

ABBREVIATIONS

DESCRIPTION	ABBREV.
ABOVE	ABV
AUTOMATIC DOOR OPENER	ADO
AMPERE FRAME	AF
AMPERE TRIP	AT
BARE COPPER	BC
ELECTRICAL CONDUIT	C
CAMERA	CAM
CIRCUIT BREAKER	CB, C/B
DIRECT BURIAL	DB
DENTAL EQUIPMENT SUPPLIER	DES
ELECTRICAL CONTRACTOR	EC
EQUIPMENT GROUND	EG
ELECTRIC WATER COOLER	EW
FIRE ALARM	FA
FIRESTOP	FS
FUSED SAFETY SWITCH	FSS
GENERAL CONTRACTOR	GC
GROUND TERMINAL BOX	GTB
GROUND FAULT CIRCUIT INTERRUPTER	GFCI
LOCAL TEMPERATURE CONTROL PANEL	LTOP
LIGHT FIXTURES	LTS
MAIN DISTRIBUTION PANEL	MOP
MAIN LUGS ONLY	M.L.O.
MECHANICAL CONTRACTOR	MC
NON-FUSED SAFETY SWITCH	NFSS
NIGHT LIGHT	NL
PHOTO CELL	PCELL
PLUMBING CONTRACTOR	PC
POWER OPERATED DAMPER	POD
POWER TYPE ROOF VENTILATION	PTRV
RECEPTACLE	REC
SAFETY SWITCH	SS
TIMECLOCK	TC
WIRELESS ACCESS POINT	WAP
WIRE	W
WEATHER PROOF IN USE	WP

ELECTRICAL SYMBOL LEGEND

ONLY SYMBOLS USED ON PLANS APPLY. DIMENSIONS (+X) ARE TO TOP OF BOX.

SYMBOL	DESCRIPTION
	CIRCUIT BREAKER PANEL BOARD
	CIRCUITRY, CONCEALED WHERE FEASIBLE 2 CONDUCTORS UNLESS INDICATED OTHERWISE BY HASH MARKS
	HOME RUN TO PANEL
	SAFETY DISCONNECT SWITCH, NEMA RATING AMPACITY AND FUSING AS REQUIRED
	120V DUPLEX GROUNDED RECEPTACLE, 18" AFF U.O.N WP = WEATHER PROOF GFI = GROUND FAULT INTERRUPTER IG = ISOLATED GROUND 120V
	120V DUPLEX GFCI RECEPTACLE, 18" AFF U.O.N
	QUADRAPLEX GROUNDED RECEPTACLE, 18" AFF U.O.N
	SPECIAL PURPOSE RECEPTACLE AS NOTED
	JUNCTION BOX
	EXHAUST FAN INSTALLED BY OTHERS
	DATA COMMUNICATIONS OUTLET, 18" AFF U.O.N (BOX, CONDUIT TO CLG SPACE ONLY)
	TELEPHONE OUTLET, 18" AFF U.O.N., (BOX, CONDUIT TO CEILING SPACE ONLY)
	TELEPHONE EQUIP. BACKBOARD, SIZE AS REQUIRED
	CABLE TV OUTLET, WIRE BACK TO SERVICE BOX.
	CIRCUITRY
	UNDERGROUND CIRCUITRY
	ACCESS CONTROL CARD READER
	DOOR ELECTRIC STRIKE

2018 APPENDIX B BUILDING CODE SUMMARY FOR ALL COMMERCIAL PROJECTS
Electrical design

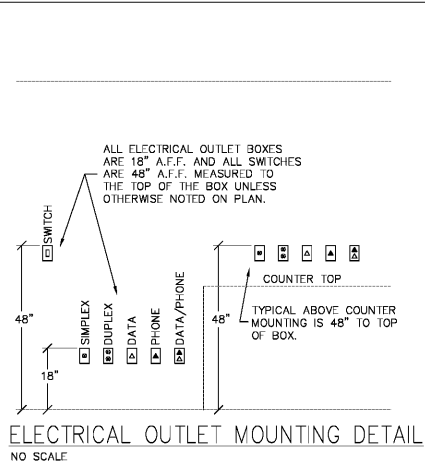
ELECTRICAL SYSTEM AND EQUIPMENT
Method of Compliance: Energy Code - Prescriptive

Lighting schedule (each fixture type)
Lamp type required in fixture: VARIES
Number of lamps in fixture: VARIES
Ballast type used in the fixture: VARIES
Number of ballasts in fixture: VARIES
Total wattage per fixture: VARIES
Total interior wattage specified vs. allowed (whole building or space by space): 854 VS 1,363
Total exterior wattage specified vs. allowed: 6,664 VS 8,121

Whole Building (X) Space by Space ()
EXTERIOR LIGHTING WATTAGE SPECIFIED VS ALLOWED: 854 VS 1,363

Additional Efficiency Package Options
(When using the 2018 NEC; not required for ASHRAE 90.1)

- C.406.2 More Efficient HVAC Equipment Performance
- C.406.3 Reduced Lighting Power or Density
- C.406.4 Enhanced Digital Lighting Controls
- C.406.5 On-Site Renewable Energy
- C.406.6 Dedicated Outdoor Air System
- C.406.7 Reduced Energy Use in Service Water Heating



ELECTRICAL SPECIFICATIONS

ALL WORK SHALL COMPLY WITH LAWS APPLYING TO ELECTRICAL INSTALLATIONS IN EFFECT, AND WITH THE MOST RECENT EDITION OF THE NATIONAL ELECTRICAL CODE, ADA, APPLICABLE SECTIONS OF OTHER NFPA, OSHA, LIFE SAFETY CODES AND RECOMMENDATIONS, AND THE INTERIM AMENDMENTS IN EFFECT AT THE TIME OF THE PROPOSAL.

THE WORK INCLUDES PROVIDING MATERIALS, DEVICES, WIRING, FIXTURES, ETC. NECESSARY FOR A COMPLETE FUNCTIONING ELECTRICAL SYSTEM. ALL MATERIALS FURNISHED BY THE CONTRACTOR SHALL BE NEW AND UNUSED AND FREE FROM DEFECTS. INSTALL, CONNECT AND ADJUST ALL EQUIPMENT PER MANUFACTURER'S INSTRUCTIONS. ANY ITEM NOT SPECIFICALLY SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS, BUT THAT IS NORMALLY REQUIRED TO CONFORM TO THE INTENT, ARE TO BE CONSIDERED A PART OF THE CONTRACT. ALL MATERIALS USED SHALL BE NEW AND SHALL CONFORM TO THE STANDARDS ESTABLISHED BY THE UNDERWRITERS LABORATORIES INCORPORATED.

THE INTENT OF THE DRAWINGS IS TO INDICATE THE GENERAL EXTENT OF WORK REQUIRED FOR THE PROJECT. THE DRAWINGS FOR ELECTRICAL WORK ARE DIAGRAMMATIC, SHOWING THE LOCATION, TYPE, DEVICES AND EQUIPMENT REQUIRED. THE DRAWINGS SHALL NOT BE SCALED FOR EXACT MEASUREMENTS. PROVIDE ALL FIXTURES, DEVICES, ACCESSORIES, OFFSETS, AND MATERIALS NECESSARY TO FACILITATE THE SYSTEM'S FUNCTIONING AS INDICATED BY THE DESIGN AND THE EQUIPMENT FURNISHED BY OTHERS.

HOOK-UP CHARGES, PERMITS, LOCAL FEES AND ALL OTHER EXPENSES RELATED TO A COMPLETE AND FUNCTIONING ELECTRICAL SYSTEM SHALL BE INCLUDED IN THE CONTRACTORS BID. THE CONTRACTOR SHALL COOPERATE FULLY WITH UTILITY SERVICE PROVIDERS WITH RESPECT TO THEIR SERVICES.

COORDINATE WITH THE WORK OF OTHER SECTIONS, EQUIPMENT FURNISHED BY OTHERS, AND WITH THE CONSTRAINTS OF THE EXISTING CONDITIONS OF THE PROJECT SITE.

COORDINATE WITH THE LOCAL ELECTRIC UTILITY COMPANY AND TELEPHONE COMPANY AS TO THE REQUIREMENTS FOR SERVICE CONNECTIONS AND PROVIDE ALL LABOR, MATERIALS, AND TESTING NECESSARY.

DEFINITIONS: FURNISH MEANS TO SUPPLY AND DELIVER TO PROJECT SITE, READY FOR INSTALLATION. INSTALL MEANS TO PLACE IN POSITION AND MAKE CONNECTIONS FOR SERVICE OR USE. PROVIDE MEANS TO FURNISH AND INSTALL, COMPLETE AND READY FOR INTENDED USE. WIRING MEANS THE INCLUSION OF ALL RACEWAYS, FITTINGS, CONDUCTORS, CONNECTORS, JUNCTION AND OUTLET BOXES, SPLICES, CONNECTIONS, TAPE, AND ALL OTHER ITEMS NECESSARY AND/OR REQUIRED IN CONNECTION WITH SUCH WORK. CONDUIT MEANS THE INCLUSION OF ALL HANGERS, SLEEVES, SUPPORTS, FITTINGS, ETC.

FIRESTOPPING IS A MATERIAL OR COMBINATION OF MATERIALS USED TO RETAIN INTEGRITY OF FIRE-RATED CONSTRUCTION BY MAINTAINING AN EFFECTIVE BARRIER AGAINST THE SPREAD OF FLAME, SMOKE, AND HOT GASES THROUGH PENETRATIONS IN FIRE RATED WALL AND FLOOR ASSEMBLIES.

WARRANTY: PROVIDE LABOR AND MATERIALS TO REPAIR OR REPLACE DEFECTIVE PARTS AND MATERIALS AS REQUIRED FOR ONE YEAR AFTER SUBSTANTIAL COMPLETION OR OWNER ACCEPTANCE OF THE COMPLETED PROJECT.

ELECTRICAL DESIGN HAS BEEN BASED ON THE INSTALLATION OF 75°C CONDUCTORS CONNECTED TO TERMINAL LUGS AND EQUIPMENT, U.L. LISTED FOR A MINIMUM 75°C. CONDUCTORS TERMINATED ON EQUIPMENT OR DEVICES WITH A LOWER RATING (60°C) OR NO RATING SHOWN, SHALL HAVE CONDUCTOR SIZE INCREASED TO CONFORM TO NEC TABLE 310-16.

ALL EQUIPMENT SHALL BE EQUAL TO OR EXCEED THE MINIMUM REQUIREMENTS OF NEMA, IEEE, AND UL.

DISCONNECT SWITCHES SHALL BE HEAVY-DUTY, QUICK-MAKE, QUICK-BREAK TYPE, NEMA 1 ENCLOSURE FOR INDOOR LOCATIONS (NEMA 3R FOR OUTDOOR LOCATIONS). SWITCHES SHALL BE AS MANUFACTURED BY SQUARE 'D', GENERAL ELECTRIC, OR SIEMENS (I.T.E.). PROVIDE FUSES AS MANUFACTURED BY BUSSMAN, GOULD-SHAMMUT, OR LITTLE-FUSE. ALL CONDUCTORS SHALL BE LISTED FOR A MINIMUM OF 75°C. SWITCHES USED AS SERVICE ENTRANCE EQUIPMENT TO BE U.L. LISTED AS "SER" RATED EQUIPMENT. WHERE MULTIPLE DISCONNECTS ARE USED AS A SERVICE ENTRANCE MEANS, A NEUTRAL CONDUCTOR SHALL BE RUN TO THE NEUTRAL TERMINAL IN EACH SERVICE DISCONNECT AND SHALL BE BONDED PER NEC.

PANEL BOARDS SHALL BE AS MANUFACTURED BY SQUARE-D OR EQUAL MEETING U.L. STANDARDS 50 AND 67, WITH U.L. LABEL. PANELS AND SERVICE ENTRANCE EQUIPMENT TO BE U.L. LISTED AS "SER" RATED EQUIPMENT. PANELBOARDS SHALL BE FULLY RATED.

BREAKERS: THERMAL MAGNETIC TYPE, QUICK-MAKE, QUICK-BREAK, PLUG-IN TYPE OF SINGLE UNIT CONSTRUCTION. TWO POLE BREAKERS SHALL BE SINGLE UNIT COMMON TRIP TYPE. BREAKERS USED AS SWITCHES FOR 120V LIGHTING CIRCUITS SHALL BE APPROVED FOR THAT USE AND MARKED "SWD".

GROUNDING SYSTEM: PERMANENTLY AND EFFECTIVELY GROUND ALL METALLIC CONDUIT, SUPPORTS, CABINETS, PANELBOARDS AND SYSTEM NEUTRAL CONDUCTORS. MAINTAIN CONTINUITY OF EQUIPMENT GROUND THROUGHOUT THE SYSTEM. GROUND CLAMPS SHALL BE APPROVED TYPE, SPECIFICALLY DESIGNED FOR GROUNDING. WIRE OR GROUNDING CONDUCTOR ENCLOSED IN CONDUIT, GROUND CLAMP SHALL BE OF A TYPE WHICH GROUND BOTH CONDUCTOR AND CONDUIT. ALL CIRCUITS IN FLEXIBLE METAL OR PLASTIC CONDUIT SHALL INCLUDE A GROUNDING WIRE SIZE AS ACCORDANCE WITH NATIONAL ELECTRICAL CODE.

CONDUCTORS: INSULATED SOFT ANNEALED 99% PURE COPPER WITH COLOR CODING, B AND S GAUGES TO AND SMALLER THAN SOLID, #8 AND LARGER TO BE STRANDED, MINIMUM #12 UNLESS OTHERWISE INDICATED. CONDUCTORS MUST BE INSTALLED IN ACCORDANCE WITH N.E.C. AND CANNOT BE SUPPORTED FROM SUSPENSION WIRES. WIRING NOT TO BE USED UNDERGROUND, AT SERVICE ENTRANCE, OUTSIDE, OR IN WET LOCATIONS. ALL INSULATION TO BE RATED FOR 600 V.

DEVICES SHALL BE "COMMERCIAL SPECIFICATION GRADE" OR EQUAL. ALL DEVICES AND COVER PLATES SHALL BE WHITE COLOR UNLESS OTHERWISE DIRECTED. STANDARD DUPLEX RECEPTACLES SHALL BE GROUNDING TYPE, 20A, NEMA STANDARD 5-20R, SIDE WIRED, LEVITON OR EQUAL LIGHT SWITCHES SHALL BE 20 AMP, 120 VOLT LEVITON OR EQUAL. WHERE SWITCHES ARE GROUPED, PROVIDE GANG PLATES.

LIGHT FIXTURES & LAMPS ARE TO BE FURNISHED BY E.C. AS NOTED ON THE LIGHT FIXTURE SCHEDULE. FIXTURE INSTALLATION SHALL BE BY THE ELECTRICAL CONTRACTOR ACCORDING TO LOCAL CODE AUTHORITY. THE ELECTRICAL CONTRACTOR SHALL REMOVE MATERIALS AT THE TIME OF REMOVAL AND IMMEDIATELY REPORT ANY DAMAGE OR MISSING PIECES.

LIGHT FIXTURE QUANTITIES AND INPUT WATTAGES LISTED IN LIGHT FIXTURE SCHEDULE ARE FOR ENGINEERING ENERGY CALCULATIONS ONLY AND ARE NOT TO BE USED BY CONTRACTOR FOR QUANTITY TAKE-OFFS.

EMERGENCY LIGHTING SHALL HAVE A MINIMUM OF 90 MIN. BATTERY BACK-UP. AS REQUIRED BY LOCAL CODE AUTHORITY.

LAYOUT BRANCH CIRCUIT WIRING AND ARRANGEMENT OF HOME RUNS FOR MAXIMUM ECONOMY AND EFFICIENCY. INCREASE WIRE SIZE IF VOLTAGE DROP EXCEEDS 3% OR 100 FEET OF LENGTH.

CONCEAL WIRING SYSTEM ABOVE SUSPENDED CEILING OR IN WALL OR FLOOR CONSTRUCTION WHERE POSSIBLE. INSTALL CONDUITS PARALLEL TO BUILDING LINES, AND TO CLEAR ALL OPENING, DEPRESSIONS, PIPES, DUCTS, STRUCTURE, ETC.

ALL WIRING SHALL BE IN CONDUIT UNLESS SPECIFICALLY NOTED OTHERWISE (IE. LOW VOLTAGE PLENUM RATED WIRE).

INSTALL CONDUIT CONTINUOUS BETWEEN BOXES AND CABINETS WITH NO MORE THAN FOUR (4) 90 DEGREE BENDS. SECURELY FASTEN IN PLACE WITH STRAPS, HANGERS AND STEEL SUPPORTS AS REQUIRED. DO NOT SUPPORT CONDUIT FROM SUSPENDED CEILING OR SUSPENSION WIRES. REAM CONDUIT ENDS BEFORE INSTALLATION AND THOROUGHLY CLEAN BEFORE INSTALLATION. OPENINGS SHALL BE PLUGGED OR COVERED TO KEEP CONDUIT CLEAN.

CONDUIT SHALL BE SIZED TO COMPLY WITH NEC FOR NUMBER AND SIZE OF CONDUCTORS INSTALLED, MINIMUM 2" BELOW GRADE. PROVIDE SCHEDULE 40 PVC PLASTIC OR RIGID STEEL CONDUIT BELOW GRADE, MINIMUM 3/4". PROVIDE ELECTRICAL METAL TUBING (EMT), FLEXIBLE METAL CONDUIT (IN LENGTHS 6' OR LESS) FOR INTERIOR LOCATIONS. EMT CONNECTORS AND COUPLING SHALL BE SET-SCREW TYPE. CLAMP CONDUIT TO BOXES WITH BUSHING INSIDE OF LOCKNUT ON SIDE.

BELOW GRADE RACEWAYS SHALL BE CONSIDERED WET LOCATION AND SHALL BE SEALED PER NEC 300.5 (G) WITH A SEALANT IDENTIFIED FOR USE WITH INSTALLED CONDUCTORS/INSULATION.

"MC" TYPE CABLE MAY BE USED IN CONCEALED SPACES WHERE NOT SUBJECT TO PHYSICAL DAMAGE OR CORROSION. "MC" & "AC" CABLE MUST BE INSTALLED IN A WORKMANLIKE MANNER AND PERPENDICULAR OR PARALLEL TO BUILDING LINES. CABLE MUST BE INSTALLED IN ACCORDANCE WITH N.E.C. ARTICLE 330.

ALL CONDUIT AND RACEWAY SYSTEMS SHALL BE INSTALLED WITH SEPARATE GROUND CONDUCTOR. CONDUIT SYSTEM IS NOT TO BE USED AS THE SOLE GROUNDING MEANS.

HOOK-UP OR REFINISH DAMAGED SURFACES OF FIXTURES AND EQUIPMENT, EXPOSED TO VIEW.

DATA & TELEPHONE PREMISES WIRING & CABLES TO BE FURNISHED AND INSTALLED BY OWNER. RACEWAY AND/OR CONDUIT TO BE PROVIDED BY E.C. VERIFY EXACT MOUNTING LOCATIONS WITH ARCHITECT PRIOR TO FASTENING RACEWAY OR CONDUIT TO WALL, CEILING OR FLOOR. FASTEN TO SURFACE AS RECOMMENDED BY MANUFACTURER. MOUNT SO RACEWAY IS IN THE LEAST OBVIOUS LOCATION. REAM ALL CUTS SMOOTH. PROVIDE ALL REQUIRED BOXES, EXTENSIONS, FITTINGS, ELBOWS AND DEVICES FOR A COMPLETE INSTALLATION.

REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT LOCATION OF LIGHTING FIXTURES AND OTHER CEILING MOUNTED EQUIPMENT.

FOR EQUIPMENT FURNISHED BY OWNER OR OTHER CONTRACTORS; ELECTRICAL CONTRACTOR TO VERIFY EXACT LOAD, TYPE OF CONNECTION AND MOUNTING HEIGHT FOR EACH BOX OR EQUIPMENT ITEM TO BE INSTALLED. ALL HARDWIRED CONNECTIONS TO EQUIPMENT TO BE MADE WITH FLEXIBLE LIQUID-TITE METAL CONDUIT WITH GREEN GROUND CONDUCTOR INSTALLED INSIDE RACEWAY. GROUND CONDUCTOR SHALL BE BONDED AT BOTH ENDS.

COORDINATE ALL REQUIRED ROOF AND WALL OPENINGS WITH THE GENERAL CONTRACTOR. PROVIDE ALL CURBS, FLASHING, SLEEVES, SUPPORTING FRAMES, REINFORCING ANGLES, ETC. WHICH ARE REQUIRED UNLESS DIRECTED OTHERWISE.

ALUMINUM CONDUCTORS ARE NOT PERMITTED, EXCEPT AT SERVICE ENTRANCE. CONDUCTOR CONNECTION MUST BE PER MANUFACTURER'S REQUIREMENTS.

THE USE OF ROMEX, BX, ETC. IS NOT PERMITTED.

WIRE CONNECTORS SHALL BE EQUAL TO 3M CONNECTORS.

ROOF PENETRATIONS SHALL COMPLY WITH "SMACNA" AND "NRCA" STANDARDS, AND WITH THE REQUIREMENTS OF THE ROOFING WARRANTY, IF APPLICABLE. DO NOT PERFORM ROOFING PENETRATIONS IN A MANNER WHICH WOULD VOID OR OTHERWISE LIMIT THE ROOFING WARRANTY.

TESTING: E.C. TO PROVIDE ALL TESTING MATERIALS, EQUIPMENT, LABOR, CONNECTIONS, ETC. REQUIRED TO PERFORM TESTS. TEST ALL FIXTURES, CIRCUITS, EQUIPMENT, AND DEVICES FOR PROPER OPERATION AND FREEDOM FROM SHORTS, GROUNDS AND OPEN CIRCUITS BEFORE OFFICIAL INSPECTIONS. PERFORM ALL TESTS REQUIRED BY LOCAL AUTHORITIES AND/OR SPECIFICATIONS BY OTHERS.

LIGHTING SYMBOL LEGEND

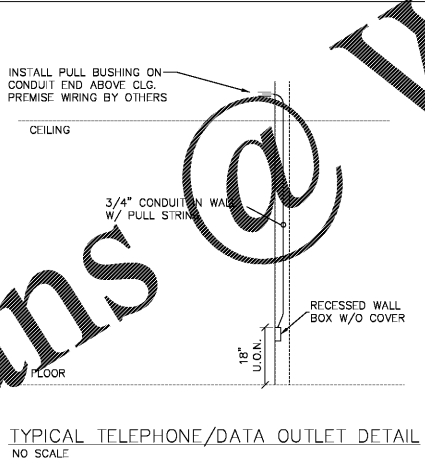
ONLY SYMBOLS USED ON PLANS APPLY. DIMENSIONS (+X) ARE TO TOP OF BOX.

SYMBOL	DESCRIPTION
	WALL MOUNTED LIGHT FIXTURE
	CEILING MOUNTED LIGHT FIXTURE
	2X4 FLUORESCENT LIGHT FIXTURE
	2X2 FLUORESCENT LIGHT FIXTURE
	BATTERY PACK EXIT SIGN
	BATTERY PACK EMERGENCY LIGHT
	BATTERY PACK COMBINATION EXIT/EMERGENCY LIGHT
	REMOTE EXIT DISCHARGE FIXTURE
	120V SWITCH 48" TO TOP AFF
	3-WAY SWITCH
	4-WAY SWITCH
	DIMMER SWITCH
	SWITCH W/ PILOT LAMP
	HOME RUN TO PANEL
	CIRCUITRY
	UNSWITCHED CIRCUITRY

OCCUPANCY SENSING DEVICES

DEVICES SHALL MEET INTENDED SEQUENCE OF OPERATION. ACCEPTABLE MANUFACTURER'S ARE COOPER, LEVITON, LUTRON, SYNERGY & WATTSTOPPER.

SYMBOL	DESCRIPTION	TECHNOLOGY
	WALL SWITCH OCCUPANCY SENSOR	ULTRASONIC-US PASSIVE INFRARED-PIR
	WALL SWITCH OCCUPANCY SENSOR W/ DUAL RELAY	PIR
	WALL SWITCH OCCUPANCY SENSOR W/ DIMMER CONTROL	PIR
	DIRECTIONAL CEILING MOUNT OCCUPANCY SENSOR	US/PIR
	OCCUPANCY SENSOR MOMENTARY OVERRIDE SWITCH	NA
	DIGITAL TIMER SWITCH TO OVERRIDE TIMELOCK 2 HOURS MAX SETTING.	NA
	CEILING MOUNT OCCUPANCY SENSOR, 360° SENSING VIEW.	US/PIR
	LIGHT FIXTURE MOUNT OCCUPANCY SENSOR	US/PIR
	VOLTAGE DEVICE POWER METER	NA
	DIRECTIONAL CEILING/WALL MOUNT OCCUPANCY SENSOR	US/PIR



ELECTRICAL SYBOLS & NOTES

NO SCALE



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