

**SYMBOL LEGEND**

(NOT ALL SYMBOLS WILL APPLY TO THIS PROJECT)

**GENERAL NOTES**

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	EXISTING REMOVE NEW WORK		EMERGENCY LIGHTING UNIT		MEDIUM VOLTAGE DISCONNECT SWITCH
	CEILING MOUNTED EXIT SIGN - ARROW AS INDICATED		MEDIUM VOLTAGE DRAWOUT CIRCUIT BREAKER		TRANSFORMER (DELTA-WYE CONN.)
	WALL MOUNTED EXIT SIGN		SHIELDED TRANSFORMER		DRAWOUT CIRCUIT BREAKER (TRIP FRAME)
	HOMERUN CONDUIT		COMBINATION MAGNETIC STARTER AND CIRCUIT BREAKER		CIRCUIT BREAKER (TRIP FRAME) WITH GROUND FAULT INTERRUPTER
	GROUND PHASE SWITCHED NEUTRAL ISOLATED GROUND		MAGNETIC STARTER		MOTOR CIRCUIT PROTECTOR
	FLEXIBLE CONDUIT		ADJUSTABLE SPEED DRIVE		MOTOR CONTROL CENTER STARTER UNIT
	CONDUIT TURNING DOWN		BELL		FUSE
	CONDUIT TURNING UP		HORN "H" OR SIREN "S"		GROUND GENERATOR
	CONDUIT SEAL		BUZZER		CURRENT TRANSFORMER (NUMBERS INDICATE RATIO AND QUANTITY)
	CONDUIT CAP		PUSHBUTTON		POTENTIAL TRANSFORMER (NUMBER INDICATES QUANTITY)
	BUSWAY WITH DESCRIPTION		MANUAL PULL STATION		AMMETER SWITCH
	GROUNDING CONDUCTOR		FIRE ALARM HORN (V=VISUAL SIGNAL)		VOLTMETER SWITCH
	CABLE TRAY WITH DESCRIPTION		PHOTOELECTRIC SMOKE DETECTOR		VOLTMETER
	CEILING JUNCTION BOX		IONIZATION SMOKE DETECTOR		AMMETER
	WALL JUNCTION BOX		THERMAL DETECTOR		KILOWATT METER
	DUPLEX RECEPTACLE OUTLET		DUCT SMOKE DETECTOR (PHOTOELECTRIC)		TRANSFER SWITCH
	SINGLE RECEPTACLE OUTLET		MAGNETIC DOOR HOLDER		KEY INTERLOCK #1
	DOUBLE DUPLEX RECEPTACLE OUTLET		PRESSURE SWITCH		BATTERY
	GROUND FAULT CIRCUIT INTERRUPTER		FLOW SWITCH		NORMALLY CLOSED CONTACT
	DUPLEX OUTLET WITH WEATHERPROOF COVER		VALVE SUPERVISORY SWITCH		NORMALLY OPEN CONTACT
	SPLIT WIRED DUPLEX RECEPTACLE		FIRE ALARM RACEWAY		PROTECTIVE RELAY, SOLENOID COIL
	DUPLEX ISOLATED GROUND		CEILING SPEAKER		THERMAL OVERLOAD
	SPECIAL PURPOSE OUTLET - USE SUBSCRIPT TO IDENTIFY TYPE IN SPECS		WALL SPEAKER		CONNECTION
	FLOOR RECEPTACLE OUTLET USE SUBSCRIPT TO IDENTIFY TYPE IN SPECS		TELECOMMUNICATIONS OUTLET		CROSS, NO CONNECTION
	RECEPTACLE RACEWAY		FLOOR MOUNTED TELECOMMUNICATIONS OUTLET		SURGE ARRESTOR
	SINGLE POLE SWITCH - USE SUBSCRIPT TO DESIGNATE CONTROL OF PARTICULAR OUTLETS		INTERCOM OUTLET		TRANSIENT VOLTAGE SURGE SUPPRESSOR
	DOUBLE POLE SWITCH		TELECOMMUNICATIONS RACEWAY		CAPACITOR
	THREE-WAY SWITCH		PROTECTED TRANSMISSION SYSTEM (PTS)		CONTROL RELAY #1
	FOUR-WAY SWITCH		DATA TERMINAL CONNECTION		BUS PLUG CIRCUIT BREAKER
	WEATHERPROOF SWITCH		TELEVISION OUTLET		THERMOSTAT
	KEY OPERATED SWITCH		CARD READER		KEYED NOTE DESIGNATION
	DIMMER SWITCH - NUMBER INDICATES WATTAGE		ELECTRIC DOOR STRIKE		ELECTRICAL EQUIPMENT DESIGNATION (SEE SCHEDULE)
	OCCUPANCY SENSING SWITCH		DOOR CONTACTS		MECHANICAL EQUIPMENT DESIGNATION (SEE SCHEDULE)
	PHOTOCCELL		HAND GEOMETRY UNIT		NAMEPLATE DESIGNATION (SEE SCHEDULE)
	REMOTE CONTROL SWITCH		MOTION DETECTOR		WEATHERPROOF ABOVE FINISH FLOOR
	FLUORESCENT LUMINAIRE		CLOSED CIRCUIT TV CAMERA		
	FLUORESCENT STRIP LUMINAIRE				
	WALL MOUNTED FLUORESCENT LUMINAIRE				
	CEILING MOUNTED LUMINAIRE				
	WALL MOUNTED LUMINAIRE				
	EMERGENCY LUMINAIRE				
	LIGHT POLE WITH LUMINAIRE				

- PERFORM INSTALLATION IN ACCORDANCE WITH THE CURRENT EDITION OF THE NATIONAL ELECTRICAL CODE (NEC), THE OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA), AND APPLICABLE DOE ORDERS. EQUIPMENT SHALL BE LISTED BY A NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL).
- PROVIDE AND MAINTAIN A CLEAR WORKING SPACE ABOUT ELECTRICAL EQUIPMENT (SWITCHBOARDS, PANELBOARDS, ETC.) IN ACCORDANCE WITH NEC ARTICLES 110.26 AND 110.34.
- USE 800 VAC CIRCUIT BREAKERS IN 480V AND 480V/277V SWITCHBOARDS, PANELBOARDS AND MOTOR CONTROL CENTERS.
- PROVIDE CIRCUIT BREAKERS WITH UL LISTED INTERRUPTING RATING (RMS SYMMETRICAL AMPERES) GREATER THAN THE AVAILABLE FAULT CURRENT SHOWN ON THE ELECTRICAL ONE-LINE DIAGRAM.
- PROVIDE PADLOCKING PROVISIONS FOR EACH TWO- AND THREE-POLE CIRCUIT BREAKER.
- BOND RACEWAYS AND THE FRAMES AND ENCLOSURES OF MOTORS, BREAKERS, SWITCHES, AND OTHER ELECTRICAL EQUIPMENT TO THE BUILDING GROUNDING SYSTEM. INSTALL AN INSULATED EQUIPMENT GROUND CONDUCTOR IN EACH RACEWAY OR CONDUIT. SIZE EQUIPMENT GROUND CONDUCTOR IN ACCORDANCE WITH NEC TABLE 250.122.
- IDENTIFY NEW BRANCH CIRCUITS AT THE PANEL AND AT THE LOAD OUTLET, RECEPTACLE AND SWITCH. IDENTIFY THE PURPOSE OF INDIVIDUAL CIRCUIT BREAKERS, SAFETY SWITCHES AND MOTOR STARTERS BY MEANS OF NAMEPLATES AS INDICATED.
- ROUTE CONDUITS TO SUIT EQUIPMENT AND BUILDING STRUCTURE. LIMIT THE USE OF ELECTRICAL METALLIC TUBING (EMT) TO AREAS WHERE IT WILL NOT BE SUBJECT TO PHYSICAL DAMAGE OR CORROSION. USE INTERMEDIATE METAL CONDUIT (IMC) OR RIGID GALVANIZED STEEL CONDUIT (RGS) FOR WORK EMBEDDED IN CONCRETE OR EXPOSED TO PHYSICAL DAMAGE. USE MINIMUM 3/4 INCH CONDUIT EXCEPT AS FOLLOWS: 1/2" CONDUIT MAY BE USED FOR 20 AMP GENERAL LIGHT AND POWER CIRCUITS AND FOR CONTROL CIRCUITS; 3/8" FLEXIBLE METAL CONDUIT MAY BE USED TO CONNECT LIGHT FIXTURES IN SUSPENDED CEILINGS. USE LIQUID-TIGHT FLEXIBLE METAL CONDUIT FOR FLEXIBLE CONNECTIONS TO EQUIPMENT IN MECHANICAL ROOMS OR OUTDOORS.
- SEAL AROUND CONDUIT PENETRATIONS THROUGH INTERIOR WALLS AND FLOORS SEPARATING AREAS TO RESTORE ORIGINAL FIRE RATING; USE A UL CLASSIFIED FIRE SEALANT. SEAL PENETRATIONS THROUGH ROOF AND EXTERIOR WALLS TO MAKE WATERPROOF. REQUEST INSPECTION OF FIRE SEALS BY ELECTRICAL INSPECTOR FROM AUTHORITY HAVING JURISDICTION BEFORE AND AFTER PLACEMENT OF FIRE SEAL MATERIALS.
- USE 12 AWG OR LARGER CONDUCTORS FOR POWER WIRING. USE 14 AWG STRANDED CONDUCTORS FOR CONTROL WIRING UNLESS OTHERWISE SPECIFIED OR SHOWN ON THE DRAWINGS.
- USE ONLY COPPER CONDUCTORS ON CIRCUITS 600V AND LESS. CONDUCTORS 10 AWG AND SMALLER SHALL BE SOLID AND 8 AWG AND LARGER AWG SHALL BE STRANDED. PROVIDE TYPE THHN/THWN WIRE INSULATION; XHHW INSULATION MAY BE USED FOR 1 AWG AND LARGER.
- USE THE FOLLOWING CONDUCTOR COLOR CODES:  

208Y/120 VOLT	480Y/277 VOLT
PHASE A BLACK	BROWN
PHASE B RED	ORANGE
PHASE C BLUE	YELLOW
NEUTRAL WHITE	GRAY
EQUIP. GROUND GREEN	GREEN

 ISOLATED GROUND SHALL BE GREEN WITH YELLOW TRACER.
- ARRANGE CONNECTIONS FOR SINGLE PHASE CIRCUITS TO ACHIEVE THREE PHASE LOAD BALANCE WITHIN 20% OF THE AVERAGE PHASE LOAD CURRENT. UNGROUNDED CONDUCTORS USING A COMMON NEUTRAL MUST ORIGINATE FROM DIFFERENT PHASES.
- INSTALL OUTDOOR EQUIPMENT TO BE WEATHERPROOF AND TO EXCLUDE BIRDS AND RODENTS WITH MAXIMUM 1/2" DIAMETER UNPROTECTED OPENINGS IN ENCLOSURES.
- ITEMS DESIGNATED BY A NUMBER IN A HEXAGON ARE DESCRIBED IN THE ELECTRICAL EQUIPMENT LIST. ITEMS DESIGNATED BY A NUMBER IN A DIAMOND ARE DESCRIBED IN THE MECHANICAL EQUIPMENT LIST. NAMEPLATES ARE DESIGNATED BY A NUMBER IN A RECTANGLE AND ARE DESCRIBED IN THE NAMEPLATE SCHEDULE.
- PROVIDE LIGHTNING PROTECTION IN ACCORDANCE WITH NFPA 780. PROVIDE MATERIAL THAT IS UL LABELED FOR LIGHTNING PROTECTION SERVICE. THE LIGHTNING PROTECTION SYSTEM DESIGN AND INSTALLATION SHALL FOLLOW THAT SHOWN ON THE DRAWINGS.
- TEST CONDUCTORS FOR CONTINUITY AND FREEDOM FROM SHORTS AND UNINTENTIONAL GROUNDS.
- ELECTRICAL EQUIPMENT SPECIFIED IN THIS DOCUMENT SHALL BE ACCEPTANCE TESTED AND INSPECTED IN ACCORDANCE WITH NETA IAS BY THE LAML SUPPORT SERVICES SUB-CONTRACTOR.
- ELECTRICAL MATERIALS AND CONSTRUCTION SHALL CONFORM TO LOS ALAMOS NATIONAL LABORATORY STANDARD CONSTRUCTION SPECIFICATIONS WHERE APPLICABLE.
- DISPOSE OF ITEMS REMOVED AS DIRECTED BY THE LAML CONSTRUCTION INSPECTOR.
- REPAIR AREAS DAMAGED DURING CONSTRUCTION TO MATCH ADJACENT AREAS WITH RESPECT TO BOTH COLOR AND FINISH.
- KEEP JOB SITE IN AN ORDERLY CONDITION AND AT PROJECT COMPLETION, REMOVE ALL WASTE. LEAVE THE JOB SITE IN A CONDITION ACCEPTABLE TO THE LAML CONSTRUCTION INSPECTOR.
- IF A CONFLICT ARISES BETWEEN THE FIELD CONDITIONS AND THESE GENERAL ELECTRICAL REQUIREMENTS, CONTACT THE LAML PROJECT LEADER FOR DIRECTIONS.
- TE-BNS TO EXISTING POWER SYSTEMS WILL BE PERFORMED BY THE LAML SUPPORT SERVICES SUB-CONTRACTOR.

**DESIGNER:**  
 EDIT AND/OR MODIFY GENERAL NOTES TO BE PROJECT SPECIFIC.  
 DO NOT USE THESE GENERAL NOTES ON PROJECTS WITH FORMAL SPECIFICATIONS. DRAW SYMBOLS SUCH AS TRANSFORMERS, SWITCHBOARDS AND CABLE TRAY TO SCALE IN PLAN VIEWS.

2	7-12-08	UPDATED TELE BLOCK ADDS/UPDATES SYMBOLS	LT	DP	RD	DP	TD
1	11-19-08	NEW DESIGN ID, CONDUCTOR LIST, ADD 3 SYMBOLS, UPDATED NOTES, REPLACES 27201	DP	DP	DP	DP	TD

**ENGINEERING STANDARDS PROGRAM**

**ENGINEERING STANDARDS MANUAL**

ELECTRICAL SYMBOL LEGEND AND GENERAL NOTES

BLDG: 7A-

DATE: 08-21-08

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**CHAPTER 7 ST-D5000-1**

DRAWING DEVELOPED FOR ML-3/ML-4 PROJECTS. FOR ML-1/ML-2, ADDITIONAL REQUIREMENTS AND QA REVIEWS ARE REQUIRED. (REMOVE THIS NOTE WHEN INSERTED INTO A DRAWING PACKAGE).

NOT FOR CONSTRUCTION