GENERAL ELECTRICAL SPECIFICATIONS

GENERAL:

IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE A COMPLETE AND OPERABLE ELECTRICAL SYSTEM AS SHOWN ON THE DRAWING'S. THE COMPLETE INSTALLATION SHALL MEET THE REQUIREMENTS OF THE LATEST NATIONAL ELECTRICAL CODE AND ALL LOCALLY ADOPTED AMENDMENTS, INCLUDING BUT NOT NECESSARILY LIMITED TO THE FOLLOWING:

CALIFORNIA ELECTRICAL CODE-LATEST EDITION

1. CALIFORNIA ADMINISTRATIVE CODE, TITLE 24
2. CALIFORNIA ADMINISTRATIVE CODE, TITLE 19 FIRE CODE
3. UNDERWRITERS LABORATORY
4. AMERICAN NATIONAL STANDARD INSTITUTE
5. NEMA (NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION)
6. ALL OTHER APPLICABLE STATE, LOCAL LAWS AND REGULATIONS

WHERE THESE SPECIFICATIONS CALL FOR A HIGHER STANDARD THAN THE ABOVE-MENTIONED RULES, THE SPECIFICATIONS SHALL GOVERN.

IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO INSTALL ALL WORK IN ACCORDANCE WITH STAMPED PLANS APPROVED BY THE ELECTRICAL DIVISION OF THE DEPARTMENT OF BUILDING AND SAFETY.

PRIOR TO CONTRACTOR SUBMITTING HIS/HER BID. HE/SHE SHALL VISIT THE JOB SITE TO BECOME COMPLETELY FAMILIAR WITH ALL ASPECTS OF THE NEW CONSTRUCTION AND ALL REQUIREMENTS THAT MAY BE IMPOSED BY THE OWNER. FAILURE TO DO THIS WILL RELIEVE OWNER OF ANY FINANCIAL OBLIGATION FOR EXTRA WORK OR COST INCURRED BY THE CONTRACTOR. CONTRACTOR SHALL TAKE NOTICE OF ALLOWABLE WORK HOURS, ON-SITE STORAGE FACILITIES, AND AVAILABLE PARKING AND INCLUDE THIS IN HIS/HER BID.

ALL PERMITS SHALL BE OBTAINED AND PAID FOR BY THE CONTRACTOR.

ACCURATE RECORD DRAWINGS SHALL BE MAINTAINED AND PRESENTED TO THE OWNER AND ELECTRICAL ENGINEER AT THE TIME OF OCCUPANCY PERMIT.

THE CONTRACTOR SHALL UNCONDITIONALLY GUARANTEE ALL HIS/HER WORK FOR ONE YEAR AFTER ACCEPTANCE AND FURNISH ALL MANUFACTURER WARRANTIES FOR THE EQUIPMENT HE/SHE FURNISHES.

THE CONTRACTOR SHALL INSTALL ALL ELECTRICAL EQUIPMENT IN A NEAT AND WORKMANLIKE MANNER. ELECTRICAL EQUIPMENT SHALL BE FIRMLY SECURED TO THE SURFACE ON WHICH IT IS MOUNTED.

SHOP DRAWINGS SHALL BE SUBMITTED ON ALL MAJOR PIECES OF ELECTRICAL EQUIPMENT, INCLUDING SERVICE-ENTRANCE EQUIPMENT. LIGHTING FIXTURES, PANELBOARDS, SWITCHES, WIRING DEVICES, AND PLATES, AND EQUIPMENT FOR MISCELLANEOUS SYSTEMS. EACH ITEM OF EQUIPMENT PROPOSED SHALL BE A STANDARD CATALOG PRODUCT OF AN ESTABLISHED MANUFACTURER. THE SHOP DRAWING SHALL GIVE COMPLETE INFORMATION ON THE PROPOSED EQUIPMENT. EACH ITEM OF THE SHOP DRAWING SHALL BE PROPERLY LABELED, INDICATING THE INTENDED SERVICE OF THE MATERIAL, THE JOB NAME, AND THE ELECTRICAL CONTRACTOR'S NAME.

WHERE EQUIPMENT IS IDENTIFIED BY MANUFACTURER AND CATALOG NUMBER, IT SHALL BE CONSTRUED AS THE BASE OF REQUIREMENTS FOR QUALITY AND PERFORMANCE. WHERE MANUFACTURERS FOR EQUIPMENT ARE IDENTIFIED BY NAME, THE ELECTRICAL CONTRACTOR MAY SUBMIT FOR APPROVAL, SIMILAR EQUIPMENT BY OTHER MANUFACTURERS AS SUBSTITUTION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE SUFFICIENT SUPPORTING DATA TO PERMIT EVALUATION OF THE PROPOSED SUBSTITUTE WITH RESPECT TO QUALITY, PERFORMANCE, SERVICEABILITY, AND WARRANTY. THE ENGINEER'S DECISION AS TO WHETHER THE SUBMITTED EQUIPMENT IS ACCEPTABLE SHALL BE FINAL AND BINDING.

ALL CHANGES NECESSARY TO ACCOMMODATE THE SUBSTITUTED EQUIPMENT SHALL BE MADE AT THE CONTRACTOR'S EXPENSE, AND SHALL BE AS APPROVED BY THE ENGINEER. DETAILED DRAWINGS INDICATING THE REQUIRED CHANGES SHALL BE SUBMITTED FOR APPROVAL AT THE TIME THE SUBSTITUTION IS REQUESTED.

IF SUBSTITUTIONS ARE MADE IN LIEU OF THE LIGHTING FIXTURES SPECIFIED, PHOTOMETRIC PERFORMANCE, FORM, DIMENSION, DESIGN AND PROFILE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

AT COMPLETION OF WORK, THIS CONTRACTOR SHALL CLEAN UP AND REMOVE ALL DEBRIS AND MATERIALS NOT INSTALLED IN WORK, DISPOSE IN AN ENVIRONMENTALLY APPROVED MANNER, LEAVING PREMISES CLEAN.

ELECTRICAL CONTRACTOR SHALL PROVIDE A TEMPORARY CONSTRUCTION SERVICE IF REQUIRED FOR THIS PROJECT TO MAINTAIN ESSENTIAL SERVICES DURING CIRCUIT CUT-OVER PERIODS.

SECURE PERMISSION FROM THE OWNER BEFORE PERFORMING ANY CUTTING OR PATCHING WORK WHICH IS LIKELY TO AFFECT THE STRENGTH OF A STRUCTURAL MEMBER. ALL PENETRATIONS THROUGH CONCRETE CONSTRUCTION SHALL BE DONE BY THE MEANS DENOTED BY ARCHITECT.

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INSTALL EQUIPMENT AND WIRING AS REQUIRED AND AS INDICATED ON THE ELECTRICAL AND MECHANICAL DRAWINGS AND SPECIFICATIONS. SEE MECHANICAL DRAWINGS FOR EXACT EQUIPMENT LAYOUTS AND REQUIREMENTS INCLUDING SIZES, VOLTAGES, CONTROL WIRING, CONTROL DEVICES TO BE FURNISHED AND/OR INSTALLED, LOCATIONS AND OTHER REQUIREMENTS.

CONDUIT RUNS ARE SHOWN DIAGRAMMATICALLY. EXACT LOCATIONS AND ROUTING SHALL BE DETERMINED IN THE FIELD TO SUIT CONDITIONS.

THE CONTRACTOR SHALL BE RESPONSIBLE TO MAKE AND OBTAIN APPROVAL FOR ALL NECESSARY ADJUSTMENTS IN CIRCUITING AS REQUIRED TO ACCOMMODATE THE RELOCATIONS OF EQUIPMENT AND/OR DEVICES WHICH ARE AFFECTED BY ANY APPROVED AUTHORIZED CHANGE. ALL CHANGES SHALL BE CLEARLY INDICATED ON THE RECORD (AS-BUILT) DRAWINGS.

ALL MATERIAL AND EQUIPMENT SHALL BE NEW, UL LISTED, APPROVED BY THE LOCAL JURISDICTION AND, UNLESS OTHERWISE NOTED, SHALL BE FURNISHED AND INSTALLED BY THE ELECTRICAL CONTRACTOR. EQUIPMENT EXPOSED TO WEATHER SHALL BE UL LISTED WEATHERPROOF.

ALL MOTORS OR EQUIPMENT LOCATED OUT OF SIGHT OR MORE THAN 50 FEET FROM AN ELECTRICAL PANEL, SHALL HAVE HORSEPOWER RATED DISCONNECTS INSTALLED AT THE MOTOR EQUIPMENT.

ALL REQUIRED POWER OUTAGES THAT ARE NECESSARY IN ORDER TO COMPLETE ANY PORTION OF THE WORK SHALL BE ENTIRELY AT THE OWNER'S CONVENIENCE AND AT A TIME DESIGNATED BY HIM/HER AND BE FULLY COORDINATED WITH THE OWNER'S REPRESENTATIVE. A MINIMUM OF 48 HOURS OF ADVANCED NOTICE SHALL BE GIVEN TO THE OWNER OF TIME DESIRED. OWNER SHALL APPROVE TIME OF OUTAGE BEFORE THIS CONTRACTOR DISCONNECTS ANY CIRCUITS. CONTRACTOR SHALL FURNISH, INSTALL AND REMOVE ANY TEMPORARY JUMPERS ETC. TO MAINTAIN ALL LOADS THAT THE OWNER DESIGNATES AS NOT BEING ABLE TO SHUT DOWN DURING CONSTRUCTION.

SHOULD ANY CONDITIONS EXIST THAT DIFFER FROM WHAT IS INDICATED ON THESE DRAWINGS THAT CAUSE DEVIATIONS IN THE WORK SHOWN, THE CONTRACTOR SHALL IN A TIMELY MANNER SO NOT TO IMPAIR THE CONSTRUCTION SCHEDULE OR SEQUENCE OF EVENTS, SUBMIT A WRITTEN REPORT OF THE CONDITIONS FOUND TO THE OWNER'S REPRESENTATIVE FOR APPROPRIATE DIRECTION ON HOW TO COMPLETE THE WORK IN QUESTION.

PRIOR TO START OF INSTALLATION THE CONTRACTOR SHALL COORDINATE THE FINAL LOCATION OF EACH OUTLET AND DEVICE WITH THE OWNER'S REPRESENTATIVE. THE OWNER RESERVES THE RIGHT TO RELOCATE ANY OUTLET OR DEVICE UP TO 8 FEET FROM THE LOCATION INDICATED ON THE PLANS AT NO ADDITIONAL COST.

ALL FEEDER LENGTHS INDICATED ON SINGLE LINE DIAGRAMS OR FEEDER SCHEDULE ARE FOR VOLTAGE DROP PURPOSES ONLY AND ARE NOT TO BE USED FOR MATERIAL TAKE-OFF OR BIDDING PURPOSES.

COORDINATE ALL EXIT SIGN LOCATIONS WITH THE LOCAL FIRE MARSHAL PRIOR TO BEGINNING WORK.

THE CONTRACTOR SHALL REFER TO THE ARCHITECTURAL DRAWINGS TO VERIFY DIMENSIONS, CLEARANCES, OBSTRUCTIONS, TYPE OF CONSTRUCTION, DOOR SWINGS, SINK AND SPLASH BOARD DIMENSIONS AND BATH MIRRORS, TO CLEAR SWITCHES AND RECEPTACLES PRIOR TO INSTALLATION.

WHERE ACCESS PANELS FOR ACCOMMODATING ELECTRICAL WORK ARE LOCATED AND/OR SIZED ON THESE DRAWINGS, OR DRAWINGS PREPARED UNDER SEPARATE DIVISIONS OF THE WORK, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO RE-SIZE AND/OR PROVIDE SUITABLE ACCESS PANELS FOR THE CONDITIONS. WHERE INSUFFICIENT SPACE EXISTS TO ACCOMMODATE LARGER ACCESS PANELS, A SUITABLE ALTERNATIVE IS TO MOUNT THE ELECTRICAL COMPONENTS TO THE BACKSIDE OF THE HINGED DOOR WITH AN APPROPRIATELY SIZED AND CODE APPROVED FLEXIBLE FITTING, THUS ALLOWING ACCESS TO ELECTRICAL COMPONENTS FROM THE OCCUPIED SPACE IN LIEU OF THE ATTIC.

WHERE ELECTRICAL RACEWAYS ARE INSTALLED THROUGH 2 TO 4-HOUR RATED FLOORS OR WALLS, THE CONTRACTOR SHALL PROVIDE APPROPRIATE FITTINGS APPROVED BY THE LOCAL AUTHORITIES FOR THE INTENDED PURPOSE AND APPLICATION. FITTINGS SHALL SEAL TIGHT THE INTERIOR AND EXTERIOR OF EACH RACEWAY PENETRATION TO PROHIBIT FIRE PASSING FROM ONE AREA TO ANOTHER. WHERE EMPTY CONDUITS ARE INSTALLED FOR FUTURE USE, THE CONTRACTOR SHALL PROPERLY SEAL THE RACEWAY TO COMPLY WITH THE PROVISIONS INDICATED ABOVE. THE ELECTRICAL CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR REVIEW THE PROPOSED FITTINGS TO BE USED AND DETAILS REGARDING THE INSTALLATION METHODS PRIOR TO THEIR INSTALLATION. THE INSTALLATION SHALL NOT BE COMPLETED UNTIL FINAL APPROVAL HAS BEEN RECEIVED FROM THE ARCHITECT TO PROCEED.

AS A CONDITION FOR FURNISHING MATERIAL TO THIS PROJECT, THE MANUFACTURERS AND SUPPLIERS AGREE TO DEFEND, HOLD HARMLESS, AND TO INDEMNIFY OWNER, ARCHITECT, ELECTRICAL ENGINEER, AND ALL RELATED SUBSIDIARIES AGAINST ANT LIABILITY ARISING OUT OF PRODUCT FAILURE OR MANUFACTURING DEFECT OF THE EQUIPMENT THEY FURNISH.

DEMOLITION:

THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL OF THE NECESSARY DEMOLITION WORK REQUIRED TO ACCOMMODATE THE REMODELING WITHIN THE VARIOUS PROJECT AREAS. RESTORE CONTINUITY OF ALL EXISTING CIRCUITING THAT IS TO REMAIN THAT BECOMES DISTURBED AS A RESULT OF THE WORK PERFORMED DURING CONSTRUCTION. FURNISH ALL LABOR AND MATERIALS TO REROUTE CIRCUITRY TO REMAIN, CONCEAL FROM VIEW IN PUBLIC AREAS AND MAINTAIN ALL CODE REQUIRED CLEARANCES AND ACCESSIBILITY. FIELD VERIFY ALL CONDITIONS AND REQUIREMENTS PRIOR TO STARTING WORK. WHERE EXISTING CONDUITS BECOME EXPOSED AS A RESULT OF THE NEW WORK, CONTRACTOR SHALL REWORK AS REQUIRED TO SUIT CONDITIONS TO CONCEAL SUCH CONDUIT FROM VIEW IN ALL PUBLIC AND BACK OF HOUSE AREAS.

ALL WIRING WITHIN EXISTING OUTLETS ARE TO BE RE-IDENTIFIED WITH EASY-MARKERS TO REFLECT THE NEW CIRCUIT DESIGNATIONS WHERE REWORK OR EXISTING IS REQUIRED TO COMPLETE NEW WORK.

ALL EXISTING ELECTRICAL EQUIPMENT AND MATERIAL THAT IS REMOVED AS A PART OF THIS WORK SHALL BE DELIVERED TO OWNER AT A LOCATION ON THE PROPERTY THAT HE/SHE DESIGNATES.

WHERE EXISTING OUTLETS, AFFECTED BY THE NEW WORK ARE TO BE ABANDONED, REMOVE EXISTING OUTLET AND WIRING, CUT OFF AND PLUG EXISTING CONDUIT. WHERE THERE IS A POSSIBILITY TO REUSE A PORTION OF THE EXISTING CONDUIT SYSTEM, EXTEND EXISTING CONDUIT TO NEAREST ACCESSIBLE LOCATION AND PROVIDE JUNCTION BOX WITH SUITABLE COVER. COORDINATE EXTENT OF THIS WORK WITH OWNER'S REPRESENTATIVE.

WIRE AND CABLES:

ALL WIRING SHALL BE COPPER, MINIMUM SIZE #12-AWG. USE THHN IN DRY LOCATIONS ONLY AND THWN IN WET LOCATIONS. ALL FIXED ELECTRICAL APPLIANCES SHALL BE WIRED IN APPROVED ENCLOSURES. ALL FINAL FLEX CONDUIT CONNECTIONS TO ANY EQUIPMENT SHALL INCLUDE SUFFICIENT SLACK IN FLEX TO MOVE WITH THE EQUIPMENT.

COLOR CODE SECONDARY SERVICE, FEEDER AND BRANCH CIRCUIT CONDUCTORS WITH FACTORY APPLIED COLOR AS FOLLOWS:

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

TERMINAL CABINETS

TERMINAL CABINETS SHALL BE FLUSH OR SURFACE MOUNTED AS INDICATED WITH HINGED DOORS AND LOCK. MATCH PANEL BOARD LOCK. EXTERIOR FINISH TO BE SAME AS FOR PANEL BOARDS. PROVIDE 3/4" PLYWOOD BACKING INSIDE OF CABINET. PROVIDE PROPER NUMBER OF TERMINALS IN CABINETS AS REQUIRED.

PROVIDE FLAT MOUNT TERMINAL BLOCKS MOUNTED ON PLYWOOD BACKING INSIDE TERMINAL CABINETS FOR CONDUCTOR TERMINATION. PROVIDE QUANTITY OF TERMINAL BLOCKS FOR EACH SYSTEM AS REQUIRED. TERMINAL BLOCKS SHALL BE KULKA STANDARD 600-600A SERIES AS MANUFACTURED BY MARATHON SPECIAL PRODUCTS.

PROVIDE A BAKELITE NAMEPLATE FASTENED WITH SCREWS TO THE FACE OF EACH TERMINAL CABINET WHICH WILL IDENTIFY IT.

MATCH PANEL KEY

PROVIDE CIRCUIT DIRECTORY AND HOLDER ON INSIDE OF DOOR WITH ONE LINE FOR EACH CONDUCTOR ENTERING AND EACH CONDUCTOR LEAVING CABINET.

UNDERGROUND HANDHOLES AND BOXES.

INSTALL HANDHOLES AND BOXES LEVEL AND PLUMB AND WITH ORIENTATION AND DEPTH COORDINATED WITH CONNECTING CONDUITS TO MINIMIZE BENDS AND DEFLECTIONS REQUIRED FOR PROPER ENTRANCES.

UNLESS OTHERWISE INDICATED, SUPPORT UNITS ON A LEVEL BED OF CRUSHED STONE OR GRAVEL, GRADED FROM 1/2 INCH SIEVE TO NO. 4 SIEVE AND COMPACTED TO SAME DENSITY AS ADJACENT UNDISTURBED EARTH.

ELEVATION: IN PAVED AREAS, SET SO COVER SURFACE WILL BE FLUSH WITH FINISHED GRADE. SET COVERS OF OTHER ENCLOSURES 1 INCH ABOVE FINISHED GRADE.

INSTALL HANDHOLES WITH BOTTOM BELOW FROST LINE, BELOW GRADE.

INSTALL REMOVABLE HARDWARE, INCLUDING PULLING EYES, CABLE STANCHIONS, CABLE ARMS, AND INSULATORS, AS REQUIRED FOR INSTALLATION AND SUPPORT OF CABLES AND CONDUCTORS AND AS INDICATED. SELECT ARM LENGTHS TO BE LONG ENOUGH TO PROVIDE SPARE SPACE FOR FUTURE CABLES BUT SHORT ENOUGH TO PRESERVE ADEQUATE WORKING CLEARANCES IN ENCLOSURE.

FIELD_CUT OPENINGS FOR CONDUITS ACCORDING TO ENCLOSURE MANUFACTURER'S WRITTEN INSTRUCTIONS. CUT WALL OF ENCLOSURE WITH A TOOL DESIGNED FOR MATERIAL TO BE CUT. SIZE HOLES FOR TERMINATING FITTINGS TO BE USED, AND SEAL AROUND PENETRATIONS AFTER FITTINGS ARE INSTALLED.

CONDUCTOR IDENTIFICATION & INSTALLATION

THE DRAWINGS INDICATE THE ARRANGEMENT OF OUTLETS ON EACH BRANCH CIRCUIT AND THE CIRCUIT TAGS SHOW THE NUMBER OF THE CIRCUIT, AND THE BOARD TO WHICH IT WILL BE CONNECTED. CIRCUITS INDICATED WITH THE SAME NUMBERS SHALL BE CONNECTED TO THE SAME BREAKER ON THE PANEL BOARD.

ALL FEEDERS AND BRANCH CIRCUITS SHALL BE TAGGED IN ALL PULL BOXES AND IN THE GUTTERS OF ALL PANELS TO WHICH THEY CONNECT.

ALL WIRING SHALL BE INSTALLED WITH IDENTIFIED NEUTRAL CONDUCTORS.

NO WIRE SHALL BE INSTALLED UNTIL ALL WORK OF OTHER CONTRACTORS THAT MIGHT CAUSE INJURY TO THE SAID WIRE HAS BEEN COMPLETED. CARE SHALL BE USED TO PULL WIRES TO INSURE THAT NO DAMAGE OCCURS TO THE INSULATION. POWDERED SOAPSTONES OR WIRE EASE SHALL BE USED FOR PULLING IN WIRES.
IN MAKING THE CONNECTION OF ALL BRANCH CIRCUITS TO THE TERMINALS OF SWITCHES, BASE PLUGS, ETC. THE WIRES SHALL BE LOOPED AROUND THE BINDING SCREWS OR BE FITTED WITH CONNECTING LUGS. AT THE CEILING OUTLETS, THE CONTRACTOR SHALL LEAVE NOT LESS THAN 6" OF FREE ENDS ON EACH WIRE FOR CONNECTIONS TO THE FIXTURES.

NO SPLICES SHALL BE PERMITTED EXCEPT IN OUTLET BOXES, AND IN PANEL BOARD GUTTERS.

SWITCHES AND RECEPTACLES SHALL BE SECURELY FASTENED TO THE OUTLET BOX. WHERE THE OUTLET BOX COVERS ARE BACK OF THE FINISHED WALLS THE SWITCH OR RECEPTACLE SHALL BE BUILT OUT FROM THE SAME WITH WASHERS SO THAT IT IS RIGIDLY HELD IN PLACE TO THE BOX. THE FLOATING OF ANY SWITCH OR RECEPTACLE WILL NOT BE PERMITTED.

ALL SIGNAL AND COMMUNICATIONS CONDUCTORS SHALL BE IDENTIFIED IN TERMINAL CABINETS AS TO TYPE OF SYSTEM, E.G.: CLOCK, BELL, FIRE ALARM, ETC. AS WELL AS THE LOCATION OF THE OTHER END OF THE CONDUCTOR BY ROOM NUMBER OR NAME, AS DIRECTED BY THE OWNER. IDENTIFICATION SHALL BE BY NUMBERS AT TERMINAL STRIPS AND A NUMBERED DIRECTORY IN A CARD HOLDER INSIDE THE TERMINAL CABINET.

FIRE ALARM SYSTEM WIRING SHALL BE COLOR-CODED AS FOLLOWS:

INITIATING DEVICES - TWO YELLOW WIRES, TWO ORANGE WIRES.
NOTIFICATION DEVICES - TWO BLACK WIRES, TWO RED WIRES.

TELECOMMUNICATION SYSTEM WIRING SHALL BE COLOR-CODED GREEN AND YELLOW.

SECURITY SYSTEM WIRING SHALL BE COLOR-CODED BLUE AND YELLOW.

ALL POWER WIRING #6 GAUGE AND SMALLER SHALL BE FACTORY COLOR CODED. FOR LARGER THAN #6, MARK CONDUCTORS ON EACH END AND AT ALL JUNCTION AND/OR PULL BOXES WITH A 1" BAND OF COLORED PRESSURE-SENSITIVE PLASTIC TAPE. FOR ISOLATED GROUND WIRES, MARK WITH A 1" BAND OF GREEN TAPE, FOLLOWED BY A 1" BAND OF YELLOW TAPE, FOLLOWED BY A 1" BAND OF GREEN TAPE. COLORS FOR EACH PHASE AND THE NEUTRAL SHALL BE CONSISTENT THROUGHOUT THE SYSTEM.

THE WHITE OR GRAY CONDUCTOR SHALL BE THE NEUTRAL AT EACH OUTLET. CONDUCTORS HAVING WHITE, GRAY OR GREEN COVERING SHALL NOT BE USED TO INDICATE OTHER THAN NEUTRAL OR GROUNDING. THIS LIMITATION APPLIES TO ALL POWER, LIGHTING, AND CONTROL CIRCUITS.

INSTALLATION OF CONDUCTORS SHALL BE MADE IN A NEAT AND WORKMANLIKE MANNER TO MEET CODE REQUIREMENTS AND SHALL BE RUN CONTINUOUS WITHOUT WELD, SPLICE OR JOINT BETWEEN BOXES. DO NOT INSTALL WIRES IN CONDUIT UNLESS THE ENTIRE SYSTEM OF CONDUIT AND OUTLET BOXES ARE PERMANENTLY IN PLACE. ALL CONDUCTORS SHALL BE PULLED USING A U.L. APPROVED WIRE LUBRICANT.

MAKE ALL TERMINATIONS AT MOTORS USING 3M SERIES 5300 MOTOR LEAD/CABLE SPLICING KITS. MAKE CONNECTION PER 3M WRITTEN INSTALLATION PROCEDURES.

ON ALL BOLTED ELECTRICAL CONNECTIONS, THE CONTRACTOR SHALL USE BELVILLE WASHERS.

ALL WIRING TO BE NEATLY BUNDLED AND TIED WITH NYLON CORD OR PLASTIC STRAPS.

SPLICES IN UNDERGROUND BOXES SHALL BE MADE WITH CRIMP ON COMPRESSION CONNECTORS AND INSULATED WITH HEAT SHRINK SLEEVES OR WITH SPLICE KITS LISTED BY THE MANUFACTURER FOR WET LOCATIONS. WIRE NUTS ARE NOT PERMITTED.

FIRE RATED AREAS

WHERE CONDUIT, CABINETS, OR BOXES PENETRATE FIRE RATED CEILINGS, WALLS OR FLOORS PROVIDE A FIRE RATED ENCLOSURE OR FIRE STOP. RATING OF ENCLOSURE OR FIRE STOP SHALL MATCH OR EXCEED RATING OF AREA PENETRATED. VERIFY LOCATION OF FIRE RATED AREAS WITH ARCHITECTURAL DRAWINGS.

WHERE OUTLET BOXES ARE RECESSED ON OPPOSITE SIDE OF A FIRE RATED WALL, BOXES SHALL BE SEPARATED BY A HORIZONTAL DISTANCE OF 24 INCHES. WHERE OPENING FOR STEEL ELECTRICAL OUTLET BOXES EXCEED 15 SQ. INCHES IN AREA, OR AN AGGREGATE OF MORE THAN 100 SQ. INCHES FOR ANY 100 SQ. FEET OF WALL OR PARTITION AREA, FIRE STOPPING IS REQUIRED.

PENETRATIONS IN WALLS, FLOOR OR CEILINGS REQUIRING PROTECTED OPENINGS SHALL BE FIRE-STOPPED. FIRE-STOPPING SHALL BE OF AN APPROVED MATERIAL, SECURELY INSTALLED AND CAPABLE OF MAINTAINING ITS INTEGRITY WHEN SUBJECTED TO THE TIME-TEMPERATURE CURVE OF STATE FIRE MARSHAL STANDARD 12-43-3 AND STANDARD 12-43-1. MANUFACTURER'S INSTALLATION INSTRUCTIONS SHALL BE MADE AVAILABLE TO THE INSPECTION AUTHORITY AND KEPT AT THE JOB SITE.

WIRING DEVICES:

SINGLE-POLE SWITCHES SHALL BE 20 AMPERES, 120/277 VOLT, AC, SIDE AND BACK WIRED, HUBBELL CAT. #HBL-1221-W, OR EQUAL BY G.E., PASS & SEYMOUR, OR LEVITON. VERIFY FINISH COLOR WITH ARCHITECT.

THREE-WAY SWITCHES SHALL BE 20 AMPERES, 120/277 VOLT, AC, SIDE AND BACK WIRED, HUBBELL CAT. #HBL-1223-W, OR EQUAL BY G.E., PASS & SEYMOUR, OR LEVITON. VERIFY FINISH COLOR WITH ARCHITECT.

DUPLEX RECEPTACLES FOR 120 VOLT, SINGLE-PHASE SERVICE TO BE RATED 20 AMPERES, 125 VOLT, BACK AND SIDE WIRED, 2-WIRE (NEMA 5-20R) GROUNDING TYPE, VERIFY FINISH COLOR WITH ARCHITECT, HUBBELL CAT. #HBL8300 OR EQUAL BY PASS & SEYMOUR, G.E., LEVITON.

DOUBLE DUPLEX RECEPTACLES (4-PLEX): TO BE SAME AS DUPLEX RECEPTACLES. TWO DUPLEX RECEPTACLES IN 4" X 4" OUTLET BOX WITH ONE TWO-GANG FACEPLATE. LEVITON, PASS & SEYMOUR, G.E., OR HUBBELL.

ALL DEVICE PLATES SHALL BE OF THE UNBREAKABLE PLASTIC TYPE, MANUFACTURED BY PASS & SEYMOUR, LUTRON, LEVITON, G.E., OR HUBBELL AND VERIFY FINISH COLOR WITH ARCHITECT. DEVICE PLATES FOR EQUIPMENT, STORAGE, KITCHEN, AND LABORATORY AREAS SHALL BE STAINLESS STEEL.

OUTLETS AND DEVICES SHALL BE SET RIGID, PLUMB, FASTENED SECURELY; WHERE CONCEALED, SET FLUSH WITH FINISH SURFACE.

WIRING CONNECTIONS: CURL WIRE AROUND TERMINAL SCREWS AND TIGHTEN FIRMLY. SNAP-IN, PRESSURE-TYPE TERMINALS ARE NOT ACCEPTABLE.

GFI/GFCI TYPE RECEPTACLES FOR 120 VOLT, SINGLE-PHASE SERVICE TO BE RATED 20 AMPERES, 125 VOLT, BACK AND SIDE WIRED, 2-WIRE (NEMA 5-20R) GROUNDING TYPE, VERIFY FINISH COLOR WITH ARCHITECT, HUBBELL CAT #GFR8300H.

ALL RECEPTACLE AND SWITCH COVER PLATES SHALL CLEARLY INDICATE, WITH PERMANENT BLACK MARKER ON THE INSIDE OF THE PLATE, THE CIRCUIT NUMBER AND THE SOURCE OF POWER FEEDING THAT SWITCH OR RECEPTACLE.

ALL LIGHTING CONTROLS SHALL BE +48" TO +36" AND WITHIN SIGHT OF LIGHTING FIXTURES. CAC-24.
ALL CONVENIENCE RECEPTACLES SHALL BE +15". CAC-24.
ALL HEATING AND COOLING CONTROLS SHALL BE +48". CAC-24.

LIGHTING:

ALL LIGHTING FIXTURES SHALL BE U.L. LISTED.

PROVIDE LIGHTING FIXTURES WHERE INDICATED ON PLANS AND AS INDICATED IN LIGHT FIXTURE SCHEDULE. LAMPS SHALL BE PROVIDED BY THE CONTRACTOR. CONTRACTOR SHALL INCLUDE IN HIS/HER BID ALL LABOR AND MATERIAL TO INSTALL ALL LIGHT FIXTURES, INCLUDING THOSE FURNISHED BY THE OWNER. PROVIDE 1-1/2" CEILING SPACERS FOR FLUORESCENT FIXTURES WHERE REQUIRED.

ALL RECESSED LIGHTING FIXTURES SHALL HAVE JUNCTION BOXES APPROVED FOR THE NUMBER OF CONDUCTORS REQUIRED. BOXES MAY BE LOCATED IN NEARBY ACCESSIBLE AREAS SUCH AS STORAGE ROOMS, EQUIPMENT ROOMS, CLOSETS, ACCESSIBLE CEILING SPACES, OR IN REMOTE AREAS AS APPROVED, BUT NOT WHERE VISIBLE TO PUBLIC.

PROVIDE LENSED LIGHTING FIXTURES WITH LENSES OF 100% PURE VIRGIN ACRYLIC.

PROJECT SHALL BE BID WITH LIGHTING FIXTURES AND OTHER EQUIPMENT AS SPECIFIED ON PLANS. SUBSTITUTIONS SHALL BE LISTED AS ALTERNATE.

WHERE THERE IS INSUFFICIENT SPACE FOR A SPECIFIED RECESSED FIXTURE, PROVIDE EITHER A MORE SHALLOW FIXTURE AS APPROVED, OR A SURFACE MOUNTED FIXTURE OF EQUAL QUALITY AND SIMILAR PHYSICAL APPEARANCE TO MATCH OTHER FIXTURES IN THE SAME AREAS AND AS APPROVED.

PROVIDE ALL NECESSARY SUPPORTS FOR LIGHTING FIXTURES AS REQUIRED. WHERE FIXTURES ARE INSTALLED ON OR IN SUSPENDED CEILINGS, SECURE FIXTURES TO CEILING FRAME SYSTEM AND PROVIDE FIXTURE SUPPORTS INDEPENDENT OF THE CEILING SUSPENSION SYSTEM, AS REQUIRED.
PROVIDE PENDANT FIXTURES WITH SWIVEL HANGER, LEGALLY APPROVED FOR WEIGHT SUPPORTED AND FOR EARTHQUAKE COMPLIANCE. WHEN INSTALLED, ALL PENDANT FIXTURES INCLUDING CONTINUOUS FLUORESCENT ROWS SHALL SWING A MINIMUM OF 20" IN ANY DIRECTION.

RECESSED FIXTURES IN FIRE RATED CEILINGS AND SUPPLY AIR PLENUMS SHALL BE EITHER APPROVED FOR THE FIRE RATINGS OF THE CEILING, OR SHALL BE FULLY ENCLOSED IN A FIRE RATED HOUSING ACCEPTABLE TO LEGAL AUTHORITIES. SEAL ALL OPENINGS AS REQUIRED TO ELIMINATE AIR LEAKS.

COORDINATE LOCATION OF ALL LIGHTING FIXTURES WITH THE EXISTING CONDITIONS PRIOR TO STARTING WORK. PROVIDE MOUNTING METHOD AS REQUIRED BY CEILINGS AND FIXTURES TO BE INSTALLED.

ALL LIGHTING FIXTURES SHOWN AND SPECIFIED ON THE ELECTRICAL DRAWINGS AS WELL AS THOSE REFLECTED ON THE ARCHITECTURAL, INTERIOR DESIGN OR OTHER DRAWINGS PREPARED UNDER OTHER DIVISIONS OF WORK SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR UNLESS OTHERWISE STATED.

CONDUIT:

CONDUIT INSTALLED WITHIN CONCEALED AREAS MAY BE EMT OR RIGID STEEL. IN EXPOSED AREAS SUBJECT TO CONDUIT DAMAGE, ONLY GALVANIZED RIGID STEEL CONDUIT MAY BE USED. ALL CONDUIT IN FINISHED AREAS SHALL BE CONCEALED. A MAXIMUM OF 4' OF CONDUIT AND WIRE SHALL BE SOLAR EXPOSED.

ALL CONDUITS INSTALLED UNDERGROUND SHALL BE A MINIMUM OF 1". UNDERGROUND CONDUITS SHALL BE PVC, SCHEDULE 40 ELECTRICAL CONDUIT, AS MANUFACTURED BY CARLON OR EQUAL, UNLESS OTHERWISE NOTED.
CONDUITS SHOWN ON THE DRAWINGS HAVE BEEN SIZED BASED ON METALLIC RACEWAYS UNLESS NOTED OTHERWISE. ELECTRICAL CONTRACTOR MAY OPT TO USE SCHEDULE 40 PVC WHERE PERMITTED BY CODE AND THE OWNER. IF PVC IS USED, ELECTRICAL CONTRACTOR SHALL SIZE ALL SUCH CONDUITS AS REQUIRED TO INCLUDE GROUND CONDUCTOR, AND SHALL SIZE GROUND WIRE PER CODE. PVC RACEWAYS SHALL NOT BE INSTALLED ABOVE GRADE. ALL FLEX CONDUITS SHALL INCLUDE A GROUNDING CONDUCTOR SIZED PER THE NEC.

ALL PVC UNDERGROUND CONDUITS SHALL UTILIZE COATED OR WRAPPED RIGID STEEL ELBOWS AND RISERS WHEN RISING ABOVE GRADE, EXCEPT IN AREAS NOT SUBJECT TO MECHANICAL DAMAGE AND WITH PRIOR APPROVAL FROM THE ELECTRICAL ENGINEER.
MAINTAIN A MINIMUM OF 6" CLEARANCE BETWEEN ALL CONDUIT SLEEVES. VERIFY WITH GENERAL CONTRACTOR.

THE ELECTRICAL CONTRACTOR SHALL PROVIDE EXPANSION/DEFLECTION FITTINGS FOR CONDUITS CROSSING EXPANSION JOINTS. FITTINGS SHALL BE SUITABLE FOR CONDITIONS TO BE ENCOUNTERED. VERIFY WITH OWNER'S REPRESENTATIVE PRIOR TO COMMENCING WORK. SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL.

PARKING LOT CONDUITS SHALL HAVE A MINIMUM COVER OF 24".

A CONCEALED CONDUIT SYSTEM SHALL BE INSTALLED FOR ALL INTERIOR WIRING INCLUDING CONTROLS. CONDUIT SHALL BE RUN CONTINUOUS BETWEEN OUTLETS, ETC., AND WITH THE MINIMUM NUMBER OF BENDS.

CONDUIT RUNS FOR CIRCUITS OPERATING OVER 600V SHALL HAVE A GROUNDING BUSHING INSTALLED AT EACH TERMINATION.

ALL CONDUIT RUNS ON ROOF AND UP TO TEN FEET ABOVE FINISH GRADE SHALL BE GALVANIZED RIGID STEEL CONDUIT WITH THREADED COUPLINGS AND CONNECTORS.

PVC 40 OR RIGID STEEL FACTORY WRAPPED WITH PVC TAPE SHALL BE USED FOR UNDERGROUND RUNS.

WHERE UNDERGROUND CONDUIT CANNOT BE RUN BELOW BUILDING FOOTINGS THE CONTRACTOR SHALL PROVIDE PVC-80 SLEEVES THROUGH THE FOOTINGS (CONTRACTOR SHALL OBTAIN APPROVAL FOR ALL SLEEVE SIZES AND LOCATIONS WITH THE STRUCTURAL ENGINEER BEFORE INSTALLATION).

ALL CONDUIT RISERS THROUGH SLAB SHALL BE RIGID STEEL OR IMC (FACTORY WRAPPED WITH PVC TAPE OR WITH FACTORY APPLIED PVC COATING) AND SHALL EXTEND A MINIMUM OF FOUR INCHES (4") ABOVE FINISHED FLOOR.

ALL CONDUIT SHALL BE DELIVERED TO THE SITE OF CONSTRUCTION IN THEIR ORIGINAL BUNDLES. EACH LENGTH OF CONDUIT SHALL BEAR THE LABEL OF THE NATIONAL BOARD OF FIRE UNDERWRITERS. ALL CONDUIT SUBJECTED TO ROUGH USAGE WHILE ON THE JOB BEFORE INSTALLATION AND NOT ACCEPTABLE TO THE ARCHITECT SHALL BE REMOVED FROM THE PREMISES UPON NOTICE.

CONDUIT INSTALLED IN MASONRY WALLS SHALL BE RIGID STEEL GALVANIZED CONDUIT OR PVC, NOT IN THE SAME MASONRY CELL AS THE BUILDING STRUCTURAL REINFORCING STEEL.

THE JOINTS IN ALL CONDUITS INSTALLED UNDER CONCRETE SLABS ON THE GROUND, OR UNDERGROUND, OR EXPOSED TO THE WEATHER, SHALL BE MADE LIQUID AND GAS-TIGHT. ALL UNDERGROUND CONDUIT OUTSIDE OF THE BUILDINGS SHALL BE BURIED TO A DEPTH OF NOT LESS THAN 24" BELOW FINISH GRADE. UTILITY SERVICES SHALL COMPLY WITH UTILITY COMPANY REQUIREMENTS. TWO OR MORE POWER OR TELECOMMUNICATIONS CONDUIT RUNS INSTALLED IN A COMMON TRENCH SHALL BE SEPARATED HORIZONTALLY BY AT LEAST FOUR INCHES (4"). TWO OR MORE POWER AND TELECOMMUNICATIONS CONDUIT RUNS INSTALLED IN A COMMON TRENCH SHALL BE SEPARATED HORIZONTALLY BY AT LEAST TWELVE (12"). ELECTRICAL CONDUIT RUNS INSTALLED IN A COMMON TRENCH WITH OTHER UTILITY LINES SHALL BE SEPARATED HORIZONTALLY FROM SUCH LINES BY AT LEAST TWELVE INCHES (12").

CHANGES IN DIRECTION SHALL BE MADE WITH CONDUIT SWEEP ELBOWS OR LONG RADIUS BENDS MADE ON THE JOB. WHERE TWO OR MORE CONDUITS ARE GROUPED IN EXPOSED LOCATIONS, THE SWEEPS SHALL BE STRUCK FROM THE SAME CENTER FORMING CONCENTRIC ARCS.

ALL JOINTS IN CONDUIT SHALL BE MADE WITH STANDARD COUPLING. IN MAKING JOINTS, CONDUITS MUST BE TRULY AND ACCURATELY CUT AND THREADED (WHERE APPLICABLE) WITH STRAIGHT THREAD, SMOOTHLY REAMED AND SQUARELY BUTTED. ALL CONDUIT SHALL BE KEPT CORKED AND DRY DURING CONSTRUCTION, USING PLASTIC CAPS OR CONDUIT PENNIES HELD IN PLACE WITH CONDUIT BUSHINGS. SHOULD DIRT OR MOISTURE COLLECT IN ANY CONDUIT, THE CONTRACTOR SHALL SWAB THEM OUT TO THE SATISFACTION OF THE ARCHITECT.

CONDUITS ENDING AT THE MOTORS SHALL BE CARRIED AS CLOSE AS POSSIBLE TO THE TERMINAL BLOCKS MAKING ALLOWANCE FOR THE MOVEMENT OF THE MOTORS WHEN THEY ARE EQUIPPED WITH SLIDE RAILS. THE CONNECTION BETWEEN THE CONDUIT TERMINALS ON THE MOTOR AND THE CONDUIT SHALL BE MADE WITH LIQUID-TIGHT FLEXIBLE CONDUIT USING THE PROPER FITTINGS.

ALL CONDUITS WHERE THEY ENTER PANEL BOXES, PULL BOXES, OR OUTLET BOXES SHALL BE SECURED IN PLACE BY GALVANIZED LOCKNUTS - ONE (1) LOCKNUT INSIDE OF BOX. AN INSULATED THROAT SHALL BE USED WHERE CONDUCTORS ARE #4 OR LARGER.

WHERE CONDUITS ARE RUN EXPOSED, THE SAME SHALL BE INSTALLED STRAIGHT AND TRUE WITH REFERENCE TO THE ADJACENT CONSTRUCTION.

CONDUIT 1" AND ABOVE SHALL HAVE INSULATED THROAT BUSHINGS.

ANY CONDUIT INSTALLED UNDER BUILDING SHALL BE UNDER THE SLAB.

ALL BOXES FOR BRACKET OUTLETS SHALL BE EQUIPPED WITH 3/8" "NO-BOLT" FIXTURE STUD. THESE BOXES SHALL BE SO SET THAT WHEN IN PLACE THE FIXTURE SHALL BE AT RIGHT ANGLES TO THE CEILING OR WALLS.

ALL EMPTY CONDUIT SHALL BE EQUIPPED WITH A #12 GALVANIZED IRON PULL WIRE OR NYLON PULL ROPE CONTINUOUS FROM OUTLET TO OUTLET.

FLEXIBLE CONDUIT WILL BE PERMITTED FOR CONNECTING LIGHTING FIXTURES TO JUNCTION BOXES.

FLEXIBLE CONNECTION IN OUTDOOR AND DAMP LOCATIONS SHALL BE FLEXIBLE LIQUID-TIGHT METAL CONDUIT.

INSTALL ROOF JACKS FOR THIS CONSTRUCTION IN ACCORDANCE WITH OTHER SECTIONS OF THIS SPECIFICATION.

THE MAXIMUM ALLOWED LENGTH OF FLEX CONDUIT AT EQUIPMENT CONNECTIONS IS 18".

EXPANSION JOINTS FOR CONDUIT SHALL BE PROVIDED WHERE REQUIRED TO COMPENSATE FOR THERMAL EXPANSION AND CONTRACTION.

NO CONDUIT SMALLER THAN 1/2 INCH ELECTRICAL TRADE SIZE SHALL BE USED.

OUTLET, PULL BOXES & JUNCTION BOXES:

JUNCTION BOXES AND OUTLET BOXES SHALL BE SIZED PER CODE, BUT IN NO CASE LESS THAN THE FOLLOWING: OUTLETS WITH (9) OR LESS #12 CONDUCTORS SHALL BE 4"/S X 2-1/2"/D AND OUTLETS WITH (10) THROUGH (18) CONDUCTORS SHALL BE 4-11/16"/S X 2-1/8"/D.

ALL JUNCTION BOXES SHALL CLEARLY INDICATE WITH PERMANENT BLACK MARKER, IN 1/2" LETTERING, THE CIRCUIT NUMBERS AND THE SOURCE OF POWER OF ALL CONDUCTORS CONTAINED WITHIN THAT JUNCTION BOX. OUTLETS FOR THE ATTACHMENT OF THE FIXTURES TO BE PROVIDED WITH 3/8" MALLEABLE IRON FIXTURE STUDS AND BOX HANGERS WHERE REQUIRED.

TELEPHONE OUTLETS SHALL BE DOUBLE GANG BOX WITH SINGLE GANG 1-HOLE TELEPHONE COVER PLATE, UNLESS OTHERWISE NOTED ON DRAWINGS.
CABLE TELEVISION OUTLETS SHALL BE DOUBLE GANG BOX WITH SINGLE GANG 1-HOLE CATV COVER PLATE, UNLESS OTHERWISE NOTED ON DRAWINGS.

INTERIOR BOXES SHALL BE GALVANIZED STEEL, MANUFACTURERS: B & C METAL STAMPING, BRYANT, GENERAL ELECTRIC, LEVITON COMPANY, NORRIS STEEL CITY, CROUSE-HINDS, APPLETON, RACO, CARLON.
EXTERIOR BOXES SHALL BE "FS" TYPE BOXES WITH THREADED HUBS AS REQUIRED AND FULLY GASKETED UNLESS OTHERWISE NOTED.

PANELBOARDS:

ALL SWITCHBOARDS AND PANELBOARDS SHALL BE CONSTRUCTED PER THE NATIONAL ELECTRICAL CODE AND ALL LOCALLY ADOPTED AMENDMENTS. WHERE REGULATIONS APPLY, CONSTRUCTION SHALL MEET REQUIREMENTS OF SERVING UTILITY COMPANY.
ALL SWITCHBOARDS AND MOTOR CONTROL CENTERS SHALL HAVE WITHSTAND RATINGS GREATER THAN THE AVAILABLE FAULT CURRENT WITH 42,000 AMP BEING THE MINIMUM. CONFIRM CONDITIONS WITH SERVING UTILITY COMPANY. SUBMIT CERTIFICATION OF COMPLIANCE WITH SHOP DRAWINGS.
ALL OVERCURRENT DEVICES IN EQUIPMENT SHALL BE U.L. LISTED TO INTERRUPT THE AVAILABLE FAULT CURRENT. ALL PANELBOARDS AND SWITCHBOARDS SHALL BE GROUNDED IN ACCORDANCE WITH THE NEC AND ALL LOCALLY ADOPTED AMENDMENTS.

WALL-MOUNTED PANELS SHALL BE PROVIDED WITH TRIM AND DOOR CONSTRUCTED OF CODE GUAGE SHEET STEEL AND SHALL HAVE FACTORY FINISH. DOOR SHALL BE FITTED WITH HINGES, SPRING CATCH LATCH AND CYLINDER LOCK. PROVIDE 2 KEYS WITH EACH PANEL. PROVIDE DIRECTORY CARD HOLDER AND TYPEWRITTEN PANEL SCHEDULE. PANELBOARD SHALL BE SO CONSTRUCTED AS TO PROVIDE FOR ADJUSTABLE ALIGNMENT OF TRIM AND INTERIOR PANEL.

PROVIDE ENGRAVED NAMEPLATES IDENTIFYING SWITCHBOARDS AND PANELBOARDS. ALL EQUIPMENT NAMEPLATE IDENTIFICATIONS SHOWN ON THE DRAWINGS ARE FOR REFERENCE ONLY. PRIOR TO FABRICATING THE FINISHED NAMEPLATES, CONSULT WITH THE OWNER'S BUILDING ENGINEER FOR THE ACTUAL NOMENCLATURE TO BE USED.

PROVIDE PANELBOARDS WITH SEPARATE GROUND BAR.

UNLESS OTHERWISE INDICATED ON PLANS, PANEL SHALL BE INSTALLED WITH TOP OF CABINET AT 6'-6" A.F.F.

MANUFACTURERS SHALL BE SQUARE D OR EQUAL APPROVED BY ENGINEER PRIOR TO BID PROPOSAL.

WHERE LOADS ARE ADDED TO EXISTING PANELBOARDS, THE PANEL SCHEDULE SHALL BE UPDATED AND SHALL INDICATE THE LOCATION AND DESCRIPTION OF THE LOAD.

ALL LUG CONNECTIONS TO PANEL BUSSING, SWITCHES, AND BREAKERS TO BE SIZED TO ACCOMMODATE CONDUCTOR SIZES INDICATED ON THESE DRAWINGS. REDUCTION OF CIRCULAR MIL CAPACITY OF CONDUCTORS IS NOT PERMITTED. ALL LUGS SHALL BE RATED FOR 75 DEGREES CELSIUS.

CIRCUIT BREAKERS:

MOLDED CASE CIRCUIT BREAKERS SHALL BE OF THE QUICK-MAKE, QUICK-BREAK, TRIP-FREE, THERMAL MAGNETIC BOLT-ON TYPE WITH ON-OFF-TRIPPED POSITIONS.

CIRCUIT BREAKERS ABOVE 225 AMPERE RATING SHALL HAVE INTERCHANGEABLE TRIP ELEMENTS.

ALL CIRCUIT BREAKERS SHALL BE CALIBRATED FOR OPERATION IN AN AMBIENT TEMPERATURE OF 40 DEGREES CELSIUS.

ALL MUTI-POLE BREAKERS SHALL BE SO DESIGNED THAT AN OVERLOAD IN ONE POLE AUTOMATICALLY CAUSES ALL POLES TO OPEN.

ALL PANELBOARD CIRCUIT BREAKERS USED FOR DIRECT SWITCHING OR LIGHTING CIRCUITS, SHALL BE SWITCH DUTY RATED.

ALL CIRCUIT BREAKERS SHALL HAVE A MINIMUM 10,000 AIC RATING FOR 250V PANELS AND 14,000 AIC RATING FOR 600V PANELS.

FUSES:

ALL FUSES SHALL BE MANUFACTURED BY GOULD SHAMUT, LITTLEFUSE, OR BUSSMANN MANUFACTURING CO.

ALL FLUORESCENT FIXTURES WITH ELECTRONIC BALLASTS OPERATING AT 120 VOLTS SHALL HAVE A HARMONIC DISTORTION OF NOT MORE THAN 10%.

ALL FLUORESCENT FIXTURES WITH ELECTRONIC BALLASTS OPERATING AT 277 VOLTS SHALL HAVE A HARMONIC DISTORTION OF NOT MORE THAN 20%

ALL FLUORESCENT FIXTURES IN INDOOR LOCATIONS SHALL BE INSTALLED WITH A DISCONNECTING MEANS PER NEC ART. 410.73(G).

LAMPS:

INCANDESCENT LAMPS SHALL BE OF THE EXTENDED SERVICE TYPE, INSIDE FROSTED. RATING TYPE, ENVELOPE AND OTHER BASE AS RECOMMENDED BY FIXTURE MANUFACTURER UNLESS SPECIFIED OTHERWISE.
FLUORESCENT LAMPS SHALL BE T8, 3500 KELVIN, RAPID START, UNLESS OTHERWISE SHOWN ON DRAWINGS.
HIGH INTENSITY DISCHARGE LAMPS SHALL BE CALIFORNIA TITLE 20 COMPLIANT AND OF TYPE RECOMMENDED BY FIXTURE MANUFACTURER, G.E., SYLVANIA, OR PHILLIPS.

TRANSFORMERS:

TRANSFORMERS SHALL BE TP-1 RATED, DRY TYPE, SHEET METAL ENCLOSED, CLASS 220 DEGREES INSULATION, TWO WINDING, WITH PRIMARY AND SECONDARY VOLTAGES AND KVA RATINGS AS SHOWN ON THE DRAWINGS.
THREE-PHASE TRANSFORMERS SHALL BE DELTA CONNECTED ON PRIMARY WINDINGS. SECONDARY WINDINGS SHALL BE WYE CONNECTED.

TRANSFORMERS SHALL BE PROVIDED WITH FOUR (4) 2-1/2% TAPS. TWO ABOVE AND TWO BELOW NOMINAL VOLTAGE ON PRIMARY WINDING.

TERMINALS SHALL BE READILY ACCESSIBLE FROM TOP AND FRONT OF TRANSFORMER, WITH TOP AND/OR FRONT PANELS REMOVABLE.

TRANSFORMERS 15 KVA AND LARGER SHALL BE IN A HEAVY GUAGE, SHEET STEEL, VENTILATED ENCLOSURE. THE VENTILATING OPENINGS SHALL BE DESIGNED TO PREVENT ACCIDENTAL ACCESS TO LIVE PARTS IN ACCORDANCE WITH UL, NEMA, AND NATIONAL ELECTRICAL CODE STANDARDS FOR VENTILATED ENCLOSURES. SINGLE PHASE TRANSFORMERS THROUGH 167 KVA, AND THREE PHASE TRANSFORMERS THROUGH 112.5 KVA SHALL BE DESIGNED SO THEY CAN BE EITHER FLOOR OR WALL MOUNTED. TRANSFORMERS ABOVE 112.5KVA SHALL BE FLOOR MOUNTED DESIGN.

ALL TRANSFORMERS SHALL BE INSTALLED TO MEET THE MANUFACTURERS RECOMMENDED NAMEPLATE CLEARANCES.

TRANSFORMERS SHALL BE MOUNTED ON VIBRATION ISOLATORS FINAL CONDUIT CONNECTIONS TRANSFORMERS SHALL USE FLEXIBLE CONDUIT AS VIBRATION ISOLATION.

GROUNDING:

GENERAL: PROVIDE A COMPLETE GROUNDING SYSTEM AND SAFELY GROUND ALL SERVICE DISTRIBUTION EQUIPMENT AND RELATED METALLIC EQUIPMENT IN AN APPROVED MANNER AND AS REQUIRED BY THE NEC AND AS SHOWN ON THE DRAWINGS.

GROUNDING CONNECTIONS SHALL BE MADE WITH THE FOLLOWING TYPES OF CONNECTORS AS MANUFACTURED BY BURNDY, ILLSCO OR AN EQUIVALENT MANUFACTURER.

A. CABLE TO WATER PIPE	TYPE "GAR"
B. CABLE TO UFER SYSTEM	TYPE "GAR"
C. CABLE TO BOX OR CABINET	TYPE "QAB"

ALL GROUNDING CONDUCTORS SHALL BE RUN IN CONDUIT AND SHALL BE INSULATED AS SPECIFIED.

THE MAIN GROUNDING CONNECTIONS FOR THE SERVICE EQUIPMENT SHALL BE MADE TO THE UFER GROUNDING SYSTEM AND TO THE WATER MAIN OR NEAREST ACCESSIBLE WATER PIPE WITH CLAMP OR FITTINGS MADE OF COPPER BRONZE, OR OTHER SIMILAR NON-FERROUS MATERIAL.

RESISTANCE TO GROUND SHALL NOT EXCEED 25 OHMS AS MEASURED BY EITHER THE "FALL OF POTENTIAL" METHOD OR BY "DIRECT READING GROUND RESISTANCE."
CONNECTIONS TO THE WATER MAIN SHALL BE MADE ON THE "STREET SIDE" OF THE WATER METERS. IF THE CONNECTION IS MADE ON THE "BUILDING SIDE" OF THE METERS, SUITABLE COPPER JUMPERS OF FLEXIBLE, STRANDED INSULATED CABLE, BY-PASSING ALL METERS, SHALL BE PROVIDED AND INSTALLED, ALL IN ACCORDANCE WITH LOCAL CODE.

ALL GROUNDING CONDUCTORS SHALL BE PROTECTED FROM MECHANICAL INJURY AND SHALL BE RIGIDLY SUPPORTED. UNLESS OTHERWISE SHOWN, GROUND CONDUCTORS SHALL NOT BE RUN IN CONCRETE SLAB OR FILL UNLESS PROTECTED BY STEEL CONDUIT AND BOTH ENDS OF THE CONDUIT SHALL BE PROVIDED WITH A CODE-APPROVED TYPE OF SOLDERLESS CONNECTOR AND SHALL BE BOLTED OR CLAMPED TO EQUIPMENT OR CONDUIT. NO SOLDER CONNECTIONS ALLOWED.

GROUND ALL INTERIOR METALLIC WATER AND GAS PIPING PER REQUIREMENTS OF THE LOCAL AUTHORITIES.

PROVIDE A SEPARATE GREEN GROUND IN ALL CONDUIT.

LIFE SAFETY:

CONTRACTOR SHALL FURNISH AND INSTALL NEW LIFE SAFETY DEVICES IN THE AREAS OF WORK. ALL DEVICES ARE TO BE OF THE SAME MANUFACTURER UNLESS NOTED AS THE EXISTING BUILDING LIFE SAFETY SYSTEM AND FULLY APPROVED FOR INSTALLATION BY ALL AUTHORITIES. AT NO TIME SHALL THE CONTRACTOR DISCONNECT OR DISABLE ANY PART OF THE BUILDING LIFE SAFETY SYSTEM WITHOUT APPROVAL OF THE BUILDING LIFE SAFETY DIRECTOR. COORDINATE ALL REQUIRED WORK WITH THE BUILDING LIFE SAFETY DIRECTOR.

ALL FIRE ALARM RELATED BACK BOXES, JUNCTION BOXES, AND BLANK COVER PLATES SHALL BE PAINTED DARK RED IN COLOR FOR IDENTIFICATION.
ALL FIRE ALARM CONTROLS SHALL BE +48". CAC-24.

UTILITY:

ELECTRICAL CONTRACTOR SHALL COORDINATE ALL ELECTRICAL AND TELEPHONE SERVICES, EQUIPMENT LOCATIONS, ETC. WITH UTILITY COMPANIES PRIOR TO BID AND START OF WORK. INCLUDE ALL RELATED COSTS FOR THIS PROJECT AS PART OF BID PROPOSAL.

FIRE ALARM SYSTEM GENERAL NOTES

1. CONSULT WITH THE OAR AND/OR IOR BEFORE STARTING WORK.
2. ALL FIRE ALARM EQUIPMENT SHALL BE BRACED OR ANCHORED FOR SEISMIC RESTRAINT AS SHOWN ON DRAWINGS.
3. IT IS THE INTENT OF THESE DRAWINGS THAT THIS BE A COMPLETE FIRE ALARM JOB. ANY ERRORS OR OMISSIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER PRIOR TO BIDDING THE JOB.
4. REFER TO THE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS, EQUIPMENT AND MATERIALS APPROVED FOR USE IN THIS CONTRACT.
5. ALL FIRE ALARM EQUIPMENT, DEVICES, J. BOXES, RACEWAYS, ETC. EXPOSED TO WEATHER SHALL BE WEATHERPROOF.
6. ALL RACEWAYS, INCLUDING CONDUITS, WIREMOLDS, ETC., SHALL BE SIZED PER N.E.C. FOR THE NUMBER AND SIZE OF CONDUCTORS ENCLOSED IN A RACEWAY, U.N.O. (SEE "RACEWAY AND WIRE SCHEDULE" ON E3.0).
7. THE CONTRACTOR SHALL VISIT THE SITE OF THE WORK AND THOROUGHLY FAMILIARIZE HIMSELF WITH THE WORKING CONDITIONS AND THE EXACT NATURE AND EXTENT OF THE WORK TO BE DONE, TAKING INTO ACCOUNT ANY SPECIAL OR UNUSUAL FEATURES PECULIAR TO THIS JOB.
8. THE CONTRACTOR SHALL EXAMINE ALL CONTRACT PLANS AND EXISTING FIELD CONDITIONS IN ORDER TO LOGICALLY LOCATE WORK IN ACCORDANCE WITH EXISTING CABINETS, BEAMS, FURRING, DOOR SWINGS, DUCTS, PIPES AND CEILINGS. THE INSTALLATION OF EQUIPMENT, DEVICES, PULL BOXES, CONDUITS, ETC. UNDER THIS PROJECT SHALL COMPLY WITH ALL APPLICABLE ADA REQUIREMENTS. SPECIFICALLY, NEW EQUIPMENT OR DEVICES SHALL BE INSTALLED WITH THE BOTTOM AT 80"A.F.F. OR HIGHER, OR 27"A.F.F. OR LOWER. WHERE NEW EQUIPMENT OR DEVICES ARE INSTALLED BETWEEN 80" A.F.F. AND 27"A.F.F., THEY SHALL NOT OBSTRUCT THE PASSAGE WAY OR BECOME A SAFETY HAZARD. CONSULT THE ARCHITECT/ENGINEER AND/OR INSPECTOR FOR AN ALTERNATE LOCATION IF REQUIRED.
9. ALL INTERIOR AND EXTERIOR FIRE ALARM DEVICES SHOWN ON PLANS SHALL BE MOUNTED PER SPECIFICATIONS.
10. REFER TO VARIOUS SPECIFICATIONS FOR EXPOSED RACEWAYS, PULL BOXES, TERMINAL CABINETS, POWER SUPPLIES, HARDWARE AND OTHER TYPES OF FIRE ALARM EQUIPMENT THAT SHALL BE PAINTED TO MATCH THE SURFACES WHERE INSTALLED.
11. ALL FIRE ALARM MATERIALS, EQUIPMENT, DEVICES, BOXES, CONDUIT, WIRE, CABLE, ETC. USED ON THIS PROJECT SHALL BE NEW, UNLESS NOTED OTHERWISE.
12. RACEWAY INSTALLATION REQUIREMENTS:

    ALL RACEWAYS SHALL BE INSTALLED PER SPECIFICATION REQUIREMENTS.

13. WIRING INSTALLATION REQUIREMENTS:
    a. ALL WIRING, INCLUDING ELECTRICAL CONDUCTORS AND FIRE ALARM CABLES USED ON THIS PROJECT, REGARDLESS IF CONCEALED IN WALLS, CEILINGS, ATTICS, CRAWL SPACES, ETC. OR RUN EXPOSED, SHALL BE INSTALLED IN RACEWAYS. USE OF OPEN WIRING OF ANY KIND AND IN ANY LOCATION IS PROHIBITED - NO EXCEPTIONS.
    b. ALL FIRE ALARM SYSTEM RACEWAYS AND PULL BOXES SHALL BE DEDICATED TO FIRE ALARM WIRING ONLY, AND SHALL NOT BE USED FOR ANY OTHER WIRING. WHERE IT IS NOT POSSIBLE TO PROVIDE DEDICATED UNDERGROUND OR ABOVEGROUND PULL BOXES, OTHER SIGNAL, BUT NOT POWER, PULL BOXES MAY BE USED, HOWEVER, MEANS OF PHYSICAL AND ELECTRICAL SEPARATION OF FIRE ALARM WIRING FROM ALL OTHER WIRING SHALL BE PROVIDED.
    c. SPLICING OF FIRE ALARM SYSTEM WIRING IN JUNCTION BOXES, PULL BOXES, ETC., IS NOT ALLOWED. ALL TERMINATIONS SHALL BE MADE IN TERMINAL CABINETS ON TERMINAL BLOCKS OR ON FIRE ALARM EQUIPMENT OR DEVICE TERMINALS.
    d. ALL WIRING SHALL BE CUT FOR IN AND OUT. WIRING SHALL NOT BE LOOPED THROUGH DEVICES.
    e. T-TAPPING OF SLC LOOPS IS ONLY ALLOWED IN TERMINAL CABINETS, AND NOT ON DEVICE TERMINALS.
    f. POINT AND COMMON ANNUNCIATION ARE PROHIBITED.
14. SMOKE DETECTORS SHALL NOT BE INSTALLED WITHIN A 36-INCH HORIZONTAL PATH FROM THE SUPPLY OR RETURN REGISTERS OF A FORCED AIR HEATING OR COOLING SYSTEM AND SHALL BE INSTALLED OUTSIDE OF THE DIRECT AIRFLOW FROM THOSE REGISTERS.
15. HEAT DETECTORS INSTALLED ABOVE SUSPENDED CEILINGS SHALL HAVE THEIR LOCATIONS MARKED BELOW THE CEILING AND BE EASILY ACCESSIBLE.
16. THE ENTIRE FIRE ALARM WORK, INSTALLED UNDER THIS PROJECT, SHALL COMPLY WITH ALL APPLICABLE PROVISIONS OF NFPA 72, C.F.C., C.B.C. AND C.E.C, AS APPROVED BY DSA ON STAMPED DRAWINGS.
17. CHANGES TO THE APPROVED DRAWINGS AND SPECIFICATIONS SHALL BE MADE BY AN ADDENDA OR A CHANGE ORDER APPROVED BY THE DIVISION OF THE STATE ARCHITECT, AS REQUIRED BY SECTION 4-338, PART 1, TITLE 24, CCR.
18. A "DSA CERTIFIED" PROJECT INSPECTOR EMPLOYED BY THE DISTRICT (OWNER) AND APPROVED BY THE DIVISION OF THE STATE ARCHITECT SHALL PROVIDE CONTINUOUS INSPECTIONS OF THE WORK. THE DUTIES OF THE INSPECTOR ARE DEFINED IN SECTION 4-342, PART 1, TITLE 24, CCR.
19. FIRE ALARM DEVICES THAT HAVE END-OF-LINE RESISTORS INSTALLED IN THEM SHALL BE SO MARKED, INCLUDING AUDIBLE OR VISUAL LOOP NUMBER (EXAMPLE: "ELR-A1"), AND THIS MARKING SHALL BE DONE IN SUCH A MANNER THAT IT IS EASILY SEEN BY MAINTENANCE PERSONNEL.
20. "LABEL DESCRIPTIONS" INDICATING DEVICE TYPE AND LOCATION, THAT ARE DISPLAYED ON THE FIRE ALARM LCD DISPLAYS, SHALL BE CLEAR AND EASILY UNDERSTOOD BY THE OFFICE STAFF. DESCRIPTIONS SHALL BE BASED ON THE STAFF'S UNDERSTANDING OF THE SITE AND NOT ON INFORMATION TAKEN FROM DRAWINGS. VERIFY THIS INFORMATION WITH THE SCHOOL ADMINISTRATION PRIOR TO PROGRAMMING.
21. AFTER ALL FIRE ALARM EQUIPMENT AND DEVICES ARE INSTALLED, AND PROGRAMMING IS COMPLETED, THE FIRE ALARM DEVICE MAP IN THE SCHOOL MAIN OFFICE SHALL BE UPDATED TO INDICATE TO SCHOOL PERSONNEL THE LOCATION OF THE NEW DEVICES.

Know what's below. Call before you dig.

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CONSULTING ELECTRICAL ENGINEERS
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OJAI, CA 93023
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DALEFERRANTI@LIVE.COM

PERMIT SUBMITTAL

MARK	DATE	REVISIONS
1		
2		
3		

CHECK AND VERIFY ALL DIMENSIONS BEFORE PROCEEDING WITH THE WORK. REPORT DISCREPANCIES TO THE ARCHITECT. ALL CONSTRUCTION SHALL CONFORM TO THE C.B.C.

SITE IMPROVEMENTS FOR MODULAR CLASSROOM
ROOSEVELT ELEMENTARY SCHOOL
2324 VERDE STREET
FOR
BAKERSFIELD CITY SCHOOL DISTRICT
BAKERSFIELD, KERN COUNTY, CALIFORNIA, 93306

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LICENSED ARCHITECT STEPHEN J. CORBIN No.C-16788 REN. 01/30/17 STATE OF CALIFORNIA

STEPHEN J. CORBIN, NCARB, AIA, LEED AP BD+C

LICENSED PROFESSIONAL ENGINEER DALE FERRANTI E 17524 EXP. 6/30/2017 ELECTRICAL STATE OF CALIFORNIA

GENERAL ELECTRICAL SPECIFICATIONS, DETAILS

JOB NO.	
DRAWN : G.GARCIA	
CHECKED : D.FERRANTI	
DATE : 2/12/2016	

E1.1 OF SHEETS