGHTING AND PLUG LOAD CONTROL REQUIREMENTS. CONTROLLERS ARE SIMPLE TO INSTALL, AND DO NOT	
HAVE DIP SWITCHES/POTENTIOMETERS, OR REQUIRE SPECIAL CONFIGURATION FOR STANDARD APPLICATIONS. CONTROL UNITS INCLUDE THE FOLLOWING	
FEATURES 1. AUTOMATIC ROOM CONFIGURATION TO THE MOST ENERGY-EFFICIENT	
SEQUENCE OF OPERATION BASED UPON THE DEVICES IN THE ROOM. 2. SIMPLE REPLACEMENT USING THE DEFAULT AUTOMATIC CONFIGURATION	
CAPABILITIES, A ROOM CONTROLLER MAY BE REPLACED WITH AN OFF-THE- SHELF DEVICE.	
3. MULTIPLE ROOM CONTROLLERS CONNECTED TOGETHER IN A LOCAL NETWORK MUST AUTOMATICALLY ARBITRATE WITH EACH OTHER, WITHOUT REQUIRING	
ANY CONFIGURATION OR SETUP, SO THAT INDIVIDUAL LOAD NUMBERS ARE ASSIGNED STARTING WITH LOAD 1 TO A MAXIMUM OF 64, ASSIGNED BASED ON	
EACH CONTROLLER'S DEVICE ID'S FROM HIGHEST TO LOWEST. 4. BASED ON INDIVIDUAL CONFIGURATION, EACH LOAD SHALL BE CAPABLE OF THE	:
FOLLOWING BEHAVIOR ON POWER UP FOLLOWING THE LOSS OF NORMAL POWER:	
a. TURN ON TO 100 PERCENT b. TURN OFF	
<ul> <li>c. TURN ON TO LAST LEVEL</li> <li>5. EACH LOAD BE CONFIGURABLE TO OPERATE IN THE FOLLOWING SEQUENCES</li> <li>5. PASED ON OPERATORY</li> </ul>	
BASED ON OCCUPANCY: a. AUTO-ON/AUTO-OFF (FOLLOW ON AND OFF)	
<ul> <li>b. MANUAL-ON/AUTO-OFF (FOLLOW OFF ONLY)</li> <li>6. BACNET OBJECT INFORMATION SHALL BE AVAILABLE FOR THE FOLLOWING OBJECTS: LOAD STATUS, SCHEDULE STATE, DEMAND RESPONSE, ROOM</li> </ul>	
OCCUPANCY, TOTAL ROOM LIGHTING WATTS, ELECTRICAL CURRENT, WATTS PER CONTROLLER, TOTAL ROOM W/SF, FORCE ON/OFF ALL LOADS.	
7. UL 2043 PLENUM RATED 8. MANUAL OVERRIDE AND LED INDICATION FOR EACH LOAD	
9. ZERO CROSS CIRCUITRY FOR EACH LOAD 10.ALL DIGITAL PARAMETER DATA PROGRAMMED INTO AN INDIVIDUAL ROOM	
CONTROLLER OR PLUG LOAD CONTROLLER SHALL BE RETAINED IN NON- VOLATILE FLASH MEMORY WITHIN THE CONTROLLER ITSELF. MEMORY SHALL	
HAVE AN EXPECTED LIFE OF NO LESS THAN 10 YEARS. 11.DIMMING ROOM CONTROLLERS SHALL SHARE THE FOLLOWING FEATURES:	
a. EACH LOAD SHALL HAVE AN INDEPENDENTLY CONFIGURABLE PRESET ON LEVEL FOR NORMAL HOURS AND AFTER HOURS EVENTS TO ALLOW	
DIFFERENT DIMMED LEVELS TO BE ESTABLISHED AT THE START OF BOTH NORMAL HOURS AND AFTER HOURS EVENTS.	
<ul> <li>b. FADE RATES FOR DIMMING LOADS SHALL BE SPECIFIC TO BOUND SWITCH BUTTONS, AND THE LOAD SHALL MAINTAIN A DEFAULT VALUE FOR ANY</li> </ul>	
BOUND BUTTONS THAT DO NOT SPECIFY A UNIQUE VALUE. c. THE FOLLOWING DIMMING ATTRIBUTES MAY BE CHANGED OR SELECTED	
USING A WIRELESS CONFIGURATION TOOL: 1) ESTABLISH PRESET LEVEL FOR EACH LOAD FROM 0-100 PERCENT	
2) SET HIGH AND LOW TRIM FOR EACH LOAD 3) INITIATE LAMP BURN IN FOR EACH LOAD OF EITHER 0, 12 OR 100 HOURS	
<ul><li>d. OVERRIDE BUTTON FOR EACH LOAD PROVIDES THE FOLLOWING FUNCTIONS:</li><li>1) PRESS AND RELEASE FOR ON/OFF CONTROL</li></ul>	
<ul><li>2) PRESS AND HOLD FOR DIMMING CONTROL</li><li>e. EACH DIMMING OUTPUT CHANNEL SHALL HAVE AN INDEPENDENTLY</li></ul>	
CONFIGURABLE MINIMUM AND MAXIMUM CALIBRATION TRIM LEVEL TO SET THE DIMMING RANGE TO MATCH THE TRUE DYNAMIC RANGE OF THE	
CONNECTED BALLAST OR DRIVER. LED LEVEL INDICATORS ON BOUND DIMMING SWITCHES SHALL UTILIZE THIS NEW MAXIMUM AND MINIMUM TRIM.	
f. EACH DIMMING OUTPUT CHANNEL SHALL HAVE AN INDEPENDENTLY CONFIGURABLE MINIMUM AND MAXIMUM TRIM LEVEL TO SET THE DYNAMIC	
RANGE OF THE OUTPUT WITHIN THE NEW 0-100 PERCENT DIMMING RANGE DEFINED BY THE MINIMUM AND MAXIMUM CALIBRATION TRIM.	
g. CALIBRATION AND TRIM LEVELS MUST BE SET PER OUTPUT CHANNEL. DEVICES THAT SET CALIBRATION OR TRIM LEVELS PER CONTROLLER (AS OPPORT OF THE DEPLOY AND ADD ADD ADD ADD ADD ADD ADD ADD ADD	
OPPOSED TO PER LOAD) ARE NOT ACCEPTABLE. h. ALL CONFIGURATION SHALL BE DIGITAL. DEVICES THAT SET CALIBRATION OR TRIMULEVELS ARE OUTPUT CHANNEL VIA TRIM ROTS OR DID SWITCHES ARE	
TRIM LEVELS PER OUTPUT CHANNEL VIA TRIM POTS OR DIP-SWITCHES ARE NOT ACCEPTABLE. B. FIXTURE CONTROLLERS SHALL INCLUDE	
1. A FORM FACTOR AND PRODUCT RATINGS TO ALLOW VARIOUS OEM FIXTURE MANUFACTURERS TO MOUNT THE DEVICE INSIDE THE BALLAST/DRIVER CAVITY	
OF STANDARD-SIZED FLUORESCENT OR LED GENERAL LIGHTING FIXTURES. 2. ONE 3A 120/277V RATED MECHANICALLY HELD RELAY.	
3. PROGRAMMABLE BEHAVIOR ON POWER UP FOLLOWING THE LOSS OF NORMAL POWER:	
a. TURN ON TO 100 PERCENT b. TURN OFF	
c. TURN ON TO LAST LEVEL 4. REQUIREMENT FOR 7 MA OF 24VDC OPERATING POWER FROM THE DIGITAL	
LIGHTING CONTROL LOCAL NETWORK. 5. FIXTURE CONTROLLER DOES NOT REQUIRE A CONNECTION TO A NEUTRAL	
CONDUCTOR TO OPERATE, AND UNLIKE OTHER TYPES OF LOAD CONTROLLERS IT DOES NOT CONTRIBUTE POWER TO THE DIGITAL LIGHTING CONTROL LOCAL	
NETWORK TO DRIVE ACCESSORY DEVICES. 6. POWER TO DRIVE THE FIXTURE CONTROLLER ELECTRONICS CAN COME FROM	
ANY ROOM CONTROLLER 7. 0-10V DIMMING CAPABILITY VIA A SINGLE 0-10 VOLT ANALOG OUTPUT FROM THE	
DEVICE FOR CONTROL OF COMPATIBLE BALLASTS AND LED DRIVERS. THE 0-10 VOLT OUTPUT SHALL AUTOMATICALLY OPEN UPON LOSS OF POWER TO THE	
FIXTURE CONTROLLER. 8. CONNECT TO A SINGLE OR DUAL RJ-45 ADAPTOR WITH 24 INCH LEADS. SINGLE	
ADAPTOR MOUNTS IN A 1/2 INCH KO AND DUAL ADAPTOR IN A 2.2 BY 1.32 INCH RECTANGULAR HOLE FOR CONNECTION TO THE DIGITAL LIGHTING CONTROL	

9. ADAPTOR LEADS ARE INSULATED FOR USE IN A FIXTURE CAVITY, AND THE LEAD LENGTH ALLOWS THE OEM FIXTURE MANUFACTURER FLEXIBILITY TO POSITION THE FIXTURE CONTROLLER AND THE RJ45 JACK IN THE BEST LOCATIONS ON FACH FIXTURE 10.A COMPLETE SET OF DIMMING FEATURES DESCRIBED ABOVE IN THE PARAGRAPH DETAILING ON/OFF/DIMMING ENHANCED ROOM CONTROLLERS. 2.04 CEILING/WALL MOUNTED OCCUPANCY SENSOR AND WALL SWITCH OCCUPANCY

A. OCCUPANCY SENSORS SHALL PROVIDE GRAPHIC LCD DISPLAY FOR DIGITAL CALIBRATION AND ELECTRONIC DOCUMENTATION. FEATURES INCLUDE THE FOLLOWING 1. DIGITAL CALIBRATION AND PUSHBUTTON CONFIGURATION FOR THE FOLLOWING VARIABLES a. SENSITIVITY, 0-100 PERCENT IN 10 PERCENT INCREMENTS b TIME DELAY 1-30 MINUTES IN 1 MINUTE INCREMENTS c TEST MODE FIVE SECOND TIME DELAY d. DETECTION TECHNOLOGY, PIR, ULTRASONIC OR DUAL TECHNOLOGY ACTIVATION AND/OR RE-ACTIVATION. e WALK-THROUGH MODE 2. PROGRAMMABLE CONTROL FUNCTIONALITY INCLUDING:

a. EACH SENSOR MAY BE PROGRAMMED TO CONTROL SPECIFIC LOADS WITHIN A LOCAL NETWORK b. SENSOR SHALL BE CAPABLE OF ACTIVATING ONE OF 16 USER-DEFINABLE LIGHTING SCENES c. ADJUSTABLE RETRIGGER TIME PERIOD FOR MANUAL-ON LOADS. LOAD WILL RETRIGGER (TURN ON) AUTOMATICALLY WITHIN A CONFIGURABLE PERIOD OF TIME (DEFAULT 10 SECONDS) AFTER TURNING OFF d. ON DUAL TECHNOLOGY SENSORS, INDEPENDENTLY CONFIGURABLE TRIGGER MODES ARE AVAILABLE FOR BOTH NORMAL (NH) AND AFTER HOURS (AH) TIME PERIODS. THE RETRIGGER MODE CAN BE PROGRAMMED TO USE THE FOLLOWING TECHNOLOGIES: e ULTRASONIC AND PASSIVE INFRARED f ULTRASONIC OR PASSIVE INFRARED g. ULTRASONIC ONI Y h. PASSIVE INFRARED ONLY

INDEPENDENTLY CONFIGURABLE SENSITIVITY SETTINGS FOR PASSIVE INFRARED AND ULTRASONIC TECHNOLOGIES (ON DUAL TECHNOLOGY SENSORS) FOR BOTH NORMAL (NH) AND AFTER HOUR (AH) TIME PERIODS. 3. ONE OR TWO RJ-45 PORT(S) FOR CONNECTION TO DIGITAL LIGHTING CONTROL LOCAL NETWORK. 4. TWO-WAY INFRARED (IR) TRANSCEIVER TO ALLOW REMOTE PROGRAMMING HROUGH HANDHELD COMMISSIONING TOOL AND CONTROL BY REMOTE PERSONAL CONTROLS. 5. ASSIGNMENT OF OCCUPANCY SENSOR TO A SPECIFIC LOAD WITHIN THE ROOM WITHOUT WIRING OR SPECIAL TOOLS. 6. MANUAL OVERRIDE OF CONTROLLED LOADS 7. ALL DIGITAL PARAMETER DATA PROGRAMMED INTO AN INDIVIDUAL OCCUPANCY SENSOR SHALL BE RETAINED IN NON-VOLATILE FLASH MEMORY WITHIN THE SENSOR ITSELF. MEMORY SHALL HAVE AN EXPECTED LIFE OF NO LESS THAN 10 B. BACNET OBJECT INFORMATION SHALL BE AVAILABLE FOR THE FOLLOWING 1. DETECTION STATE 2. OCCUPANCY SENSOR TIME DELAY OCCUPANCY SENSOR SENSITIVITY, PIR AND ULTRASONIC C. UNITS SHALL NOT HAVE ANY DIP SWITCHES OR POTENTIOMETERS FOR FIELD

D. MULTIPLE OCCUPANCY SENSORS MAY BE INSTALLED IN A ROOM BY SIMPLY CONNECTING THEM TO THE FREE TOPOLOGY DIGITAL LIGHTING CONTROL LOCAL NETWORK. NO ADDITIONAL CONFIGURATION WILL BE REQUIRED. 2.05 WALL SWITCHES A. LOW VOLTAGE MOMENTARY PUSHBUTTON SWITCHES IN 1. 2. 3. 4. 5 AND 6 BUTTON CONFIGURATION. WALL SWITCHES SHALL INCLUDE THE FOLLOWING FEATURES: I. TWO-WAY INFRARED (IR) TRANSCEIVER FOR USE WITH PERSONAL AND CONFIGURATION REMOTE CONTROLS 2 REMOVABLE BUTTONS FOR FIELD REPLACEMENT WITH ENGRAVED BUTTONS

AND/OR ALTERNATE COLOR BUTTONS, BUTTON REPLACEMENT MAY BE COMPLETED WITHOUT REMOVING THE SWITCH FROM THE WALL 3. CONFIGURATION LED ON EACH SWITCH THAT BLINKS TO INDICATE DATA TRANSMISSION 4. LOAD/SCENE STATUS LED ON EACH SWITCH BUTTON WITH THE FOLLOWING ARACTERISTICS: a. BI-LEVEL LED b. DIM LOCATOR LEVEL INDICATES POWER TO SWITCH c. BRIGHT STATUS LEVEL INDICATES THAT LOAD OR SCENE IS ACTIVE d. DIMMING SWITCHES SHALL INCLUDE SEVEN BI-LEVEL LEDS TO INDICATE LOAD

LEVELS USING 14 STEPS. 5. PROGRAMMABLE CONTROL FUNCTIONALITY INCLUDING: a. BUTTON PRIORITY MAY BE CONFIGURED TO ANY BACNET PRIORITY LEVEL, FROM 1-16 CORRESPONDING TO NETWORKED OPERATION ALLOWING LOCAL ACTIONS TO UTILIZE LIFE SAFETY PRIORITY

b. SCENE PATTERNS MAY BE SAVED TO ANY BUTTON OTHER THAN DIMMING ROCKERS. ONCE SET, BUTTONS MAY BE DIGITALLY LOCKED TO PREVENT OVERWRITING OF THE PRESET LEVELS

- 6. ALL DIGITAL PARAMETER DATA PROGRAMMED INTO AN INDIVIDUAL WALL SWITCH SHALL BE RETAINED IN NON-VOLATILE FLASH MEMORY WITHIN THE WALL SWITCH ITSELF. MEMORY SHALL HAVE AN EXPECTED LIFE OF NO LESS THAN 10 YEARS
- B. BACNET OBJECT INFORMATION SHALL BE AVAILABLE FOR THE FOLLOWING OB.IECTS. 1. BUTTON STATE SWITCH LOCK CONTROL
- 3 SWITCH LOCK STATUS C. TWO RJ-45 PORTS FOR CONNECTION TO DIGITAL LIGHTING CONTROL LOCAL
- NFTWORK D. MULTIPLE DIGITAL WALL SWITCHES MAY BE INSTALLED IN A ROOM BY SIMPLY CONNECTING THEM TO THE FREE TOPOLOGY DIGITAL LIGHTING CONTROL LOCAL NETWORK. NO ADDITIONAL CONFIGURATION SHALL BE REQUIRED TO ACHIEVE
- MULTI-WAY SWITCHING. E. LOAD AND SCENE BUTTON FUNCTION MAY BE RECONFIGURED FOR INDIVIDUAL 3UTTONS FROM LOAD TO SCENE, AND VICE VERSA.
- I. INDIVIDUAL BUTTON FUNCTION MAY BE CONFIGURED TO TOGGLE, ON ONLY OR 2. INDIVIDUAL SCENES MAY BE LOCKED TO PREVENT UNAUTHORIZED CHANGE. 3. FADE UP AND FADE DOWN TIMES FOR INDIVIDUAL SCENES MAY BE ADJUSTED
- FROM 0 SECONDS TO 18 HOURS 4. RAMP RATE MAY BE ADJUSTED FOR EACH DIMMER SWITCH. 5 SWITCH BUTTONS MAY BE BOUND TO ANY LOAD ON ANY LOAD CONTROLLER OR RELAY PANEL AND ARE NOT LOAD TYPE DEPENDENT; EACH BUTTON MAY BE BOUND TO MULTIPLE LOADS.

### PART 3 EXECUTION 3.01 INSTALLATION

- A. INSTALL ALL ROOM/AREA DEVICES USING MANUFACTURER'S FACTORY-TESTED LOW VOLTAGE CABLE WITH PRE-TERMINATED RJ-45 CONNECTORS. 1. IF PRE-TERMINATED CABLE IS NOT USED FOR ROOM/AREA WIRING, EACH FIELD-TERMINATED CABLE SHALL BE TESTED FOLLOWING INSTALLATION AND TESTING RESULTS SUBMITTED TO THE MANUFACTURER'S REPRESENTATIVE FOR APPROVAL PRIOR TO PROCEEDING WITH THE WORK
- 2. IF FIXTURES HAVE INTERNAL DIGITAL LIGHTING CONTROL CONTROL MODULES, ENSURE THAT THEY ARE ALSO CONNECTED WITH LOW VOLTAGE CABLE. 3. INSTALL ALL ROOM TO ROOM NETWORK DEVICES USING MANUFACTURER-SUPPLIED NETWORK WIRE OR WIRELESS DEVICES NETWORK WIRE
- SUBSTITUTION IS NOT PERMITTED AND MAY RESULT IN LOSS OF PRODUCT WARRANTY
- 4. LOW VOLTAGE WIRING TOPOLOGY MUST COMPLY WITH MANUFACTURER'S SPECIFICATIONS 5. ROUTE NETWORK WIRING AS INDICATED ON THE DRAWINGS AS CLOSELY AS POSSIBLE. DOCUMENT FINAL WIRING LOCATION, ROUTING AND TOPOLOGY ON
- AS BUILT DRAWINGS B. ALL CLASS II CABLING SHALL ENTER ENCLOSURES FROM WITHIN LOW-VOLTAGE WIRING AREAS AND SHALL REMAIN WITHIN THOSE AREAS. NO CLASS I CONDUCTORS SHALL ENTER A LOW-VOLTAGE AREA.
- 3.02 FIFLD QUALITY CONTROL A. MANUFACTURER'S FIELD SERVICE: ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO INSPECT COMPONENTS, ASSEMBLIES, AND EQUIPMENT INSTALLATIONS, INCLUDING CONNECTIONS, AND TO ASSIST IN TESTING. NOTIFY ENGINEER AND MANUFACTURER IN WRITING A MINIMUM OF 3 WEEKS PRIOR TO SYSTEM START-UP AND TESTING. B. TESTS AND INSPECTIONS: MANUFACTURER'S SERVICE REPRESENTATIVE SHALL

### PERFORM THE FOLLOWING INSPECTIONS AND PREPARE REPORTS. INTERIOR LIGHTING

PART 1 PRODUCTS 1.01 LUMINAIRE TYPES

- A. FURNISH PRODUCTS AS INDICATED IN LUMINAIRE SCHEDULE INCLUDED ON THE DRAWINGS 1.02 LUMINAIRES
- A. PROVIDE PRODUCTS THAT COMPLY WITH REQUIREMENTS OF NFPA 70 AND NFPA B. PROVIDE PRODUCTS THAT ARE LISTED AND LABELED AS COMPLYING WITH UL 1598, WHERE APPI ICABLE
- C. PROVIDE PRODUCTS LISTED, CLASSIFIED, AND LABELED AS SUITABLE FOR THE PURPOSE INTENDED.
- D. UNLESS OTHERWISE INDICATED, PROVIDE COMPLETE LUMINAIRES INCLUDING LAMP(S) AND ALL SOCKETS, BALLASTS, REFLECTORS, LENSES, HOUSINGS AND OTHER COMPONENTS REQUIRED TO POSITION, ENERGIZE AND PROTECT THE LAMP
- AND DISTRIBUTE THE LIGHT. E. UNLESS SPECIFICALLY INDICATED TO BE EXCLUDED, PROVIDE ALL REQUIRED
- CONDUIT, BOXES, WIRING, CONNECTORS, HARDWARE, SUPPORTS, TRIMS, ACCESSORIES, ETC. AS NECESSARY FOR A COMPLETE OPERATING SYSTEM. F. PROVIDE PRODUCTS SUITABLE TO WITHSTAND NORMAL HANDLING, INSTALLATION, AND SERVICE WITHOUT ANY DAMAGE, DISTORTION, CORROSION, FADING, DISCOLORING, ETC. G. LED LUMINAIRES
- 1. COMPONENTS: UL 8750 RECOGNIZED OR LISTED AS APPLICABLE. 2 TESTED IN ACCORDANCE WITH IES I M-79 AND IES I M-80 3. LED ESTIMATED USEFUL LIFE: MINIMUM OF 50,000 HOURS AT 70 PERCENT LUMEN MAINTENANCE, CALCULATED BASED ON IES LM-80 TEST DATA. 1.03 BALLASTS AND DRIVERS
- A. BALLASTS/DRIVERS GENERAL REQUIREMENTS: POLYCHLORINATED BIDHENVLS (PCBS) PROVIDE BALLAST 2. MINIMUM EFFICIENCY/EFFICACY: PROVIDE BALLASTS COMPLYING WITH ALL CURRENT APPLICABLE FEDERAL AND STATE BALLAST EFFICIENCY/EFFICACY STANDARDS. B. DIMMABLE LED DRIVERS:
- DIMMING RANGE: CONTINUOUS DIMMING FROM 100 PERCENT TO ONE PERCENT RELATIVE LIGHT OUTPUT UNLESS DIMMING CAPABILITY TO LOWER LEVEL IS INDICATED, WITHOUT FLICKER. 2. CONTROL COMPATIBILITY: FULLY COMPATIBLE WITH THE DIMMING CONTROLS TO BE INSTALLED.
- 1 04 ACCESSORIES A. STEMS FOR SUSPENDED LUMINAIRES: STEEL TUBING, MINIMUM 1/2" SIZE, FACTORY FINISHED TO MATCH LUMINAIRE OR FIELD-PAINTED AS DIRECTED. B. THREADED RODS FOR SUSPENDED LUMINAIRES: ZINC-PLATED STEEL, MINIMUM 1/4" SIZE FIELD-PAINTED AS DIRECTED C. PROVIDE ACCESSORY PLASTER FRAMES FOR LUMINAIRES RECESSED IN PLASTER CEILINGS
- PART 2 EXECUTION 2.01 INSTALLATION A. PERFORM WORK IN ACCORDANCE WITH NECA 1 (GENERAL WORKMANSHIP
- B. INSTALL PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. C. INSTALL LUMINAIRES SECURELY, IN A NEAT AND WORKMANLIKE MANNER, AS SPECIFIED IN NECA 500 (COMMERCIAL LIGHTING) AND NECA 502 (INDUSTRIAL LIGHTING)
- D. INSTALL LUMINAIRES PLUMB AND SQUARE AND ALIGNED WITH BUILDING LINES AND WITH ADJACENT LUMINAIRES E SUSPENDED CEILING MOUNTED LUMINAIRES . DO NOT USE CEILING TILES TO BEAR WEIGHT OF LUMINAIRES. 2. DO NOT USE CEILING SUPPORT SYSTEM TO BEAR WEIGHT OF LUMINAIRES
- UNLESS CEILING SUPPORT SYSTEM IS CERTIFIED AS SUITABLE TO DO SO. SECURE SURFACE-MOUNTED AND RECESSED LUMINAIRES TO CEILING SUPPORT CHANNELS OR FRAMING MEMBERS OR TO BUILDING STRUCTURE 4. SECURE PENDANT-MOUNTED LUMINAIRES TO BUILDING STRUCTURE.
- 5. SECURE LAY-IN LUMINAIRES TO CEILING SUPPORT CHANNELS USING LISTED SAFETY CLIPS AT FOUR CORNERS. F. SUSPENDED LUMINAIRES . INSTALL USING THE SUSPENSION METHOD INDICATED, WITH SUPPORT LENGTHS AND ACCESSORIES AS REQUIRED FOR SPECIFIED MOUNTING HEIGHT.
- 2. UNLESS OTHERWISE INDICATED, SUPPORT PENDANTS FROM SWIVEL HANGERS. G. INSTALL ACCESSORIES FURNISHED WITH EACH LUMINAIRE H. BOND PRODUCTS AND METAL ACCESSORIES TO BRANCH CIRCUIT EQUIPMENT

GROUNDING CONDUCTOR.

