CROSBY & ASSOCIATES

Architecture + Planning + Interiors + Community Engagement

NEW BERLIN POLICE STATION

Decatur Street, Berlin, MD 21643

June 6, 2016

The following document provides additional information and/or clarifications to bidders for the referenced project. Each Bidder MUST acknowledge receipt of this addendum on the Bid Forms. Failure to do so will invalidate the Bidder's proposal.

A D D E N D U M #3

1. Bid Due Date is changed to Friday, June 17, 2016:

   Bids to be submitted on the forms provided in the Bidding Documents on or before **June 17, 2016 at 2:00 PM** Eastern Standard Time at the Town offices at 10 William Street, Berlin, MD 21811. Bids received after this date and time will not be accepted and will be returned unopened to the addressee. **NO ELECTRONIC SUBMISSIONS WILL BE ACCEPTED**. All qualified bids received will be publicly opened on this date and time and read aloud.

2. In addition, the deadline for receipt of substitution requests, RFIs and clarifications is changed to Friday, June 10, 2016 at 5:00 PM EST. A revised INSTRUCTIONS TO BIDDERS form is attached to this addendum.

3. The revised BID FORM issued with Addendum #2 has the wrong contract period. The correct contract period is four-hundred-and-twenty (420) calendar days. A corrected BID FORM is attached to this addendum.

4. Specification 01 21 00, Allowances: The allowance for clay masonry is deleted. Alternate manufacturers may be substituted in accordance with section 04 20 00 paragraph 2.1.A.

5. A discrepancy has been noted between the door hardware specification schedule (Spec. 08 71 00, paragraph 3.8) and the hardware sets listed in the Door Schedule on drawing

513 Court Lane
The Highcourt Center
Cambridge, MD 21613
Tel. 410.221.6508
Cell 410.476.1133

A601. Specifically, the hardware sets listed on the drawing for doors 35, 37, 38, 39, 44A, 44B, 45A, 45B, 46, 47 and 48. The drawing is incorrect; the schedule in the specification shall govern.

6. The following specifications have been modified, or are newly issued, and are included with this addendum:
    a. Table of Contents – revised to reflect changes per this addendum.
    b. Specification 06 16 00, Roof Sheathing – revised to change sheathing product.
    c. Specification 23 09 93, Sequence of Operation – addition of dehumidifier.
    d. Specification 26 32 13, Engine Generator – new.
    e. Specification 26 13 14, Outdoor Resistive Load Bank – new.
    f. Specification 26 32 23, Transfer Switch – revised based on new generator specification.

7. <u>Requests for Clarification / Requests for Information</u>:
    a. QUESTION: "What is the required frequency of testing for Masonry (if required) for the new building? If required, what is the preferred ASTM test method?"
    RESPONSE: Materials and mixes are specified to conform to applicable ASTM standards. No field testing is required.
    b. QUESTION: "Is cabling CAT 5 or CAT 6? Does it need to be plenum rated?"
    RESPONSE: The data cables shall be plenum rated CAT 6 per specification section 27 13 00.
    c. QUESTION: "The plans call for the slab on grade to be placed on compacted dirt ["select fill"], where the Addendum #2 remarks from GTA [soils report] suggest a 4" layer of stone. How do you want to address this?"
    RESPONSE: Bids shall be based on select fill as indicated on the structural drawings.
    d. QUESTION: "The bid documents and bid form indicate for us to provide a bid bond and performance and payment bond. We are to only provide the bid bond with the bid submission correct?"
    RESPONSE: The Invitation to Bid states the following:

> General Contractors must submit with their bids a **BID BOND** in an amount equaling **ONE PERCENT (1%)** of their total bid amount. Cashier's Checks made payable to the Town of Berlin may be substituted for the Bid Bond described above. General Contractors are also required to submit with their bids a **PAYMENT AND PERFORMANCE BOND** in an amount equaling **ONE HUNDRED PERCENT (100%)** of their total bid amount. Bonds must be submitted on forms provided by the Bonding Company. All Bonds must be issued by companies licensed to conduct business in the State of Maryland.

Bidders shall provide bid bonds and certification of payment and performance bonding commitment from a qualified underwriter.

e. QUESTION: "Can you please confirm the bid bond percentage is 1% for Berlin Police Department? Also, is there a specific bid bond form from the Town of Berlin that we should be using?"
RESPONSE: The 1% BID bond is correct. The Invitation to Bid states: "Bonds must be submitted on forms provided by the Bonding Company. "

8. Clarification: Aluminum sun shades are shown in plan (drawing A101) and on elevations (drawing A201). The shades are mounted at the head of the aluminum windows (see building section 2/A301 and wall sections 1/A302 and 2/A302). Mounting brackets are bolted into aluminum window frames; this must be coordinated with aluminum window frames manufacturer. Sun shades are the full width of the opening.

9. Request for Substitution: Sweeper Metal Fabricators Corp. (www.sweepermetal.com) requests qualification of their products for specified Detention Doors and Frames (08 34 63).
Status: Qualification request is accepted. The Architect has determined the proposed products/systems are equal to the specified products/systems.

BY:

Alan J. Brock
Project Architect

INSTRUCTION TO BIDDERS

For the following Project:
Berlin Police Department Building
The Town of Berlin
Berlin, Maryland

THE OWNER:
The Town of Berlin
10 William Street
Berlin, MD 21811

THE ARCHITECT:
Crosby & Associates, AIA, LLC
513 Court Lane
Cambridge, Maryland 21613
Attn.: Alan Brock **(410) 598-1666** abrock@ca-aia.com

A. DEFINITIONS

Bidding Documents:

1. Bidding Requirements & Contract Documents

B. BIDDER'S REPRESENTATIONS

The Bidder, by making a bid, represents that they have read and understand the Bidding Documents.

C. BIDDING DOCUMENTS

1. **Copies**
   Copies, both paper and electronic versions of the Contract Documents, may be obtained as explained in the Invitation to Bid document.
2. **Interpretation of Bidding Documents**
   It is the responsibility of each Bidder to interpret the requirements and intent of the Construction Documents. Clarifications to these Construction Documents shall be made solely by the Architect in response to Bidder's written request for clarification. Clarifications will be made by the Architect by means of written Addenda issued during the bidding period. Requests for clarifications shall be submitted to the Architect in writing or electronically **no later than 5:00 PM EST on June 10, 2016.** Requests for clarifications received after this date will not be considered
3. **Substitutions**
   The materials, products and equipment described in the Construction Documents establish a standard of quality, function and dimension. Bidders may use products equal to those specified in their bids if approved by the Architect prior to the bid date. Requests for substitutions shall be submitted to the Architect in writing or electronically **no later than 5:00 PM EST on June 10, 2016.** Requests for substitutions received after this date will not be considered.
4. **ADDENDA**
   The Architect will issue Addenda to all registered bidders prior to the bid due date. Addenda will clarify questions submitted in writing or electronically to the office of the Architect **no later than 5:00 PM EST on June 10, 2016.** Bidders must acknowledge receipt of all Addenda issued on the Bid Forms stipulated for use on this project.

D. BIDDING PROCEDURES

1. **Preparation of Bids**
   Bids shall be submitted on the forms included in the Bidding Documents.
2. **Bid Security**
   Bidders shall submit with their bids a Bid Bond and Performance and Payment bond as stipulated in the Invitation to Bid document.
3. **Project Schedule**
   Time is of the essence. Bidders shall submit with their bids a Project Schedule, organized by major CSI divisions, in bar chart format showing how the Bidder intends to perform the work and to complete the project within **FOUR HUNDRED TWENTY (420)** calendar days, or less. Each Bidder's proposed scheduled will be considered as part of the evaluation for award. Each Bidder's proposed schedule shall assume a start date of July 5, 2016.
4. **Submission of Bids**
   All bids shall be submitted on the forms provided in the Bidding Documents. Bids shall be in duplicate and enclosed in a sealed envelope. The envelope is to have the Project Name, the Owner's name and address and the name and address of the Bidder on the outside of the envelope. Bids shall be submitted at the location, date and time as defined in the Invitation to Bid document. No electronically transmitted bids will be accepted.
5. **Bid Due Date**
   Bids shall be submitted on the forms provided in the Bidding Documents on or before <u>June 17, 2016 at 2:00 PM</u> Eastern Standard Time at the Town offices at 10 William Street, Berlin, MD 21811. Bids received after this date and time will not be accepted and will be returned unopened to the addressee. <u>NO ELECTRONIC SUBMISSIONS WILL BE ACCEPTED</u>. All qualified bids received will be publicly opened on this date and time and read aloud.
6. **Withdrawal of Bids**
   Bids, once submitted to the Owner, cannot be withdrawn for a period of **Sixty Days (60)** following the bid due date stipulated in the Invitation to Bid document.

E. CONSIDERATION OF BIDS

1. **Opening of Bids**
   All bids received by the Owner and qualified in accordance to the Invitation to Bid document will be publicly opened at the date and time stipulated in the Invitation to Bid document.
2. **Rejection of Bids**
   The Owner shall have the right to reject any and/or all bids. Any bid not in compliance with the Invitation to Bid or Instruction to Bidders will be rejected.
3. **Acceptance of Bid**
   The Owner will award, at their sole discretion, a contract to the lowest qualified Bidder submitting a bid on the bid due date. Award of the contract and notice to proceed will take place at a time after the bid due date determined solely by the Owner.
4. **Owner Furnished Items**
   The Owner reserves the right to procure, separately from the Construction Contract, materials, finishes, equipment, systems and other items for installation by the Contractor.

END OF DOCUMENT

BID FORM

1. Proposal of _____(herein called the "BIDDER"), organized and existing under the laws of the State of _____ doing business as _____ (insert "a corporation", "a partnership", or "an individual" as applicable). To the **TOWN OF BERLIN**, (herein called the "OWNER").

   In accordance with the Advertisement for Bids, Bidder hereby proposes to perform all WORK for the construction of **BERLIN POLICE DEPARTMENT BUILDING** in strict compliance with the CONTRACT DOCUMENTS, within the time limit and at the prices set forth below.

   By submission of this BID, each BIDDER certifies, and in the case of a joint BID each party thereto certifies as to its own organization, that this BID has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this BID with any other BIDDER or with any competitor.

   BIDDER hereby agrees to commence WORK under this contract on or before a date to be specified in the NOTICE TO PROCEED and to fully complete the project within **FOUR HUNDRED TWENTY (420)** consecutive calendar days thereafter. BIDDER further agrees to pay as liquidated damages, the sum of **FIVE HUNDRED DOLLARS ($500.00)** for each consecutive calendar day thereafter that the project remains unfinished as defined in the General Conditions of the Contract for Construction.

2. BIDDER acknowledges receipt of the following ADDENDA:

   ADDENDUM # _____ Date:_____ ADDENDUM # _____ Date:_____
   ADDENDUM # _____ Date:_____ ADDENDUM # _____ Date:_____
   ADDENDUM # _____ Date:_____ ADDENDUM # _____ Date:_____

3. BIDDER proposes the following KEY PERSONNEL will be assigned to this project:

   Project Manager: _____
   Name

   Project Superintendent: _____
   Name

   The successful BIDDER shall not substitute KEY PERSONNEL assigned to the performance of this Contract without prior written authorization by the Town of Berlin, MD.

4. _____ (check) BIDDER has included the required preliminary CONSTRUCTION SCHEDULE with his bid.

5. _____ (check) BIDDER has included the required BID BOND and PERFORMANCE & PAYMENT BOND with his bid.

6. (A) BIDDER agrees to perform all the work described in the CONTRACT DOCUMENTS for the following **LUMP SUM** price of:
   _____Dollars ($_____)

   (B) In addition, Bidder proposes a **Deduct Alternate for deleting Bullet Resistant Opaque Armor** in the following amount:
   _____Dollars ($_____)

   Bidder's **ADJUSTED LUMP SUM** (A minus B) price inclusive of the proposed deduct alternates is:
   _____Dollars ($_____)

   NOTE: BIDS shall include sales tax and all other applicable taxes and fees.

7. Submitted by:

   _____ _____
   Signature Title

   _____ _____
   Company Name Address

   _____ _____ _____
   License Number Date

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SECTION 06 16 00

ROOF SHEATHING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Combination roof sheathing and roof underlayment.
2. Self-adhering flexible flashing.
3. Liquid-applied flashing membrane.

B. Related Requirements:
1. Section 06 10 00 "Rough Carpentry".

1.2 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
1. For panels with integral water resistive barrier, include data on air/-moisture-infiltration protection based on testing according to referencing standards.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Capable of demonstrating that all wood procurement operations are conducted in accordance with procedures and policies of the Sustainable Forestry Initiative (SFI) Program.

B. Code Compliance: Comply with requirements of the following:
1. International Code Council (ICC), ICC-ESR1473 (ZIP System Roof Sheathing).
2. International Code Council (ICC), ICC-ESR2227 (ZIP System Tape).

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store materials in accordance with manufacturer's instructions.

B. Outdoor Storage: Comply with manufacturer's recommendations.
1. Set panel bundles on supports to keep off ground.
2. Cover panels loosely with waterproof protective material.
3. Anchor covers on top of stack, but keep away from sides and bottom to assure adequate air circulation.
4. When high moisture conditions exist, cut banding on panel stack to prevent edge damage.

1.5 WARRANTY

A. Special Warranty: Manufacturer’s standard form in which manufacturer agrees to repair or replace components of roof sheathing system that fail due to manufacturing defects within specified warranty period.

1. Construction Period Warranty: Manufacturer shall warrant the panels and tape for weather exposure for a period of 180 days from installation.

2. System Warranty Period: 30 years from date of Substantial Completion.

PART 2 PRODUCTS

A. Manufacturers listed are to establish a “Basis of Design.” Substitutions of equal quality and value are acceptable and shall be made in accordance with Section 01 33 00, Submittal Procedures.

2.1 COMBINATION ROOF SHEATHING AND ROOF UNDERLAYMENT

A. Oriented-Strand-Board Roof Sheathing: With integral water-resistive barrier, Exposure 1, Structural I sheathing. Thickness as indicated on drawings.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Huber Engineered Woods LLC; ZIP System Roof Sheathing.
2. Span Rating, Panel Grade and Performance Category: Not less than 40/20; Structural 1; 5/8 Performance Category.
3. Edge Profile: Tongue and groove.
4. Provide fastening guide on top panel surface with pre-spaced fastening symbols for 16-inches and 24-inches on center spacings.
5. Performance Standard: DOC PS2-10 and ICC-ES ESR-1473.
6. Factory laminated integral roofing underlayment facer.
7. Exposure Time: Designed to resist weather exposure for 180 days.

2.2 FASTENERS

A. General: Provide fasteners of size and type that comply with requirements specified in this article by the authority having jurisdiction, International Building Code.

2.3 MISCELLANEOUS MATERIALS

A. Self-Adhering Seam and Flashing Tape: Pressure-sensitive, self-adhering, cold-applied, proprietary seam tape consisting of polyolefin film with acrylic adhesive.
1. Basis-of-Design Product: Subject to compliance with requirements provide Huber Engineered Woods LLC; ZIP System Seam and Flashing Tape.
2. Thickness: 0.012 inch.
3. Width: 3.75 inch.
4. Code Compliance: Comply with requirements of authorities having jurisdiction and ICC Evaluation Service, Inc. "AC148 - Acceptance Criteria for Flexible Flashing Materials."
5. International Code Council (ICC), ICC-ES ESR2227 (ZIP System Tape).
6. American Architectural Manufacturer’s Association; AAMA 711.

B. Liquid-Applied Flashing Membrane: Gun-grade, cold-applied, silyl-terminated polyether (STPE) liquid flashing membrane compatible with sheathing/weather barrier and self-adhering seam and flashing tape, and tested as part of an assembly meeting performance requirements. Follow manufacturer’s recommendation for integration with ZIP System Tape.
1. Basis-of-Design Product: Subject to compliance with requirements provide Huber Engineered Woods LLC; ZIP System Liquid Flash.
2. Hardness, Shore A, ASTM C 661: 40 to 45
3. Total Solids: 99 percent
4. Tensile Strength, ASTM D412: 75 psi.

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:
   1. ICC-ES 1539 or NES NER-272 for power-driven fasteners.
   2. Chapter 23 in ICC's "International Building Code."

D. Coordinate roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 WOOD SHEATHING PANEL INSTALLATION

A. General: Comply with applicable recommendations in American Wood Council, “ASD/LRFD Manual for Engineered Wood Construction,” 2012 edition for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:
   1. Roof Sheathing:
      a. Screw to cold-formed metal framing.
      b. Nail or staple to wood framing.
      c. Install fasteners 3/8 inch to 1/2 inch from panel edges.
      d. Space fasteners in compliance with requirements of authority having jurisdiction.

3.3 SHEATHING JOINT TREATMENT

A. Seal sheathing joints according to sheathing manufacturer's written instructions.
   1. Apply ZIP System proprietary seam tape to joints between sheathing panels.
   2. Utilize ZIP System tape gun or hard rubber roller provided by manufacturer to ensure tape is completely adhered to substrates.
   3. When using ZIP System Liquid Flash to seal sheathing joints, follow manufacturer’s recommendations for sealing panel seams.

3.4 FLEXIBLE OR LIQUID APPLIED FLASHING INSTALLATION

A. Apply ZIP System Tape flexible flashing or ZIP System Liquid Flash liquid applied flashing membrane where indicated to comply with manufacturer's written instructions.
   1. After flexible flashing tape has been applied, roll surfaces with a hard rubber to ensure that flashing is completely adhered to substrates.
   2. Width for Flexible Flashing: 6 inch.
   3. Apply liquid-applied flashing membrane at penetrations, gaps, and cracks to form continuous weathertight surface. Apply liquid membrane according to manufacturer’s written instructions. Follow manufacturer’s recommendation for integration with ZIP System Tape.

END OF SECTION

SECTION 230993

SEQUENCE OF OPERATION FOR HVAC

PART I. - GENERAL

A. RELATED DOCUMENTS:

1. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

2. Division-22 Basic Mechanical Materials and Methods sections apply to work of this section.

B. DESCRIPTION OF WORK:

1. Sequence of operation is hereby defined as the manner and method by which controls function. Requirements for each type of control system operation are specified in this section.

2. Operating equipment, devices, and system components required for control systems shall be provided as specified and required. Other controls integral with HVAC equipment are specified in other Division-23 sections of these specifications.

C. SUBMITTALS:

1. Shop Drawings: Submit shop drawings for each system automatically controlled, containing the following information:

   a. Schematic flow diagram of system showing heat pump units, fans, pumps, and control devices. Provide verbal description of sequence of operation.
   b. Label each control device with setting or adjustable range of control.

2. Maintenance Data: Include copy of shop drawings in each maintenance manual; in accordance with requirements of Division 1.

PART II. - PRODUCTS

A. THERMOSTATS

1. Space thermostats shall be from manufacturer of heat pump units.

B. CO2 SENSORS

1. Carbon dioxide sensor shall be stand-alone, duct mounted sensor with detectable range 0 to 2000 ppm, 3 percent accuracy, 35 second response time, greater than five year life. Provide with DPDT, 1/8 Hp, 5 amp, 240 V relay output. Sensor shall be Vulcain Model 90DM2, or approved equal.

2. Carbon dioxide sensor shall control fan to maintain space CO2 setpoint of 1000 ppm (adjustable). Provide all low voltage and line voltage wiring, transformers, relays, boxes, and fitting for a complete system.

C. HUMIDISTAT

1. Humidistat shall be Honeywell model H775A with duct sensor H7635B. Humidity controls shall have adjustable range of 5 to 95 percent relative humidity with +/- 3 percent accuracy. Humidistat shall be low voltage with 0.5 horsepower contact rating, and be UL listed. Humidistat shall have LCD display and keypad for programming and operation.

PART III. - EXECUTION

A. HEAT PUMP SYSTEM:

1. Individual heat pump indoor units, compressors and heating, cooling, and dehumidification modes shall be controlled automatically by their local programmable thermostat.

B. VENTILATION AND EXHAUST:

1. Energy recovery ventilators shall be have start/stop operation based on building occupancy. When building is occupied, ERV unit shall be ON and run continuously and dampers shall be open to provide room exhaust and mechanical outdoor air ventilation of spaces. When building lights are OFF, ERV shall be OFF and dampers closed.

2. Local toilet room lighting control shall control local exhaust fans. When lights are ON, fan shall be ON, and when lights are OFF, fan shall be OFF and dampers closed.

C. DEHUMIDIFIER

1. Duct mounted humidity sensor shall signal humidistat which shall energize dehumidifier whenever relative humidity is greater than 60 percent, adjustable. Humidity sensor shall be duct mounted at discharge or ERV-1 and upstream of dehumidifier connection.

2. Dehumidifier shall be Honeywell TrueDRY model DR120A2000, or equal. Dehumidifier shall have self contained, R410A vapor compression refrigeration in a single insulated housing. Dehumidifier capacity shall be 210 CFM with 120 pints per day moisture removal at 80F/60% relative humidity entering air. Dehumidifier shall be complete with centrifugal blower, MERV-11 air filter, refrigerant compressor, evaporator and condenser coils, expansion device, accumulator, and filter-drier. Unit shall have duct collar connections, access panels, and filter rack. Dehumidifier and controls shall have 5 year limited warranty.

END OF SECTION

SECTION 263214

OUTDOOR RESISTIVE LOAD BANK

PART I. - GENERAL

A. SCOPE

1. This specification contains the minimum requirements for the design, manufacture and testing of a UL listed, air-cooled, outdoor weatherproof resistive load bank.

2. The load bank is required for periodic exercising and testing of the (standby) emergency power source. The load bank shall be permanently mounted in a weatherproof enclosure, forced air cooled with remotely mounted control panel.

3. This specification shall apply if the load bank is supplied to the purchaser, or as a part of other equipment.

4. Should the vendor take exception to any part of this specification, it shall be stated in the bid, and referenced to the specification line number.

B. SUBMITTALS

1. The manufacturer shall submit for review technical data including features, performance, electrical characteristics, physical characteristics, ratings, accessories, and finishes.

2. Shop drawings shall include dimensional plans, front and side elevations and mounting details sufficient to properly install the load bank. Load bus configuration and load connections termination area shall be clearly identified.

3. Electrical schematic drawings shall be provided to detail the operation of the load bank and the provided safety circuits. Over-current protection and control devices shall be identified and their ratings marked. A system interconnection drawing shall be included for control wiring related to the load bank.

C. STANDARDS

1. The equipment covered by this specification shall be designed with the latest applicable NEMA, NEC, and ANSI standards.

2. The load bank shall be listed to UL Standard 508A.

PART II. - PRODUCTS

A. RATINGS

1. The total capacity of the load bank shall be rated 100 KW at 208 Volts, 3-Phase, 3-Wire, 60 Hertz, 278 Amps per Phase at unity Power Factor and 5 KW minimum load step resolution.

2. The load bank shall be designed for continuous duty cycle operation with no limitations. The load bank shall operate in an ambient temperature of -28°C to 49°C (-20°F to 120°F).

B. MATERIAL AND CONSTRUCTION

1. The load bank shall be outdoor weatherproof construction, suitable for installation on a concrete pad or structural base. All exterior fasteners shall be stainless steel. The load bank shall include forklift channels in the base for lifting.

2. The load bank shall be constructed of heavy gauge aluminized steel per ASTM A463. Aluminized steel provides superior corrosion protection and extended service life, with a better tolerance to high heat exposure compared to the more common Galvanized steel.

3. The main input load bus, load step relays, fuses and blower/control relays shall be located within the load bank enclosure. A thermostatically controlled heater shall be located within the control section to provide protection to the control devices from the effects of moisture and condensation.

4. Airflow throughout the load bank shall be horizontal. Intake openings shall be designed to prevent objects greater than 0.50″ diameter from entering the unit.

5. The load bank exhaust hood shall be angled downward. The exhaust hood shall be constructed of non-corrosive aluminized steel or aluminum.

6. The load bank enclosure shall have a baked polyester powder coated finish with a film thickness of 2.8 +/- 0.4 Mils per coat.

7. Load elements shall be contained in an integral resistor case. Resistors can be individually removed for inspection or service.

C. RESISTIVE LOAD ELEMENTS

1. Load elements shall be Avtron Helidyne™, helically wound chromium alloy rated to operate at approximately ½ of maximum continuous rating of wire. Elements must be fully supported across the entire length within the air stream by segmented ceramic insulators on stainless steel rods. Element supports shall be designed to prevent a short circuit to adjacent elements or to ground.

2. The change in resistance due to temperature shall be minimized by maintaining conservative watt densities.

3. The overall tolerance of the load bank shall be –0% to +5% KW at rated voltage. A –5%, +5% rating allows the load bank to deliver less than rated KW and shall not be used. The load bank must deliver full rated KW at rated voltage.

D. COOLING

1. The load bank shall be cooled by integral TEFC or TEAO motor(s) which is direct coupled to the cooling fan blade. The fan motor must be electrically protected against overload using a motor overload device and short circuit protected using three (3) current limiting fuses with an interrupting rating of 200K A.I.C.

2. The fan blade is to be an airfoil design constructed from aluminum or non-corroding material.

E. PROTECTIVE DEVICES

1. A differential pressure switch shall be provided to detect air loss. The switch shall be electrically interlocked with the load application controls to prevent load from being applied if cooling air is not present.

2. An over-temperature switch shall be provided to sense the load bank exhaust in the heater case assembly. The switch shall be electrically interlocked with the load application controls to remove load from being applied in the event of an over temperature condition.

3. To provide for major fault protection, branch fuses shall be provided on all three phases of

switched load steps above 50KW. Branch fuses shall be current limiting type with an interrupting rating of 200K A.I.C.

4. The exterior of the load bank shall have appropriate warning/caution statements on access panels.

F. CONTROL PANEL

1. The control panel shall be a remote 19″ rack mounted panel housed in a NEMA 4 type wall mount enclosure. The control panel shall contain the following manual controls and visual indicators:

   a. Power ON/OFF switch
   b. Blower START/STOP pushbuttons.
   c. Master load ON/OFF switch.
   d. Load step switches for ON/OFF application of individual load steps.
   e. Power ON indication light.
   f. Blower ON light.
   g. Blower/Air FAILURE light.
   h. OVERTEMPERATURE light.

2. A standard remote load dump circuit shall be provided as part of the load bank control circuit. Provisions shall be provided to remove the load bank off-line from the operation of a remote normally closed set of auxiliary contacts from a transfer switch or other device. In the event of the remote contact opening, all load is removed.

3. An Automatic Load Step Controller shall be provided for maintaining a minimum load on the generator set. The controller shall monitor the connected downstream loads and will automatically add or subtract load steps in response to building load changes as to maintain a minimum load level on the generator set. The controller includes an initial time-delay circuit, and automatic time delayed load step application circuit. A remote contact closure is required for activation and transfer of control. A separate current transformer shall be supplied loose for mounting and sensing of downstream loads.

PART III. - EXECUTION

A. DOCUMENTATION

1. Installation and operation manuals shall be provided with the equipment and shall include complete details for the installation, commissioning, operation, and maintenance of the load bank.

2. The manuals shall include the electrical schematic and interconnect drawings for the power and control wiring for the load bank and all control devices.

3. A complete parts list with part numbers, device identification, and rating shall be included in the manuals. The original manufacturers name and part number shall be included in the parts listing.

4. Two (2) sets of manuals shall be provided with the load bank.

B. QUALITY CONTROL

1. The load bank shall be fully tested using a test specification written by the supplier. Tests shall include electrical functional testing, verifying conformance to assembly drawings and specifications. Each load step shall be cold resistance checked to verify proper calibration of resistive load steps and proper ohmic value.

2. The manufacturer shall maintain this data on file for inspection purposes by the purchaser. Tests using high potential equipment shall be performed to ensure isolation of the load circuits from the control circuits and to determine isolation of the load circuits from the load bank frame. Tests of all safety circuits shall be performed to verify conformance to the specification.

3. All electrical circuits shall have a high potential insulation resistance test performed at twice rated voltage plus 1000 VAC to assure insulation integrity.

4. All quality control test equipment shall be regularly maintained and calibrated to traceable national standards.

5. The Company's Quality System shall be ISO9001 Certified.

C. QUALIFICATION OF MANUFACTURER

1. The load bank shall be manufactured by a firm regularly engaged in the manufacture of load banks and who can demonstrate at least twenty five (25) years experience with at least twenty five (25) installations of load banks similar or equal to the ones specified herein.

2. The manufacturer shall have a written Quality Control procedure available for review by the purchaser, which will document all phases of operations, engineering, and manufacturing.

3. Manufacturer must have a field service organization with service personnel having a minimum of an Associate Degree in Electrical Engineering.

4. The load bank shall be as manufactured by: Emerson Electric Avtron model, or approved equal.

END OF SECTION

SECTION 263213

ENGINE GENERATOR SET

PART I - GENERAL

1. 1 Scope of Work

A. It is the intent of this specification to secure an engine-driven generator set that has been prototype tested, factory built, production-tested, and site-tested together with all accessories necessary for a complete installation as shown on the plans and drawings and specified herein.

B. This section includes the following items from a single supplier:
1. Engine generator set.
2. Weather enclosure.
3. Related accessories as specified.

C. Any and all exceptions to the published specifications shall be subject to the approval of the Town of Berlin, architect, and engineer.

D. The power system shall be furnished by a single manufacturer who shall be responsible for the design, coordination, and testing of the complete system. The entire system shall be installed as shown on the plans, drawings, and specifications herein.

E. The equipment shall be produced by a manufacturer who has produced this type of equipment for a period of at least 10 years and who maintains a service organization available twenty-four hours a day throughout the year.

F. The equipment shall be produced by a manufacturer who is ISO 9001 certified for the design, development, production and service of its complete product line.

1. 2 General Requirements

A. It is the intent of this specification to secure a generator set system that has been tested during design verification, in production, and at the final job site. The generator set will be a commercial design and will be complete with all of the necessary accessories for complete installation as shown on the plans, drawings, and specifications herein. The equipment supplied shall meet the requirements of the National Electrical Code and applicable local codes and regulations.

B. All equipment shall be new and of current production by a national firm that manufactures the generator sets and controls, transfer switches, and switchgear, and assembles the generator sets as a complete and coordinated system. There will be one-source responsibility for warranty, parts, and service through a local representative with factory-trained servicemen.

1. 3 Submittal

A. The submittal shall include prototype test certification and specification sheets showing all standard and optional accessories to be supplied; schematic wiring diagrams, dimension drawings, and interconnection diagrams identifying by terminal number each required interconnection between the generator set, the transfer switch, and the remote annunciator panel if it is included elsewhere in these specifications.

B. Shop Drawings

C. Samples

1. 4 Codes and Standards

A. The generator set shall be listed to UL 2200 or submitted to an independent third party certification process to verify compliance as installed.

B. The power system shall be furnished by a single manufacturer who shall be responsible for the design, coordination, and testing of the complete system. The equipment shall be produced by a manufacturer who is ISO 9001 certified for the design, development, production, and service of its complete production line.

C. The generator set shall conform to the requirements of the following codes and standards:

1. CSA C22.2, No. 14-M91 Industrial Control Equipment.
2. EN50082-2, Electromagnetic Compatibility-Generic Immunity Requirements, Part 2: Industrial.
3. EN55011, Limits and Methods of Measurement of Radio Interference Characteristics of Industrial, Scientific and Medical Equipment.
4. IEC8528 part 4, Control Systems for Generator Sets.
5. IEC Std 61000-2 and 61000-3 for susceptibility, 61000-6 radiated and conducted electromagnetic emissions.
6. IEEE446 Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications.
7. NFPA 70, National Electrical Code, Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.
8. NFPA 99, Essential Electrical Systems for Health Care Facilities.
9. NFPA 110, Emergency and Standby Power Systems. The generator set shall meet all requirements for Level 1 systems. Level 1 prototype tests required by this standard shall have been performed on a complete and functional unit. Component level type tests will not substitute for this requirement.

1. 5 Testing

A. To ensure that the equipment has been designed and built to the highest reliability and quality standards, the manufacturer and/or local representative shall be responsible for three separate tests: design prototype tests, final production tests, and site tests.

B. Design Prototype Tests. Components of the emergency system, such as the engine/generator set, transfer switch, and accessories, shall not be subjected to prototype tests because the tests are potentially damaging. Rather, similar design prototypes and preproduction models shall be subject to the following tests:

1. Maximum power (kW).
2. Maximum motor starting (kVA) at 35% instantaneous voltage dip.
3. Alternator temperature rise by embedded thermocouple and/or by resistance method per NEMA MG1-32.6.
4. Governor speed regulation under steady-state and transient conditions.
5. Voltage regulation and generator transient response.
6. Harmonic analysis, voltage waveform deviation, and telephone influence factor.
7. Three-phase short circuit tests.
8. Alternator cooling air flow.
9. Torsional analysis to verify that the generator set is free of harmful torsional stresses.
10. Endurance testing.

C. Final Production Tests. Each generator set shall be tested under varying loads with guards and exhaust system in place. Tests shall include:

1. Single-step load pickup

2. Safety shutdown device testing
3. Rated Power @ 0.8 PF
4. Maximum power

D. Upon request, a witness test, or a certified test record sent prior to shipment.

E. Site Tests. The manufacturer's distribution representative shall perform an installation check, startup, and building load test. The engineer, regular operators, and the maintenance staff shall be notified of the time and date of the site test. The tests shall include:

1. Fuel, lubricating oil, and antifreeze shall be checked for conformity to the manufacturer's recommendations, under the environmental conditions present and expected.
2. Accessories that normally function while the set is standing by shall be checked prior to cranking the engine. These shall include: block heaters, battery chargers, alternator strip heaters, remote annunciators, etc.
3. Generator set startup under test mode to check for exhaust leaks, path of exhaust gases outside the building, cooling air flow, movement during starting and stopping, vibration during operation, normal and emergency line-to-line voltage and frequency, and phase rotation.
4. Automatic start by means of a simulated power outage to test remote-automatic starting, transfer of the load, and automatic shutdown. Prior to this test, all transfer switch timers shall be adjusted for proper system coordination. Engine coolant temperature, oil pressure, and battery charge level along with generator set voltage, amperes, and frequency shall be monitored throughout the test.

1. 6 Warranty and Maintenance

A. The generator set shall include a standard warranty covering one year or 2000 hours, whichever comes first, to guarantee against defective material and workmanship in accordance with the manufacturer's published warranty from date of startup.

B. The generator set manufacturer and its distributor shall maintain a 24-hour parts and service organization. This organization shall regularly engage in maintenance contract programs to perform preventive maintenance and service on equipment similar to that specified. A service agreement shall be available and shall include system operation under simulated operating conditions; adjustment to the generator set, transfer switch, and switchgear controls as required, and certification in the owner's maintenance log of repairs made and function tests performed on all systems.

PART II Equipment

2. 1 The generator set shall be a Kohler model 200REZXB with a 4UA10 alternator, or approved equal. It shall provide 200kW/250 kVA when operating at 120/208Y volts, 60 Hz, .8 power factor. The generator set shall be capable of a Standby 130°C rating while operating in an ambient condition of less than or equal to 77° F and a maximum elevation of 500 feet above sea level. The standby rating shall be available for the duration of the outage.

A. Motor starting performance and voltage dip determinations shall be based on the complete generator set. The generator set shall be capable of supplying 385 LRKVA for starting motor loads with a maximum instantaneous voltage dip of 35%, as measured by a digital RMS transient recorder in accordance with IEEE standard 115. Motor starting performance and voltage dip determination that does not account for all components affecting total voltage dip i.e. engine, alternator, voltage regulator and governor will not be acceptable. As such, the generator set shall be prototype tested to optimize and determine performance as a generator set system.

B. Vibration isolators shall be provided between the engine-alternator and heavy-duty steel base.

2. 2 Engine

A. The minimum 11.05 liter displacement engine shall deliver a minimum of 302 HP at a governed engine speed of 1800 rpm, and shall be equipped with the following:
   1. Electronic isochronous governor capable of 0.5% steady-state frequency regulation.
   2. 24-volt positive-engagement solenoid shift-starting motor.
   3. 45-ampere automatic battery charging alternator with a solid-state voltage regulation.
   4. Positive displacement, full-pressure lubrication oil pump, cartridge oil filters, dipstick, and oil drain.
   5. Dry-type replaceable air cleaner elements for normal applications.
   6. The engine shall be turbocharged and shall be fueled by natural gas.
   7. The engine shall have a minimum of 6 cylinders and be liquid-cooled by Unit Mounted Radiator 122°F/50°C.

B. The generator must accept rated load in one step.

2. 3 Cooling System

A. The engine shall be liquid-cooled by a closed loop, unit mounted radiator rated to operate the generator set at full load at an ambient temperature of 50 degrees C (122 degrees F). The radiator fan and other rotating engine parts shall be guarded against accidental contact.

2. 4 Battery

A. Each genset requires a BCI group 31 batteries which must meet the engine manufactures' specifications for the ambient conditions specified in Part 1 Project Conditions and shall comply with the NFPA requirements for engine cranking cycles. Each battery shall be rated according to SAE Standards J-537 with a minimum cold cranking amp of 950 amps and a minimum reserve capacity of 185 Minutes at 80F. The battery plates shall be constructed of a Calcium-Lead alloy to provide long waterless operation and extended battery life. The battery elements must be anchor-locked with full-frame grids and tight-packed commercial plates to resist the effects of vibration. The battery must contain a handle to aid in lifting and the case must be constructed of polypropylene to resist breakage and extend service life. Removable cell covers shall be provided to allow for checking of electrolyte specific gravity.

B. Battery rack and battery cables capable of holding the manufacturer's recommended batteries shall be supplied.

2. 5 Alternator

A. The alternator shall be salient-pole, brushless, 2/3-pitch, with 4 bus bar provisions for external connections, self-ventilated with drip-proof construction and amortisseur rotor windings and skewed for smooth voltage waveform. The ratings shall meet the NEMA standard (MG1-32.40) temperature rise limits. The insulation shall be class H per UL1446 and the varnish shall be a vacuum pressure impregnated, fungus resistant epoxy. Temperature rise of the rotor and stator shall be limited to Standby 130°C. The PMG based excitation system shall be of brushless construction controlled by a digital, three phase, solid- state voltage regulator capable of maintaining voltage within ±0.25% at any constant load from 0% to 100% of rating. The AVR shall be capable of proper operation under severe nonlinear loads and provide individual adjustments for voltage range, stability and volts-per-hertz operations. The AVR shall be protected from the environment by conformal coating. The waveform harmonic distortion shall not exceed 5% total RMS measured line-to-line at full rated load. The TIF factor shall not exceed 50.

B. The alternator shall have a maintenance-free bearing, designed for 40000 hour B10 life. The alternator shall be directly connected to the flywheel housing with a semi-flexible coupling between the rotor and the flywheel.

C. The generator shall be inherently capable of sustaining at least 300% of rated current for at least 10 seconds under a 3-phase symmetrical short circuit without the addition of separate current-support devices.

D. Motor starting performance and voltage dip determinations shall be based on the complete generator set. The generator set shall be capable of supplying 590.00 LRKVA for starting motor loads with a maximum instantaneous voltage dip of 35%, as measured by a digital RMS transient recorder in accordance with IEEE Standard 115. Motor starting performance and voltage dip determination that does not account for all components affecting total voltage dip, i.e., engine, alternator, voltage regulator, and governor will not be acceptable. As such, the generator set shall be prototype tested to optimize and determine performance as a generator set system.

2. 6 Controller

A. Decision Maker® 3000 Generator Set Controller, or approved equal.

1. The generator set controller shall be a microprocessor based control system that will provide automatic starting, system monitoring and protection. The controller system shall also provide local monitoring and remote monitoring. The control system shall be PC based and provide updating of all necessary parameters, firmware and software.
2. The controller shall be mounted on the generator set and shall have integral vibration isolation. The controller shall be prototype and reliability tested to ensure operation in the conditions encountered.
3. Codes and Standards
   a. The generator set controller shall meet NFPA 110 Level 1 requirements and shall include an integral alarm horn as required by NFPA.
   b. The controller shall meet NFPA 99 and NEC requirements.
   c. The controller shall be UL 508 listed.

B. The generator set controller shall include the following features and functions:

1. Push button Master Control buttons. The buttons shall be tactile-feel membrane with an indicator light to initiate the following functions:
   a. Run Mode: When in the run mode the generator set shall start as directed by the operator.
   b. Off/Reset Mode: When in the Off/Reset mode the generator set shall stop, the reset shall reset all faults, allowing for the restarting of the generator set after a shutdown.
   c. Auto Mode: When in Auto the mode the generator set shall be ready to accept a signal from a remote device.
2. Emergency Stop Switch. The remote stop switch shall be red in color with a "mushroom" type head. Depressing the stop button will immediately stop the generator set and lockout the generator set for any automatic remote starting.
3. Push Button/Rotary Selector dial. This dial shall be used for selection of all Menus and sub-menus. Rotating the dial moves you through the menus, pushing the dial selects the menu and function/features in that menu. Pushing the button selects the feature/function and sub-menus.
4. Digital Display. The digital display shall be alphanumeric, with 2 lines of data and approximately 24 charters. The display shall have back lighting for ease of operator use in high and low light conditions. The display shall display status of all faults and warnings. The display shall also display any engine faults. While the generator set is running the display shall scroll all important information across the screen for ease of operator use. The scroll can be stopped by pushing the rotary dial. The display shall fall asleep when the generator set is not running and will wake-up when the generator set starts or the rotary dial is depressed.
5. Fault Light. The controller shall have an annunciator fault light that glows red for faults and yellow for warnings. These faults and warnings shall be displayed in the digital display. The fault light will also glow yellow when not in AUTO.
6. Alarm Horn. The controller shall provide an alarm horn that sounds when any faults or warnings are present. The horn shall also sound when the controller is not in the AUTO mode.

7. Alarm Silence/Lamp Test Button. When this button is depressed it shall test all controller lamps. This button will also silence the alarm horn when the unit is not AUTO.
8. USB Connection. The controller shall have a USB connection on the face of the controller. This connection shall allow for updating of all software and firmware. This port shall also allow for all servicing of generator set parameters, fault diagnostics and viewing of all controller information via use a laptop computer.
9. Dedicated user inputs. The controller shall have dedicated inputs for remote emergency stop switch, remote 2 wire star for transfer switch and auxiliary shutdown.
10. The controller shall have auto resettable circuit protection integral on the circuit board.
11. The generator controller shall display and monitor the following engine and alternator functions and allow adjustments of certain parameters at the controller:

    a. Automatic restart - the controller has automatic restart feature which initiates the start routine and re-crank after a failed start attempt.
    b. Cyclic cranking - the controller shall have programmable cyclic cranking
    c. Engine starting aid - the controller shall have the capability of providing control for an optional engine starting aid.

12. The control system shall include time delays for engine start and cool down.
13. The control system shall interface with the engine ECM and display engine fault codes and warnings. The ECM shall also include sender failure monitoring to help distinguish between failed senders and actual failure conditions.
14. The controller shall monitor and display engine governor functions with include steady state and transient frequency monitoring.

C. Controller Engine control features and functions

1. Automatic restart - the controller has automatic restart feature that initiates the start routine and re-crank after a failed start attempt.
2. Cyclic cranking - the controller shall have programmable cyclic cranking
3. Engine starting aid - the controller shall have the capability of providing control for an optional engine starting aid.
4. The control system shall include time delays for engine start and cool down.
5. The control system shall interface with the engine ECM and display engine fault codes and warnings. The ECM shall also include sender failure monitoring to help distinguish between failed senders and actual failure conditions.
6. The controller shall monitor and display engine governor functions with include steady state and transient frequency monitoring

D. Controller Alternator control features and functions

1. Integrated hybrid voltage regulator. The system shall have integral microprocessor based voltage regulator system that provides +/- 5% voltage regulation, no-load to full load with three phase sensing. The system is prototype tested and control variation of voltage to frequency. The voltage regulator shall be adjustable at the controller with maximum +/- 10% adjustable of nominal voltage.
2. AC output voltage regulator adjustment. The system shall allow for adjustment of the integral voltage regulator with maximum of +/- 10% adjustment of the system voltage.
3. Alternator thermal overload protection. The system shall have integral alternator overload and short circuit protection matched to each alternator for the particular voltage and phase configuration.
4. Power metering. The controller digitally displays power metering of kW and Kva.

E. Other control features and functions

1. Event logging. The controller keeps a record of up to 1000 events, for warning and shutdown faults. This fault information becomes a stored record of systems events and can be reset.
2. Historical data logging. The controller total number of generator set successful start shall be recorded and displayed.
3. Programmable access. The control system shall include a USB port that gives service technicians the ability to provide software and firmware upgrades. The system shall also be capable of allowing setting of all critical parameters using the service software and a laptop computer. All parameters and setting should be capable to being stored on a laptop for future upgrades of printing for analysis.
4. Generator Set Warning, Shutdown Alarm and Status

    a. The generator set shall have alarms and status indication lamps that show non-automatic status and warning and shutdown conditions. The controller shall indicate with a warning lamp and or alarm and on the digital display screen any shutdown, warning or engine fault condition that exists in the generator set system. The following alarms and shutdowns shall exist as a minimum: All engine functions, all generator functions, common faults, warnings and alarms.

F. Communications

1. The generator set engine shall be equipped with an ECM (engine control module), the controller shall communicate with the ECM for control, monitoring, diagnosis, and meet SAE J1939 standards
2. Kohler proprietary RBUS communication shall be available.
3. A RBUS shall be able to monitor and alter parameters, and start or stop a generator.
4. The controller shall have the capability to communicate to a personal computer (IBM or compatible). Provide appropriate application software of selection by Town of Berlin.
5. A variety of connections shall be available based on requirements. Provide as required:
    a. A single control connection to a PC via USB
    b. Internet connection via Ethernet
6. Generator and transfer switch controls shall be equipped with communications modules capable of connecting to the same communication network.

G. Generator Remote Monitoring and other devices

1. Remote annunciator. Shall provide a minimum of 20 light remote annunciator panel for monitoring generator set conditions conveniently by facility personnel. The annunciator shall provide audible and visual alarms that meet NFPA 110 level 1 system requirements. The device shall have warnings for high/low battery voltage, battery charger failure and spare alarms for user defined inputs. The device shall have an area to identify the system device. Lamp test and alarm silence buttons will be provided. Alarm horn shall work in accordance with NFPA 110. The device shall also have the capability of annunciating Transfer Switch functions and have a key switch for testing of the automatic transfer switch. The annunciator shall also have a USB port for the upgrading of software, firmware and for allowing service personnel to change device parameters.
2. Inputs and Outputs. The controller shall have relay outputs and digital and analog inputs standard on the board. Also provide additional inputs and outputs via remote board that connects to the genset controller and provides optional connections for customer devices.

2. 7 Accessories

A. Battery Charger. A 10-ampere automatic float to equalize battery charger capable of charging both lead-acid batteries with the following features:

1. Automatic 3-stage float to equalization charge
2. Voltage regulation of 1% from no to full load over 10% AC input line voltage variations
3. Battery charging current Ammeter and battery voltage voltmeter with 5% full-scale accuracy
4. LED lamp for power ON indication
5. Current limited during engine cranking, short circuit, and reverse polarity conditions
6. Temperature compensated for ambient temperatures for -40°C to 60°C
7. Alarm circuit board featuring alarm contacts for low battery voltage, high battery voltage, and battery charger malfunction.
8. UL 1012 Listed

B. Battery Rack and Cables. Battery rack and battery cables capable of holding the manufacturer's recommended batteries shall be supplied.

C. The generator shall be furnished with an externally mounted, recessed, emergency stop switch (break glass, pushbutton style) protected from accidental operation.

D. The generator shall be supplied with a thermostatically controlled strip heater to prevent the accumulation of moisture and dampness and to maintain the stator windings above the dew point. The heater shall be wired to be “on” at all times that the generator set is not operating.

E. The generator set shall be provided with a run relay which shall provide a three-pole, double-throw relay with 10-amp/ 250 VAC contacts to indicate that the generator is running. The run relay dry contacts can be used for energizing or de-energizing customer devices while the generator is running (e.g. louvers, indicator lamps, etc.)

F. Generator Overcurrent and Fault Protection:

1. The generator shall be provided with a factory installed, 100% rated line circuit breaker rated at 600.00 amperes that is UL489 listed. Line circuit breakers shall be sized for the rated ampacity of the loads served by the breaker per the NEC.
2. Load side lugs shall be provided from the factory. The line circuit breaker shall include auxiliary contacts, shunt trip, undervoltage trip, alarm switch, and overcurrent switch functionality. Load side breaker connections made at the factory shall be separated from field connections.
3. The shunt trip device shall be connected to trip the generator breaker when the generator-set is shut down by other protective devices.
4. When GFI is required per the NEC, additional neutrals shall be factory installed, and the alarm indication shall be integrated with the generator-set alarms.
5. The circuit breaker(s) shall incorporate an electronic trip device with the following characteristics: Adjustable long time delay, adjustable short time delay, and instantaneous.

G. Barriers to provide segregation of wiring from an emergency source to emergency loads from all other wiring and equipment, if required by the NEC, shall be provided.

H. Flex Exhaust Tube. The exhaust piping shall be gas proof, seamless, stainless steel, flexible exhaust bellows with threaded NPT connection.

I. Remote Annunciator Panel. The remote annunciator shall meet NFPA 110, Level 1 requirements and enable remote viewing of the generator status. The panel shall be connected to the generator controller via either network communication wires or via hard wired connections. Options shall be available to provide ATS source position, loaded test,

and retransfer. The panel shall have the capability to be either flush- mounted or surface-mounted. The annunciator shall meet UL508 requirements.

J. The controller must have the capability to communicate to a personal computer (IBM or compatible) running Windows '9X, Windows XT, Windows 7, Windows 8, or Windows NT.

K. Run Relay. The run relay shall provide a three-pole, double-throw relay with 10-amp/ 250 VAC contacts to indicate that the generator is running. The relay provides three sets of dry contacts for energizing or deenergizing customer devices while the generator is running (e.g. louvers, indicator lamps, etc.)

L. Standard Air Cleaner. The air cleaner shall provide engine air filtration which meets the engine manufacturer's specifications under typical operating conditions.

M. 2 Input/5 Output Module. The 2 Input/5 Output Module kit provides two additional analog inputs and 5 additional dry contact outputs. The analog inputs can be used for analog or digital input functions. They can be set up for 0-5VDC, ±3VDC resistive or relay contact sensor devices. The dry contact outputs are arranged as two 120VAC or 28VDC, 10A from C contacts and three 28VDC, 2A form C contacts. Input and output functions are user defined using Site Tech software.

N. Block Heater. The block heater shall be thermostatically controlled and sized to maintain manufacturers recommended engine coolant temperature to meet the start-up requirements of NFPA 99 and NFPA 110, Level 1.

O. Supply flexible fuel lines to provide a flexible connection between the engine fuel fittings and the fuel supply tank piping and for the fuel return lines from the injector pump per engine manufacturer's recommendations. Flex line shall have a protective steel wire braid to protect the hose from abrasion.

P. Sound Enclosure

1. The generator set shall be supplied with a Level 2 Sound Attenuated Enclosure, providing a sound pressure of 71 dB(A) while the generator is operating at 100% load at 7 meters (23 feet) – free field – using acoustic insulation and acoustic-lined inlet hoods, constructed from high strength, low alloy 14 gauge galvanized steel. The acoustic insulation used shall meet UL 94 HF1 flammability classification. The enclosure shall be manufactured from bolted panels to facilitate service, future modifications, or field replacement. The enclosure shall use external vertical air inlet and outlet hoods with 90 degree angles to discharge air up and reduce noise. The enclosure shall have an integral rodent guard and skid end caps and shall have bracing to meet 241 kph (150 mph) wind loading.
2. The enclosure components and skid shall be cleaned with a two-stage alkaline cleaning process to remove grease, grit, and grime from parts. Components shall then be subjected to a Zirconium-based conversion coating process to prepare the metal for electrocoat (e-coat) adhesion. All enclosure parts shall receive an 100% epoxy primer electrocoat (e-coat) with high-edge protection. Following the e-coat process, the parts shall be finish coated with powder baked paint for superior finish, durability, and appearance with a Power ArmorTM industrial finish that provides heavy duty durability in harsh conditions, and is fade-, scratch- and corrosion-resistant.
3. The enclosure must surpass a 3,000 hour salt spray corrosion test per ASTM B-1117.
4. Enclosures will be finished in the manufacturer's standard color.
5. The enclosures shall allow the generator set to operate at full load in an ambient temperature of 50°C with no additional derating of the electrical output of the generator set.
6. Enclosures shall be equipped with sufficient side and end doors to allow access for operation, inspection, and service of the unit and all options. Minimum

requirements are two doors per side. When the generator set controller faces the rear of the generator set, an additional rear facing door is required. Access to the controller and main line circuit breaker shall meet the requirements of the National Electric Code.

7. Doors shall be fitted with hinges, hardware, and the doors shall be removable.
8. Doors shall be equipped with lockable latches. Locks shall be keyed alike. Door locks shall be recessed to minimize potential of damage to door/enclosure.
9. A duct between the radiator and air outlet shall be provided to prevent re-circulation of hot air.
10. The complete exhaust system shall be internal to the enclosure.
11. The critical silencer shall be fitted with a tailpipe and rain cap.

END OF SECTION

SECTION 263223

AUTOMATIC TRANSFER SWITCH

PART I - GENERAL

1. 1 SCOPE OF WORK

A. Furnish and install service entrance rated automatic transfer switch system with 3-Pole/4-Wire, Solid Neutral (T), 600 Amps, 208 Volt-60Hz ©. Automatic transfer shall consist of an inherently double throw power transfer switch mechanism and a microprocessor controller to provide automatic operation. All transfer switches and controllers shall be the products of the same manufacturer.

1. 2 SUMMARY

A. This section includes the following items from a single supplier:

1. Automatic transfer switch
2. Related Accessories as specified

B. Related Requirements

1. It is the intent of this specification to secure an automatic transfer switch that has been prototype tested, factory built, production-tested, and site-tested together with all accessories necessary for a complete installation as shown on the plans and drawings and specified herein.
2. Any exceptions to the published specifications shall be subject to the approval of the engineer and submitted minimum 10 days prior to the closing of the bid with a line by line summary description of all the items of compliance, any items that have been are omitted or have been taken exception to, and a complete description of all deviations.
3. It is the intent of this specification to secure an automatic transfer switch that has been tested during design verification, in production, and at the final job site. The automatic transfer switch will be a commercial design and will be complete with all of the necessary accessories for complete installation as shown on the plans, drawings, and specifications herein. The equipment supplied shall meet the requirements of the National Electrical Code and applicable local codes and regulations.
4. All equipment shall be new and of current production by an international, power system manufacturer of generators, transfer switches, and paralleling switchgear. The manufacturer shall be a supplier of a complete and coordinated system. There will be single-source responsibility for warranty, parts, and service through a factory-authorized representative with factory-trained technicians.

1. 3 CODES AND STANDARDS

A. Automatic transfer switches and controls shall conform to the requirements of:

1. UL 1008 - Standard for Transfer Switch Equipment

2. IEC 947-6-1 Low-voltage Switchgear and Control gear; Multifunction equipment; Automatic Transfer Switching Equipment

3. NFPA 70 - National Electrical Code.

4. NFPA 110 - Emergency and Standby Power Systems

5. IEEE Standard 446 - IEEE Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications

6. NEMA Standard ICS 10-2005, Electromechanical AC Transfer Switch Equipment

7. EN61000-4-4 Fast Transient Immunity Severity Level 4

8. EN61000-4-5 Surge Immunity Class 4 (voltage sensing and programmable inputs only)

9. IEEE 472 (ANSI C37.90A) Ring Wave Test

10. IEC Specifications for EMI/EMC Immunity (CISPR 11, IEC 1000-4-2, IEC 1000-4-3, IEC 1000-4-4, IEC 1000-4-5, IEC 1000-4-6, IEC 1000-4-8, IEC 1000-4-11)

1. 4 SUBMITTALS

A. Product Data

1. The submittal shall include specification sheets showing all standard and optional accessories to be supplied; schematic wiring diagrams, dimension drawings, and interconnection diagrams identifying by terminal number each required interconnection between the generator set, the transfer switch, and the remote annunciator panel if it is included elsewhere in these specifications.

2. Shop Drawings

3. Samples

4. Close Out Documents

a. Maintenance Contracts
b. Operation And Maintenance Data
c. Spare Parts and Tools
d. Bonds
e. Warranty Documentation
f. Record Documentation
g. Software

PART II PRODUCTS

2. 1 Automatic transfer switches shall be Service Entrance - Programmed Transition KOHLER KEP-DCTA-0600SNK, or approved equal. Any alternate shall be submitted for approval to the consulting engineer at least 10 days prior to bid date. Alternate bids shall include a line-by-line clarification of the specification marked with "D" for deviation; "E" for exception, and "C" for comply.

A. The automatic transfer switch shall be produced by a manufacturer who is ISO 9001 certified for the design, development, production and service of its complete product line.

B. A manufacturer who has produced this type of equipment for a period of at least 10 years and who maintains a service organization available twenty-four hours a day throughout the year shall produce the automatic transfer switch.

C. The automatic transfer switch shall be furnished by a single manufacturer who shall be responsible for the design, coordination, and testing of the complete system. The entire system shall be installed as shown on the plans, drawings, and specifications herein.

D. The manufacturer shall maintain a national service organization of employing personnel located throughout the contiguous United States. The Service center's personnel must be factory trained and must be on call 24 hours a day, 365 days a year.

E. The manufacturer shall maintain records of each switch, by serial number, for a minimum of 20 years.

2. 2 WARRANTY

A. The ATS shall include a standard warranty covering one (1) year to guarantee against defective material and workmanship in accordance with the manufacturer's published warranty from the date of initial startup.

B. The ATS manufacturer and its distributor shall maintain a 24-hour parts and service organization. This organization shall regularly engage in maintenance contract programs to perform preventive maintenance and service on equipment similar to that specified. A service agreement shall be available and shall include system operation under simulated operating conditions; adjustment to the generator set, transfer switch, and switchgear controls as required, and certification in the owner's maintenance log of repairs made and functional tests performed on all systems.

2. 3 ENCLOSURE

A. The ATS shall be furnished in a NEMA 1 enclosure.

B. All standard door mounted switches and indicating LEDs shall be integrated into a flush-mounted, interface membrane or equivalent in the enclosure door for easy viewing & replacement. The panel shall be capable of having a manual locking feature to allow the user to lockout all membrane mounted control switches to prevent unauthorized tampering. This cover shall be mounted with hinges and have a latch that may be padlocked. The membrane panel shall be suitable for mounting by others when furnished on open type units.

2. 4 Controller Display and Keyboard

A. A four line, 20 character LCD display and dynamic 4 button keypad shall be an integral part of the controller for viewing all available data and setting desired operational parameters. Operational parameters shall also be available for viewing and control through the communications interface port or USB. The following parameters shall only be adjustable via a password protected programming on the controller:

1. Nominal line voltage and frequency
2. Single or three phase sensing
3. Operating parameter protection
4. Transfer operating mode configuration (Standard transition, Programmed transition, or Closed transition)

2. 5 Voltage Frequency and Sensing

A. Voltage (all phases) and frequency on both the normal and emergency sources shall be continuously monitored, with the following pickup, dropout, and trip setting capabilities (values shown as % of nominal unless otherwise specified):

Parameter	Dropout/Trip	Pickup/Reset
Under voltage	75 to 98%	85 to 100%
Over voltage	106 to 135%	95 to 100% of trip

Under frequency	95 to 99%	80 to 95%
Over frequency	101 to 115%	105 to 120%
Voltage unbalance	5 to 20%	3 to 18%

B. Repetitive accuracy of all settings shall be within ± 0.5% over an operating temperature range of -20°C to 70°C.

C. An adjustable dropout time for transient voltage and frequency excursions shall be provided. The time delays shall be 0.1 to 9.9 seconds for voltage and .1 to 15 seconds for frequency.

D. Voltage and frequency settings shall be field adjustable in 1% increments either locally with the display and keypad, remotely via the communications interface port or USB.

E. The controller shall be capable of sensing the phase rotation of both the normal and emergency sources. The source shall be considered unacceptable if the phase rotation is not the preferred rotation selected (ABC or BAC). Unacceptable phase rotation shall be indicated on the LCD; the service required LED and the annunciation through the communication protocol and dry contacts. In addition, the phase rotation sensing shall be capable of being disabled, if required.

F. The controller shall be capable of detecting a single phasing condition of a source, even though a voltage may be regenerated by the load. This condition is a loss of phase and shall be considered a failed source.

G. Source status screens shall be provided for both normal & emergency to provide digital readout of voltage on all 3 phases (phase to phase and phase to neutral), frequency, and phase rotation.

2. 6 Time Delays

A. An adjustable time delay of 0 to 6 seconds shall be provided to override momentary normal source outages and delay all transfer and engine starting signals. Capability shall be provided to extend this time delay to 60 minutes by providing an external 12 or 24 VDC power supply.

B. A time delay shall be provided on transfer to the emergency source, adjustable from 0 to 60 minutes, for controlled timing of transfer of loads to emergency.

C. A time delay shall be provided on re-transfer to normal. The time delays shall be adjustable from 0 to 60 minutes. Time delay shall be automatically bypassed if the emergency source fails and the normal source is acceptable.

D. A time delay shall be provided on shut down of engine generator for cool down, adjustable from 0 to 60 minutes.

E. A time delay activated output signal shall also be provided to drive external relay(s) for selective load disconnect and reconnect control. The controller shall be capable of controlling a maximum of 9 individual output time delays to step loads on after a transfer occurs. Each output may be individually programmed for their own time delay of up to 60 minutes. Each sequence shall be independently programmed for transferring from normal to emergency and transferring from emergency to normal. The controller shall also include the following built-in time delays for the following operations:

1. 0 to 60 minute time delay on failure to acquire the acceptable electrical parameters from the emergency source.
2. 10 seconds to 15 minute time delay for a failure to synchronize on an in-phase operation.

F. All time delays shall be adjustable in 1 second increments.

G. All time delays shall be adjustable by using the display and keypad, with a remote device connected to the communications interface port or USB.

H. Each time delay shall be identified and a dynamic countdown shall be shown on the display. Active time delays can be viewed with a remote device connected to the communications interface port or USB.

I. A time delay shall be provided to delay the transfer while in the OFF position. The time delays shall be adjustable from 1 second to 60 minutes.

2. 7 Test and Certifications

A. Upon request, the manufacturer shall provide a notarized letter certifying compliance with all of the requirements of this specification including compliance with the above codes and standards. The certification shall identify, by serial number(s), the equipment involved. No exceptions to the specifications, other than those stipulated at the time of the submittal, shall be included in the certification.

B. The ATS manufacturer shall be certified to ISO 9001 International Quality Standard and the manufacturer shall have third party certification verifying quality assurance in design/development, production, installation and servicing in accordance with ISO 9001.

2. 8 Service Representation

A. The manufacturer shall maintain a national service organization of employing personnel located within 60 mile radius of the site. The service center's personnel must be factory trained and must be on call 24 hours a day, 365 days a year.

B. The manufacturer shall maintain records of each switch, by serial number, for a minimum of 20 years.

2. 9 Additional Features

A. The controller shall have 3 levels of security. Level 1 shall allow monitoring of settings and parameters only. The Level 1 shall be capable of restricted with the use of a lockable cover. Level 2 shall allow test functions to be performed and Level 3 shall allow setting of all parameters.

B. The display shall provide for the test functions, allowed through password security. The test function shall be load, no load or auto test. The auto test function shall request an elapsed time for test. At the completion of this time delay the test shall be automatically ended and a retransfer sequence shall commence. All loaded tests shall be immediately ended and retransfer shall occur if the emergency source fails and the normal source is acceptable.

C. A contact closure shall be provided for a low-voltage engine start signal. The start signal shall prevent dry cranking of the engine by requiring the generator set to reach proper output, and run for the duration of the cool down setting, regardless of whether the normal source restores before the load is transferred.

D. Auxiliary contacts shall be provided consisting of a minimum of two contacts, closed when the ATS is connected to the normal source and two contacts closed, when the ATS is connected to the emergency source.

E. LED indicating lights shall be provided; one to indicate when the ATS is connected to the normal source (green) and one to indicate when the ATS is connected to the emergency source (red).

F. LED indicating lights shall be provided and energized by controller outputs. The lights shall provide true source availability of the normal (green) and emergency sources (red), as determined by the voltage, frequency and phase rotation sensing trip and reset settings for each source.

G. A membrane switch shall be provided on the membrane panel to test all indicating lights and display when pressed.

H. Provide the ability to select “commit/no commit to transfer" to determine whether the load should be transferred to the emergency generator if the normal source restores before the generator is ready to accept the load.

I. Terminals shall be provided for a remote contact which opens to signal the ATS to transfer to emergency and for remote contacts which closes to inhibit transfer to emergency and/or retransfer to normal. Both of these inhibit signals can be activated through the keypad, communications interface port or USB. A “not-in-auto" LED shall indicate anytime the controller is inhibiting transfer from occurring.

J. An in-phase monitor shall be a standard feature in the controller. The monitor shall control transfer so that motor load inrush currents do not exceed normal starting currents, and shall not require external control of power sources. The in-phase monitor shall be specifically designed for and be the product of the ATS manufacturer. The in-phase monitor shall be capable of being enabled or disabled from the user interface, communications interface port or USB.

K. The programmed transition feature shall control the transfer so that mechanism is placed in a load disconnect position for an adjustable period of time, giving motor and transformer loads an opportunity to decay to acceptable levels. The programmed transition feature shall be specifically designed for and be the product of the ATS manufacturer. The programmed transition setting shall be capable of being enabled or disabled from the user interface, communications interface port or USB. The controller shall include a built-in time delay for programmed transition operation. This time shall be adjustable from the user interface. The default value shall be 1 second and shall be adjustable from 0 to 60 minutes.

L. A prime power run sequence shall be available to allow the controller to sequence the usage of each generator, when each source connected to the ATS is a generator. The use shall be able to set the duration of the run time for each generator from the user interface.

M. A time based load control feature shall be available to allow the prioritized addition and removal of loads based during transfer. This feature may be enabled for either or both sources. The user shall be able to control up to nine loads with independent timing sequences for pre and post transfer delays in either direction of transfer.

N. A current based load control feature shall be available to allow the prioritized addition and removal of loads based on the measured current through the transfer switch. This feature maybe enabled for either or both sources and shall incorporate high and low set points for both sources. The user shall be able to designate up to nine outputs for current based load control. Adjustable time delays shall be available to prevent changes in outputs for momentary current variations.

O. The controller shall provide 2 inputs for external controls that can be programmed from the following values:

-Common fault -Remote test
-Inhibit transfer -Low battery voltage
-Service disconnect (Service Entrance only) -Time delay bypass
-Bypass contactor disable (Bypass only) -Three source system disable
-Load shed forced to OFF position (Programmed transition only) -Peak shave

The controller shall provide two form "C" contact outputs rated for up to 12A @ 240VAC @ 480VAC that can be programmed from the following values:

-Aux switch open -Transfer switch aux contact fault
-Alarm silenced -Alarm active
-I/O communication loss -Contactor position
-Exercise active -Test mode active
-Fail to transfer -Fail to acquire standby source

-Source available -Phase rotation error
-Not in automatic mode -Common law
-In phase monitor sync -Load bank control active
-Load control active -Maintenance mode active
-Non-emergency transfer -Fail to open/close
-Loss of phase -Over/under voltage
-Over/under frequency -Voltage unbalance
-Start signal -Peak shave active
-Preferred source supplying load -Standby source supplying load
-Fail to acquire preferred source -Three source system disable

The controller shall be capable of expanding the number of inputs and outputs with additional modules.

-Optional input/output modules shall be furnished which mount on the inside of the enclosure to facilitate ease of connections.

P. *Engine Exerciser* - The controller shall provide an internal engine exerciser. The engine exerciser shall allow the user to program up to 21 different exercise routines based on a calendar mode. For each routine, the user shall be able to:

1. Enable or disable the routine
2. Enable or disable transfer of the load during routine
3. Set the start time
4. Time of day, day of week, week of month (1st, 2nd, 3rd, 4th, alternate or every)
5. Set the duration of the run
6. At the end of the specified loaded exercise duration the switch shall transfer the load back to normal and run the generator for the specified cool down period. All loaded exercises shall be immediately ended and retransfer shall occur if the standby source fails. The next exercise period shall be displayed on the main screen with the type of exercise, time, and date. The type of exercise and the time remaining shall be displayed when the exercise is active. It shall be possible of ending the exercise event with a single button push.

Q. *Date and time* - The date shall automatically adjust for leap year and the time shall have the capability of automatically adjusting for daylight saving and standard times.

R. Systems Status - The controller shall have a default display the following on:

1. System status
2. Date, time and type of the next exercise event
3. Average voltage of the preferred and standby sources
4. Scrolling through the displays shall indicate the following:

   a. Line of line and lone to neutral voltages for both sources
   b. Frequency of each source
   c. Load current for each phase
   d. Single or three phase operation
   e. Type of transition
   f. Preferred source
   g. Commit or no commit modes of operation
   h. Source/source mode
   i. In phase monitor enable/disable
   j. Phase rotation
   k. Date and time

S. Controllers that require multiple screens to determine system status or display “coded" system status messages, which must be explained by references in the operator’s manual, are not permissible.

T. *Self Diagnostics* - The controller shall contain a diagnostic screen for the purpose of detecting system errors. This screen shall provide information on the status input signals to the controller which may be preventing load transfer commands from being completed.

U. *Communications Interface* - The controller shall be capable of interfacing through standard communications with a network of transfer switches and generators. It shall be able to be connected via an RS-485 serial communication (up to 4000 ft. direct connect or multi-drop configuration) and an Ethernet connectivity (over standard 10baseT Ethernet networks utilizing a RJ-45 port or remotely utilizing a dial-up modem). This module shall allow for seamless integration of existing or new communication transfer devices and generators.

V. The transfer switch shall also be able to interface to 3rd party applications using Modbus RTU and Modbus TCP/IP open standard protocols utilizing Modbus register maps. Proprietary protocols shall not be acceptable.

W. The controller shall contain a USB port for use with a software diagnostic application available to factory authorized personnel for downloading the controller's parameters and settings; exercise event schedules; maintenance records and event history. The application can also adjust parameters on the controller.

X. *Data Logging* - The controller shall have the ability to log data and to maintain the last 2000 events, even in the event of total power loss. The following events shall be time and date stamped and maintained in a non-volatile memory. The controller shall be able to display up to the last 99 events. The remaining events shall be accessible via the communications interface port or USB.

1. Event Logging Data, date and time indication port or USB
2. Statistical Data:
   - Total number of transfers*
   - Total number of fail to transfers*
   - Total number of transfers due to preferred source failure*
   - Total number of minutes of operation*
   - Total number of minutes in the standby source*
   - Total number of minutes not in the preferred source*
   - Normal to emergency transfer time
   - Emergency to normal transfer time
   - System start date
   - Last maintenance date

   *The statistical data shall be held in two registers. One register shall contain data since start up and the second register shal contain data from the last maintenance reset.

Y. *External DC Power Supply* - An optional provision shall be available to connect up to two external 12/24 VDC power supply to allow the LCD and the door mounted control indicators to remain functional when both power sources are dead for extended periods of time. This module shall contain reverse battery connection indication and circuit protection.

2. 10 Service Entrance Switch

A. A two position disconnect switch shall be provided to disconnect the normal source and inhibit during maintenance or emergency.

1. The controller shall display SERVICE DISCONNECT
2. Further transfer is inhibited after transfer to Emergency

B. Molded case circuit breakers (MCCB) shall be 80% rated.

C. The transfer switch mechanism shall provide a simple means of manual operation using only components, which are permanently affixed, in the operating position.

D. The unit shall permit manual operation of the transfer switch while the system is energized and carrying rated load. Transfer switches, which require all sources of power to be de-energized prior to manual load transferring, shall not be acceptable.

E. Transfer switch control power shall be obtained from the source being transferred to. The controls shall not require any connection to external power source. Transfer switches requiring power from the engine starting (or other) battery are not acceptable.

F. A control circuit isolation plug shall be provided to isolate all control circuitry inside the transfer switch to facilitate maintenance procedures. When isolated, there shall be no voltage present on the control circuitry.

G. Cable Connections: Provision shall be made to terminate all incoming and outgoing power cables and grounding conductors. Connections shall be via screw type cable lugs.

H. The Power Switching units shall be fix-mounted, utilize fully enclosed contacts and their withstand/closing rating shall be equal to or exceed the required withstand rating of the complete mechanism.

I. The service entrance rated automatic transfer switch shall automatically transfer the load to the generator supply in the event of a utility supply failure and return the load to the utility supply upon restoration. The transfer switch shall incorporate an isolating mechanism and over current protection on the utility supply to allow operation as the main services disconnect in accordance with NEC requirements. The transfer switch power switching devices shall be mechanically and electrically interlocked to prevent the utility and generator supplies from being interconnected.

J. Molded Case Circuit Breaker Service Entrance Rated Transfer Switches

1. For service entrance automatic transfer rated 250 to 800 Amps, the normal connection shall be provided with a electronic trip, molded case breaker with current ratings as shown on the plans.

END OF SECTION