

# ELECTRICAL STANDARD SYMBOLS

## STANDARD SYMBOLS

| SYMBOL | DESCRIPTION   |
|--------|---|
|        | SIMPLEX RECEPTACLE, 125V, 20A, NEMA 5-20R SEE NOTE 4 FOR MOUNTING INSTRUCTIONS AND NOTE 5 FOR EQUIVALENT PRODUCTS AND SUFFIX EXPLANATIONS. SEE NOTE 11 FOR MARKING.   |
|        | DUPLEX RECEPTACLE, 125V, 20A, NEMA 5-20R SEE NOTE 4 FOR MOUNTING INSTRUCTIONS AND NOTE 5 FOR EQUIVALENT PRODUCTS AND SUFFIX EXPLANATIONS. SEE NOTE 11 FOR MARKING.  |
|        | DOUBLE DUPLEX RECEPTACLE, TWO 125V, 20A, NEMA 5-20R RECEPTACLES IN THE SAME BOX. SEE NOTE 4 FOR MOUNTING INSTRUCTIONS AND NOTE 5 FOR EQUIVALENT PRODUCTS AND SUFFIX EXPLANATIONS. SEE NOTE 11 FOR MARKING.  |
|        | SPECIAL RECEPTACLE, N = NEMA CONFIGURATION NUMBER. SEE NOTE 4 FOR MOUNTING INSTRUCTIONS. SEE NOTE 11 FOR MARKING.   |
|        | SNAP SWITCH, N = POLE TYPE, X = STYLE, α = DEVICE OR CIRCUIT BEING SWITCHED. SEE NOTE 4 FOR MOUNTING INSTRUCTIONS, NOTE 5 FOR EQUIVALENT PRODUCTS AND SUFFIX EXPLANATIONS, AND NOTE 11 FOR MARKING.   |
|        | PLUG STRIP, SURFACE-MOUNTED WITH SNAP SWITCH, OVERLOAD PROTECTION, AND NEMA 5-15R RECEPTACLES. N = EQUIPMENT SCHEDULE ENTRY WITH SPECIFIC MANUFACTURER'S DATA. SEE NOTE 11 FOR MARKING.   |
|        | JUNCTION BOX, 4" SQUARE GALVANIZED STEEL BOX, STEEL CITY OR EQUIVALENT. SURFACE MOUNT-BLANK GALVANIZED STEEL COVER PLATE WITH CRUSHED OR ROLLED CORNERS FLUSH MOUNT-BLANK HEAVY-DUTY NYLON COVER PLATE, COLOR TO MATCH OTHERS IN ROOM.  |
|        | PULL BOX, SQUARE PAINTED STEEL WITH COVER. N = EQUIPMENT SCHEDULE ENTRY WITH SPECIFIC MANUFACTURER'S DATA. MOUNT AS SHOWN ON DRAWINGS.  |
|        | CONDUIT OR RACEWAY, EXPOSED OR SURFACE-MOUNTED. SYMBOLS INDICATE NUMBER AND SERVICE OF CONDUCTORS:<br>  = PHASE    i = NEUTRAL    ? = SWITCHED    † = GROUND<br>CONDUIT OR RACEWAY, CONCEALED AND ACCESSIBLE BEHIND PANELS OR ABOVE CEILINGS.<br>CONDUIT OR RACEWAY, CONCEALED AND INACCESSIBLE UNDER FLOOR OR SLAB, OR BURIED.   |
|        | MOTOR X = MOTOR NAMEPLATE HORSEPOWER, N = EQUIPMENT SCHEDULE ENTRY. MOTOR SHALL HAVE FINAL CONNECTION MADE USING FLEXIBLE MEANS AS STATED IN CONSTRUCTION STANDARD SPECIFICATION 16001.<br>EXCEPTION: FRACTIONAL-HORSEPOWER MOTORS WITH INTEGRAL CORD AND PLUG SHALL BE SERVED FROM A CONTROLLED RECEPTACLE MOUNTED AS CLOSE AS PRACTICAL TO THE MOTOR, WHICH SHALL SERVE AS A DISCONNECTING MEANS. DO NOT MODIFY FACTORY CORDS AND PLUGS.<br>ALTERNATE EXCEPTION: WHEN SPECIFICALLY SHOWN ON THE DRAWINGS, THE SERVICE CONDUCTORS SHALL TERMINATE IN A NEMA L-SERIES TWIST-LOCK RECEPTACLE AND THE INTEGRAL MOTOR CORD IN A MATING PLUG, WHICH SHALL SERVE AS A DISCONNECTING MEANS.   |
|        | MOTOR CONTROLLER, SEPARATELY-ENCLOSED N = EQUIPMENT SCHEDULE ENTRY, WHICH SHALL SHOW NEMA SIZE, ENCLOSURE TYPE, AND ACCESSORIES. CONTROLLER SHALL HAVE DISCONNECTING MEANS WITH LOCK-OUT PROVISIONS, MOTOR SHORT-CIRCUIT AND GROUND-FAULT PROTECTION DEVICE, MOTOR STARTER WITH RESETTABLE OVERLOADS, AND ALL ACCESSORIES AND AUXILIARY CONTACTS AS SPECIFIED IN THE EQUIPMENT SCHEDULE. SEE NOTE 4 FOR MOUNTING INSTRUCTIONS, NOTE 12 FOR MARKING, AND NOTE 13 FOR LABELING.<br>EXCEPTION: WHERE SHOWN AS PART OF A ONE-LINE DIAGRAM FOR A MOTOR CONTROL CENTER, THIS SHALL DESCRIBE A BUCKET OR COMPARTMENT WITHIN THE MOTOR CONTROL CENTER.<br>EXCEPTION: WHERE SHOWN ON THE DRAWINGS AND EQUIPMENT SCHEDULE, THIS SHALL BE A MOTOR-RATED AND THERMALLY-PROTECTED SNAP SWITCH CONTROLLER FOR FRACTIONAL-HP MOTORS. |
|        | MOTOR CONTROLLER, VARIABLE-FREQUENCY N = EQUIPMENT SCHEDULE ENTRY. CONTROLLER SHALL HAVE DISCONNECTING MEANS WITH LOCK-OUT PROVISIONS, BYPASS, FULL-SPEED CONTROLLER, PROGRAMMING AND STATUS DISPLAY VISIBLE WITH THE COVER IN PLACE, MOTOR SHORT-CIRCUIT, OVERLOAD, AND GROUND-FAULT PROTECTION DEVICES, AND ALL ACCESSORIES AND CONTROLS AS SPECIFIED IN THE EQUIPMENT SCHEDULE. SEE NOTE 4 FOR MOUNTING INSTRUCTIONS, NOTE 12 FOR MARKING, AND NOTE 13 FOR LABELING. SEE ALSO CONSTRUCTION STANDARD SPECIFICATION 16269.   |
|        | CONTACTOR, SEPARATELY-ENCLOSED N = EQUIPMENT SCHEDULE ENTRY, WHICH SHALL SHOW NEMA SIZE AND ENCLOSURE TYPE, COIL VOLTAGE, NUMBER OF NO AND NC CONTACTS AND THEIR RATINGS, AND ALL ACCESSORIES AND CONTROLS AS SPECIFIED IN THE EQUIPMENT SCHEDULE. SEE NOTE 4 FOR MOUNTING INSTRUCTIONS, NOTE 12 FOR MARKING, AND NOTE 13 FOR LABELING.   |
|        | SAFETY SWITCH, WITH LOCK-OUT PROVISIONS. N = EQUIPMENT SCHEDULE ENTRY, WHICH SHALL SHOW NEMA SIZE AND ENCLOSURE TYPE, NUMBER OF POLES AND BUSES, AMPERAGE AND/OR MOTOR HORSEPOWER RATING, AND FUSE PROVISIONS AS APPROPRIATE. SEE NOTE 4 FOR MOUNTING INSTRUCTIONS, NOTE 12 FOR MARKING, AND NOTE 13 FOR LABELING.  |
|        | CABLE TRAY, N = EQUIPMENT SCHEDULE ENTRY. BOND ALL SECTIONS OF TRAY AND SHOW POINT OF CONNECTION TO BUILDING OR SYSTEM GROUND POINT. MOUNT WITH BOTTOM OF TRAY AT 82" AFF UNLESS OTHERWISE SHOWN.   |
|        | BUSWAY, FEEDER TYPE WITHOUT STAB-IN PROVISIONS. N = EQUIPMENT SCHEDULE ENTRY, WHICH SHALL INCLUDE VOLTAGE, AMPERAGE, AND NEMA ENCLOSURE TYPE. MOUNT AS SHOWN ON DRAWINGS. SEE NOTE 12 FOR MARKING AND NOTE 13 FOR LABELING.   |
|        | BUSWAY, WITH STAB-IN PROVISIONS. N = EQUIPMENT SCHEDULE ENTRY, WHICH SHALL INCLUDE VOLTAGE, AMPERAGE, AND NEMA ENCLOSURE TYPE. NAME = ASSIGNED BUSWAY SCHEDULE NAME. MOUNT AS SHOWN ON DRAWINGS. SEE NOTE 12 FOR MARKING AND NOTE 13 FOR LABELING.  |
|        | SWITCHBOARD OR PANELBOARD, N = EQUIPMENT SCHEDULE ENTRY, WHICH SHALL INCLUDE VOLTAGE, AMPERAGE, CIRCUIT BREAKER RATING, DOOR AND COVER ARRANGEMENT, AND NEMA ENCLOSURE TYPE. NAME = ASSIGNED PANEL SCHEDULE NAME. WALL-MOUNTED PANELS WITH UPPER EDGE NO HIGHER THAN 78" AFF UNLESS OTHERWISE SHOWN. SEE STANDARD CONSTRUCTION SPECIFICATION 16440 FOR ADDITIONAL INFORMATION. SEE NOTE 12 FOR MARKING AND NOTE 13 FOR LABELING. INSTALL AS-BUILT PANEL SCHEDULE FROM ENGINEER OF RECORD.   |
|        | FREE-STANDING EQUIPMENT SHALL BE MOUNTED ON A 4" HOUSEKEEPING PAD.  |
|        | FLUSH-MOUNTED EQUIPMENT SHALL BE SHOWN SUBMERGED IN THE WALL IN THE PLAN VIEW DRAWINGS.   |
|        | SURFACE-MOUNTED EQUIPMENT IN OCCUPIED SPACES SHALL HAVE SKIRTING FROM FLOOR TO CEILING TO CONCEAL CONDUITS. SKIRTING TYPE AND FINISH SHALL COORDINATE WITH ROOM TRIM.   |

## STANDARD SYMBOLS (CONTINUED)

| SYMBOL | DESCRIPTION   |
|--------|---|
|        | LUMINAIRE, DOWNLIGHT, FLUSH-MOUNTED N = EQUIPMENT SCHEDULE ENTRY, WHICH SHALL INCLUDE VOLTAGE, NUMBER AND TYPE OF LAMPS AND BALLAST, AND TRIM PROVISIONS. α = SWITCH IDENTIFICATION. SEE STANDARD CONSTRUCTION SPECIFICATION 16501 FOR ADDITIONAL INFORMATION.  |
|        | LUMINAIRE, DOWNLIGHT, SURFACE-MOUNTED N = EQUIPMENT SCHEDULE ENTRY, WHICH SHALL INCLUDE VOLTAGE, NUMBER AND TYPE OF LAMPS AND BALLAST, AND TRIM PROVISIONS. α = SWITCH IDENTIFICATION. SEE STANDARD CONSTRUCTION SPECIFICATION 16501 FOR ADDITIONAL INFORMATION.                                      |
|        | LUMINAIRE, SCONCE OR DECORATIVE, WALL-MOUNTED N = EQUIPMENT SCHEDULE ENTRY, WHICH SHALL INCLUDE VOLTAGE, NUMBER AND TYPE OF LAMPS AND BALLAST, AND TRIM PROVISIONS. α = SWITCH IDENTIFICATION. SEE STANDARD CONSTRUCTION SPECIFICATION 16501 FOR ADDITIONAL INFORMATION.                              |
|        | LUMINAIRE, TRACKLIGHT N = EQUIPMENT SCHEDULE ENTRY, WHICH SHALL INCLUDE VOLTAGE, NUMBER AND TYPE OF LAMPS, BALLAST OR TRANSFORMER TYPE AS APPROPRIATE, AND TRIM PROVISIONS. α = SWITCH IDENTIFICATION.  |
|        | LUMINAIRE, FLUORESCENT, NOMINAL 1X4 N = EQUIPMENT SCHEDULE ENTRY, WHICH SHALL INCLUDE VOLTAGE, NUMBER AND TYPE OF LAMPS AND BALLAST, AND MOUNTING PROVISIONS. α = SWITCH IDENTIFICATION. SEE STANDARD CONSTRUCTION SPECIFICATION 16501 FOR ADDITIONAL INFORMATION AND FOR TROFFER CABLE WHIP OPTIONS. |
|        | LUMINAIRE, FLUORESCENT, NOMINAL 2X4 N = EQUIPMENT SCHEDULE ENTRY, WHICH SHALL INCLUDE VOLTAGE, NUMBER AND TYPE OF LAMPS AND BALLAST, AND MOUNTING PROVISIONS. α = SWITCH IDENTIFICATION. SEE STANDARD CONSTRUCTION SPECIFICATION 16501 FOR ADDITIONAL INFORMATION AND FOR TROFFER CABLE WHIP OPTIONS. |
|        | LUMINAIRE, HIGH- OR LOW-BAY, METAL-HALIDE N = EQUIPMENT SCHEDULE ENTRY, WHICH SHALL INCLUDE VOLTAGE, WATTAGE AND TYPE OF LAMPS AND BALLAST, AND MOUNTING PROVISIONS. α = SWITCH IDENTIFICATION. SEE STANDARD CONSTRUCTION SPECIFICATION 16514 FOR ADDITIONAL INFORMATION AND FOR CABLE WHIP OPTIONS.  |
|        | LUMINAIRE, EXTERIOR N = EQUIPMENT SCHEDULE ENTRY, WHICH SHALL INCLUDE VOLTAGE, WATTAGE AND TYPE OF LAMPS AND BALLAST, AND MOUNTING PROVISIONS. α = SWITCH IDENTIFICATION, OR α = PC TO INDICATE INTEGRAL PHOTOCELL CONTROL. SEE STANDARD CONSTRUCTION SPECIFICATION 16514 FOR ADDITIONAL INFORMATION. |
|        | EMERGENCY LIGHTING CIRCUIT, DIAGONAL GRID INDICATES NORMALLY-ON CIRCUIT AND CROSSHATCH GRID INDICATES NORMALLY-OFF CIRCUIT. APPROPRIATE GRID APPLIES TO ENTIRE FIXTURE, OR TO MIDDLE LAMP OF MULTI-LAMP DUAL-BALLAST FIXTURE AS SHOWN. SEE NOTE 9 FOR EMERGENCY LUMINAIRE MARKING.                    |
|        | EXIT LIGHT, MOUNT AS SHOWN ON DRAWINGS. SEE NOTE 9 FOR TABLE OF ACCEPTABLE EQUIPMENT AND CONDITIONS OF SERVICE.   |
|        | EMERGENCY LIGHT, MOUNT AS SHOWN ON DRAWINGS. SEE NOTE 9 FOR TABLE OF ACCEPTABLE EQUIPMENT.  |
|        | SPECIAL EQUIPMENT, SMALL N = EQUIPMENT TYPE. SEE NOTE 2 FOR EXPLANATION. SYMBOL WITH APPENDAGE IS SURFACE-MOUNTED, OTHERWISE IS FLUSH-MOUNTED. WHEN SHOWN INSIDE A LARGER SYMBOL, IS INTEGRAL TO THE LARGER EQUIPMENT.  |
|        | SPECIAL EQUIPMENT, MEDIUM N = EQUIPMENT TYPE. SEE NOTE 2 FOR EXPLANATION. SYMBOL WITH APPENDAGE IS SURFACE-MOUNTED, OTHERWISE IS FLUSH-MOUNTED.   |
|        | SPECIAL EQUIPMENT, LARGE N = EQUIPMENT TYPE. SEE NOTE 2 FOR EXPLANATION. EQUIPMENT IS FREE-STANDING AND MOUNTED ON A 4" HOUSEKEEPING PAD UNLESS OTHERWISE SHOWN ON THE DRAWINGS.  |
|        | LIGHTNING PROTECTION AIR TERMINAL, COPPER, SIZE AND MOUNTING PROVISIONS AS SHOWN ON DRAWINGS. SHOWN WITH CROSS-LEAD CONNECTION. SEE ALSO CONSTRUCTION STANDARD SPECIFICATION 13100.   |
|        | LIGHTNING PROTECTION EQUIPMENT BOND, SHOWN WITH CROSS-LEAD CONNECTION. SEE ALSO CONSTRUCTION STANDARD SPECIFICATION 13100.  |
|        | EQUIPMENT GROUNDING CONDUCTOR BOND, WHEN RUN SEPARATELY FROM POWER CONDUCTORS, LISTED AND COMPATIBLE WITH EQUIPMENT BEING GROUNDED, SHOWN WITH GROUND LEAD.   |
|        | GROUNDING ELECTRODE CONDUCTOR BOND, SHOWS NUMBER AND APPROXIMATE LOCATION OF DRIVEN GROUND RODS BONDED TO GROUNDING SYSTEM. TW LETTERS INDICATE TEST WELL.  |
|        | RESERVED  |

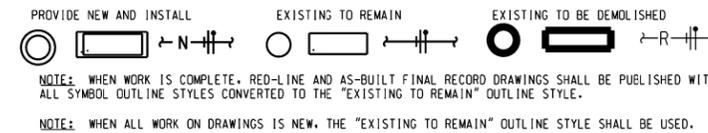
## GENERAL NOTES

- WHERE SYMBOLS ARE NOT LISTED ON THIS DRAWING, USE THE AMERICAN NATIONAL STANDARD GRAPHIC SYMBOLS FOR ELECTRICAL WIRING AND LAYOUT DIAGRAMS USED IN ARCHITECTURE AND BUILDING CONSTRUCTION, ANSI Y32.9-1972. NOT ALL SYMBOLS SHOWN ON THESE DOCUMENTS MAY BE USED ON EVERY PROJECT. ADDITIONAL SYMBOLS MAY BE FOUND ON THESE RELATED STANDARD DRAWINGS:  
E-0007STD ONE-LINE DIAGRAM SYMBOLS  
E-0011STD SAMPLE ELECTRICAL EQUIPMENT SCHEDULE  
FA-7001STD FIRE ALARM WIRING DIAGRAMS  
T-5002STD TELECOMMUNICATIONS RED AND BLACK OUTLET DETAILS  
TS-0002STD ELECTRONIC SECURITY SYMBOLS, LEGEND, AND NOTES (OUD)

2. THE FOLLOWING SYMBOLS ARE USED FOR THE APPLICATION SHOWN, WHERE N = EQUIPMENT SCHEDULE ENTRY:

|     |  |
|-----|--|
|     | MECHANICAL EQUIPMENT   |
|     | ELECTRICAL EQUIPMENT   |
|     | CONTROLS EQUIPMENT   |
|     | KEYED NOTES  |
|     | WHEN ATTACHED TO ANOTHER SYMBOL, INDICATES SURFACE MOUNTING. PROVIDE FLUSH-OR SURFACE-MOUNTED JUNCTION BOXES AND CONDUCTORS AS REQUIRED BY THE EQUIPMENT AND KEYED NOTES, DRAWING DETAILS, OR EQUIPMENT SCHEDULES. |
| TR  | TRANSFORMER: SIZE, TYPE, AND NOMENCLATURE AS SHOWN IN THE EQUIPMENT SCHEDULE.  |
| PC  | PHOTOCELL, SEPARATELY MOUNTED. WHEN INTEGRAL TO THE EQUIPMENT BEING CONTROLLED, THE PC LETTERS SHALL APPEAR WITHIN THE SYMBOL FOR THE CONTROLLED EQUIPMENT.  |
| S   | AUDIO SPEAKER, PUBLIC ADDRESS OR AS SHOWN IN KEYED NOTES.  |
| J   | JUNCTION BOX   |
| M   | VIDEO MONITOR, AS SHOWN IN KEYED NOTES.  |
| INV | LIGHTING INVERTER, WITH POWER CONNECTIONS AS SHOWN ON DRAWINGS. INVERTER TO BE FURNISHED AS SFE.   |
| RD  | RADIATION DETECTOR STATION, WITH DATA DROP AND POWER RECEPTACLE AS SHOWN ON DRAWINGS. DETECTOR TO BE FURNISHED AS SFE. DETECTOR TYPE TO BE IDENTIFIED IN KEYED NOTES.  |
| GD  | GAS DETECTOR STATION, WITH DATA DROP AND POWER RECEPTACLE AS SHOWN ON DRAWINGS. DETECTOR TO BE FURNISHED AS SFE. DETECTOR TYPE TO BE IDENTIFIED IN KEYED NOTES.  |

3. THE FOLLOWING SYMBOL OUTLINE STYLES SHALL BE USED TO INDICATE WHETHER THE ITEM IS TO BE PROVIDED NEW AND INSTALLED, OR IS EXISTING TO REMAIN, OR IS EXISTING TO BE DEMOLISHED.



4. MOUNT THE LISTED WIRING DEVICES AT THE FOLLOWING HEIGHTS AS MEASURED TO THE CENTER OF THE DEVICE, UNLESS OTHERWISE SHOWN ON THE DRAWINGS:

| DEVICE             | MOUNTING HEIGHT | LOCATION OR USE                                |
|--------------------|-----------------|--|
| RECEPTACLE         | 18" AFF         | OFFICES, CONFERENCE ROOMS, AND SIMILAR SPACES  |
| RECEPTACLE         | 36" AFF         | CORRIDORS AND HALLWAYS                         |
| RECEPTACLE         | 48" AFF         | LABORATORIES, RESTROOMS, AND MECHANICAL SPACES |
| SPECIAL RECEPTACLE | 48" AFF         | ALL SPACES, UNLESS OTHERWISE SHOWN ON DRAWINGS |
| SNAP SWITCH        | 48" AFF         | ALL SPACES, UNLESS OTHERWISE SHOWN ON DRAWINGS |
| DATA DROP          | 48" AFF         | ALL SPACES, WHERE CLEAR OF FURNITURE           |
| THERMOSTAT         | 60" AFF         | ALL SPACES, UNLESS OTHERWISE SHOWN ON DRAWINGS |
| MOTOR CONTROLLER   | 72" AFF TO TOP  | ALL SPACES, EXCEPT WHERE MOUNTED ON EQUIPMENT  |
| SAFETY SWITCH      | 72" AFF TO TOP  | ALL SPACES, EXCEPT 18" AFF MAXIMUM ON ROOFS    |

NOTE: WHERE ARCHITECTURAL FEATURES SUCH AS MULLIONS REQUIRE VERTICAL STACKING OF THESE DEVICES, THE DEVICE MOST OFTEN USED (SWITCH OR RECEPTACLE) SHALL BE MOUNTED AT THE LISTED HEIGHT. THERMOSTATS SHALL BE MOUNTED ABOVE SWITCHES AND RECEPTACLES SHALL BE MOUNTED BELOW SWITCHES. A DEVICE SHALL NOT BE MOUNTED BELOW A DATA DROP SUCH THAT ACCESS TO THE JACKS IS IMPEDED.

5. PROVIDE WIRING DEVICES ACCORDING TO THE FOLLOWING EQUIVALENCY TABLE:

| DEVICE             | SUFFIX | ARROW-HART   | HUBBELL | LEVITON  | PASS-SEYMOUR |
|--------------------|--------|--|---------|----------|--------------|
| SWITCH, SPST       |        | 1221-1   | 1221-1  | 1221-21  | 20AC1-1      |
| SWITCH, DPST       | 2      | 1222-1   | 1222-1  | 1222-21  | 20AC2-1      |
| SWITCH, SPDT       | 3      | 1223-1   | 1223-1  | 1223-21  | 20AC3-1      |
| SWITCH, DPDT       | 4      | 1224-1   | 1224-1  | 1224-21  | 20AC4-1      |
| SWITCH, MOTION DET | M      | WATT-STOPPER WS-120/277, OR AS SPECIFIED               |         |          |              |
| SWITCH, DIMMING    | D      | AS SPECIFIED, COMPATIBLE WITH LAMP BALLAST AND VOLTAGE |         |          |              |
| RECEPT., SIMPLEX   |        | 5361V  | 5361-1  | 5361-1   | 5361-1       |
| RECEPT., DUPLEX    |        | 5362V  | 5362-1  | 5362-1   | BR20-1       |
| RECEPT., GFCI      | GF     | VG20V  | GF201L  | 7899-1   | 2095-1       |
| RECEPT., ISO GND   | IG     | 1G5362RN   | 1G-5362 | 13632-1G | 1G6300       |
| RECEPT., WX-PROOF  | WP     | PROVIDED BY NEMA WEATHERPROOF COVER PLATE              |         |          |              |

NOTE: PROVIDE EACH DEVICE WITH APPROPRIATE COVER PLATE. GANGED DEVICES SHALL HAVE A SINGLE, COMMON COVER PLATE. FLUSH-MOUNTED DEVICES SHALL HAVE A PLASTER RING AND HEAVY-DUTY NYLON COVER PLATE. COLOR TO MATCH DEVICE. SURFACE-MOUNTED DEVICES SHALL HAVE GALVANIZED STEEL COVER PLATE WITH STEEL CITY SMOOTH-ROLLED OR -CRUSHED CORNERS AND EDGES.  
EXCEPTION: IN AREAS BEING PARTIALLY REMODELED, MATCH COLOR OF EXISTING DEVICES.

6. PROVIDE ALL RACEWAYS WITH CONDUCTORS ENERGIZED AT MORE THAN 50 VOLTS LINE-TO-GROUND WITH AN INSULATED COPPER EQUIPMENT GROUNDING CONDUCTOR. THE EQUIPMENT GROUNDING CONDUCTOR SHALL BE SIZED PER NEC TABLE 250.122, UNLESS OTHERWISE SHOWN. AN EQUIPMENT GROUNDING CONDUCTOR SHALL BE PROVIDED BETWEEN SERVICE TRANSFORMERS AND THE BUILDING SERVICE SWITCHGEAR FOR FAULT CURRENT RETURN, UNLESS OTHERWISE SHOWN.

7. POWER CONDUCTORS SHALL BE COLOR-CODED AS FOLLOWS:

| VOLTAGE  | PHASE A | PHASE B | PHASE C | NEUTRAL | GROUND                   |
|----------|---------|---------|---------|---------|--------------------------|
| 120/208Y | BLACK   | RED     | BLUE    | WHITE   | GREEN                    |
| 277/480Y | BROWN   | ORANGE  | YELLOW  | GRAY    | GREEN WITH YELLOW STRIPE |

LIGHTING INVERTER OUTPUTS: NORMALLY-ON = ORANGE NORMALLY-OFF = PURPLE

NOTE: SMALLER GAUGE CONDUCTORS SHALL HAVE COLOR-CODED INSULATION. LARGER CONDUCTORS WHOSE INSULATION IS BLACK SHALL BE COLOR-CODED BY MEANS OF TAPE APPLIED AT EACH END, SPLICE, AND JUNCTION.

8. CONDUITS AND RACEWAYS SHALL BE COLOR-CODED BY MEANS OF 3/4" TAPE (SCOTCH #35 OR EQUIVALENT) APPLIED AT EACH JOINT AND TERMINATION AS FOLLOWS:

| COLOR             | SANDIA CLASSIFIED NETWORK                                       |
|-------------------|---|
| WHITE/RED STRIPED | SANDIA RESTRICTED NETWORK, INTERCOM, TELEPHONE, INSTRUMENTATION |
| WHITE             | NORMAL POWER AND CONTROLS, 120V TO 4160V, EXCEPT EMC5           |
| BLUE              | ENERGY MANAGEMENT CONTROL SYSTEM (EMCS)                         |
| PURPLE            | SPECIAL POWER (DC, ISOLATED, EMERGENCY, REGULATED, USER)        |
| ORANGE            | SPECIAL NON-POWER (CLOSED-CIRCUIT TV, INTERLOCKS, USER)         |
| BLACK             | GROUND, WHEN RUN SEPARATELY FROM POWER CONDUCTORS               |
| BROWN             | FIRE AND EVACUATION ALARMS                                      |
| GREEN             | INTRUSION ALARM AND ACCESS CONTROL                              |
| YELLOW            |   |

9. INSTALL "EMERGENCY SERVICE" LABEL (THOMAS & BETTS WAT-5033 OR EQUIV.), COLOR: BLACK ON ORANGE (NORMALLY ON) OR BLACK ON YELLOW (NORMALLY OFF), VISIBLE FROM THE FLOOR. ON ALL LUMINAIRES AND LIGHTING CONTACTOR ENCLOSURES SERVED BY EMERGENCY POWER CIRCUITS, EXIT LIGHTS SHALL HAVE BLACK HIGH-IMPACT PLASTIC BODY WITH CONFIGURABLE SINGLE- OR DOUBLE-FACES AND BI-DIRECTIONAL ARROWS, UNIVERSAL MOUNTING, UNIVERSAL 120/277 VOLTAGE OPERATION, GREEN LETTERING AND ARROWS, AND INDIRECT-VIEW LED LAMP SYSTEM. BATTERY MODEL SHALL HAVE INTEGRAL ELECTRONIC SELF-TEST AND DIAGNOSTIC CIRCUIT WITH INDICATOR LED AND MANUAL TEST BUTTON ON LOWER EDGE OF BODY. EMERGENCY LIGHTS SHALL HAVE HIGH-IMPACT PLASTIC BODY WITH TWO INDIVIDUALLY-AIMED LAMPS, UNIVERSAL MOUNTING, UNIVERSAL 120/277 VOLTAGE OPERATION, AND REPLACEABLE SEALED BATTERY. UNIT SHALL HAVE INTEGRAL ELECTRONIC SELF-TEST AND DIAGNOSTIC CIRCUIT WITH INDICATOR LED AND MANUAL TEST BUTTON ON LOWER EDGE OF BODY. PROVIDE EXIT AND EMERGENCY FIXTURES AS FOLLOWS, UNLESS OTHERWISE SHOWN ON THE DRAWINGS:

| TYPE            | MANUFACTURER & MODEL | BATTERY | SERVICE          |
|-----------------|----------------------|---------|------------------|
| EXIT LIGHT      | DUAL-LITE LXUGB      | NO      | INVERTER CIRCUIT |
| EXIT LIGHT      | DUAL-LITE LXUGB-J    | YES     | LIGHTING CIRCUIT |
| EMERGENCY LIGHT | HIGH-LITES HL-100-SX | YES     | LIGHTING CIRCUIT |

10. ASSIGN MULTI-POLE CIRCUITS BY THE PANELBOARD LOCATION NUMBER AS FOLLOWS, UNLESS OTHERWISE SHOWN ON THE DRAWINGS:

- 2-POLE CIRCUIT: USE THE FIRST PANELBOARD NUMBER
- 3-POLE CIRCUIT: USE THE MIDDLE PANELBOARD NUMBER

NOTE: SWITCHBOARDS POPULATED WITH ONLY MULTI-POLE CIRCUIT BREAKERS MAY HAVE A SINGLE NUMBER ASSIGNED TO EACH BREAKER POSITION, WHICH SHALL BE USED AS THE CIRCUIT NUMBER.

11. LABEL ALL RECEPTACLE AND SWITCH COVERS WITH PANELBOARD AND CIRCUIT NUMBER. FOR INTERIOR EQUIPMENT, USE BROTHER P-TOUCH 3 LABEL MAKER WITH TC-10 LABEL CARTRIDGE. FOR EXTERIOR EQUIPMENT, USE ALUMINUM DYMO HALF-INCH TAPE LABEL WITH EMBOSSED LETTERING. ABBREVIATE LETTERING TO PROVIDE NECESSARY INFORMATION WITH MINIMUM LABEL SIZE, SUCH AS:

PANELBOARD 2BL4, CIRCUIT 23 = 2BL4-23

12. LABEL ALL SWITCHGEAR, PANELBOARDS, AND SEPARATELY-MOUNTED EQUIPMENT WITH FEEDER SOURCE AND CIRCUIT NUMBER. FOR INTERIOR EQUIPMENT, PROVIDE WHITE MICARTA PLATE WITH QUARTER-INCH BLOCK LETTERING. FOR EXTERIOR EQUIPMENT, PROVIDE ANODIZED ALUMINUM PLATE WITH QUARTER-INCH EMBOSSED BLOCK LETTERING. ATTACH TO EQUIPMENT USING HERMES CONTACT CEMENT IN A CLEAR SPACE ON THE UPPER PORTION OF THE EQUIPMENT COVER APPROXIMATELY 66" AFF. ABBREVIATE LETTERING OR ADJUST LETTER SIZE TO PROVIDE NECESSARY INFORMATION WITH MINIMUM LABEL SIZE, SUCH AS:

277/480V PANEL BBH14  
FROM SWB3 3 CKT 6  
HHW CIRC PUMP 4  
FROM MCC BH3 CKT A3

13. ON ALL SWITCHGEAR, PANELBOARDS AND SEPARATELY-MOUNTED EQUIPMENT, INSTALL SFE ARC FLASH AND SHOCK WARNING LABEL IN A CLEAR SPACE ON THE COVER SO THAT IT IS PLAINLY VISIBLE. ENSURE APPROPRIATE DATA FROM ENGINEER OF RECORD IS LEGIBLY PRINTED PERMANENTLY IN BLOCK LETTERS, UNLESS SPECIFICALLY SHOWN. DO NOT REPLACE AN EXISTING LABEL WHICH APPEARS SERVICEABLE.

14. PHASE ROTATION CHECK: ON MULTI-PHASE EQUIPMENT, PERFORM A PHASE ROTATION CHECK PRIOR TO ENERGIZING THE EQUIPMENT. USE KNOPP K-3 OR EQUIVALENT DEVICE WITH RED OR "A" LEAD CONNECTED TO PHASE A, WHITE OR "B" LEAD CONNECTED TO PHASE B, AND BLUE OR "C" LEAD CONNECTED TO PHASE C. NOTE THE PHASE ROTATION AND ANNOTATE TEST DOCUMENTATION WITH DEVICE USED, MANNER CONNECTED, ROTATION OBSERVED, DATE OF TEST, AND NAME OF CRAFTSMAN. DO NOT ENERGIZE EQUIPMENT UNLESS OBSERVED ROTATION MATCHES THE REQUIREMENTS OF THE EQUIPMENT.

15. SANDIA STANDARD CONSTRUCTION SPECIFICATION 16001 CONTAINS ADDITIONAL INFORMATION FOR ALL ELECTRICAL WORK, AND IS INCORPORATED HEREIN BY REFERENCE. IN ALL CASES OF DISAGREEMENT BETWEEN THIS DRAWING, SECTION 16001, AND THE PROJECT DOCUMENTS, STOP WORK IF NECESSARY AND RESOLVE THE DISAGREEMENT USING THE CONTRACT "REQUEST FOR INFORMATION" PROCEDURE. THIS PROCEDURE AND OTHER SPECIFICATIONS, DRAWINGS, AND FORMS DESCRIBED HEREIN ARE AVAILABLE AT [HTTP://WWW.SANDIA.GOV/ENGSTD.S](http://www.sandia.gov/engstds).

| REV  | DATE | DESCRIPTION                    | DWN | CKD | APP |
|------|------|--------------------------------|-----|-----|-----|
| 9/09 |      | UPDATED PART NUMBERS           | BN  | HDL |     |
| 4-06 |      | STANDARDS MODIFICATIONS        | SJR | NC  | NC  |
| 6-01 |      | LIGHTING STDS MODIFICATIONS    | ELG | FL  | FL  |
| 9-08 |      | CONSOLIDATED & UPDATED SYMBOLS | PS  | SFR | HDL |

P.O. PROJECT NO. REV DATE DESCRIPTION DWN CKD APP

**U.S. DEPARTMENT OF ENERGY**  
NNSA/SANDIA SITE OFFICE ALBUQUERQUE, NEW MEXICO

**SANDIA NATIONAL LABORATORIES**

**Electrical Standard Symbol List And Gen**

**Standards**

DISCIP: E SUB-DISCIP: - STD DATE 04/17/2006 SEQ.

OLD FILENAME: 073140E.02  
FILENAME: E-0006STD.dgn

SIZE DRAWING NO  
**D+** **E-0006STD.DGN**