

ELECTRICAL SPECIFICATIONS

1.1 GENERAL

- A. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2011 NATIONAL ELECTRICAL CODE. THIS SHALL BE THE MINIMUM REQUIREMENTS. WHEN THE PLANS IDENTIFY STRICTER REQUIREMENTS, PLANS SHALL GOVERN.
B. CONTRACTOR SHALL ENSURE THAT ALL WORK IS PROPERLY COORDINATED AND PERFORMED TO MEET THE NEC REQUIREMENTS OF "NEAT AND WORKMANLIKE" INSTALLATIONS.

1.2 DOCUMENTATION

- A. CONTRACTOR SHALL PROVIDE THE FOLLOWING DOCUMENTS AS SPECIFIED:
1. SUBMITTALS
B. ALL DATA FOR EACH DOCUMENT SHALL BE SUBMITTED TOGETHER AS A SINGLE PACKAGE.

1.3 REGULATORY REQUIREMENTS

- A. CONFORM TO APPLICABLE STATE BUILDING CODES AND LOCAL CODES APPLICABLE TO PROJECT SITE.
B. ELECTRICAL: CONFORM TO NFPA 70.
C. OBTAIN PERMITS, AND REQUEST INSPECTIONS FROM AUTHORITY HAVING JURISDICTION.
D. ALL ITEMS PROVIDED SHALL BE LISTED BY UNDERWRITER'S LABORATORY AND BE SO LABELED.

1.4 PROJECT/SITE CONDITIONS

- A. COORDINATE ALL ELECTRICAL WORK WITH OTHER TRADES TO PREVENT CONFLICTS. COORDINATE LOCATION OF ALL EQUIPMENT WITH OTHER TRADES AND SITE CONDITIONS TO ENSURE THAT NEC AND SPECIFIED CLEARANCES ARE PROVIDED. NOTIFY ENGINEER OF ANY CONFLICTS.

1.5 CONDUIT

- A. MINIMUM SIZE: 1/2 INCH.
B. ACCEPTABLE MANUFACTURERS OF CONDUIT PRODUCTS SPECIFIED HEREIN ARE AS FOLLOWS: ALLIED, TRIANGLE, WHEATLAND OR LTV. ACCEPTABLE MANUFACTURERS OF FITTINGS SHALL BE BY CONDUIT MANUFACTURERS OR APPLETON, STEEL CITY, REGAL, RACO OR O-Z/GEDNEY.
C. ALL CONDUIT SHALL BE ROUTED CONCEALED WHERE POSSIBLE.
D. ARRANGE SUPPORTS TO PREVENT MISALIGNMENT DURING WIRING INSTALLATION.
E. FASTEN CONDUIT SUPPORTS TO BUILDING STRUCTURE AND SURFACES UNDER PROVISIONS OF THESE SPECIFICATIONS.
F. ROUTE EXPOSED CONDUIT PARALLEL AND PERPENDICULAR TO WALLS.
G. CUT CONDUIT SQUARE USING SAW OR PIPE CUTTER; DEBURR CUT ENDS.
H. BRING CONDUIT TO SHOULDER OF FITTINGS; FASTEN SECURELY.
I. PROVIDE INSULATING BUSHINGS ON ALL METALLIC CONDUITS ENTERING WIREWAYS, PULLBOXES, CABINETS, PANELBOARDS, ETC.
J. GROUND AND BOND CONDUIT UNDER PROVISIONS OF THESE SPECIFICATIONS.

1.6 BUILDING WIRE AND CABLE

- A. ONLY PRODUCT OF DOMESTIC MANUFACTURER WILL BE ACCEPTED.
B. ACCEPTABLE MANUFACTURERS: ALLIED, AMERICAN INSULATED, CAROL, PIRELLI, ROME, SENATOR, SOUTHWIRE OR TRIANGLE.
C. CONDUCTOR: COPPER NO EXCEPTIONS. SOLID CONDUCTOR FOR 10 AWG AND SMALLER, STRANDED FOR 8 AWG AND LARGER. MINIMUM CONDUCTOR SIZE SHALL BE #12 AWG UNLESS OTHERWISE NOTED OR SPECIFIED.
D. INSULATION VOLTAGE RATING: 600 VOLTS.
E. INSULATION: ANSINFPFA 70; TYPE XHHW INSULATION FOR CIRCUITS 6AWG AND LARGER; TYPE THHN/THWN INSULATION FOR CIRCUITS 8 AWG AND SMALLER. AT THE CONTRACTOR'S OPTION, TYPE THHN/THWN INSULATION MAY BE UTILIZED THROUGHOUT FOR ALL FEEDERS AND BRANCH CIRCUITS.
F. VERIFY THAT MECHANICAL WORK LIKELY TO DAMAGE WIRE HAS BEEN COMPLETED.
G. COMPLETELY AND THOROUGHLY SWAB RACEWAY BEFORE INSTALLING WIRE.
H. INSTALL PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
I. USE CONDUCTOR NOT SMALLER THAN 12 AWG FOR POWER AND LIGHTING CIRCUITS.
J. PULL ALL CONDUCTORS INTO RACEWAY AT SAME TIME.
K. USE SUITABLE WIRE PULLING LUBRICANT FOR BUILDING WIRE 4 AWG AND LARGER.
L. NEATLY TRAIN AND LACE WIRING INSIDE BOXES, EQUIPMENT, AND PANELBOARDS USING THOMAS AND BETTS TY-RAPS OR EQUAL BY PANDUIT OR IDEAL.
M. CLEAN CONDUCTOR SURFACES BEFORE INSTALLING LUGS AND CONNECTORS
N. MAKE SPLICES, TAPS, AND TERMINATIONS TO CARRY FULL AMPACITY OF CONDUCTORS WITH NO PERCEPTIBLE TEMPERATURE RISE.
O. CONTRACTOR SHALL UTILIZE #12AWG CONDUCTORS.

1.7 BOXES

- A. SHEET METAL OUTLET BOXES: ANSINEMA OS 1, GALVANIZED STEEL.
B. LUMINAIRE AND EQUIPMENT SUPPORTING BOXES: RATED FOR WEIGHT OF EQUIPMENT SUPPORTED; INCLUDE 1/2 INCH MALE FIXTURE STUDS WHERE REQUIRED.
C. INSTALL ELECTRICAL BOXES AS SHOWN ON DRAWINGS, AND AS REQUIRED FOR SPLICES, TAPS, WIRE PULLING, EQUIPMENT CONNECTIONS AND COMPLIANCE WITH REGULATORY REQUIREMENTS.
D. MOUNTING HEIGHTS AS SPECIFIED SHALL BE TO THE BOTTOM OF THE OUTLET.
E. ALIGN ADJACENT WALL MOUNTED OUTLET BOXES FOR SWITCHES, THERMOSTATS, AND SIMILAR DEVICES WITH EACH OTHER.
F. ALL OUTLET BOXES AND RECESSED JUNCTION BOXES SHALL BE INSTALLED FLUSH WITH FINISHED WALL.
G. SUPPORT BOXES INDEPENDENTLY OF CONDUIT.
H. USE 4 INCH SQUARE BOX WITH PLASTER RING FOR SINGLE DEVICE OUTLET.
I. USE GANG BOX WHERE MORE THAN ONE LINE VOLTAGE DEVICE IS MOUNTED TOGETHER. DO NOT USE SECTIONAL BOX.

J. INSTALL KNOCKOUT CLOSURE IN UNUSED BOX OPENING.

1.8 WIRING DEVICES

- A. MANUFACTURERS: ARROW-HART, BRYANT, EAGLE, LEVITON, GENERAL ELECTRIC OR PASS AND SEYMOUR.
B. DESCRIPTION: NEMA WD 1, HEAVY-DUTY, SPECIFICATION GRADE, AC ONLY SNAP SWITCH, 120 VOLT, 20 AMPS.
C. DESCRIPTION: NEMA WD 1; HEAVY-DUTY SPECIFICATION GRADE RECEPTACLE. TYPE 5-20R; SINGLE OR DUPLEX AS INDICATED ON DRAWINGS.
D. GFCI RECEPTACLE: CONVENIENCE RECEPTACLE WITH INTEGRAL GROUND FAULT CIRCUIT INTERRUPTER TO MEET REGULATORY REQUIREMENTS.
E. VERIFY OUTLET BOXES ARE INSTALLED AT PROPER HEIGHT.
F. INSTALL DEVICES PLUMB AND LEVEL.
G. INSTALL SWITCHES WITH OFF POSITION DOWN.
H. INSTALL DUPLEX RECEPTACLES WITH GROUNDING POLE ON TOP.
I. CONNECT WIRING DEVICES BY WRAPPING SOLID CONDUCTOR AROUND SWITCH TERMINAL OR BY MEANS OF INTEGRAL SCREW TENSIONED CLAMP WHERE APPLICABLE. UNDER NO CIRCUMSTANCES IS "BACK WIRING" OF DEVICES BY A SPRING TENSION MEANS RECEPTACLE.
J. CONNECT WIRING DEVICE GROUNDING TERMINAL TO EQUIPMENT GROUNDING CONDUCTOR.
K. INSTALL WALL SWITCH 48 INCHES ABOVE FINISHED FLOOR.
L. INSTALL CONVENIENCE RECEPTACLE 18 INCHES ABOVE FINISHED FLOOR, UNLESS NOTED OTHERWISE.
1.9 GROUNDING AND BONDING
A. PROVIDE A SYSTEM GROUNDING CONDUCTOR IN ALL CONDUITS, NO EXCEPTIONS. CONNECT OUTLET BOXES TO GROUNDING CONDUCTOR(S) BY SCREW FASTENED BONDING JUMPER.
B. USE MINIMUM 6 AWG COPPER CONDUCTOR INSTALLED IN CONDUIT FOR COMMUNICATIONS SYSTEM GROUNDING CONDUCTOR. LEAVE 18 INCH FEET SLACK CONDUCTOR AT TERMINAL BOARD.
C. INTERIOR ELECTRICAL SYSTEM SHALL BE GROUNDED IN COMPLIANCE WITH ARTICLE 250 OF NEC.
1.10 SUPPORTING DEVICES
A. USE TOGGLE BRACKET, HOLLOW MASONRY, PLASTER, OR GYPSUM BOARD PARTITIONS AND WALLS; EXPANSION ANCHORS IN SOLID MASONRY WALLS; OR CONCRETE SURFACES; AND SHEET METAL SCREWS ON PLYWOOD BACKBOARDS.
DO NOT FASTEN SUPPORTS TO PIPING, DUCTWORK, MECHANICAL EQUIPMENT, OR CONDUIT.
C. DO NOT USE POWDER ACTUATED ANCHORS.
D. DO NOT DRILL STRUCTURAL STEEL MEMBERS, EXCEPT AS SPECIFICALLY NOTED.
1.11 ELECTRICAL IDENTIFICATION
A. FOR ALL PANELBOARDS, PROVIDE NEATLY TYPEWRITTEN DIRECTORY OF EACH DEVICE USAGE. LOCATE DIRECTORY INSIDE PANELBOARD DOOR. PROTECT DIRECTORY WITH CLEAR PLASTIC.

1.12 LED LIGHT FIXTURES

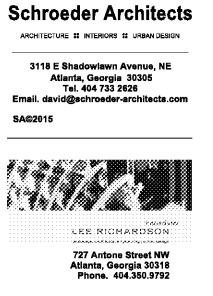
- A. GENERAL:
1. LED LIGHT FIXTURES SHALL BE IN ACCORDANCE WITH IES, NFPA, UL, AS SHOWN ON THE DRAWINGS, AND AS SPECIFIED.
2. LED LIGHT FIXTURES SHALL BE REDUCTION OF HAZARDOUS SUBSTANCES (RHSS)-COMPLIANT.
3. LED DRIVERS SHALL INCLUDE THE FOLLOWING FEATURES UNLESS OTHERWISE INDICATED:
a. MINIMUM EFFICIENCY: 85% AT FULL LOAD.
b. MINIMUM OPERATING AMBIENT TEMPERATURE: -20°C. (4°F.)
c. INPUT VOLTAGE: 120 - 277V (±10%) AT 60 HZ.
d. INTEGRAL SHORT CIRCUIT, OPEN CIRCUIT, AND OVERLOAD PROTECTION.
e. POWER FACTOR: ≥0.95
f. TOTAL HARMONIC DISTORTION: ≤5-20%.
g. COMPLY WITH FCC 47 CFR PART 15.
4. LED MODULES SHALL INCLUDE THE FOLLOWING FEATURES UNLESS OTHERWISE INDICATED:
a. COMPLY WITH IES LM-79 AND LM-80 REQUIREMENTS.
b. MINIMUM CRI 80 AND COLOR TEMPERATURE 4000+ K UNLESS OTHERWISE SPECIFIED IN LIGHTING FIXTURE SCHEDULE.
c. MINIMUM RATED LIFE: 50,000 HOURS PER IES L70.
d. LIGHT OUTPUT LUMENS AS INDICATED IN THE LIGHTING FIXTURE SCHEDULE.
e. LED DOWNLIGHTS: HOUSING, LED DRIVER, AND LED MODULE SHALL BE PRODUCTS OF THE SAME MANUFACTURER.
f. LED TROFFERS:
1. LED DRIVERS, MODULES, AND REFLECTOR SHALL BE ACCESSIBLE, SERVICEABLE, AND REPLACEABLE FROM BELOW THE CEILING.
2. HOUSING, LED DRIVER, AND LED MODULE SHALL BE PRODUCTS OF THE SAME MANUFACTURER.
D. EGRESS FIXTURES SHALL HAVE FACTORY INSTALLED BATTERY.
E. GRID TROFFERS SHALL BE INDEPENDENT SUPPORTS OF CEILING GRID SYSTEM. PROVIDE HANGER WIRE FROM STRUCTURE TO EACH CORNER OF FIXTURE TO SECURE FIXTURE TO BUILDING STRUCTURE.
F. FIXTURE WHIPS: MANUFACTURER'S FIXTURE WHIPS MUST BE PROVIDED WITH THREADED FITTING ON EACH END. SNAP-IN TWIST-IN FITTINGS ARE NOT PERMITTED.
G. LOCATE RECESSED CEILING LUMINAIRES AS INDICATED ON REFLECTED CEILING PLAN.
H. INSTALL SURFACE MOUNTED LUMINAIRES PLUMB AND ADJUST TO ALIGN WITH BUILDING LINES AND WITH EACH OTHER. SUPPORT FROM STRUCTURE. ALL FIXTURES AND EXIT SIGNS SHALL BE RIGIDLY SUPPORTED TO PREVENT MOVEMENT.
I. ALL RECESSED LUMINAIRES SHALL PERMIT REMOVAL FROM BELOW.
J. INSTALL WALL MOUNTED LUMINAIRES AT HEIGHT SPECIFIED.
K. INSTALL ACCESSORIES FURNISHED WITH EACH LUMINAIRE.
L. CONCEAL CEILING MOUNTED FIXTURE TO CONCEAL BRANCH CIRCUIT OUTLETS.
M. CEILING MOUNTED FIXTURE WHIPS: MAXIMUM 6 FEET IN LENGTH.
N. MAKE WIRING CONNECTIONS TO BRANCH CIRCUIT USING BUILDING WIRE WITH INSULATION SUITABLE FOR TEMPERATURE CONDITIONS WITHIN LUMINAIRE.
O. BOND PRODUCTS AND METAL ACCESSORIES TO BRANCH CIRCUIT EQUIPMENT GROUNDING CONDUCTOR.
P. INSTALL SPECIFIED LAMPS IN EACH LUMINAIRE.
Q. PROVIDE INSULATED BUSHING OR GROMMET IN ALL FIXTURE OPENINGS WHERE CONDUITORS PASS THROUGH.
R. OPERATE EACH LUMINAIRE AFTER INSTALLATION AND CONNECTION. INSPECT FOR PROPER CONNECTION AND OPERATION. CLEAN FINISHES AND TOUCH UP DAMAGE.

1.13 PANELBOARDS

- A. PANELBOARDS: NEMA PB1 CIRCUIT BREAKER TYPE, ACCEPTABLE MANUFACTURERS: GENERAL ELECTRIC, CUTLER HAMMER/WESTINGHOUSE, SIEMENS OR SQUARE D.
B. ENCLOSURE: NEMA TYPE 1 OR AS INDICATED ON PLANS.
C. PROVIDE FLUSH OR SURFACE CABINET FRONT AS SCHEDULED WITH SCREW COVER AND HINGED DOOR WITH FLUSH LOCK ALL KEYED ALIKE. FINISH IN MANUFACTURER'S STANDARD GRAY ENAMEL.
D. PROVIDE PANELBOARDS WITH 100 PERCENT COPPER BUS. RATINGS OF ALL PANELBOARDS SHALL BE AS SPECIFIED AND/OR SCHEDULED ON DRAWINGS. PROVIDE WITH 100 PERCENT CAPACITY NEUTRAL. PROVIDE GROUNDING BUS IN ALL PANELBOARDS.
E. MINIMUM INTEGRAL SHORT CIRCUIT RATING: 10,000 AMPERES RMS SYMMETRICAL FOR 240 VOLT PANELBOARDS; UNLESS NOTED OTHERWISE ON DRAWINGS. SERIES RATING WITH UPSTREAM BREAKERS FOR HIGHER FAULT CURRENT SHALL BE OBSERVED WHERE NOTED ON PLANS.
F. MOLDED CASE CIRCUIT BREAKERS: NEMA AB 1; BOLT-ON TYPE THERMAL MAGNETIC TRIP CIRCUIT BREAKERS, WITH COMMON TRIP HANDLE FOR ALL POLES. CIRCUIT BREAKERS SHALL BE LISTED AS SUITABLE FOR USE WITH 75 C CONDUCTOR.
G. INSTALL PANELBOARDS PLUMB IN CONFORMANCE WITH NEMA PB 1.1. TOP OF PANEL HEIGHT: 6 FT. - 6 IN.
H. PROVIDE FILLER PLATES FOR UNUSED SPACES IN PANELBOARDS.
I. PROVIDE NAMEPLATE AND TYPED CIRCUIT DIRECTORY IN ACCORDANCE FOR EACH PANELBOARD. REVISE DIRECTORY TO REFLECT CIRCUITING CHANGES REQUIRED TO BALANCE PHASE LOADS.
K. VISUAL AND MECHANICAL INSPECTION: INSPECT FOR PHYSICAL DAMAGE, PROPER ALIGNMENT, ANCHORAGE, AND GROUNDING. CHECK PROPER INSTALLATION AND TIGHTNESS OF CONNECTIONS FOR CIRCUIT BREAKERS, AND LUGS.
L. FEEDER AND BRANCH CIRCUIT OVERCURRENT PROTECTIVE DEVICES 250 AMPS AND HIGHER SHALL BE 100 PERCENT CONTINUOUS LOAD RATED DEVICES.

Original Plans

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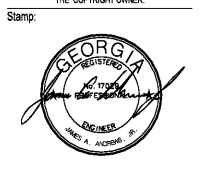


Table with columns: Rev., Description, Date. Row 1: Issued For Permit, 03/01/2018

Sheet Title: ELECTRICAL SPECIFICATIONS

Sheet Number: E701