

ELECTRICAL SPECIFICATIONS – NOT ALL MAY BE USED

SYMBOLS LEGEND

- SECTION 1 – GENERAL SPECIFICATIONS AND WARRANTY
  - ELECTRICAL CONTRACTOR SHALL TAKE RESPONSIBILITY FOR A COMPLETE ELECTRICAL SYSTEM THAT MEETS THE INTENT OF THESE CONSTRUCTION DOCUMENTS, NOTES, AND SPECIFICATIONS.
  - ELECTRICAL DRAWINGS ARE SCHEMATIC IN NATURE. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE A COMPLETE, OPERATIONAL, AND FUNCTIONAL SYSTEM, ANY AND ALL DEVICES, MATERIALS, AND LABOR SHALL BE INCLUDED IN INITIAL BID.
  - BEFORE PROCEEDING WITH ELECTRICAL CONTRACTOR SHALL CONDUCT ON-SITE FIELD INVESTIGATION TO BECOME FAMILIAR WITH EXISTING SITE CONDITIONS. THERE WILL BE NO ALLOWANCES MADE FOR FAILURE TO COMPLY.
  - ALL ELECTRICAL INSTALLATIONS SHALL COMPLY WITH THE CURRENT ADOPTED NATIONAL ELECTRIC CODE (NEC), INTERNATIONAL BUILDING CODE (IBC), INTERNATIONAL ENERGY CONSERVATION CODE (IECC), ANY LOCAL AND STATE ADOPTED CODES AND ORDINANCES, AND LOCAL UTILITY COMPANY REQUIREMENTS.
  - IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO OBTAIN CLARIFICATION ON ANY CONFLICT IN THE CONSTRUCTION DOCUMENTS, ELECTRICAL SPECIFICATIONS, OR DESIGN PRIOR TO HIS BID. THIS CLARIFICATION SHALL BE MADE IN THE FORM OF A WRITTEN R.F.I. ANY INTERPRETATIONS MADE BY THE CONTRACTOR NOT CLARIFIED IN WRITING SHALL BE HIS OR HER RESPONSIBILITY TO CORRECT (AT HIS COST) TO MEET THE INTENT OF THE CONSTRUCTION DOCUMENTS.
  - THE MATERIALS AND WORKMANSHIP MUST COMPLY WITH THE CURRENT ADOPTED LOCAL CODES (NFPA, NEC, IBC, ADA, EPA, IECC, UTILITY COMPANY REQUIREMENTS, AND ANY AND ALL STATE AND LOCAL ADOPTED CODES).
  - ELECTRICAL CONTRACTOR SHALL OBTAIN A FULL SET OF CONSTRUCTION DOCUMENTS AND COORDINATE WITH ALL TRADES INCLUDING BUT NOT LIMITED TO, ARCHITECTURAL, CIVIL, MECHANICAL, PLUMBING, STRUCTURAL, AND ELECTRICAL. FIRE ALARM AND EQUIPMENT VENDOR, NO PROVISIONS WILL BE MADE FOR FAILURE TO COMPLY.
  - THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY EXACT LOCATION OF ALL DEVICES AND LIGHT FIXTURES WITH OWNER/ARCHITECT PRIOR TO ROUGH-IN. ANY CONFLICTS SHALL BE PROVIDED IN WRITING TO THE ENGINEER.
  - IT IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO CONTACT SERVING ELECTRICAL UTILITY COMPANY WITHIN FIVE (5) BUSINESS DAYS OF BEING AWARDED A CONTRACT. ELECTRICAL CONTRACTOR SHALL PROVIDE THE SERVING UTILITY COMPANY WITH A COMPLETE SET OF ELECTRICAL CONSTRUCTION DOCUMENTS INCLUDING (BUT NOT LIMITED TO) AN ELECTRICAL SITE PLAN, ONE-LINE DIAGRAM, PANEL SCHEDULES, AND "SES" LOAD SUMMARY.
  - THE ELECTRICAL CONTRACTOR SHALL TAKE RESPONSIBILITY FOR ANY EQUIPMENT HE SUPPLIES. ALL EQUIPMENT SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS. THE ELECTRICAL CONTRACTOR SHALL, AT HIS COST, CORRECT ANY FAILURE TO COMPLY.
  - ANY DEVIATION FROM THE ELECTRICAL CONSTRUCTION DOCUMENTS SHALL BE APPROVED IN WRITING IN THE FORM OF AN R.F.I.
  - THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PERMITS AND VARIANCES NEEDED TO COMPLETE HIS SCOPE OF WORK.
- SECTION 2 – REMODELS AND TENANT IMPROVEMENTS
  - ELECTRICAL CONTRACTOR SHALL VERIFY THE EXACT SCOPE OF REMODEL PRIOR TO THE START OF WORK. ELECTRICAL CONTRACTOR SHALL PROTECT ALL EXISTING POWER AND LIGHTING THAT IS TO REMAIN AND KEEP ENERGIZED DURING CONSTRUCTION.
  - ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING A SAFE AND HAZARD FREE WORK ZONE. CONTRACTOR SHALL REMOVE ALL DEMOLISHED EQUIPMENT AT THE END OF EACH DAY TO MINIMIZE HAZARDS AND TO MAINTAIN A CLEAN WORK ENVIRONMENT.
  - THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR:
  - VERIFY SERVICE ENTRANCE STRUCTURE BONDING AND GROUNDING AND BRING INTO COMPLIANCE IF FOUND TO NOT MEET NEC CODE REQUIREMENTS.
  - VERIFY ALL FEEDER SIZES AND BRING INTO COMPLIANCE IF FOUND TO NOT MEET NEC CODE REQUIREMENTS.
  - 25.A. ALL ELECTRICAL DISTRIBUTION EQUIPMENT (SWITCHBOARDS, DISTRIBUTION PANELBOARDS, AND TRANSFORMERS) IN THIS SCOPE OF WORK SHALL BE INSPECTED TO ENSURE PROPER WORKING ORDER. ALL EQUIPMENT SHALL BE CLEANED AND HAVE LUGS RE-TORQUED.
  - 25.B. ANY LIGHT FIXTURE THAT IS TO REMAIN OR BE RE-USED IN THIS SCOPE OF WORK SHALL BE CLEANED AND RE-LAMPED.
  - 25.C. ALL LIGHT FIXTURES WITH EMERGENCY FEATURES SHALL BE INSPECTED AND TESTED. ANY FIXTURE FOUND TO BE DAMAGED SHALL BE REPAIRED OR REPLACED AS REQUIRED. THE SAME SHALL BE RE-TESTED AFTER REPAIR.
  - THE ELECTRICAL CONTRACTOR SHALL REPORT ALL DISCREPANCIES AND NON-COMPLIANT ITEMS TO THE OWNER AND ENGINEER IN WRITING.
  - ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR RELOCATING ANY JUNCTION BOXES LOCATED ABOVE NEW HARD LID CEILING.
- SECTION 3 – ELECTRICAL DEMOLITION
  - ELECTRICAL CONTRACTOR SHALL VERIFY THE EXACT SCOPE OF DEMOLITION PRIOR TO THE START OF WORK. ELECTRICAL CONTRACTOR SHALL PROTECT ALL EXISTING POWER AND LIGHTING THAT IS TO REMAIN AND KEEP ENERGIZED DURING CONSTRUCTION.
  - ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING A SAFE AND HAZARD FREE WORK ZONE. CONTRACTOR SHALL REMOVE ALL DEMOLISHED EQUIPMENT AT THE END OF EACH DAY TO MINIMIZE HAZARDS AND TO MAINTAIN A CLEAN WORK ENVIRONMENT.
  - ANY DEMOLISHED CIRCUITS SHALL BE REMOVED COMPLETELY INCLUDING BUT NOT LIMITED TO CONDUIT, WIRE, SUPPORT STRUCTURES, FASTENERS, AND JUNCTION BOXES. ALL REMOVED CIRCUITS SHALL BE RE-LABELED IN PANELBOARDS OR LOAD CENTERS AS "SPARE" TRUNK.
  - ELECTRICAL CONTRACTOR SHALL TRACE AN UN-WARNED BRANCH CIRCUIT AND PROVIDE A NEW, TYPED PANEL SCHEDULE DIRECTORY THAT CLEARLY IDENTIFIES ALL BRANCH CIRCUITS.
  - EXISTING ELECTRICAL EQUIPMENT THAT INTERFERES WITH CURRENT SCOPE OF WORK SHALL BE PROTECTED OR REMOVED AND RE-INSTALLED UPON PROJECT COMPLETION. SUCH REMOVAL, DISCONNECTION, RELOCATION AND RE-INSTALLATION SHALL BE INCLUDED IN ELECTRICAL CONTRACTOR'S ORIGINAL BID. FAILURE TO COMPLY SHALL NOT RESULT IN ADDED COST TO THE OWNER.
  - ANY DISTRIBUTION BOARDS, PANEL BOARDS, OR LOAD CENTERS AFFECTED UNDER THIS SCOPE SHALL HAVE THE LOADS OF EACH CIRCUIT AFFECTED AND FEEDERS TESTED TO VERIFY THEY DO NOT EXCEED BOX OF THEIR STATED RATING. ANY DAMAGED CIRCUIT BREAKER OR FEEDERS SHALL BE REPLACED WITH NEW UNDER THIS SCOPE OF CONSTRUCTION.
  - ALL EXISTING EQUIPMENT AND INSTALLATIONS SHALL BE VERIFIED TO BE IN COMPLIANCE WITH EXISTING CODES AND ORDINANCES. ALL NON-COMPLIANT INSTALLATIONS SHALL BE BROUGHT UP TO COMPLIANCE WITH EXISTING CODES.
  - ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR EXTENDING ANY CONDUIT THAT RUNS THROUGH, OR IS STUBBED UP IN, A DEMOLISHED WALL.
- SECTION 4 – MEANS, METHODS, AND MATERIALS
  - ALL RECEPTABLES LOCATED WITHIN SIX FEET OF WATER OR A SINK SHALL BE PROTECTED BY EITHER A GFCI TYPE RECEPTABLE OR GFCI TYPE CIRCUIT BREAKER IN PANELBOARDS.
  - ALL EMT, "SEALTHIGHT", RIGID NON-METALLIC CONDUIT, FLEXIBLE METALLIC CONDUIT, FLEXIBLE NON-METALLIC CONDUIT, AND ANY OTHER CONDUIT THAT DOES NOT CONTAIN A GROUND WIRE SHALL HAVE A GROUND WIRE SIZED PER NEC INCLUSIVE AS PART OF BRANCH CIRCUIT.
  - ALL EQUIPMENT AND MATERIALS SHALL BE A STANDARD PRODUCT MADE BY A REPUTABLE MANUFACTURER. INSTALL ALL EQUIPMENT AS RECOMMENDED BY MANUFACTURER SPECIFICATIONS.
  - ALL WIRING DEVICES SHALL BE SPEC GRADE BY PASS & SEYMOUR, HUBBELL, OR LEVITON. ALL WIRING DEVICES SHALL BE RATED AT 20 AMPS OR GREATER. WIRING DEVICES SHALL BE WHITE.
  - CONTRACTOR SHALL VERIFY EXACT LOCATION OF ALL DEVICES AND LIGHT FIXTURES WITH OWNER/ARCHITECT PRIOR TO ORDERING.
  - ELECTRICAL CONTRACTOR SHALL PROVIDE PERMANENT MARKING ON COVERPLATE INDICATING PANEL AND CIRCUIT NUMBER. COVERPLATES SHALL BE WHITE FOR OFFICE APPLICATIONS AND STAINLESS STEEL IN WAREHOUSE/INDUSTRIAL/MANUFACTURING AREAS. CONTRACTOR SHALL VERIFY EXACT FINISH WITH ARCHITECT PRIOR TO ORDERING.
  - ELECTRICAL CONTRACTOR MAY USE ELECTRICAL TUBING ("EMT") WHERE ACCEPTABLE BY THE NEC. EMT SHALL NOT BE USED WHERE INSTALLATION IS SUBJECT TO PHYSICAL DAMAGE. MINIMUM ACCEPTABLE SIZE FOR BRANCH CIRCUITS IS 1/2" AND HOMERUNS IS 1/2".
  - ALL EMT FITTINGS SHALL BE COMPRESSION TYPE. SET-SCREW FITTINGS SHALL ONLY BE ACCEPTED WITH WRITTEN APPROVAL FROM OWNER AND ENGINEER.
  - ALL CONDUCTORS SHALL BE COPPER AND RATED FOR 90°C. THE MINIMUM LINE VOLTAGE CONDUCTOR SIZE SHALL BE #12 AWG COPPER. ALL CONDUCTORS #6 AND SMALLER SHALL HAVE THIN OR THINW INSULATION. ALL CONDUCTORS #4 AWG AND LARGER SHALL HAVE XHHW OR XHHW-2 TYPE INSULATION. ALL CONDUCTOR INSULATION SHALL BE RATED FOR 90 DEGREES. ANY 120V BRANCH CIRCUIT OVER 100'-0" SHALL HAVE #10 AWG MINIMUM AND 277V BRANCH CIRCUITS OVER 200'-0" SHALL HAVE #10 AWG MINIMUM.
  - BRANCH CIRCUITS CONTAINING TWO (2) OR MORE CURRENT CARRYING CONDUCTORS SHALL HAVE DEDICATED NEUTRALS.
  - ALL CONDUITS SHALL BE INSTALLED IN A NEAT AND ORGANIZED MANNER. CONDUITS SHALL BE RUN PARALLEL AND PERPENDICULAR TO BUILDING LINE. CONDUIT SHALL NOT BE RUN ON EXTERIOR FACES OF THE BUILDING.
  - ALL CONDUIT SUPPORT SHALL BE INSTALLED ON THE STRUCTURE OF THE BUILDING BY WAY OF UN-SUPPORTED OR EQUAL UL LISTED PRODUCT. CONDUIT SHALL NOT BE SUPPORTED BY CEILING GRID SYSTEM, TRAY WIRING, OR ANY OTHER SUPPORTING SYSTEM. ALL INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE AND ALL APPLICABLE LOCAL CODES.
  - FLEXIBLE METAL CONDUIT SHALL BE USED TO CONNECT EQUIPMENT THAT MAY VIBRATE. MAXIMUM LENGTH SHALL BE 6'-0". SUCH INSTALLATIONS MADE OUTDOORS SHALL UTILIZE SLEIGHT TIGHT.
  - MC CABLE MAY BE USED FOR CONCEALED BRANCH CIRCUITS ONLY. MC CABLE MAY NOT BE USED FOR EXPOSED BRANCH CIRCUITS, HOME RUNS, MEDICAL APPLICATIONS, OR EXTERIOR INSTALLATIONS. CONCEALED BRANCH CIRCUITS ONLY. MC CABLE MAY BE USED FOR MEDICAL CONCEALED BRANCH CIRCUITS ONLY. MC CABLE SHALL NOT BE USED FOR EXPOSED BRANCH CIRCUITS, HOME RUNS, OR EXTERIOR INSTALLATIONS. THE USE OF MC CABLE MUST BE ACCEPTED BY OWNER/TEENANT/LANDOWNER IN WRITING PRIOR TO USE.
  - ALL NEW FEEDERS SHALL BE CONTINUOUS. ANY SPICE IN A NEW CONDUCTOR REQUIRES WRITTEN APPROVAL BY ENGINEER.
  - ALL FEEDERS SHALL HAVE CONTINUOUS COLORED INSULATION.
  - ALL FEEDER CONNECTIONS AND SPICES SHALL BE EXTENDED WELDS – NO EXCEPTIONS.
  - ALL CABLES INSTALLED IN A PLENUM CEILING SHALL BE PLENUM RATED ACCORDING TO THE ADOPTED NEC ARTICLE "WIRING METHODS."
  - ALL NON-METALLIC CONDUIT (PVC – MINIMUM OF SCHEDULE 40) SHALL BE INSTALLED A MINIMUM OF 24" BELOW GROUND OR SLAB. PVC MAY ONLY BE USED UNDERGROUND, IN CONCRETE, OR IN MASONRY WALLS. ALL CONDUIT INSTALLED UNDERGROUND SHALL CONTAIN A METALLIC TRACER WIRE. THE METALLIC TRACER WIRE SHALL BE A MINIMUM OF #10 AWG COPPER. IT IS RECOMMENDED THE TRACER WIRE BE SECURED TO THE TOP OF THE CONDUIT AT 6'-0" ON CENTER.
  - ALL CONDUCTORS #10 AND SMALLER SHALL BE SOLID COPPER. ALL CONDUCTORS #8 AND LARGER SHALL BE STRANDED COPPER.
  - ANY ANY MATERIAL USED IN THE CONSTRUCTION SHALL BE LISTED IN THE CONSTRUCTION DOCUMENTS.
  - ALL CONDUCTORS SHALL BE LABELED AT TERMINATION POINTS WITH PANEL AND CIRCUIT NUMBER THAT FEEDS EACH CONDUCTOR.
  - CONDUCTOR COLOR CODING:
    - \*ALL ISOLATED GROUNDING CONDUCTORS (G) SHALL BE GREEN
    - \*ALL ISOLATED GROUNDING CONDUCTORS (L) SHALL BE GREEN WITH YELLOW STRIP
    - 4.22.A. 120V, 2-WIRE, UNGROUNDED LEG-BLACK; GROUNDED NEUTRAL-WHITE
    - 4.22.A. 120V/240V, 3-WIRE, 1-PHASE: PHASE A-BLACK; PHASE B-RED; GROUNDED NEUTRAL-WHITE
    - 4.22.B. 240V DELTA, 3-WIRE, 3-PHASE: PHASE A-BROWN; PHASE B-RED; PHASE C-BLUE
    - 4.22.C. 120V/240V, 4-WIRE, 3-PHASE HIGH-LEG DELTA: PHASE A-BLACK; PHASE B-BLUE; HIGH LEG (208V) IN NEUTRAL-ORANGE; GROUNDED NEUTRAL-WHITE
    - 4.22.D. 208V/120V, 4-WIRE, 3-PHASE: PHASE A-BLACK; PHASE B-RED; PHASE C-BLUE; GROUNDED NEUTRAL-WHITE
    - 4.22.E. 480V DELTA, 3-WIRE, 3-PHASE: PHASE A-BROWN; PHASE B-ORANGE; PHASE C-YELLOW
    - 4.22.F. 480V/277V, 4-WIRE, 3-PHASE: PHASE A-BROWN; PHASE B-ORANGE; PHASE C-YELLOW; GROUNDED NEUTRAL-GRAY
  - ALL JUNCTION BOXES SHALL BE LOCATED IN ACCESSIBLE LOCATIONS. BOXES SHALL NOT BE LOCATED ABOVE HARD LID CEILING.
- SECTION 5 – ELECTRICAL SUBMITTALS, AS-BUILTS AND WARRANTIES
  - ELECTRICAL CONTRACTOR SHALL SUBMIT A COMPLETE ELECTRICAL SUBMITTAL TO ELECTRICAL CONTRACTOR FOR REVIEW AND APPROVAL PRIOR TO ORDERING ANY EQUIPMENT. SUBMITTAL SHALL INCLUDE ANY NEW SWITCHBOARDS, DISTRIBUTION PANEL BOARDS, CIRCUIT BREAKERS, LIGHT FIXTURE, LIGHT POLES, LIGHTING CONTROLS, FIRE ALARM EQUIPMENT, STARTERS, DISCONNECT SWITCHES, INTERNALLY MOUNTED AND EXTERIOR MOUNTED SPD'S, AND HVAC EQUIPMENT.
  - SUBMITTAL MAY BE EMAILED AS A .PDF DOCUMENT OR DELIVERED AS A HARD COPY. IF HARD COPIES ARE REQUIRED; (1) ONE TO MARK-UP AND RETURN AND (1) ONE TO KEEP FOR ENGINEER'S RECORDS.
  - ALL SUBMITTALS AND/OR SHOP DRAWINGS SHALL INCLUDE COMPLETE DIMENSIONS FOR REFERENCE.
  - THE CONTRACTOR SHALL PROVIDE (2) TWO SETS OF MANUFACTURE AND SUPPLIER WARRANTIES, OPERATIONS MANUALS, AND ALL OTHER MATERIAL TO OWNER/TENANT WITHIN TWO WEEKS OF FINAL CERTIFICATE OF OCCUPANCY.
  - THE ELECTRICAL CONTRACTOR SHALL PROVIDE A COMPLETE, ACCURATE, AND FINAL AS-BUILT TO THE ENGINEER AND OWNER WITHIN 2 WEEKS OF PROJECT COMPLETION. AS-BUILDING BY THE ENGINEER WILL BE BILLED A STANDARD HOURLY RATE.
  - THE ELECTRICAL CONTRACTOR SHALL TRANSFER ALL MANUFACTURE WARRANTIES TO OWNER/TENANT AT COMPLETION OF PROJECT. THIS SHALL INCLUDE ALL WRITTEN DOCUMENTATION FURNISHED BY SUPPLIER/MANUFACTURER.
  - THE OWNER/TENANT RESERVES THE RIGHT TO REQUIRE THE CONTRACTOR TO REMOVE AND REPLACE (AT HIS COST) ANY EQUIPMENT OR INSTALLATIONS THAT DO NOT MEET THESE ELECTRICAL SPECIFICATIONS OR ELECTRICAL CONSTRUCTION DOCUMENTS.
  - THE ELECTRICAL CONTRACTOR SHALL PROVIDE A MINIMUM OF TWO YEAR WARRANTY ON ALL WORK PERFORMED BY THE CONTRACTOR. THIS INCLUDES ALL MATERIAL AND EQUIPMENT FURNISHED AND LABELED BY ANY ITEM THAT FAILS OR IS FOUND TO HAVE A DEFECT SHALL BE REPAIRED OR REPLACED, AT THE CONTRACTORS, EXPENSE WITHIN WARRANTY PERIOD.
- SECTION 6 – SERVICE ENTRANCE SECTION
  - ALL NEW SERVICE EQUIPMENT SHALL BE INSTALLED SUCH THAT IT MEETS ALL CLEARANCE REQUIREMENTS STATED IN NEC ARTICLE 110.
  - ALL SERVICE EQUIPMENT REQUIRING SPECIAL INSPECTIONS AND/OR OBSERVATIONS SHALL BE COORDINATED WITH DESIGN ENGINEER, A.H.J. AND SERVING UTILITY COMPANY. QUALIFIED 3RD PARTY SHALL CONDUCT HI-POI TEST AND PROVIDE WRITTEN RESULTS TO ENGINEER. SEE ADDITIONAL INFORMATION IN ELECTRICAL SPECIFICATION SECTION 8.
  - ELECTRICAL ENGINEER SHALL BE NOTIFIED UPON COMPLETION OF INSTALLATION OF ANY NEW OR RENOVATED ELECTRICAL DISTRIBUTION SYSTEM. ELECTRICAL ENGINEER SHALL HAVE OPPORTUNITY TO INSPECT INSTALLED SYSTEM PRIOR TO ENERGIZING SYSTEM REGARDLESS IF SPECIAL INSPECTION IS REQUIRED.
  - ALL ELECTRICAL EQUIPMENT RATED 1000 AMPERES OR GREATER SHALL BE TESTED IN COMPLIANCE WITH UL 869 OR 891. THESE TESTS SHALL BE PERFORMED BY QUALIFIED TESTING AGENCY AND RESULTS APPROVED BY BUILDING OFFICIAL.
  - ALL GROUND FAULT SETTINGS SHALL BE SET PER MANUFACTURER'S RECOMMENDATIONS AS STATED IN COORDINATION STUDY.
  - ELECTRICAL CONTRACTOR SHALL PROVIDE A COMPLETE SET OF SUBMITTALS TO ENGINEER TO REVIEW PRIOR TO ORDERING ANY EQUIPMENT. SUBMITTALS SHALL ALSO BE PROVIDED TO SERVING UTILITY COMPANY FOR APPROVAL PRIOR TO ORDERING ANY EQUIPMENT.
  - ACCEPTABLE MANUFACTURERS FOR SWITCHGEAR SHALL BE SIEMENS, SQUARE D, EATON-OUTLER HAMMER, GENERAL ELECTRIC (GE), SUN VALLEY (AS SPECIFIED ON CONSTRUCTION DOCUMENTS), AND MYERS POWER SYSTEMS (FOR SITE PEDESTAL SERVICES AS SPECIFIED IN DOCUMENTS).
  - ALL NEW SWITCHGEAR SHALL HAVE COPPER BUSSING (SILVER PLATED), HAVE ULL, LABEL, AND FULL SIZED BUSSING (HORIZONTAL AND VERTICAL), TAPERED BUSSING NOT PERMITTED.
  - ALL ELECTRICAL METERED SECTIONS AND UTILITY COMPLAINT FULL SECTIONS SHALL BE BARRED FROM ALL OTHER WORK. FINAL APPROVAL OF ALL SWITCH GEAR SHALL BE MADE BY A.H.J. AND/OR SERVING UTILITY COMPANY.
  - ALL SWITCH GEAR 480V LINE TO LINE WITH SWITCHES AND/OR CIRCUIT BREAKERS 1000 AMPERS AND GREATER SHALL HAVE A GROUND FAULT PROTECTION. ALL GROUND FAULT PROTECTED SYSTEMS SHALL BE PROVIDED WITH AUDIBLE AND VISIBLE ALARM AND AUTOMATIC DIALER.
  - ALL SERVICE ENCLOSURES SHALL MEET ALL ULL REQUIREMENTS AND SERVING UTILITY REQUIREMENTS. THERE SHALL BE A PHYSICAL BARRIER BETWEEN SECTIONS, LINE AND LOAD. ALL SWITCHGEAR SHALL BE ULL LISTED FOR FRONT ACCESS ONLY.
  - NO COVERS SHALL BE MORE THAN 1/2" OF THE TOTAL HEIGHT OF THE SWITCHGEAR. THE HEIGHT AND DEPTH OF ALL SWITCHGEAR SECTIONS SHALL BE CONSISTENT.
  - CONTRACTOR SHALL PROVIDE A CONCRETE HOUSEKEEPING PAD AT ALL FREE STANDING ELECTRICAL SWITCHGEAR. COORDINATE EXACT REQUIREMENTS AND SIZE WITH SERVING UTILITY COMPANY.
  - ELECTRICAL CONTRACTOR SHALL ENSURE ALL CIRCUIT BREAKERS RATED 1200AMPS AND LARGER ARE PROVIDED WITH ARC ENERGY REDUCTION "REL", PER NEC 240.87.
  - ELECTRICAL CONTRACTOR SHALL ENSURE ALL FUSES RATE 1200AMPS AND LARGER ARE PROVIDED WITH ARC ENERGY REDUCTION "REL", PER NEC 240.87.
  - ALL CIRCUIT BREAKERS IN SERVICES AND DISTRIBUTION BOARDS SHALL BE TOOK RATED.
- SECTION 7 – COORDINATION STUDY
  - WHEN REQUIRED, A COORDINATION STUDY SHALL BE REQUIRED WHEN A TWO-TIER GROUND FAULT PROTECTED SYSTEM OR CIRCUIT BREAKER WITH ADJUSTABLE TRIP IS SPECIFIED.
  - THE PURPOSE OF THE COORDINATION STUDY IS TO ANALYZE ALL PROTECTIVE DEVICES IN THE SYSTEM AND DETERMINE THE CORRECT SETTING TO MINIMIZE DAMAGE CAUSED BY AN ELECTRICAL FAULT.
  - THE COORDINATION STUDY SHALL INCLUDE THE OVER-CURRENT DEVICE CLOSEST TO UTILITY COMPANY SERVICE, MAIN CIRCUIT BREAKERS AT ALL PANEL BOARDS, AND BRANCH CIRCUIT BREAKERS IN ALL PANEL BOARDS. THE COORDINATION STUDY SHALL INCLUDE BOTH NORMAL POWER AND EMERGENCY/STAND-BY SYSTEMS. ALL PHASE AND GROUND OVER-CURRENT PROTECTION SHALL BE INCLUDED IN THIS STUDY. THIS WILL ENSURE PROPER COORDINATION FOR THE ELECTRICAL DISTRIBUTION SYSTEM.
  - THE COORDINATION STUDY SHALL BE REQUESTED BY THE ELECTRICAL CONTRACTOR AT THE TIME OF SHOP DRAWING PREPARATION. THE COORDINATION STUDY SHALL BE DONE BY AN ELECTRICAL E.E. IN THE STATE IN WHICH THE PROJECT IS TO BE CONSTRUCTED. THE STUDY CAN BE COMPLETED BY EITHER AN INDEPENDENT CONSULTANT OR MANUFACTURER.
  - COORDINATION STUDY SHALL PROVIDE ALL TRIP CURVES OF FUSES AND CIRCUIT BREAKERS IN THE SYSTEM INCLUDING TIME AND CURRENT RATIOS FOR ALL CURVES.
  - COORDINATION STUDY SHALL PROVIDE THE FOLLOWING ITEMS: GROUND FAULT PICKUP AND TIME DELAY, CIRCUIT BREAKER SETTING, LONG-TIME, SHORT-TIME, AND INSTANTANEOUS SETTINGS, TIME AND BRANDS, FUSE RATIO, CIRCUIT BREAKER TRIP CURVES, AND CURRENT TRANSFORMER RATIO RELAY TAG AND TIME DELAY.
  - THE COORDINATION STUDY SHALL BE PROVIDED TO THE ENGINEER WITH SWITCHGEAR SUBMITTAL AND SHALL INCLUDE A SUMMARY NOTING ANY ITEMS THAT ARE NOT COORDINATED OR UNDER RATED.
- SECTION 8 – ELECTRICAL TESTING
  - AN INDEPENDENT TESTING AGENCY SHALL PROVIDE TEST RESULT TO ENGINEER ON THE ELECTRICAL "SES" AND ELECTRICAL DISTRIBUTION SYSTEM. TESTING SHALL BE MADE BY A CERTIFIED NETA OR NIBP TESTER IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND NATIONAL RECOGNIZED PRACTICES AND STANDARDS.
  - FALL OF POTENTIAL TESTING – ALL NEW SERVICES SHALL HAVE FALL OF POTENTIAL TESTING (RESISTANCE TO GROUND) PERFORMED. THE GROUND SHALL HAVE 5 OHMS OR LESS RESISTANCE TO GROUND. SYSTEM SHALL HAVE LESS THAN 0.5 OHMS POINT TO POINT BETWEEN MAIN GROUNDING AND EQUIPMENT FAMES, NEUTRAL, OR ANY DERIVED NEUTRAL. HI-POI TEST SHALL NOT BE COMPLETED IF THERE HAS BEEN RAINFALL WITHIN 24-HOURS BEFORE THE TEST.

- OVER-POTENTIAL (HI-POI) TESTING – ALL NEW SERVICES OR EXISTING SERVICES WITH NEW SWITCHES/BREAKERS ADDED TO IT SHALL HAVE HI-POI TEST PERFORMED IF IT IS OVER 1000 AMPS.
  - TESTING SHALL BE DONE PRIOR TO PHASE TO GROUND AND PHASE TO PHASE TESTING.
  - INSULATION RESISTANCE TEST (MEGGER TEST) – TESTING AGENCY SHALL TEST AT 1000 VOLTS FOR ONE MINUTE WITH A MINIMUM OF 50 MEGOHMS OF RESISTANCE TO GROUND. TESTING AGENCY SHALL PERFORM TEST ON BOTH PHASE TO GROUND AND PHASE TO PHASE.
  - BEFORE PROCEEDING WITH ELECTRICAL CONTRACTOR SHALL CONDUCT ON-SITE FIELD INVESTIGATION TO BECOME FAMILIAR WITH EXISTING SITE CONDITIONS. THERE WILL BE NO ALLOWANCES MADE FOR FAILURE TO COMPLY.
  - PICK-UP TIME SETTING WITH COORDINATION STUDY. TESTING AGENCY SHALL TEST THE GROUND FAULT PROTECTION RELAY TIMING. TESTING AGENCY SHALL TEST THE GROUNDING CONDUCTOR AND THE INSULATION FOR RESISTANCE TO GROUND.
- SECTION 9 – ELECTRICAL DISTRIBUTION, PANELBOARDS, CIRCUIT BREAKERS, AND TRANSFORMERS
    - LABELING:
      - ALL NEW AND EXISTING PANEL BOARDS SHALL BE PROVIDED WITH NEW, TYPED PANEL BOARD DIRECTORY UNDOUBLY LABELING WHAT EACH CIRCUIT BREAKER SERVES.
      - ALL ELECTRICAL EQUIPMENT (PANELS, SWITCHBOARDS, DISTRIBUTION BOARDS, TRANSFORMERS, DISCONNECT SWITCHES, MOTOR STARTER, ETC) SHALL BE LABELED WITH PERMANENT BLACK STOCK TAG WITH 1/2" TALL WHITE LETTERS. LABEL SHALL INCLUDE NAME OF EQUIPMENT, VOLTAGE, AND PHASE. IN ADDITION, ALL ELECTRICAL DISTRIBUTION EQUIPMENT SHALL BE PROVIDED WITH A WARNING LABEL READING AS FOLLOWS: "WARNING – ELECTRICAL EQUIPMENT – ONLY QUALIFIED PERSONNEL SHALL OPEN OR OPERATE EQUIPMENT."
      - EXISTING PANEL BOARDS:
        - 9.3.A. PROVIDE NEW CIRCUIT BREAKERS TO MATCH BRAND AND TYPE WITH ALL ARC RATING AS INDICATED IN CONSTRUCTION DOCUMENTS.
        - 9.3.B. PROVIDE 60 DEGREE RATED TERMINATIONS, CONNECTORS, AND LUGS FOR ALL PANEL BOARDS 100 AMPERES AND LESS. PROVIDE 75 DEGREE MINIMUM TERMINATIONS, CONNECTORS, AND LUGS FOR ALL PANEL BOARDS GREATER THAN 100 AMPERES.
    - NEW PANEL BOARDS:
      - 9.4.A. ALL NEW PANEL BOARDS SHALL BE ULL LISTED. PROVIDE NEMA RATING AS REQUIRED FOR APPLICATIONS IN WHICH IT IS INSTALLED.
      - 9.4.B. ALL NEW PANEL BOARDS SHALL HAVE COPPER BUSSING, HAVE A HINGED COVER, AND BE DOOR-IN-DOOR CONSTRUCTION.
      - 9.4.C. PROVIDE 60 DEGREE RATED TERMINATIONS, CONNECTORS, AND LUGS FOR ALL PANEL BOARDS 100 AMPERES AND LESS. PROVIDE 75 DEGREE MINIMUM TERMINATIONS, CONNECTORS, AND LUGS FOR ALL PANEL BOARDS GREATER THAN 100 AMPERES.
      - 9.4.D. ACCEPTABLE MANUFACTURERS FOR PANEL BOARDS SHALL BE SIEMENS, SQUARE D, EATON-OUTLER HAMMER, AND GENERAL ELECTRIC (GE).
      - 9.4.E. ALL GROUND AND NEUTRAL BARS SHALL BE COPPER.
    - CIRCUIT BREAKERS:
      - 9.5.A. ALL CIRCUIT BREAKERS SHALL BE FULL SIZED, NO PICK-UP OR TANDEM BREAKERS WILL BE ACCEPTED.
      - 9.5.B. ALL CIRCUIT BREAKERS SHALL BE SWITCH RATED.
      - 9.5.C. ALL CIRCUIT BREAKERS FEEDING HVAC MOTORS SHALL BE HCAR RATED.
      - 9.5.D. ALL CIRCUIT BREAKERS FEEDING MOTORS SHALL BE HCAR RATED.
      - 9.5.E. ANY CIRCUIT BREAKER FEEDING A CLASS 1 OR CLASS 2 AREAS SHALL HAVE SWITCHED NEUTRALS.
    - TRANSFORMERS:
      - 9.6.A. ALL TRANSFORMERS ABOVE 15kva SHALL BE RATED FOR A MINIMUM OF 150 DEGREE TEMPERATURE RISE ABOVE 40 DEGREES AMBIENT.
      - 9.6.B. ALL TRANSFORMERS 75kva AND BELOW SHALL BE ABLE TO BE WALL, FLOOR, OR RACK MOUNTED.
      - 9.6.C. ALL TRANSFORMERS SHALL BE ULL LISTED.
      - 9.6.D. ACCEPTABLE MANUFACTURERS FOR TRANSFORMERS SHALL BE SIEMENS, SQUARE D, EATON-OUTLER HAMMER, ACME TRANSFORMERS, AND GENERAL ELECTRIC (GE).
    - LUMINAIRES, BALLASTS, AND LAMPING
      - 10.1. ALL LUMINAIRES SHALL BE LISTED FOR THE USE IN WHICH THEY ARE INSTALLED. ANY LUMINAIRE INSTALLED OUTDOORS SHALL BE LISTED AS EITHER DAMP OR WET DEPENDING ON LOCATION OF INSTALLATION.
      - 10.2. ALL LUMINAIRES THAT ARE RECESSED SHALL EITHER BE I.C. RATED OR LOCATED A MINIMUM OF 3" AWAY FROM COMBUSTIBLE MATERIALS. RECESSED FIXTURES SHALL BE THERMALLY PROTECTED.
      - 10.3. ALL FLUORESCENT FIXTURES THAT HAVE DOUBLE ENDED LAMPS SHALL HAVE INTEGRAL DISCONNECTING MEANS PER CURRENT ADOPTED EDITION OF IECC.
      - 10.4. ALL LIGHT FIXTURES PROVIDED AND INSTALLED BY CONTRACTOR SHALL BE INSTALLED WITH LAMPS, WIRING, AND ANY SPECIFIC ACCESSORIES.
      - 10.5. THE ELECTRICAL CONTRACTOR SHALL COORDINATE EXACT MOUNTING, CEILING TYPE, AND MOUNTING HEIGHT WITH ARCHITECT PRIOR TO ORDERING. ALL FIXTURES INSTALLED IN A GRID CEILING OR WITH A FLANGE KIT SHALL BE EQUIPPED WITH 4 FOUR EARTHQUAKE MOUNTING CLIPS. ALL TROFFERS INSTALLED IN A LAY-IN GRID SHALL BE SUPPORTED PER IBC REQUIREMENTS. CONNECT A MINIMUM OF (2) #8 WIRES TO OPPOSITE CORNERS OF FIXTURE TO FIXTURE TAUGHT TO STRUCTURE AND (2) LOOSE WIRES AT OTHER CORNERS.
      - 10.6. ANY MANUALLY OPERATED PANEL BOARDS SHALL BE SIEMENS, SQUARE D, EATON-OUTLER HAMMER, AND GENERAL ELECTRIC (GE).
      - LAMPING:
        - 10.7.A. ALL FLUORESCENT LAMPS SHALL BE A MINIMUM OF 3500 KELVIN (UNLESS NOTED OTHERWISE IN LUMINAIRE SCHEDULE) AND 80+ CRI.
        - 10.7.B. ALL INCANDESCENT LAMPS SHALL BE A MINIMUM OF 100 WATT AND 120V.
        - 10.7.C. ALL INCANDESCENT LAMPS SHALL BE 130V FOR "A" TYPE BASE.
      - BALLASTS:
        - 10.8. ALL ACCEPTABLE BALLAST MANUFACTURERS ARE: ADVANCED, GE, AND LUTRON.
        - 10.8.A. ALL BALLASTS SHALL BE ULL LISTED, CEM CERTIFIED, AND ITC TESTED. BALLASTS SHALL HAVE AN "A" SOUND RATING, A THD OF LESS THAN 10%, AND A POWER FACTOR GREATER THAN 0.9.
        - 10.8.C. ALL FLUORESCENT BALLASTS SHALL START AT 120V TO AT LEAST 60 DEGREES F. WHEN BALLASTS ARE LISTED IN LUMINAIRE SCHEDULE AS "COLD WEATHER", INSTALLED IN COOLERS, OUTSIDE, OR OPEN WAREHOUSE AREAS, BALLAST SHALL START AT 0 DEGREES F.
        - 10.8.D. ALL H.I.D. BALLASTS SHALL BE PULSE START, START AT A MINIMUM OF -20 DEGREES F AND 131 DEGREES F.
        - 10.8.E. ALL ELECTRONIC DIMMING BALLASTS SHALL DIM SMOOTHLY FROM 100% OUTPUT TO 10% OUTPUT. IN ADDITION, ELECTRONIC DIMMING BALLASTS SHALL LIMIT INRUSH CURRENT TO A MAXIMUM OF 3 AMPS AT 120V.
  - SECTION 10 – EMERGENCY LIGHTING AND BALLASTS
    - 11.1. ALL EMERGENCY LIGHTS SHALL BE ULL LISTED AND DESIGNATED BY ARCHITECT OF RECORD. ELECTRICAL CONTRACTOR SHALL PROVIDE A 1 FOOT CANDLE AVERAGE AND A 0.1 FOOTCANDLE MINIMUM ON THE PATH OF ESCAPE PER IBC 1006.
    - 11.2. ALL LIGHT FIXTURES DESIGNATED AS EMERGENCY (EM) OR NIGHTLIGHT (NL) SHALL BE CONNECT AS UN-SWITCHED.
  - SECTION 12 – LIGHTING CONTROLS (SWITCHES, DIMMERS, OCCUPANCY SENSORS, CONTROL PANELS, DAYLIGHTING, CONTRACTOR)
    - 12.1. ALL LIGHT SWITCHES SHALL BE INSTALLED IN COMPLIANCE WITH NEC AND IECC FOR GROUPING AND ACCESSIBILITY.
    - 12.2. ALL LIGHT SWITCHES SHALL BE PROGRAMMABLE. ALL LIGHT SWITCHES SHALL BE INSTALLED WITH LAMPS, WIRING, AND ANY SPECIFIC ACCESSORIES.
    - 12.3. ALL LIGHTING CONTROL PANELS SHALL HAVE DELAYS RATED AT 14,000 MIC OR GREATER. ALL LIGHTING CONTROL PANELS SHALL BE PROGRAMMED BY ELECTRICAL CONTRACTOR. ZONING AND TIMES SHALL BE COORDINATED WITH OWNER/TENANT. ALL PROGRAMMING SHALL MEET THE REQUIREMENTS OF THE CURRENT ADOPTED IECC.
    - 12.4. ALL DAYLIGHT HARVESTING SENSORS SHALL AUTOMATICALLY CONTROL LIGHTING IN DESIGNATED ZONE. TARGET LIGHTING LEVELS SHALL BE COORDINATE WITH OWNER/TENANT.
    - 12.5. ALL LIGHTING CONTRACTORS SHALL PROVIDE A MINIMUM RATING OF 4,000 MIC FOR 0.5 SECONDS UNLESS SPECIFICALLY NOTED OTHERWISE IN THE CONSTRUCTION DOCUMENTS.
    - 12.6. ACCEPTABLE OCCUPANCY SENSOR, SWITCH, LOW-VOLTAGE SWITCH, TOGGLE SWITCH, AND DIMMER SWITCH MANUFACTURERS ARE: LUTON, LEVITON, WATTS/POWER, HUBBELL, DOUGLAS, AND LC AND D.
    - 12.7. ACCEPTABLE LIGHTING CONTROL RELAY PANELS ARE: WATT STOPPER, LUTON, HUBBELL, DOUGLAS, AND LC AND D.
    - 12.8. ALL LIGHTING CONTRACTORS SHALL PROVIDE A MINIMUM RATING OF 4,000 MIC FOR 0.5 SECONDS UNLESS SPECIFICALLY NOTED OTHERWISE IN THE CONSTRUCTION DOCUMENTS.
    - 12.9. ALL LIGHTING CONTRACTORS SHALL PROVIDE A MINIMUM RATING OF 4,000 MIC FOR 0.5 SECONDS UNLESS SPECIFICALLY NOTED OTHERWISE IN THE CONSTRUCTION DOCUMENTS.
    - 12.10. ALL SWITCHING DEVICES SHALL BE ULL LISTED FOR SPECIFIC USE OF LOAD BEING CONTROLLED. ALL DIMMERS AND SWITCHES SHALL MEET ULL, ANSI, AND IECE STANDARDS.
  - SECTION 13 – TELEPHONE, DATA, AND I.T. SYSTEMS
    - 13.1. ELECTRICAL CONTRACTOR SHALL PROVIDE "EMPTY" 1/2" EMT CONDUIT WITH NYLON PULLSTRING STUBBED ABOVE ACCESSIBLE CEILING SPACE FOR ALL TELE/DATA DEVICES SHOWN. IN ADDITION, THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING JUNCTION BOX AND MID-RUN. COORDINATE ALL PHONE AND DATA REQUIREMENTS WITH OWNER/TENANT PRIOR TO ROUGH-IN.
    - 13.2. ALL TELEPHONE CONTRACTOR'S SUBMITTALS SHALL HAVE #8 AWG COPPER GROUND RIB TO MAIN SWITCH GEAR. ELECTRICAL CONTRACTOR SHALL NOTIFY ENGINEER IN WRITING IMMEDIATELY OF ANY CHANGES IN HVAC EQUIPMENT THAT WILL IMPACT OR CHANGE THE ELECTRICAL CONSTRUCTION DOCUMENTS.
    - 13.3. DISCONNECT SWITCHES FOR ALL HVAC EQUIPMENT SHALL BE HEAVY DUTY, COMMERCIAL GRADE, QUICK BREAK TYPE. ALL DISCONNECT SWITCHES LOCATED OUTSIDE SHALL BE NEMA 3R OR HIGHER AND DISCONNECT RELATED TO THE HVAC OPERATIONS. THIS SHALL BE HOSPIITAL GRADE WITH WEATHER RESISTANT (WR) OR WEATHER RESISTANT (WR) OR WEATHER RESISTANT (WR) AS REQUIRED. APPROVAL FROM ENGINEER AND A CREDIT TO OWNER. BASE BID SHALL BE BASED ON HEAVY DUTY DISCONNECT SWITCHES.
    - 13.4. ELECTRICAL CONTRACTOR SHALL PROVIDE APPROPRIATELY SIZED, TYPE, VOLTAGE, AND QUANTITY OF DUEL ELEMENT TIME-DELAY FUSES EACH HVAC UNIT. FUSES SHALL BE SIZED PER HVAC MANUFACTURE REQUIREMENTS AND/OR NAMEPLATE ON UNIT.
    - 13.5. ALL DISCONNECT SWITCHES SHALL BE INSTALLED IN ACCORDANCE WITH THE CURRENT ADOPTED NEC AND IECC.
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