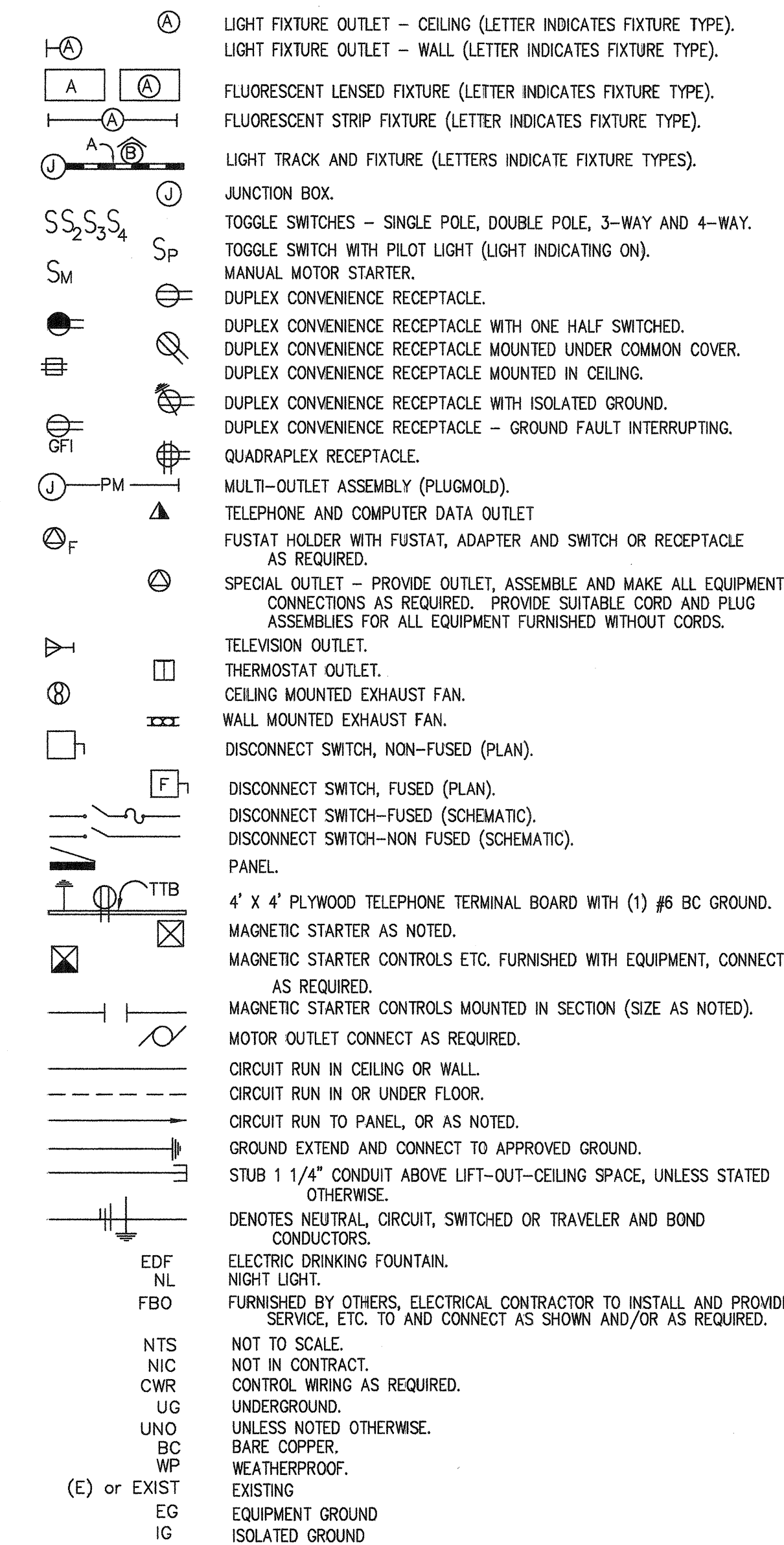


# ELECTRICAL SPECIFICATIONS

- ENTIRE ELECTRICAL INSTALLATION SHALL COMPLY WITH MOST CURRENT EDITION OF NFPA-70, NATIONAL ELECTRICAL CODE, AND ALL LOCAL CODES AND ORDINANCES.
- CONTRACTOR SHALL APPLY FOR AND OBTAIN PERMITS FOR THE ELECTRICAL WORK.
- INCLUDE AND PAY AS DIRECTED ALL COSTS FOR SERVING ELECTRICAL, TELEPHONE AND CABLE TELEVISION UTILITY CHARGES, INCLUDING ALL ADDITIONAL WORK, MATERIALS, ETC. REQUIRED TO PROVIDE THE COMPLETE ELECTRICAL, TELEPHONE AND CABLE TV INSTALLATION FOR THIS PROJECT.
- ALL WIRING SHALL BE INSTALLED IN APPROVED RACEWAY. PVC MAY BE USED ONLY FOR UNDERGROUND CIRCUITS. EMT MAY BE USED IN STUD AND FURRED SPACES, IN ATTIC SPACES AND EXPOSED ABOVE 8'-0" A.F.F. WHEN PERMITTED. USE RIGID METALLIC CONDUIT OR IMC IN CONCRETE OR MASONRY AND WHERE CONDUITS RUN EXPOSED BELOW 8'-0" A.F.F. (EXPOSED CONDUITS ONLY WHERE SPECIFICALLY ALLOWED BY ARCHITECT.) SUPPORT ALL CONDUITS AT 5'-0" INTERVALS. DO NOT USE CONDULET FITTINGS IN SIZES OVER 1 1/4". MC CABLE MAY BE USED IN ACCORDANCE WITH NEC.
- INSTALL ALL CIRCUITS AS SHOWN ON PLAN.
- PROVIDE FLEXIBLE METALLIC CONDUIT (LIQUID TIGHT WHEN INSTALLED OUTDOORS OR IN WET LOCATIONS) FOR MOTORS, A/C UNITS, MACHINERY WHICH MUST BE MOVED FOR ADJUSTMENT AND TRANSFORMERS. FLEX CONDUIT SHALL BE USED IN LENGTHS NOT TO EXCEED 3'-0". USE CLAMP TYPE CONNECTORS FOR FLEX - NO SCREW-IN TYPES.
- ALL CONDUCTORS SHALL BE COPPER, MINIMUM SIZE NO. 12 AWG WITH "THHN OR THWN" INSULATION FOR SIZES NO. 12 THROUGH 1 AWG AND "THW" OR "THWN OR THWN" FOR NO. 1/0 AWG AND LARGER.
- ALUMINUM CONDUCTORS #6 AND LARGER, THAT HAVE AN AMPACITY RATING EQUAL TO OR LARGER THAN COPPER SIZES SHOWN MAY BE USED. INCREASE RACEWAY SIZE AS REQUIRED BY CODE. LUGS FOR ALUMINUM SHALL BE AL/CU TYPE WITH NO-OX-ID CONNECTOR PASTE. TIGHTEN LUGS WITH TORQUE WRENCH TO MANUFACTURER'S RECOMMENDED VALUE.
- COLOR CODE ALL CONDUCTORS:
  - 120/240V SINGLE PHASE SYSTEM: NEUTRAL - WHITE, PHASE A - BLACK, PHASE B - RED, GROUND - GREEN.
  - 120/240V THREE PHASE DELTA SYSTEM: NEUTRAL - WHITE, PHASE A - BLACK, PHASE B - ORANGE, PHASE C - RED, GROUND - GREEN.
  - 120/208V THREE PHASE SYSTEM: NEUTRAL - WHITE, PHASE A - BLACK, PHASE B - RED, PHASE C - BLUE, GROUND GREEN.
  - 277/480V THREE PHASE SYSTEM: NEUTRAL - WHITE WITH GRAY STRIPE OR GRAY, PHASE A - BROWN, PHASE B - ORANGE, PHASE C - YELLOW, GROUND - GREEN.

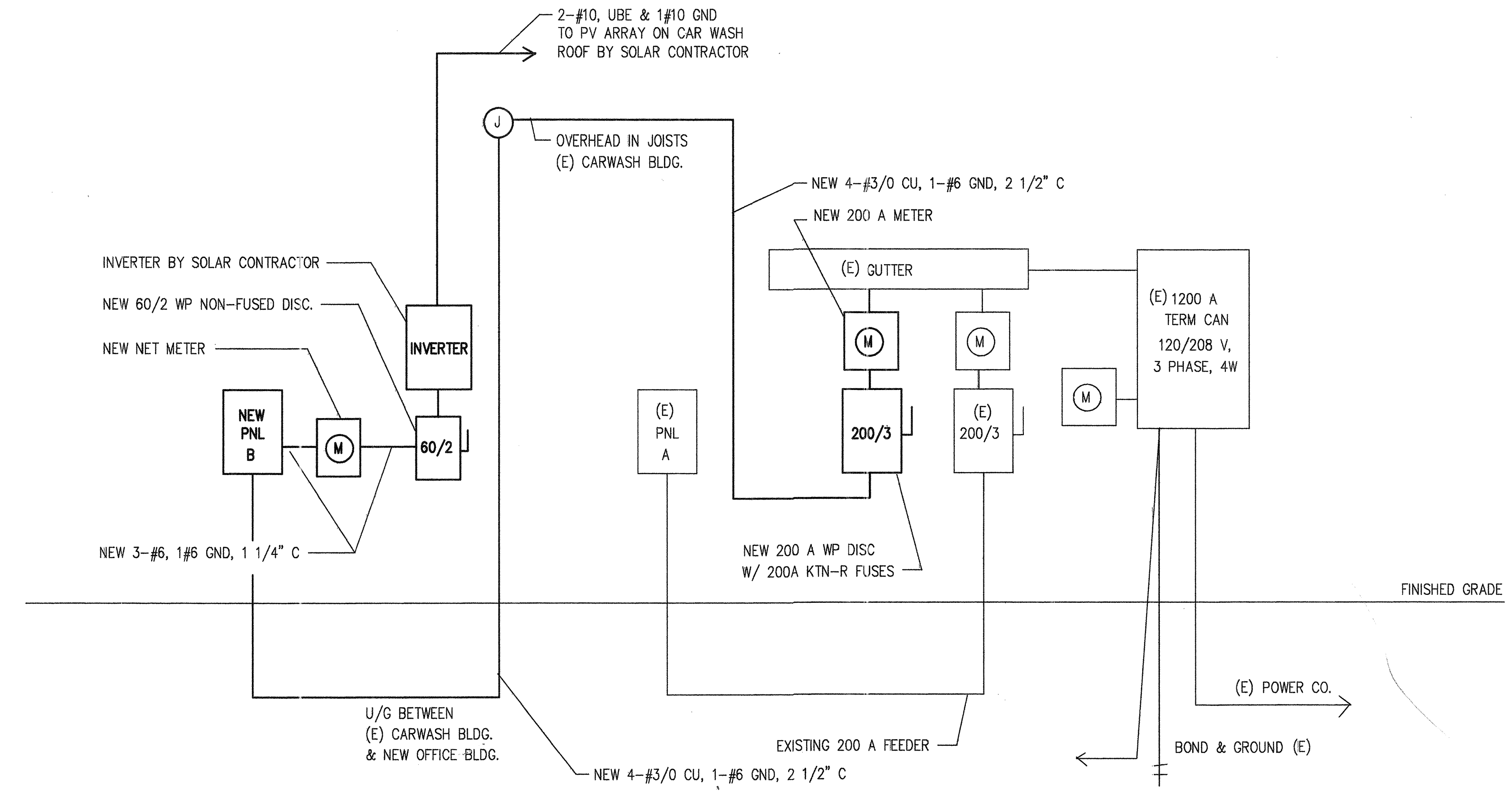
USE COLORED CONDUCTOR INSULATION FOR SIZES 12 - 6 AWG, USE COLORED TAPE FOR CONDUCTORS SIZES 4 AWG AND LARGER.
- WIRING DEVICES:
  - LIGHT SWITCHES: 15A 125-277V HUBBELL CS115 SERIES FOR FOUR OR FEWER FIXTURES PER SWITCHES, 20A 125-277V HUBBELL CS120 SERIES FOR FIVE OR MORE FIXTURES PER SWITCH.
  - RECEPTACLES: 15A DUPLEX HUBBELL BR15 SERIES EXCEPT USE 20A 120V IF ONLY ONE RECEPTACLE ON 20A CIRCUIT, SPECIAL RECEPTACLES AS NOTED. COLOR OF SWITCHES, RECEPTACLES
  - MOUNTING HEIGHTS:
    - SWITCHES: +48" AFF TO CENTER OF BOX.
    - RECEPTACLES: +15" AFF TO CENTER OF BOX, EXCEPT OVER COUNTER TOPS, ETC. HEIGHT AS NOTED.
  - MOUNT ALL RECEPTACLES VERTICAL WITH GROUNDING POLE AT TOP.
  - NOT USED.
- PROVIDE PROPER SUPPORT FOR ALL LIGHTING FIXTURES. FIXTURES WHICH WEIGH OVER 25 POUNDS SHALL NOT BE SOLELY SUPPORTED BY THE OUTLET BOX.
- PROVIDE PERMANENTLY INSTALLED BARRIERS BETWEEN LIGHT SWITCHES IN MULTI-GANG SWITCH BOXES WHEN SWITCHES ARE CONNECTED ON OPPOSITE PHASES OF 277/480V SYSTEM OR BETWEEN 120V SWITCH AND 277V SWITCH.
- DISCONNECT AND/OR STARTERS FOR HVAC EQUIPMENT SHALL NOT BE SUPPORTED BY OR MOUNTED TO THE EQUIPMENT. PROVIDE UNISTRUT BRACKETS OR SHEETMETAL DISCONNECT STANDS UP FROM ROOF STRUCTURE TO SUPPORT DISCONNECTS.
- ALL EQUIPMENT SHALL HAVE PROPER OVERCURRENT PROTECTION. THE FUSE SIZES INDICATED ON THE DRAWINGS FOR MOTORS AND EQUIPMENT ARE BASED ON EQUIPMENT SIZES AS SPECIFIED. SUBSTITUTIONS OF EQUIPMENT AS WELL AS CHANGE IN MANUFACTURER MAY MAKE OVERCURRENT DEVICES OF A DIFFERENT RATING NECESSARY. THE CONTRACTOR SHALL VERIFY THE ACTUAL NAMEPLATES AMPERE RATING OF ALL EQUIPMENT AND SHALL SELECT FUSES BASED ON THE FOLLOWING CRITERIA:
  - FOR MOTORS: FUSES SHALL BE RATED NOT OVER 125% OF THE MOTOR FULL LOAD RUNNING CURRENT. IF POSSIBLE, SELECT FUSES RATED BETWEEN 105% AND 115% OF THE MOTOR FULL LOAD RUNNING CURRENT.
  - FOR HEATING UNITS AND APPLIANCES: FUSES SHALL BE RATED AT LEAST 125% BUT NOT OVER 150% OF THE UNIT FULL LOAD RUNNING CURRENT, BUT IN NO CASE SHALL EXCEED THE "MAXIMUM FUSE SIZE" LISTED ON THE UNIT NAMEPLATE.
  - FOR PACKAGED A/C UNITS: THE FUSE SIZE MUST NOT EXCEED THE "MAXIMUM FUSE SIZE" LISTED ON THE UNIT NAMEPLATE.
- PROVIDE IDENTIFICATION NAMEPLATES FOR ALL CONTROL SWITCHES FOR HVAC AND OTHER EQUIPMENT AND ON EACH PANEL, DISCONNECT, STARTER, TIME SWITCH, ETC. NAMEPLATES SHALL BE ENGRAVED LAMINATED BAKELITE, SCREWED OR RIVETED TO EQUIPMENT. DO NOT USE STAMPED METAL NAMEPLATES OR DYMO TAPE.
- ALL MATERIALS FURNISHED BY THIS CONTRACTOR SHALL BE NEW AND IN FIRST CLASS CONDITION. THE MANUFACTURER AND CATALOG NUMBERS SPECIFIED HEREIN AND ON THE DRAWINGS ARE TO ESTABLISH DESIGN, STYLE, AND LEVEL OF QUALITY. EQUAL PRODUCTS OF OTHER MANUFACTURERS ARE ACCEPTABLE. SUBMIT SHOP DRAWINGS (FIVE COPIES MIN.) FOR THE FOLLOWING PRODUCTS: LIGHTING FIXTURES, PANELBOARDS, SAFETY SWITCHES, WIRING DEVICES AND COVERPLATES.
- VERIFY EXACT ELECTRICAL REQUIREMENTS OF EQUIPMENT FURNISHED BY OTHERS AND COMPLY WITH THOSE REQUIREMENTS AT NO ADDITIONAL COST TO OWNER.
- THIS CONTRACT SHALL INCLUDE ALL CONTINGENCIES WHICH MAY ARISE AND MAY BE REQUIRED BY ALTERATION AND DEMOLITION WORK. THIS TO INCLUDE ALL REMOVAL, RELOCATION AND REWORKING OF EXISTING ELECTRICAL OUTLETS, CONDUIT, WIRING, AND EQUIPMENT AND ANY NECESSARY SPLICING OR EXTENSION OF EXISTING CONDUIT AND WIRING SYSTEMS.
- THE ELECTRICAL CONTRACTOR SHALL FULLY GUARANTEE THE ELECTRICAL INSTALLATION FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE BY THE OWNER AGAINST ALL EVIDENCE OF IMPERFECT WORKMANSHIP OR FAILURE OR MALFUNCTION OF MATERIALS AND EQUIPMENT. WORK FOUND TO BE DEFECTIVE WITHIN THIS PERIOD SHALL BE REPLACED PROMPTLY WITHOUT COST.
- AT COMPLETION OF ELECTRICAL INSTALLATION PROVIDE OWNER WITH ACCURATE "AS BUILT" DRAWINGS INDICATING ALL VARIATIONS FROM CONTRACT DRAWINGS AND A LETTER TO THE OWNER'S REPRESENTATIVE STATING PROJECT FULLY COMPLIES WITH ALL CONTRACT DOCUMENTS AND IF NOT HOW INSTALLATION WAS ACCOMPLISHED. ALL CHANGES SHALL BE SUBJECT TO OWNER'S REPRESENTATIVE'S AND ENGINEER'S APPROVAL.

# ELECTRICAL SYMBOLS



NOTES:

- ELECTRICAL CONTRACTOR SHALL COORDINATE WITH MECHANICAL CONTRACTOR AND VERIFY SIZES OF DISCONNECTS, FUSES, BREAKERS, & WIRE, FOR ALL EQUIPMENT WHETHER OR NOT SHOWN AND NOTED ON PLAN, PRIOR ROUGH-IN.
- WIRE SIZE SHALL BE NO. 12 COPPER FOR ALL 20 AMP CIRCUITS. SIZE OF WIRE FOR CIRCUITS LARGER THAN 20 AMPS IS NOTED ON PLAN. SEE ELECTRICAL SPECIFICATIONS, NOTE 7, THIS SHEET FOR ADDITIONAL INFORMATION REGARDING WIRE SIZE.
- MC CABLE MAY BE USED WHEN INSTALLED IN ACCORDANCE WITH THE 2005 NEC.



# SERVICE ENTRANCE - ONE LINE DIAGRAM

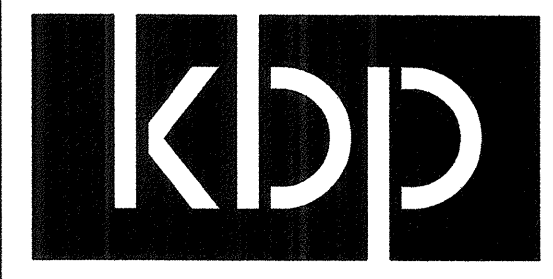
NOTE: ALL EQUIPMENT SHOWN IS EXISTING UNLESS NOTED OTHERWISE, PER EXISTING RECORD PLANS. N.T.S.

PANEL B		SHORT CIRCUIT RATING 10,000 AIC	
TYPE	NEW	VOLTAGE 120/208V - 3PH - 4W	
FLUSH	X	SURFACE	BUS 200 A MAIN LUGS
CIRCUIT DESCRIPTION	BKR	C	C BKR
RECEPTS - GFI	20	1	20
		130	1
RECEPTS - REFRIG.	20	3	20
		1500	1
		345	4
RECEPTS - GFI	20	5	20
		720	1
		480	6
WATER HEATER	20	7	20
		1500	8
		1950	10
208V, 1PH, 3KW	2	9	2
		1500	10
		1950	12
RECEPTS	20	11	12
		720	14
RECEPTS	20	13	14
		720	16
A/C INDOOR FAN	20	15	16
		300	18
SPACE	20	17	18
			20
			22
			24
			26
			28
			30
			32
			34
			36
			38
			40
			42
			60
			2
			2

TOTALPHASE-AMPS= 5020 5595 1920  
 5595 / 120 = 47 AMPS (HI LEG CONNECTED)  
 \* INDICATES CONTINUOUS DUTY LOAD AT 125% DEMAND  
 N= NEW LOAD, CIRCUIT BREAKER AND CONDUCTORS.

# LOAD CALCULATIONS

PANEL A (EXISTING) 200 A \*  
 PANEL B (THIS PERMIT) 47 A  
 TOTAL CONNECTED LOAD: 247 A  
 \* BASED ON 100% NAME PLATE OR (E) PLANS

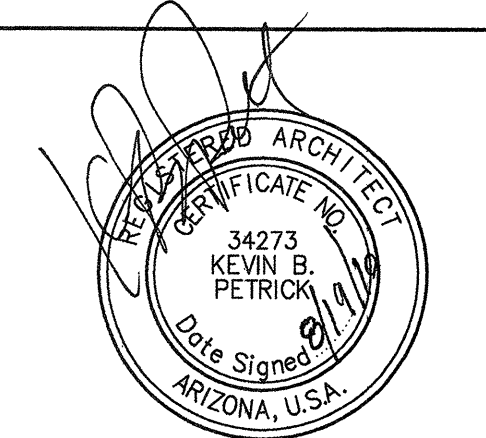


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Project:

**New two story office & garage building**

for  
**Ventana Canyon Car Wash**

4888 N. Sabino Canyon Rd.  
Tucson, Arizona

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drawing revisions:

kbp project no: **2328**

date: **AUGUST 19, 2010**

sheet title: **ONE LINE DIAGRAM & SCHEDULE**

sheet number:

**E.2**

RESERVED FOR GOVERNMENT APPROVAL STAMPS