

- o. EXPANSION FITTINGS SHALL BE INSTALLED AT RIGHT ANGLES WITH CAP JOINT CENTERED IN END OF CONDUIT. THE LENGTH OF RUN IN CONDUIT SHALL BE LIMITED TO 10 FEET. RECOMMENDATIONS, PRESET FITTINGS SHALL ALLOW FOR TEMPERATURE VARIATION.
- p. RACKS PASSING THROUGH FIRE-RATED CONSTRUCTION: SEAL OPENING WITH FIRE SEALANT.
- q. PROVIDE RACKS WITH PERFORM CONTINUITY TESTS PERFORMED BY THE CONTRACTOR USING A CONDUCTOR RETURN, MAXIMUM RESISTANCE SHALL BE 25 OHMS.
- 13. WIRE AND CABLE:
  - A. PROVIDE WIRE AND CABLE COMPLETE WITH ACCESSORIES. SIZE REFERENCE SHALL BE AWG AS NOTED.
  - B. CONDUCTORS SHALL BE COPPER, ASTM STANDARD SOLID (NO. 10 AND SMALLER) OR STRANDED (NO. 8 AND LARGER). GENERAL USE CABLING SHALL BE NOT 12 AWG. USE 12 AWG AND LARGER AT 277 VOLT CIRCUIT. MINIMUM CIRCUIT BREAKER RATING SHALL BE 200 FT CIRCUIT LENGTH PROVIDE NO. 10 MINIMUM.
  - C. CONTROL AND ALARM CABLES, EXCEPT AS NOTED, SHALL BE 20 AWG. MINIMUM. PROVIDE NO. 12 MINIMUM.
  - D. OTHER VOLTAGES AND PHASES: ADJUST CABLE SIZES AS REQUIRED TO MAINTAIN VOLTAGE DROP. PROVIDE RACKS FOR LARGER WIRE AS REQUIRED.
  - E. INSULATION SHALL BE RUBBER AND THERMOPLASTIC. INSULATION SHALL BE 100% OF THE RATED VOLTAGE. INSULATION SHALL BE 100% OF THE RATED VOLTAGE. INSULATION SHALL BE 100% OF THE RATED VOLTAGE. INSULATION SHALL BE 100% OF THE RATED VOLTAGE.
  - F. PRE MANUFACTURED METAL CLAD CABLE SHALL BE UTILIZED FOR ALL NORMAL BRANCH CIRCUITS ONLY IN DRY HOLLOW STUD WALL LOCATIONS, ABOVE ACCESSIBLE CEILING AND WHERE PERMITTED BY ARTICLE 350 & 517. CONDUCTOR SIZE SHALL BE NO. 12 AWG COPPER WITH BARE BONDING CONDUCTOR IN DIRECT CONTACT WITH THE OUTER METAL JACKET.
  - G. THE INSULATION OF ALL CONDUCTORS SHALL BE SPRAY RATED THERMOPLASTIC WITH COLOR CODING AS FOLLOWS:
    - 1) 208/120 VOLT SYSTEM:
      - a. BLACK FOR 'A' PHASE
      - b. RED FOR 'B' PHASE
      - c. BLUE FOR 'C' PHASE
    - 2) 480/277 VOLT SYSTEM:
      - a. BROWN FOR 'A' PHASE
      - b. ORANGE FOR 'B' PHASE
      - c. YELLOW FOR 'C' PHASE

- 17. LUMINAIRES:
  - A. MANUFACTURE AND INSTALL LUMINAIRES IN ACCORDANCE WITH NEC ARTICLE 410.
  - B. PROVIDE ALL LUMINAIRES INDICATED, COMPLETE WITH LUMINAIRE HOUSING, BALLAST, AND ALL EXTERIOR FIXTURES MOUNTED ON THE BUILDING. FINISH ALL PLASTER FINISHES OR GYPSUM AND DELIVER TO PROJECT SITE FOR INSTALLATION UNDER DRAWINGS.
  - C. USE FIXTURES CONFORMING TO UL STANDARDS, AND BEARING UL LABEL AND UNION LABEL WHERE A UNION LABEL IS REQUIRED.
  - D. ALL FLUORESCENT ELECTRONIC BALLASTS SHALL MEET OR EXCEED THE REQUIREMENTS OF:
    - 1) ANY/IEEE 602.41 (AMERICAN NATIONAL STANDARDS INSTITUTE).
    - 2) FCC PART 18 (RFI AND EMI).
    - 3) CEM (CERTIFIED LABOR MANUFACTURERS).
    - 4) UL (UNDERWRITERS LABORATORIES).
    - 5) PUBLIC LAW #100-357 (MINIMUM EFFICIENCY STANDARDS).
    - 6) NAECA (NATIONAL APPLIANCE ENERGY CONSERVATION AMENDMENTS).
    - 7) NEC (NATIONAL ELECTRIC CODE)
    - F. GENERAL CONSTRUCTION
      - 1) PLASTICS: 100% VIRGIN ACRYLIC. REFER TO FINISHES LIST FOR FURTHER DESCRIPTION.
      - 2) METAL:
        - a. INTERNAL: STEEL, ALUMINUM OR OTHER TYPES MENTIONED.
        - b. B & S GAUGE, NO. 22 MINIMUM FOR HOUSINGS, WITH APPROPRIATE CROSS-SECTIONAL THICKNESS. FINISH SHALL BE PERMANENTLY FINISH METAL ACCEPTABLE FOR BALLAST ENCLOSURES AND INCIDENTAL PURPOSES.
        - 3) FINISHES:
          - a. CORROSION PROTECTION: PLATING, BONDERIZING, PRIMING, ELECTROSTATIC PAINTING, OR OTHER APPROVED MEANS.
          - b. FINAL COATING: BAKED PAINT OR ENAMEL ON STEEL AND ALUMINUM. BAKED CLEAR COATERS SHALL BE USED ON TRANSPARENT FILM ON POLISHED METAL SURFACES.

- 18. EMPTY RACKWAY SYSTEMS:
  - A. A COMPLETE EMPTY RACKWAY SYSTEM CONSISTING OF BLANK 4-1/16" X 2-1/2" DEEP OUTLET BOXES AND UNITS SHALL BE PROVIDED. ALL FINISHES SHALL BE PROVIDED AND INSTALLED WHERE SHOWN FOR THE FOLLOWING SYSTEMS:
    - 1) TELEPHONE/DATA (SINGLE GANG)
    - 2) CABLE TELEVISION (SINGLE GANG)
  - B. RACKWAY SIZE SHALL BE A MINIMUM OF 3/4" IN. OR AS DOCUMENTED IN PLANS AND DETAILS.
  - C. ALL METALLIC RACKWAY SYSTEMS SHALL BE STUBBED UP AND REMAINE IN ACCESSIBLE CEILING. BONDING OF ALL RACKWAY SYSTEMS TO PROVIDE A COMMON GROUND PATH SHALL BE PROVIDED.
  - D. ACTUAL DEVICES, CONNECTORS, WIRING COMPLETE WITH TERMINATIONS AND BOX COVERS SHALL BE PROVIDED BY THE OWNER.
- 19. FIRE STOPPING:
  - A. DRAWINGS AND GENERAL PROVISIONS OF CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION SPECIFICATION SECTIONS, APPLY TO WORK OF THIS SECTION.
  - B. PROVIDE ALL REQUIRED FIRE-STOPPING WORK INCLUDING FIRE-STOPPING FLOORS, WALLS AND PARTITIONS IN NEW CONSTRUCTION.
  - C. PRODUCT DATA, SUBMIT MANUFACTURER'S PRODUCT DATA FOR EACH FIRE-STOPPING PRODUCT REQUIRED, INCLUDING INSTRUCTIONS FOR SUBSTRATE PREPARATION AND FIRE-STOPPING INSTALLATION.
  - D. FIRE RESISTANT JOINT SEALERS: PROVIDE MANUFACTURER'S STANDARD FIRE-STOPPING SEALANT WITH ACCESSORY MATERIALS HAVING FIRE RESISTANCE IDENTICAL TO THE JOINT SEALER. IDENTIFY MANUFACTURER'S IDENTIFICATION NUMBER AND INSPECTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.
  - E. THE RATING OF THE FIRE SEALANT SHALL MEET OR EXCEED THE FIRE RATING OF THE FIRE RATED PARTITION.
- 20. TESTS:
  - A. BEFORE MAKING TESTS, COMPLETE ALL CONNECTIONS AT PANELS, FIXTURES AND OTHER EQUIPMENT. INSTALL TESTS AND HAVE ALL WIRING CORRECT AT UNDESIRABLE GROUND, OPEN AND SHORT CIRCUIT CONDITIONS.
  - B. PROVIDE A SOURCE OF TEMPORARY POWER FOR MAKING TESTS AT THE BUILDING POWER IS NOT AVAILABLE AT THE TIME.
  - C. TAKE AND RECORD THE FOLLOWING READINGS ON SYSTEMS 600 VOLTS AND BELOW:
    - 1) MEGGER TESTS OF ALL FEEDER CIRCUIT CONDUCTORS, GROUND CONDUCTORS AND CONDUIT GROUND.
    - 2) AMPMETER READINGS ON ALL PHASES AND NEUTRAL OF EACH FEEDER TO INDICATE BALANCE.

no.	by	description	date
-	-	Issued For Permit & Construction	6/03/09
-	-	Issued For Client Review	3/24/09
revisions			

- 14. POWER WIRING:
  - A. PROVIDE ALL POWER WIRING TO ALL MOTORS AND EQUIPMENT. FINISHED UNDER ALL CONTRACTS ON THE PROJECT. INCLUDE EXTENSIONS FROM CONTROLLERS TO MOTORS AND MOTOR CONNECTIONS, MOUNT AND WIRE UNDER ALL CONTRACTS.
  - B. PROVIDE ALL POWER DEVICES FINISHED UNDER ALL CONTRACTS.
  - C. CONTROL WIRING:
    - A. PROVIDE ALL CONTROL WIRING FOR MOTORS AND EQUIPMENT. FINISHED UNDER ALL CONTRACTS AND AS SPECIFICALLY SHOWN ON THE DRAWINGS, EXCEPT FOR MOUNTING AND WIRING OF ALL CONTROL DEVICES FINISHED WITH EQUIPMENT.
- 15. CONTROL WIRING:
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- 16. DEVICES:
  - A. LOCAL SWITCHES:
    - 1) CONVENTIONAL, QUIET TOGGLE TYPE, RATED AT 120V, 15 AMP, 120/277V, 1224-2, 1224-2, OR EQUAL, BY HUBBELL OR PASS & SEYMOUR. TOGGLE COLOR SHALL BE SELECTED BY THE OWNER.
    - 2) PILOT LIGHT TOGGLE TYPE WITH NEON LAMP, RATED AT 20 AMP, 120/277 VOLT AC SIMILAR TO LEVITON 11221-9-FC.
  - B. INSERTION RECEPTACLES:
    - 1) COMMERCIAL SPECIFICATION GRADE DUPLEX COMMENCEMENT 125 VOLT, 2 POLE, 3 WIRE, 20 AMP WITH U GROUND SLOT GROUNDED, EXCEPT AS NOTED. DEVICE SHALL MEET OR EXCEED:
      - a. NEMA WD-1 AND WD-6
      - b. DEVICE SHALL BE SIMILAR TO HUBBELL 5342 DR EQUAL BY LEVITON, PASS & SEYMOUR OR DE FACE COLOR SHALL BE SELECTED BY OWNER. DEVICES USED ON EMERGENCY BRANCH CIRCUITS SHALL BE RED FACE ONLY.
    - 2) 5mA GROUND FAULT INTERRUPTER WITH SIMILAR TO HUBBELL 5382-G OR EQUAL BY LEVITON AND PASS & SEYMOUR.
    - 3) SPECIAL RECEPTACLES:
      - a. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE SPECIAL RECEPTACLES REQUIRED TO NEW EQUIPMENT PLUGS. PROVIDE SPECIAL RECEPTACLE TYPE PERMANENT INSTALLATION.
      - b. RECEPTACLE ORIENTATION:
        - 1) BRUSHED 302 STAINLESS STEEL. IF IT IS ASSOCIATED WITH AN EMERGENCY BRANCH CIRCUIT IDENTIFICATION FOR THAT DEVICE.
        - 2) RECESSED, THERMOPLASTIC BY SAME MANUFACTURER AS DEVICES.
      - c. CONTRACTOR SHALL COORDINATE ORIENTATION OF DEVICE WITH OWNER.
      - d. DEVICE PLATES:
        - 1) BRUSHED 302 STAINLESS STEEL. IF IT IS ASSOCIATED WITH AN EMERGENCY BRANCH CIRCUIT IDENTIFICATION FOR THAT DEVICE.
        - 2) RECESSED, THERMOPLASTIC BY SAME MANUFACTURER AS DEVICES.

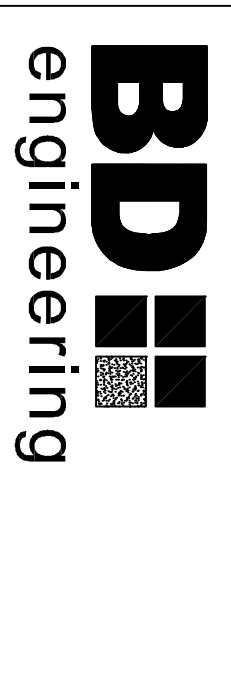
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  - C. USE FIXTURES CONFORMING TO UL STANDARDS, AND BEARING UL LABEL AND UNION LABEL WHERE A UNION LABEL IS REQUIRED.
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          - b. FINAL COATING: BAKED PAINT OR ENAMEL ON STEEL AND ALUMINUM. BAKED CLEAR COATERS SHALL BE USED ON TRANSPARENT FILM ON POLISHED METAL SURFACES.

- 21. DEMONSTRATION OF COMPLETE ELECTRICAL SYSTEMS:
  - A. SUBMIT WRITTEN CERTIFICATION THAT ELECTRICAL SYSTEMS ARE COMPLETE AND OPERATIONAL. SUBMIT CERTIFICATION WITH CONTRACTOR'S REQUEST FOR FINAL REVIEW.
    - 1) AT THE TIME OF FINAL REVIEW OF ELECTRICAL WORK, DEMONSTRATE THE OPERATION OF ELECTRICAL SYSTEMS, FURNISH LABOR, APPARATUS AND EQUIPMENT FOR SYSTEMS DEMONSTRATION, THE OWNER OR HIS REPRESENTATIVE.
      - B. THE CONTRACTOR SHALL FURNISH ALL TEST EQUIPMENT, MATERIALS, LABOR, AND TEMPORARY POWER FOR THE DEMONSTRATION. THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE ALL TESTS AND RECORDS TO BE PROVIDED TO THE OWNER. ALL TESTS SHALL BE CONDUCTED IN THE PRESENCE OF THE OWNER OR HIS REPRESENTATIVE. ALL TEST PROCEDURES SHALL CONFORM TO THIS SPECIFICATION AND APPLICABLE STANDARDS THE ANSI, IEC, NEMA, CSA, NETA, ETC.
      - C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TESTS AND TEST RECORD. TESTING SHALL BE PERFORMED BY AND UNDER THE IMMEDIATE SUPERVISION OF THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR EACH PIECE OF EQUIPMENT COPIES SHALL BE FURNISHED TO THE ENGINEER FOR REVIEW AND/OR APPROVAL.
      - D. A VISUAL INSPECTION OF ALL ELECTRICAL EQUIPMENT, MATERIALS, LABOR, AND CONNECTIONS, TIGHTNESS OF WIRING AND CONNECTION, PROPER GROUNDING, WIRING NAMEPLATE CHARTS WITH SPECIFICATION, ETC., SHALL BE MADE PRIOR TO ACTUAL TESTING.
      - E. A COMPLETE OPERATIONAL TEST SHALL BE MADE ON THE REVISED LIFE SAFETY FIRE ALARM SYSTEM. THE CONTRACTOR SHALL CONSULT WITH THE EQUIPMENT VENDOR AND THEN SUBMIT FOR APPROVAL A TEST REPORT TO THE ENGINEER. THE METHOD OF WIRING THE TESTS THE EQUIPMENT TO BE UTILIZED AND THE FEATURE TO BE CHECKED BY THE TEST. ALL INTERLOCKS AND PROTECTIVE FEATURES SHALL BE CHECKED.
- 22. SPECIAL ENGINEERING SERVICES:
  - A. IN THE INSTANCE OF COMPLEX OR SPECIALIZED ELECTRICAL SYSTEMS SUCH AS EMERGENCY SYSTEM FIRE ALARM OR SIMILAR MISCELLANEOUS SYSTEMS, THE INSTALLATION, RIVAL CONNECTIONS AND TESTING OF SUCH SYSTEMS SHALL BE MADE UNDER THE DIRECT SUPERVISION OF THE ENGINEER. THE DIRECT ENGINEERS WHO SHALL BE IN THE EMPLOY OF THE RESPECTIVE EQUIPMENT MANUFACTURER.
    - B. ANY AND ALL EXPENSES INCURRED BY THE EQUIPMENT MANUFACTURERS' REPRESENTATIVES RELATED TO THIS PROJECT SHALL BE BORNE BY THE ELECTRICAL CONTRACTOR.
- 23. DESIGN MODIFICATIONS:
  - A. THE DRAWINGS SHOW ELECTRICAL SYSTEMS WHICH ARE SUBJECT TO DESIGN MODIFICATIONS. SUCH AS:
    - 1) ANY AND ALL EXPENSES INCURRED BY THE EQUIPMENT MANUFACTURERS' REPRESENTATIVES RELATED TO THIS PROJECT SHALL BE BORNE BY THE ELECTRICAL CONTRACTOR.

# New Shop & Office Building for Shupper-Brickle Equipment Co. 11 Burnt Tavern Road Millstone Township, NJ 08535 Block: 57 Lot: 14.01

BRAN D. TANNENHAUS

NJ PROFESSIONAL ENGINEER  
NO. 0E 45901  
DATE: June 3, 2009



NJ CERTIFICATE OF AUTHORIZATION - 2462818100  
BD Engineering, LLC  
1825 Southshore Ave. Lakewood, NJ 08701  
Project No. 080056

DRAWN BY:	CHECKED BY:	SCALE:
LEF	BT	NONE

## ELECTRICAL SPECIFICATIONS

DRAWING NO.

E1.3