

BID FORM AND SPECIFICATIONS
FOR
SOMERS HIGH SCHOOL
ATS REPLACEMENT

September 1, 2023

PREPARED BY

FACILITY SERVICES & ENGINEERING, INC.

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PART 1 - INSTRUCTION TO BIDDERS

1.01 BID SUBMISSION

- A. Somers Public Schools (Owner) will receive sealed Bids for the installation of the new transfer switch at 2:00 PM, Monday, October 2, 2023. Sealed bids should be delivered to the Director of Business Services at 1 Vision Boulevard, Somers, CT. The opening of the bids will be at 2:00 PM on the same day. Bids will be opened by Stephanie Levin, the Director of Business Services. A summary of the bids will be sent by email to all bidders by the Engineer representing the Somers Public Schools, Mr. James S Smart, PE, working with Facility Services & Engineering, Inc. Email address is fsandeinc@gmail.com.

1.02 GENERAL INFORMATION

- A. Bids will be received for installing the open transition transfer switch and all work and accessories as described in the attached specifications and as shown on Drawings E-1 and E-2 dated September 1, 2023. No major excavation is anticipated. General trades work such as minor excavation of dirt around conduits serving the transfer switch that may be needed to modify the slab in order to concrete around the conduit opening under the switch and associated minor concrete work, and delivery and rigging cost shall be included in the Bid. No modifications to sidewalks are anticipated. Any new conduit shall be sealed against water and rodent intrusion. Temporary partial removal and reinstallation of the chain link fence surrounding the switch will be needed to facilitate the removal and installation of the switch. Temporary partial removal and reinstallation of the canopy located over the switch will be needed to facilitate the removal and installation of the switches. The cost associated with the temporary removal and reinstallation of the fence and canopy shall be included as part of the bid.
- B. The Project mainly involves the installation of a new 1600A, 480V, four-pole, automatic open-transition transfer switch with dual operators in a NEMA 3R enclosure to replace an existing obsolete Onan transfer switch called ATS #2 for which control wiring was damaged due to rodents and moisture infiltration and for which replacement parts are said to be unavailable. The Onan switch is presently operational only in the manual mode. Russelectric was used as the standard for the switch although an acceptable switch by Eaton and Asco will be reviewed. Separate prices for the project are solicited using the alternate switches which represent a major project cost.
- C. Two (2) Satec power check meters shall be furnished, installed and wired as noted on the Contract Documents.
- D. Manchester Awning (Tel. 860 643-3091) located in Manchester recently installed an awning / canopy over the top of the existing switch, an adjacent main service entrance circuit breaker and metering compartment and the adjacent outdoor refrigeration condensing units. In order to facilitate an ease in the replacement of the switch, a section of the awning located over the

switch must be taken down, protected from damage and temporarily stored on site and then replaced in the original location and manner. Manchester Awning shall work directly as a subcontractor to the Contractor responsible to replace the transfer switch.

- E. Work is expected to be done during a normal school shutdown such as during winter break, spring or summer recess or other school closure as worked out with Somers Public Schools. The normal feeder serving the existing ATS #2 which in turn serves the majority of the building will need to be de-energized as coordinated between the Contractor and the Somers Public Schools. The shut down can happen during normal business hours or as otherwise arranged with Somers Public Schools. Other preparation work required prior to the shutdown can be completed during normal business hours. The existing generator also serves a smaller 200A Onan transfer switch called ATS#1 located in the boiler room. The ATS #1 transfer switch is a priority 1 switch for the boiler room loads and may be used for temporary work power as needed with temporary work circuits run to the outside by the Contractor as needed.
- F. The conduit opening under switch appears to have been a source of moisture migration and rodent intrusion. The dirt area around the conduit shall be concreted with top of the new concrete flush with the existing slab.
- G. Lead time needed to order, manufacture and deliver the switch is anticipated to be main driver of the schedule with lead times for major equipment found to be excessive. The contractor shall be prompt in furnishing the switch submittal and pushing the order process. Ideally the Owner would like have the switch order placed within one month after the project is awarded.
- H. A. performance bond will not be required by the Contractor for the project.
- I. The prevailing wages are not required on the project.
- J. No sales tax on material is required to be paid. The Somers Public School will deliver to the Contractor a certificate from the State of Connecticut indicating their non-profit status.

1.03 QUERIES / ADDENDA

- A. Direct questions to James S. Smart at Facility Services & Engineering, Inc. Telephone # (860) 742-4170. Email is fsandeinc@gmail.com. Email will be the best method of communication during bidding.
- B. Addenda, if any, shall be issued during the bidding period by email. All Addenda shall become part of the Contract Documents. The Contractor shall include resultant costs in the Bid Price.
- C. Verbal answers are not binding on any party.
- D. Submit two (2) copies of the Bid Form provided, signed and placed in a closed opaque envelope, clearly identified with Bidders name, "Somers High School ATS Installation".

1.04 DURATION OF OFFER

- A. Bids shall remain open to acceptance and shall be irrevocable for a period of sixty (60) days after the Bid closing date.

1.05 ACCEPTANCE OF OFFER

- A. The Somers Public Schools reserves the right to accept or reject any or all offers.
- B. After acceptance by the Somers Public Schools (Owner), the Owner will issue a purchase order to the successful bidder.

1.06 PREVIEW OF SITE AND SCHOOL CONTACT PERSON

- A. A non-mandatory pre-bid walk-through of the site will be conducted on September 18, 2023 at 9:30 AM meeting at the Maintenance Shop site. If all bidding contractors visit the site ahead of time, the walk-through will be canceled and each bidding contractor will be notified of the walk-through cancellation by email on Friday, September 15.
- B. Those that would like to view the work site at an earlier date should contact the maintenance supervisor, Jim MacFeat, and make arrangements directly with him.
- C. The school facilities maintenance supervisor is
James MacFeat
Supervisor of Buildings and Grounds
Somers Public School
Ninth District Road
Somers, CT 06071
Telephone: (860) 749-2270 ext 2000
Fax: (860) 763-0748
Email: jim.macfeat@somers.k12.ct.us

1.07 DURATION OF OFFER

- A. Bids shall remain open to acceptance and shall be irrevocable for a period of sixty (60) days after the Bid closing date.

1.08 PROJECT PHASING

- A. The project does not require any significant phasing other than the removal of the existing ATS must be done when the new switch is delivered to the site and the site is prepped and prepped ready for installation. The replacement work must take place during a scheduled school shutdown. Access to school for installation of the meters and control wiring will be allowed during the day from between 7:00 AM and 4:00 PM on Monday through Friday or as otherwise coordinated with Somers Public Schools.

- B. A long lead time is anticipated for the switch delivery. The contractor shall make every effort to expedite the project and not let it drag. The contractor shall submit a estimated schedule for completion of the project and be diligent in maintaining the schedule.

The Bid form is on the next page.

PART 2 - BID FORM

To:

Project:

Date:

Submitted by:
(Full name)

(Full address)

- 1. Price for Material and Labor for the work associated with the complete ATS installation using a Russelectric transfer switch:**

_____ Dollars \$ _____

1a. Manufacture and delivery time for switch _____

- 2. Price for Material and Labor for the work associated with the complete ATS installation using an equivalent Asco transfer switch:**

_____ Dollars \$ _____

2a. Manufacture and delivery time for switch _____

- 3. Price for Material and Labor for the work associated with the complete ATS installation using an equivalent Eaton transfer switch:**

_____ Dollars \$ _____

3a. Manufacture and delivery time for switch _____

BID FORM SIGNATURE

Bidder please print the full name of the proprietorship, partnership or Corporation:

Authorized signing officer

Title

END OF DOCUMENT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The following Sections are also a part of this Division:

Section 16050 - Basic Materials and Methods
Section 16400 - Automatic Transfer Switch

1.02 INTENT

- A. It is the intent of the Contract Documents to call for finished work, tested and ready for operation. Any apparatus, appliance, material or work not shown on the Drawings, but mentioned in the Specifications, or vice versa, or any incidental accessories necessary to make the work complete in all respects and ready for operation, even if not particularly specified, shall be furnished, delivered and installed without additional expense to the Somers Public Schools (Owner).
- B. Minor details not typically shown or specified, but necessary for proper installation and operation, shall be included in the scope of work as though the details were shown or specified.
- C. Work under each Section shall include giving written notice to the Engineer and / or Owner of any materials or apparatus believed inadequate or unsuitable, in violation of laws, ordinances, rules or regulations of authorities having jurisdiction and any items of work omitted which are necessary to complete the work. Dimensions of the new switch are critical in order for the new switch to fit in the same location as the existing switch and on the existing concrete pad. In the absence of such written notice, it is mutually agreed that work under each Section has included the cost of all required items for the accepted, satisfactory functioning of the entire system without extra compensation.

1.03 SCOPE

- A. The scope of the projects shall include:
- Disconnect existing feeders
 - Lubricate existing feeders (normal, emergency and load) that serve or are served from the existing transfer switch to allow for the feeders to be partially pulled out of the conduits to allow for ease in concreting the conduit opening that is presently exposed to the earth and ease in installing the new switch over the top of the conduits or use crane with sufficient lift height and capacity to lift the old switch up and over the existing conductors and installation of the new switch in the reverse manner.
 - Unloading and rigging of the transfer switch in place and repull conductors and final connections
 - Installation of miscellaneous electrical work as noted and shown on the drawings such as temporary fence and awning removal and permanent replacement the same in the original manner.

- Interlock of the new 1600A ATS #2 with the existing and remaining 200A ATS #1 that serves the priority 1 boiler room loads so the ATS #1 will not revert back onto ATS #2 when ATS #2 transfers.
- Satec metering and associated conduit and wiring

1.04 CONTRACT DOCUMENTS

- A. Contract Documents indicate the general arrangement of system and work included in the Contract.
- B. Work under each Section shall closely follow the layout of work as described in the Contract Documents. The Contractor shall confirm the adequacy of the switch to fit over the existing conduit and conductors so as to maintain proper clearances within the new switch. The switch may be wider than 32" as long as it fits on the existing concrete pad.
- C. The Engineer and /or Owner may, without extra charge, make reasonable modifications in the layout as needed for proper execution of the work.
- D. Where variances occur within the Contract Documents, the item or arrangement of better quality, greater quantity or higher cost shall be included in the Contract price. The Engineer and / or Owner shall decide on the item and the manner in which the work shall be installed.

1.05 SURVEYS AND MEASUREMENTS

- A. Before submitting its Bid, the Contractor shall visit the site and shall become thoroughly familiar with all conditions under which the work will be installed as the Contractor will be held responsible for any assumptions, omissions or errors made as a result of failure to become familiar with the site. The purpose of the Contract drawings is to illustrate existing as-built condition and, as best practical, the scope of work..
- B. All measurements, both horizontal and vertical, shall be based from established bench marks and all work shall agree with the established lines and levels. All measurements related to the work shall be verified at the site and checked for correctness.

1.06 CODES AND STANDARDS

- A. The Codes and Standards listed below apply to all work.
 - 2022 Connecticut State Building Code
 - 2021 International; Mechanical Code
 - 2021 International Plumbing code
 - 2021 International Energy Conservation Code
 - 2017 ICC/ANSI A117.1 Accessible and Usable Buildings and Facilities
 - 2020 National Electrical Code (NFPA-70 2005)

- B. All materials furnished and all work installed shall comply with the rules and recommendations of the NFPA, the recommendations of the fire insurance rating organization having jurisdiction and with the requirements of all Governmental departments having jurisdiction. All materials and equipment shall be listed by Underwriters Laboratories, Inc., ETL Testing Laboratories, Inc. or other pre-approved testing agency and bear an approval label.
- C. The Contractor shall include in its scope of work, without extra cost to the Owner, all labor, materials, services, apparatus, shipping charges, rigging and Drawings in order to comply with all applicable laws, ordinances, rules and regulations whether or not noted in the Contract Documents.

1.07 PERMITS AND FEES

- A. The Contractor shall give all necessary notices and obtain all permits. Somers Public Schools is a non-profit organization and is not required to pay sales tax. The Contractor shall file all necessary Drawings, prepare all Documents and obtain all necessary approvals of all Governmental and State departments having jurisdiction, obtain all required certificates of inspections for its work and deliver a copy to the Owner before request for acceptance and final payment for the work. The Engineer will provide three (3) sets of stamped signed drawings to the Contractor ready for the permit application.

1.08 COORDINATION

- A. All ordering of the switch and equipment shall be carried out in a most expeditious manner so as to minimize the length of the project. Particular emphasis is placed on timely installation of the switch .
- B. The Contractor is required to examine all Contract Documents and mutually arrange work so as to avoid interference with existing school operations and coordinate with ordering and delivery of the switch. .

1.09 REVIEW

- A. The equipment, materials, workmanship, design and arrangement of all work shall be subject to the review of the Owner and Engineer, The Contractor shall submit electronic files of the proposed switch. The engineer will mark up the submittal and place a marked up Shop Drawing stamp on the submittal.
- B. The Contractor shall notify the Engineer and / or Owner in writing, within 30 days of the awarding of the Contract of any material that has extensive or unacceptable delivery time or material that will experience a delay in delivery that may preclude the Contractor from finishing the project on the agreed schedule. Ideally, the Owner would like to have the switch ordered within three (3) weeks of the Contract award date.
- C. Specified equipment characteristics are to be used as mandatory requirements where the Contractor proposes to use an acceptable equivalent.

- D. If material or equipment is installed before it is reviewed, the Contractor shall be liable for its removal and replacement at no extra charge to the Owner if, in the opinion of the Owner and Engineer, the material or equipment does not meet the intent of the Drawings and Specifications. Each piece of equipment or device shall bear the manufacturer's nameplate giving name of manufacturer, description, size, type, serial or model number, electrical characteristics and other information. Nameplates furnished and installed by the Contractor or distributor will not be acceptable. Failure on the part of the Engineer to reject shop drawings or to reject work in progress shall not be interpreted as acceptance of work not in conformance to the Contract Documents. Work and/or materials not in conformance with Contract Documents shall be corrected whenever it is discovered.

1.10 EQUIPMENT DEVIATION

- A. In the event that only one manufacturer of a product is specified, and it is found that the manufacturer has discontinued the product, the Contractor shall use an acceptable equivalent product as noted below that has all features of the original specified product and as approved by the engineer.
- B. Equipment, material or devices submitted for review as an "equivalent" to such equipment, material or devices specified shall meet the following requirements:
1. The equivalent shall have the similar construction features such as, but not limited to:
 - a. Material thickness, gauge, weight, density, etc.
 - b. Welded, riveted, bolted, etc., construction
 - c. Finish, priming, corrosion protection
 2. The equivalent shall perform with the same or better efficiency of energy consumption.
 3. The equivalent shall be locally represented by the manufacturer for service, parts and technical information.
 4. The equivalent shall bear the same labels of performance certification as is applicable to the specified item.
- C. Where the Contractor proposes to use an item of equipment other than specified or details on the Drawings which requires any redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical, electrical or architectural layout, all such redesign and all new Drawings and detailing required therefore shall, with the concurrence of the Engineer, be prepared by the Contractor at no cost to the Owner.
- D. Where such accepted deviation or substitution requires a different quantity and arrangement of wiring, conduit and equipment from that noted in the Contract Documents, the Contractor shall, with the concurrence of the Engineer and Owner, furnish and install any such additional equipment

required by the system at no additional cost to the owner, including any costs added to other trades due to the substitution.

- E. The definition of "acceptable equivalent" is a product that, in the opinion of the Engineer and Owner, is acceptable for the intended application in lieu of the product listed in the Contract Documents and has no cost impact on the project.
- F. The definition of substitution is a product that, in the opinion of the Engineer and or Owner, is of a lesser quality and/or has cost impact on the project or requires other changes to meet the intent of the Contract Documents.

1.11 CHANGES IN WORK

- A. A Change Order is a written order to the Contractor signed by the Owner issued after execution of the Contract, authorizing a change in the work or an adjustment in the Contract sum or the Contract time. A Change Order signed by the Contractor indicates his agreement therewith, including the adjustment in the Contract sum or the Contract time.

1.12 MANUFACTURER'S IDENTIFICATION

- A. Manufacturer's nameplate, name or trademark and address shall be attached permanently to all equipment and materials. The nameplate of a Contractor or distributor shall not be acceptable.
- B. All material and equipment for the electrical portion of the mechanical systems shall bear the label of or be listed by the Underwriters' Laboratories, Inc., ETL Testing Laboratories, Inc. or other accredited authoritative agency or testing organization approved by the authority having jurisdiction.

1.13 SHOP DRAWINGS

- A. The Contractor shall submit for review detailed shop drawings of the transfer switch and all equipment and material required to complete the project. No material or equipment may be delivered to the job site or installed until the Contractor has possession of reviewed shop drawings for the particular material or equipment. Shop drawings shall be electronically submitted to the Engineer immediately after award of Contract and before any material or equipment is purchased.
- B. Shop drawings shall be submitted for all equipment and/or devices specified. Shop drawings shall include manufacturer's names; catalog numbers, cuts, diagrams and other such descriptive data as may be required to identify the equipment. Where multiple quantities or types of equipment are being submitted, provide a cover sheet (with a list of contents) on the submittal identifying the equipment or material being submitted.
- C. Failure of the Contractor to submit shop drawings in ample time for review shall not be reason for an extension of Contract time and no claim for extension by reason of such default will be allowed, nor

shall it be reason to purchase, furnish and/or install equipment which has not been reviewed by the Engineer.

- D. The Contractor shall furnish all necessary templates, patterns, etc., for installation work and for the purpose of making adjoining work conform; furnish setting plans and shop details to other trades as required.
- E. Review rendered on shop drawings shall not be considered as a guarantee of measurements or building conditions. Where drawings are reviewed, review does not mean that drawings have been checked in detail; said review does not in any way relieve the Contractor from his responsibility or necessity of furnishing material or performing work as required by the Contract Documents.

1.14 MATERIALS AND WORKMANSHIP

- A. All materials and apparatus required for the work, except as otherwise specified, shall be new and of first-class quality and shall be furnished, delivered, erected, connected and finished in every detail and so selected and arranged as to fit properly into the building spaces.
- B. Unless otherwise specifically indicated on the Drawings or in the Specifications, all equipment and materials shall be installed with the acceptance of the Owner and Engineer and in accordance with the recommendations of the manufacturer.
- C. All work shall be of a quality consistent with good trade practice and shall be installed in a neat, workmanlike manner. The Engineer reserves the right to reject any work which, in his opinion, has been installed in a substandard, dangerous or unserviceable manner. The Contractor shall replace said work in a satisfactory manner at no extra charge to the Owner.

1.15 PROTECTION OF EQUIPMENT AND MATERIALS

- A. The Contractor shall be responsible for work and equipment until finally inspected, tested and accepted. Work and equipment shall be protected from water, dust and dirt, and against theft, injury or damage. Material and equipment received on site which is not immediately installed shall be carefully and securely stored. Open ends of work shall be closed with temporary covers or plugs during construction to prevent entry of obstructing or other foreign material.
- B. All equipment shall be received, unloaded, unpacked, stored, protected, set in place and connected up completely. Special care shall be exercised in handling and protecting equipment and fixtures. The cost of replacing any of the above equipment and fixtures which are missing or damaged by reason of mishandling or failure on the part of the Contractor to protect shall be born by the Contractor.

1.16 SCAFFOLDING, RIGGING, HOISTING

- A. The Contractor shall furnish all scaffolding, rigging, crane services, hoisting and services necessary for erection and delivery into the premises of any equipment and apparatus furnished under this project.

1.17 ACCESSIBILITY AND ACCESS PANELS

- A. Locate all equipment which must be serviced, operated or maintained in fully accessible positions. Equipment shall include, but not be limited to: motors, controllers, switchgear, etc. Access doors shall be furnished if better accessibility is required. Minor deviations from Drawings may be made to allow for better accessibility, but changes of magnitude or which involve extra cost shall not be made without the review and approved by the Engineer..
- B. Upon completion of the Project, the Contractor shall physically demonstrate that all equipment and devices installed have been located and/or provided with adequate access panels for repair, maintenance and/or operation. Any equipment not so furnished shall be relocated or provided with additional access panels by the installing Contractor at no additional cost to the Owner.

1.18 SHUTDOWNS

- A. When installation of the new switch requires the de-energization of the normal and emergency power service shutdown of an existing operating system, the de-engization shall involve lock-out tag-out procedures and shall be performed as coordinated with the Owner.
- B. The Engineer and / or Owner shall be notified of the estimated duration of the shutdown period at least ten (10) days in advance of the date the work is to be performed.
- C. Work shall be arranged for continuous performance whenever possible. The Contractor shall provide all necessary labor, including overtime, if required, to assure that existing operating services will be shut down only during the time actually required to make necessary connections.

1.19 PAINTING

- A. All materials shipped to the job site under this Division such as panels, plates, etc., shall have prime coat and standard manufacturer's finish, unless otherwise specified.
- B. The manufacturer's nameplate data on equipment shall not be painted over. Special care shall be taken to avoid covering or spattering paint on the nameplate.
- C. Damaged equipment shop coats shall be touched up in the field.

1.20 CLEANING

- A. The Contractor shall thoroughly clean all equipment of all foreign substances inside and out before being placed in operation.
- B. If any part of a system should be stopped by any foreign matter after being placed in operation, the system shall be disconnected wherever necessary to locate and remove obstructions. The system shall then be cleaned and reconnected. Any work damaged in the course of removing obstructions shall be repaired or replaced when the system is reconnected at no additional cost to the Owner.
- C. All conduits shall be blown out and swabbed clear of all debris and dust.
- D. Upon completion of work under the Contract, the Contractor shall remove from the premises all rubbish, debris and excess materials left over from his work. Any oil or grease stains on floor areas caused by the Contractor shall be removed and floor areas left clean.

1.21 OPERATING INSTRUCTIONS

- A. The Contractor shall furnish for delivery to the Engineer and / or Owner complete electronic copy of typewritten or blueprinted instructions for operating and maintaining all systems and equipment. All instructions shall be submitted in draft for review prior to final issue. Manufacturer's advertising literature or catalogs will not be acceptable for operating and maintenance instruction.
- B. The Contractor in the above-mentioned instructions shall include the maintenance schedule for the transfer switch.
- C. An authorized manufacturer's representative of the transfer switch shall attest in writing that his equipment has been properly installed prior to startup. The letter shall be included with the operating and maintenance books. A detail list of contact names and numbers required for ongoing service shall also be furnished with the operating and maintenance books

1.22 ADJUSTING AND TESTING

- A. After all the equipment and accessories to be furnished are in place, they shall be put in final adjustment and subjected to such operating tests so as to assure the Engineer and / or Owner that the equipment is in proper adjustment and in satisfactory, permanent operating condition.
- B. A factory-trained service engineering representative shall inspect the installation and assist in the initial startup and adjustment to the equipment. The period of these services shall be for such time as necessary to secure proper installation and adjustments. After the equipment is placed in permanent operation, the service engineering representative shall supervise the initial operation of the equipment and instruct the personnel responsible for operation and maintenance of the equipment. The service engineering representative shall notify the Contractor in writing that the equipment was installed according to manufacturer's recommendations and is operating as intended by the manufacturer.

1.24 GUARANTEES

- A. The Contractor shall guarantee all materials and workmanship under these Specifications and the Contract for a period of one (1) year from the date of final acceptance by the Owner.
- B. During this guaranteed period, all defects developing through materials or workmanship shall be corrected or replaced immediately by this Contractor when directed by the Engineer and / or Owner without expense to the Owner; such repairs or replacements shall be made to their satisfaction.

END OF SECTION 16010

PART 1 GENERAL

1.01 DESCRIPTION

- A. It is the intent of this Section of the Specifications to establish a standard of quality and performance characteristics for basic materials and installation methods that may be used on the project.

1.02 GENERAL REQUIREMENTS

- A. All materials and equipment required for the work shall be new, of first-class quality, and shall be furnished, delivered, erected, connected and finished in every detail and shall be so selected and arranged as to fit properly into the building spaces. Where no specific kind or quality of material is specified, a first-class standard article as accepted by the Engineer and/or Owner shall be furnished.
- B. Specifications for a particular piece of equipment, device or material specifically indicated on the Drawings by model number, type, series or other means, shall take precedence over equipment or materials specified herein,

PART 2 PRODUCTS

2.01 CONDUITS AND RACEWAYS

- A. Materials:
 - 1. Rigid Metallic Conduit (RMC) – The tubing shall be hot-dipped galvanized steel with chromate finish. The interior of the conduit shall be coated with a silicone, epoxy-ester-type lubricant for ease in pulling wires. Couplings and connectors shall threaded type.
 - 2. Electrical Metallic Tubing (EMT) - The tubing shall be thinwall, hot-dipped galvanized steel with chromate finish. The tubing shall be UL labeled and conform to Fed. Spec. WWC-563 and ANSI Specification C80.3. The interior of the conduit shall be coated with a silicone, epoxy-ester-type lubricant for ease in pulling wires. Couplings and connectors shall be high compression type equivalent or heavy duty set screw type equivalent. Indent or crimp type connectors are not acceptable.
 - 3. Polyvinyl Chloride (PVC) Schedule 40 conduits and elbows shall be manufactured to NEMA TC-2, Federal specification WC1094A and UL 651 specifications. Fittings are manufactured to NEMA TC-3, Federal specification WC1094A and UL514B. Both conduit and fittings carry respective UL or ETL Listings and UL or ETL labels.

- B. Minimum size conduit and EMT shall be 3/4 inch, unless otherwise noted

2.02 CONDUCTORS AND CABLES

A. General:

1. All building lighting and power conductors shall be soft annealed copper rated at 600 Volts, be UL listed and carry the appropriate UL label.
2. All conductors #10 AWG and smaller shall be a single, solid strand, or multiple strand when used with appropriate connectors as specified.
3. All conductors #8 AWG or larger shall be stranded wires with strands manufactured in compact configuration.
4. The outer surface of each conductor and cable shall be continuously marked along the entire length to show UL label, conductor material, conductor size, insulation type and voltage rating. Multi-conductor cables shall also show the number of insulated conductors on the outer surface.

B. Conductor and Cable Types:

1. Type THWN shall be moisture- and heat-resistant thermoplastic, PVC insulated with a nylon or equivalent outer jacket for use in 75°C maximum operating temperature in wet and dry locations.
2. Type THHN shall be heat-resistant thermoplastic, PVC insulated with a nylon or equivalent outer jacket for use in 90°C maximum operating temperature in dry locations.

PART 3 EXECUTION

3.01 GENERAL

- A. The Contractor shall layout and perform work in such a manner so as to cause no undo delay in the Owner's operation.
- B. All work shall be installed in such a readily accessible manner for maintenance, repair and operation. .
- C. Electrical access panels shall be made accessible.

3.02 CONDUITS

- A. All conduit exposed to the elements on the exterior shall be rigid metallic conduit.

- B. Conduits shall be supported to prevent distortion and misalignment during wire pulls. Conduits shall be secured using galvanized straps, lay-in adjustable hangers, clevis hangers or bolted split stamped galvanized hangers. Perforated pipe straps or wire used for pipe support will not be acceptable. Conduit supports shall be a minimum of ten (10') feet on center and shall be located as stated in the NEC.
- C. Conduits shall be grouped together and run in lines parallel or perpendicular to building lines and as tight to the building structure as possible. Steel channel racks or struts shall be used to support parallel runs.
- D. All conduits shall be installed free of dents and be fished before pulling wires. All conduits shall be suitably protected against damage and the entrance of dirt and moisture during construction.
- E. The ends of all conduits shall be cut square and reamed. Conduit connections to junction boxes shall be with double-locknuts and malleable iron insulated bushings.

3.03 WIRING AND TERMINATIONS

- A. All branch wiring #6 and smaller shall have color-coded insulation.
- B. Solid color black, red, blue, and white (neutral) shall be used for 208/120 Volt, 3-phase systems. White shall be used only for neutrals. Green shall be used for equipment grounding conductors.
- C. Solid color brown, orange, yellow, and grey (neutral) shall be used for 480/277V, 3-phase systems. Grey shall be used only for neutrals. Green shall be used for equipment grounding conductors.
- D. Wire sizes shall be as shown on the Drawings, but where sizes are not shown, wire shall be no smaller than the following minimum sizes:
 - 1. Lighting and Power Wiring - #12 AWG with 600 Volt insulation
 - 2. Control Wiring at 24 Volts - #16 AWG with 600 Volt insulation
 - 3. Control Wiring at 120 Volts - #12 AWG with 600 Volt insulation
- D. Splices for conductors or cables shall be made only in accessible splice boxes, junction boxes, outlet boxes or cabinets.
- E. Cable pulling lubricant shall be used for pulling #4 or larger conductors. The lubricants shall be Aqua-Gel II lubricant as manufactured by Ideal or Polywater J lubricant as manufactured by American Polywater, Inc. with the product type matched to the application. The lubricant shall have no flash point and nonflammable dried residue. The lubricant shall have no deleterious effect on the insulation.

3.04 SPLICES

- A. Solid conductor splices for #10 or smaller wires shall be made with UL listed solderless connectors equivalent to Ideal Twister Wire Nuts™ or 3M Scotchlok™, spring-type connectors. Stranded wire conductor splices for #10 or smaller wires shall be crimp-type connectors equivalent to Ideal or Twister Wire Nuts™ as manufactured by Ideal.
- B. Splices, cable taps and terminals for #8 and larger wires shall be made with UL approved compression connectors equivalent to T&B "Color Keyed" compression "C" taps applied with special tools according to manufacturer's recommendations, or bolted pressure connectors, of bronze or copper construction, as made by T&B, Burndy or other acceptable equivalent.

3.05 CIRCUIT OR CONDUCTOR IDENTIFICATION

- A. Phase rotation shall be indicated through the use of color tapes black, red and blue for 208V, 3-phase systems and brown orange and yellow for 480V systems applied near the ends of the wires or through similarly colored insulation.
- B. Neutral conductors shall be identified with white tape near the ends or identified with white insulation for 208V systems and grey tape or grey insulation.
- C. Insulated grounding conductors shall be identified with green tape near the ends or identified with green insulation.

3.06 GROUNDING / BONDING

- A. All electrical systems shall be grounded and bonded in strict accordance with the latest applicable edition of the NEC..
- B. Exposed, non-current-carrying metal parts of fixed equipment likely to become energized shall be grounded.
- C. The grounding electrode conductor shall be of bare or insulated, stranded copper installed in one continuous length without splice or joint. Equipment grounding conductors shall be separate, solid or stranded copper conductors identified with green insulation. All grounding conductors shall be installed in conduit or as part of a cable assembly and shall be protected from physical damage. All grounding conductors shall be sized in accordance with the NEC, as stated within these Specifications or as shown on the Drawings.
- D. Bonding shall be provided where necessary to assure electrical continuity and the capacity to safely conduct any fault current likely to be imposed. Bonding shall be accomplished through the use of the following:
 - 1. Pressure connectors or clamps

2. Wrench-tight, threaded couplings on enclosures when used with rigid metal conduit or intermediate metal conduit
 3. Tight, threadless couplings and connectors when used with rigid metal conduit, intermediate conduit and electrical metallic tubing
 4. Bonding jumpers when used around concentric or eccentric knock-outs
 5. Bonding-type lock nuts and bushings
- E. Bonding jumpers shall be copper or other corrosion-resistant material. Bonding jumpers on the supply side of the main service disconnect switch shall be sized in accordance with Table 250-94 of the NEC. Bonding jumpers on the load side of the service shall be sized in accordance with Table 250-95 of the NEC.

3.07 NAMEPLATES

- A. Nameplates shall consist of laminated black and white plastic with 5/16-inch engraved white letters on black background, lamacoid or acceptable equivalent.
- B. Nameplates shall be securely attached in place by sheet metal screws.
- C. Plastic-coated wire markers of the wraparound, self- adhesive type with factory-printed numbers, letters and symbols shall be used to identify all feeders, mains and branch circuit conductors.
- D. All conductors shall be tagged in cabinets at the time wires are pulled in and tested; markers shall not be removed for any reason.
- E. All wire and feeder cables shall be labeled with Panduit Markers, or acceptable equivalent, and wire markers in all junction boxes, panels, etc.
- F.. All junction box covers shall be labeled with the panelboard circuit number(s) that the box contains.

END OF SECTION 16050

PART 1 - GENERAL

1.01 SCOPE

- A. Furnish and install a Russelectric RTS-03 series 1600A, 480V rated , 4-pole automatic transfer switch (ATS) with dual motor operator in a NEMA 3R with an UL 1008 published 65,000A withstand and close-on ratings.

1.02 CODES and STANDARDS

The Automatic Transfer Switches and controls shall conform to the requirements of the following :

- A. UL 1008: Underwriters Laboratories Standard for Transfer Switch Equipment
- B. NFPA 70 National Electrical Code
- C. NFPA 110 Standard for emergency and standby power systems
- D. ANSI/IEEE 446 Recommended Practice for Emergency and Standby Power Systems for Commercial Applications
- E. NEMA ICS 10 P1 Industrial Control and Systems Part 1: Electromechanical AC Transfer Switch Equipment
- F. IBC-2006 International Building Code-Seismic Certified
- G. UL 508 Standard for Industrial Control

1.03 SUBMITTALS

- A. Manufacturer shall submit shop drawings for review, which shall include the following at a minimum:
 - 1. Descriptive Literature
 - 2. Plan, elevation, side and front view arrangement drawings, including overall dimension, weights and clearances, as well as mounting or anchoring requirements and conduit entrance locations.
 - 3. Schematic diagrams
 - 4. Wiring Diagrams
 - 5. Accessory list

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. The automatic transfer switches shall be a Russelectric type RTS-03 or and acceptable equivalent by Asco or Eaton. The bid form requires separate pricing for the total project using each of the three switches to allow Somer Public School (Owner) the choice in the switch selection.

2.02 CONSTRUCTION

A. General

1. The Open Transition Automatic Transfer Switch shall be a 1600A, 4-pole switched neutral switch in a NEMA 3R enclosure .
2. All four (4) poles shall be mounted on a common shaft. The continuous current rating and the closing and withstand rating of the fourth pole shall be identical to the rating of the main poles.
3. The automatic transfer switch shall be mounted in a NEMA 3R enclosure with roof sloped to the front to allow water to drain way from the building. The back of the switch will be up against the building wall.
4. Critical witch cenclosure dimensions of 36''width and 32'' minimum depth needed in order for the switch to fit in the same location on an existing concrete pad.
5. Enclosures shall be fabricated from 12-gauge steel. The enclosure shall be sized to exceed minimum wire bending space required by UL 1008.
6. The Contractor awarded the project will be responsible for ordering and purchasing the switch and carry all shipping and handling charges and positioning of the new switch over the existing conduits and remake all connections.
7. The Contractor will need to coordinate the delivery, unloading and installation. An alternate price for an equivalent Asco or Eaton transfer switch is being solicited and will be considered along with other associated factors such as manufacture and delivery time.
8. The transfer switch shall be equipped with an internal welded steel pocket for housing an operations and maintenance manual.
9. The automatic transfer switch shall be top and right side accessible with an open bottom to fit over the existing conduits. A 30'' x 30'' open bottom is the minimum size opening that will work with the existing conduit layout.
10. The main contacts shall be capable of being replaced without removing the main power cable.
11. The main contacts shall be visible for inspection without any major disassembly of the transfer switch.
12. All bolted bus connections shall have Belleville compression washers.

13. A fully rated solid neutral bus bar with required AL/CU neutral lugs shall be provided.
14. Control components and wiring shall be front accessible. All control wires shall be multi-conductor 18 gauge 600 volt SIS switchboard type in a point to point harness. All control wire terminations shall be identified with tubular sleeve type markers.
15. The complete automatic transfer switch assembly shall be factory tested to ensure proper operation and compliance with the specification requirements.
16. The primary buswork of the draw-out automatic transfer switch shall be connected to the stationary bus stabs in the freestanding cubicle by silver plated segmented, self aligning, primary disconnect fingers to facilitate proper alignment between the removable draw-out when the ATS is withdrawn and shall be available for inspection without disturbing or de-energizing the main bus.
17. The secondary control disconnect contacts mounted on the ATS shall be self-aligning and shall plug into stationary elements mounted on the freestanding cubicle.
18. Necessary controls shall be provided to ensure that the engine run circuit remains closed when the switch is in the bypassed to emergency position, even if the associated ATS is in the normal position or completely removed from the enclosure.
19. A new receptacle shall be installed in the switch wired onto the existing receptacle circuit that served the old switch. Reconnect the conduit and circuiting to the switch and receptacle. A Grainger 200W strip heater with cord and thermostat shall be installed in the switch wired to the receptacle circuit. Heater model number is as noted on the riser diagram E-1.

B. Automatic Transfer Switch

1. The transfer switch shall be double throw, actuated by two electric operators momentarily energized, and connected to the transfer mechanism by a simple over center type linkage.
2. The normal and emergency contacts shall be positively interlocked mechanically and electrically to prevent simultaneous closing. Main contacts shall be mechanically locked in both the normal and emergency positions without the use of hooks, latches, magnets, or springs, and shall be silver-tungsten alloy. Separate arcing contacts with magnetic blowouts shall be provided on all transfer switches.

C. Transfer Switch Controller

1. The transfer switch shall be equipped with a Microprocessor Controller with a Power Supply Module, CPU and I/O Modules for all voltage and ampere ratings. The controller shall be capable of both Serial and Ethernet communications.
2. The controller shall contain voltage sensing modules capable of direct single phase or three phase sensing of each source from 120 VAC to 600 VAC. The Power Supply Module shall accept a 24 VDC external power source allowing controller communications in the event of a power outage.
3. Voltage sensing shall be true RMS type and accurate to +/- 1% of nominal voltage. Frequency sensing shall be accurate to +/- 0.05Hz. The operating temperature range shall be -20 to +50 degrees C and storage from -40 to +90 C.
4. The controller shall connect to the transfer switch through an interconnecting wiring harness. Interfacing relays shall be provided to isolate the controller from abnormal voltages applied to any and all customer input and output wiring terminals.
5. All customer interface connections shall be wired to a common DIN rail Cage Clamp terminal block. Sufficient space shall be provided to allow for future modifications and upgrades.

D. Controller Display and Keypad

1. A color, ¼ VGA minimum, graphical display shall be provided for viewing data and setting operational parameters. Parameters shall also be available for viewing remotely and limited control through a front accessible USB communications port.
2. The Controller shall provide high intensity LED's for the following:
 - a. Source Availability - Indicates the source voltage and frequency are within preset parameters.
 - b. Source Connected - Indicates the source main contacts closed and the load being served from the source.
 - c. XFER Inhibit - Indicates that the ATS is being inhibited from Automatic operation to the unconnected source.
 - d. Alarm – Indicates an alarm condition is active.
 - e. TD Active – Indicates that a transfer switch time delay is actively timing.
3. For ease of navigation, the display shall include the following:
 - a. Soft Keys – Change function based on user location in the menu structure.
 - b. Dedicated Navigational Keys – Home, Scroll Up, End, Escape and Enter.
 - c. Dedicated Pushbuttons for Alarm Reset, Test, Control and Information.

PART 3 OPERATION

3.01 Voltage, Frequency and Phase Rotation Sensing

- A. Programmable voltage and frequency sensing of both sources capable of detecting single or three phase losses. The Controller shall have adjustable pickup and dropout settings for each source. Set point ranges as follows:

<u>Parameter</u>	<u>Sources</u>	<u>Dropout/Trip</u>	<u>Pickup/Reset</u>
Undervoltage	N+E, 3phase	72 to 100%	70 to 98%
Overvoltage	N+E, 3phase	100 to 108%	102 to 110%
Underfrequency	N+E, 3phase	45.1 to 60.0 HZ	45.0 to 59.9 HZ
Overfrequency	N+E, 3phase	50.0 to 69.7 HZ	50.1 to 69.8 HZ

- B. The controller shall monitor phase rotation of both sources and inhibit transfer if both sources are not the same phase rotation. (ABC or CBA)
- C. Settings shall be adjustable in 1% increments either through the keypad, USB port or remotely via communications.
- D. A single source status screen shall be provided to allow for viewing of the status of both sources including three phase voltage, power and frequency.

3.02 Time Delays

- A. The controller shall include an adjustable time delay of 0 to 10 seconds to momentarily override normal source power outages and to delay engine starting. The time delay shall be expandable up to 60 minutes if an external 24 VDC power supply is provided for ATS control.
- B. The controller shall include an adjustable 0 to 60 minute time delay on transfer to emergency, factory set at 3 seconds.

- C. The controller shall include a time delay on retransfer to the preferred source adjustable 0 to 259 minutes, factory set at 5 minutes.
- D. The controller shall include a time delay on engine cool down adjustable 0 to 60 minutes, factory set at 5 minutes.
- E. The controller shall include a timer to control the transfer time from neutral to the non-preferred source, adjustable 0 to 10 minutes, factory set at 3 seconds.
- F. The controller shall include a timer to control the time delay from neutral to the preferred source, adjustable 1 to 10 minutes, factory set at 3 seconds.
- G. Closed Transition transfer switches shall include a Failure to Synchronize time delay fixed at 60 seconds, for failure to synchronize Source 1 and Source 2 prior to closed transition transfer.
- H. Open Transition type transfer switches shall include a two stage, back-up time delay system, independent of the Microprocessor Controller (Omron Required), for protection against extended paralleling of both sources beyond 100 milliseconds. Should this time delay expire while in parallel, a contact will be provided to facilitate the tripping of a remote source circuit breaker to ensure extended parallel time does not exceed the local utility maximum time, typically 100 milliseconds.
- I. All time delays shall be adjustable in 1second increments. All time delays shall be adjustable via the graphical display, the front USB port or configuration software using the USB, serial or Ethernet communications port.

3.03 Additional Features

- A. Test Switch – The controller shall be provided with a two position, password protected, test switch to simulate a normal source failure. The test mode shall be configurable for Test Without Load or Test With Load functionality. The Test function shall be activated via the pushbutton on the display or remotely via a dry contact, voltage signal or a network signal.
- B. Engine Start Signal – A SPDT contact, rated 10 amps at 30 VDC, shall be provided to start the engine generator in the event of a normal source outage. The start shutdown contact shall be wired in parallel with the systart / stop contact in ATS #! So that either contact switch will start the generator.
- C. Source connected contacts rated 10 amps at 120 VAC shall be provided to signal when the ATS is connected to each source.

- D. Source Connected LED's – The controller shall include LED's to indicate when the ATS is connected to each source.
- E. Source Availability LED's – The controller shall include LED's to indicate the availability of each source.
- F. Commit/No-Commit Transfer Selector – The controller shall include a programmable selector to configure the controller to commit to transferring the load to emergency (or not) in the event the normal source returns prior to the generator being ready to accept load.
- G. Inhibit Transfer Signals – The controller shall be capable of accepting transfer control inputs that inhibit transfer of the ATS to either source.
- H. Auto/Manual Selector – The controller shall include a programmable function to select either Automatic or Manual operation.
- I. ATS/Engine Exerciser – The controller shall include a user configurable exerciser. Exerciser shall be configurable for daily, 7 day, 14 day or 28 day exercise periods, each with (7) programmable events. The exerciser shall also be configurable as a full, 365 day exerciser with up to 24 independent exercise events. Each event shall be configurable for Test with Load and Test Without Load. Each event shall include user adjustable start time, date and test duration. All time and date settings shall be stored in non-volatile EEPROM memory. The controller shall include full programmability for daylight savings time. The timer shall be provided, but not used. The timer on ATS #1 shall be the only exerciser.
- J. Diagnostics – The controller shall contain self and system diagnostic screens for the purpose of detecting and troubleshooting abnormal system events.
- K. Communications Interface – The controller shall be capable of interfacing via serial/RS485 or optional Ethernet TCP/IP communications ports integral to the controller. All communications parameters (baud rate, parity, IP Address, etc.) shall be accessible and programmable via the front keypad. Both serial and Ethernet communication shall be Modbus open protocol.
- L. Event Logger – The controller shall have the ability to log data and to maintain the last 256 events, even in the event of a power failure. Time and date stamping of events will be accurate to 1 ms. Controller shall be capable of synchronizing its date/time setting with a main PC via Network Time Protocol over an Ethernet TCP/IP network connection.

The following events shall be time and date stamped:

- 1.) Last Primary Source Failure

- 2.) Last reason for transfer.
- 3.) Last transfer to alternate source
- 4.) Last retransfer to primary source
- 5.) Time load is without power
- 6.) Time ATS powered up
- 7.) Total time on source 1
- 8.) Total time on source 2
- 9.) Total number of primary source failures
- 10.) Total number of transfers

M. Communications Modules

- a. Serial Communications: Controller shall support RS485 communications port to enable serial communications at baud rates up to and including 115.2Kbps and be user configurable. The serial communications shall be capable of a direct connect or multi-drop configured network.
- b. Ethernet Communications: Controller shall be capable of supporting Ethernet TCP/IP communications via an internally mounted and self powered communications card. Ethernet shall be 10/100 Mbit, auto sensing and include a RJ45 network connector.
- c. Open Protocol: Both serial and Ethernet communications shall be Modbus protocol. Proprietary communications protocols shall not be acceptable.

N. External Power Supply: The controller shall be capable of being connected to an external 24 VDC power supply to permit full operation and communications of the controller when both sources are dennergized.

O. Auto Load Shed: The controller shall be capable of being programmed to automatically shed the connected load in the event of a user configurable under frequency condition.

P. Customer Configurable Alarms – The controller shall be capable of being configured to display customer configured alarm points. Alarms shall be capable of being reset via a remote contact or the front panel RESET pushbutton.

3.04 Power Quality Metering- **Not Required**

PART 4 ADDITIONAL REQUIREMENTS

4.01 Withstand and Close Ratings

- A. The ATS shall be UL listed in accordance with UL 1008 for 3 cycle close and withstand ratings. ATSS that are not listed and labeled for 3 cycles as listed will not be approved. The automatic transfer and bypass/isolation switch shall be tested as a complete connected unit. Minimum UL listed close and withstand ratings at 480 VAC shall be 1600A rating at 65 KA 3 cycle (0.05 sec)
- B. During a 3-cycle closing and withstand tests, there shall be no contact welding or damage. The 3-cycle test shall be performed without the use of current limiting fuses. The tests shall verify that contact separation has no occurred, and there is contact continuity across all phases. Test procedures shall be done in accordance with UL-1008, and testing shall be certified by Underwriters Laboratories, Inc.
- C. When conducting temperature rise tests to UL-1008, the manufacturer shall include post-endurance temperature rise tests to verify the ability of the ATS to carry full rated current after completing the overload and endurance tests.

4.02 Manufacturer

- A. The Transfer Switch manufacturer shall employ a factory-direct field service organization, available on a 24 hours a day, 365 a year day basis. The manufacturer must include (3) eight- hour days for on- site start up and training.
- B. The manufacturer shall include an 800-telephone number, for field service contact, affixed to the outside of each enclosure.
- C. The manufacturer shall maintain records of each transfer switch, by serial number, for a minimum of 20 years.

4.03 Installation

- A. Automatic Transfer Switches shall be provided with adequate lifting means for ease of installation of wall or floor mounted enclosures.
- B. Provide access and working space as indicated or required.

END OF SECTION 16400