

**Addendum
No. 1**

Meeting Date: November 1, 2017
Draft Date: November 2, 2017
Project: Generator Replacement at DFS Wilmington
DFM Project No: MC1002000391

The work herein shall be considered part of the bid documents for the referenced project and carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents without change in Contract Sum or Contract Time. Acknowledge receipt of addendum on the bid form as indicated.

Clarifications / Pre-Bid Meeting Minutes:**Clarifications / Pre-Bid Meeting Minutes:**

1. Introductions:
 - a. OMB/DFM Project Manager – Dean Seely
(joseph.seely@state.de.us) (302) 739-5644.
 - b. Studio JAED Project Manager – Brian Zigmond
(zigmondb@studiojaed.com) 302-832-1652
 - c. Studio JAED Assistant Project Manager – Dan Shurina
(shurinad@studiojaed.com) 302-832-1652.
2. See attached pre-bid sign in sheets for reference.
3. Review of Bidding Timeline:
 - a. Bid opening is to take place in the reception area of the Facilities Management Office in the Thomas Collins Building, 540 S. DuPont Highway, Suite 1 (Third Floor), Dover, DE 19901 at **2:30 p.m. local time on Friday, November 17, 2017** – as described in the invitation to bid / advertisement for bids.
 - b. Bidders are to submit questions in writing by email to both Brian Zigmond and Dan Shurina at the e-mail addresses noted above. Responses will be issued by addendum.
 - c. Bidder questions will be accepted until 5:00PM, Tuesday, October 14, 2017.
4. All drawings must be purchased through RCI as noted in the bid advertisement. All information / addenda will be released through RCI for this bid.
 - a. IT IS THE CONTRACTOR’S RESPONSIBILITY TO CONTACT RCI PRIOR TO THE BID DATE TO ENSURE THAT THEY HAVE RECEIVED ALL ADDENDA FOR THE PROJECT.
5. A voluntary contractor walkthrough is scheduled for Tuesday, November 7th, 2017; beginning at 11:00 AM. NOTE: Photographs will be limited to certain areas of the building at the discretion of the building end-users.
6. The project includes a \$10,000 allowance for unforeseen conditions which is to be included in contractor’s base bid price and is to be used at the owner’s discretion as project progresses. The allowance is not intended for any portion of work indicated in the bid documents. Any balance

remaining in the allowance is to be returned to owner by credit change order at project conclusion.

7. Bid Form and Required Documents:
 - a. Bidders may not alter the bid form.
 - b. If bid form is reissued during the bidding process, the latest bid form is to be submitted.
 - c. Bidders are not to leave any blank lines on the bid form. Fill out bid form completely.
 - d. Bidders are to individually acknowledge receipt of each numbered addendum received on the bid form. Bidders must list themselves for any listed subcontractors scope of work if they intend to do the scope of work with their own work force.
 - e. Drug affidavits are required for bidders and listed subcontractors.
 - f. Bidders are to include a copy of Delaware business license with bid form.
 - g. A bid bond is required. Bidders are to use the state bid bond form, a copy of which is found in the project manual.
8. Note: Construction will require temporary heat to be provided by the contractor to maintain appropriate conditions to complete all work, including the installation of the new flooring under separate contract.
9. General Project Schedule (all items are subject to change due to unforeseen circumstances):
 - a. Purchase orders are expected to be in place by mid-January 2018
 - b. The total shutdown length for the autopsy suite shall be limited to 3 months (calendar). All necessary mobilization equipment, products, etc. are expected to be in place prior to the Owner leaving the site.
10. After-hours work may only be undertaken in strict coordination with the Owner, and will only be entertained for specific needs such as utility shutdowns or particularly disruptive work.
11. The State of Delaware will review previous HAZMAT / AHERA reports for the site.
12. The building occupants being displaced will be relocated under separate contract.
13. As noted in the bid documents, the contractor managing this project will be responsible for coordination of all other contracts being undertaken during this project timeline. However, the contractor is NOT responsible for providing additional supervision while work being performed outside of their contract is underway.
14. The contractor is responsible for obtaining all building permits. No drawings have been submitted to the City at this time. Signed and sealed drawings will be provided to the successful contractor for this purpose.
15. Parking – As noted, parking on the site is extremely limited. DFS is working to obtain some parking across the street in conjunction with DART. Additional information will be provided in a future addendum.

Changes to Drawings:

1. *Drawing P10.1 Gas Piping Plan* – See revised drawing attached.
2. *Drawing E9.4 Electrical Single Line Diagram New Work* – See revised drawing attached.
3. *Drawing E9.6 Electrical Single Line Diagram New Work Alternate #1* – See revised drawing attached.

Changes to Specifications:

4. *Specification 00 01 15 List of Drawing Sheets* – Revised for add alternate #1.
5. *Specification 00 41 13 Bid Form* – Revised for add alternate #1.
6. *Specification 26 32 13 Engine Generators* – See revised section attached.
7. *Specification 26 36 00 Transfer Switches* – See revised section attached.

General Information:

Pre-Bid Sign-in Sheet: Please see attached sheet for a list of the attendees at the mandatory pre-bid.

Pre-Bid Meeting Minutes: Please see above. These are now integral to the bidding documents.

END

HEADQUARTERS

2500 WRANGLE HILL ROAD
FOX RUN OFFICE PLAZA, SUITE 110
BEAR, DE 19701

302.832.1652 **PHONE**
302.832.1423 **FAX**

ARCHITECTS

ENGINEERS

FACILITIES SOLUTIONS

Project: State of Delaware DFS Emergency Generator Replacement
Project No.: MC1002000391 / 17041
Date: November 1, 2017

**PRE-BID
SIGN IN SHEET**

REPRESENTATIVE	FIRM / PHONE / FAX / EMAIL
1. <u>Scott A. Capaldi</u>	<u>Critical Design and Construction Corp</u> <u>302-588-4406</u> <u>No Fax #</u> <u>sacapaldi@cdacorp.net</u>
2. <u>Matthew Celata</u>	<u>Preferred Electric Inc.</u> <u>302-669-6252</u> <u>No Fax #</u> <u>mdcelata@preferredinc.net</u>
3. <u>Michael Travers, Sr.</u>	<u>DFM/OMB</u> <u>302-270-8641</u> <u>No Fax #</u> <u>michael.travers@state.de.us</u>
4. <u>Chip Gruber</u>	<u>Schlosser & Associates</u> <u>302-738-7333</u> <u>302-738-5692</u> <u>abakersa@hotmail.com</u>
5. <u>Ben Bello</u>	<u>Summit Mechanical</u> <u>302-893-5155</u> <u>No Fax #</u> <u>rob@summitmech.org</u>

HEADQUARTERS

2500 WRANGLE HILL ROAD
FOX RUN OFFICE PLAZA, SUITE 110
BEAR, DE 19701

302.832.1652 **PHONE**
302.832.1423 **FAX**

ARCHITECTS

ENGINEERS

FACILITIES SOLUTIONS

Project: State of Delaware DFS Emergency Generator Replacement
Project No.: MC1002000391 / 17041
Date: November 1, 2017

**PRE-BID
SIGN IN SHEET**

REPRESENTATIVE	FIRM / PHONE / FAX / EMAIL
6. <u>Steve Hill</u>	<u>Diamond Electric, Inc.</u> <u>302-697-3296</u> <u>302-697-1328</u> <u>shill@diamondelectric.org</u>
7. <u>Matt Bailey</u>	<u>Power Plus Electrical Contracting, Inc.</u> <u>302-736-5070</u> <u>302-736-5120</u> <u>mattb337@gmail.com</u>
8. <u>Michael Donaldson</u>	<u>Donaldson Electric Inc.</u> <u>302-660-7534</u> <u>302-660-7542</u> <u>mdonaldson@donaldson-electric.com</u>
9. <u>Brian Smith</u>	<u>BSS Contractors</u> <u>610-345-1316</u> <u>610-345-1318</u> <u>bsmith@bsscontractor.com</u>
10. <u>Stacey Bush</u>	<u>Amakor Inc.</u> <u>302-834-8664</u> <u>302-834-8681</u> <u>amakor@aol.com</u>

HEADQUARTERS

2500 WRANGLE HILL ROAD
FOX RUN OFFICE PLAZA, SUITE 110
BEAR, DE 19701

302.832.1652 **PHONE**
302.832.1423 **FAX**

ARCHITECTS

ENGINEERS

FACILITIES SOLUTIONS

Project: State of Delaware DFS Emergency Generator Replacement
Project No.: MC1002000391 / 17041
Date: November 1, 2017

**PRE-BID
SIGN IN SHEET**

REPRESENTATIVE	FIRM / PHONE / FAX / EMAIL
11. <u>Dean Seely</u>	<u>State of Delaware OMB/DFM</u> <hr/> <hr/> <hr/>
12. <u>Dave Ward</u>	<u>Sobieski Mechanical Contractors</u> <u>302-993-0104 x272</u> <u>No Fax #</u> <u>dward@sobieskiinc.com</u>
13. <u>Gregg Pappas</u>	<u>Sobieski Mechanical Contractors</u> <u>302-993-0104</u> <u>302-993-0119</u> <u>gpappas@sobieskiinc.com</u>
14. <u>Lisa Nichols</u>	<u>Fidelity Power Systems</u> <u>410-771-9400 x2535</u> <u>410-891-1516</u> <u>lnichols@fidelityengineering.com</u>
15. <u>Kevin Cahill</u>	<u>Cahill Contracting, Inc.</u> <u>302-378-9650</u> <u>302-378-9653</u> <u>cahillelectricco@verizon.net</u>

HEADQUARTERS

2500 WRANGLE HILL ROAD
FOX RUN OFFICE PLAZA, SUITE 110
BEAR, DE 19701

302.832.1652 **PHONE**
302.832.1423 **FAX**

ARCHITECTS

ENGINEERS

FACILITIES SOLUTIONS

Project: State of Delaware DFS Emergency Generator Replacement
Project No.: MC1002000391 / 17041
Date: November 1, 2017

**PRE-BID
SIGN IN SHEET**

REPRESENTATIVE	FIRM / PHONE / FAX / EMAIL
16. <u>Tony Orga</u>	<u>Deldeo Builders</u> <u>302-791-0243</u> <u>No Fax #</u> <u>loudeldeo@comcast.net</u>
17. <u>Phillip Tarlton</u>	<u>Gaudelli Bros.</u> <u>856-825-0636</u> <u>No Fax #</u> <u>phillip@gaudellibros.com</u>
18. <u>John DeMatteis</u>	<u>Nickle Electrical Companies</u> <u>302-856-1006</u> <u>302-856-6119</u> <u>jdematteis@nickle.email</u>
19. <u>Tony Ventresca</u>	<u>Ventresca Bros., Inc.</u> <u>302-658-6436</u> <u>302-658-2360</u> <u>tony@ventrescabros.com</u>
20. <u>Fred Fisher</u>	<u>First State Electric</u> <u>302-322-0140</u> <u>302-323-1146</u> <u>fredf@firststateelectric.com</u>



HEADQUARTERS

2500 WRANGLE HILL ROAD
FOX RUN OFFICE PLAZA, SUITE 110
BEAR, DE 19701

302.832.1652 **PHONE**
302.832.1423 **FAX**

ARCHITECTS

ENGINEERS

FACILITIES SOLUTIONS

Project: State of Delaware DFS Emergency Generator Replacement
Project No.: MC1002000391 / 17041
Date: November 1, 2017

**PRE-BID
SIGN IN SHEET**

REPRESENTATIVE

FIRM / PHONE / FAX / EMAIL

21. John Evans

State of Delaware Division of Forensic Sciences

20. Maurice Jenkins

State of Delaware OMB/DFM

DRAWINGS REDACTED

SECTION 00 01 15
LIST OF DRAWING SHEETS

G1.0 - PROJECT COVER SHEET

A3.1 - ARCHITECTURAL SITE PLANS

A3.2 - ARCHITECTURAL DETAILS

E9.0 - ELECTRICAL SYMBOLS, ABBREVIATIONS, AND NOTES

E9.1 - ELECTRICAL PLANS

E9.2 ELECTRICAL PANEL SCHEDULES

E9.3 - ELECTRICAL SINGLE LINE DIAGRAM - DEMOLITION

E9.4 - ELECTRICAL SINGLE LINE DIAGRAM - NEW WORK

E9.5 - ELECTRICAL SINGLE LINE DIAGRAM - DEMOLITION - ALTERNATE #1

E9.6 - ELECTRICAL SINGLE LINE DIAGRAM - NEW WORK - ALTERNATE #1

P10.1 - GAS PIPING PLAN

END OF SECTION

**Generator Replacement
Division of Forensic Science (DFS) Wilmington
200 South Adams Street; Wilmington, DE 19801
Contract No. MC1002000391**

BID FORM

UNIT PRICES

There are no unit prices.

ALLOWANCES

Allowances are included as follows:

ALLOWANCE No. 1: \$10,000 for general contingencies and repairs.

**Generator Replacement
Division of Forensic Science (DFS) Wilmington
200 South Adams Street; Wilmington, DE 19801
Contract No. MC1002000391**

BID FORM

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for thirty (30) days from the date of opening of bids (60 days for School Districts and Department of Education), and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid.

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within _____ calendar days of the Notice to Proceed.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am / We are an Individual / a Partnership / a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

(State of Corporation)

Business Address: _____

Witness: _____ **By:** _____
(SEAL) (Authorized Signature)

(Title)
Date: _____

ATTACHMENTS

- Sub-Contractor List
- Non-Collusion Statement
- Affidavit(s) of Employee Drug Testing Program
- Bid Security
- (Others as Required by Project Manuals)

**Generator Replacement
Division of Forensic Science (DFS) Wilmington
200 South Adams Street; Wilmington, DE 19801
Contract No. MC1002000391**

BID FORM

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 6962 (d)(10)b Delaware Code, the following sub-contractor listing must accompany the bid submittal. The name and address of the sub-contractor **must be listed for each category** where the bidder intends to use a sub-contractor to perform that category of work. In order to provide full disclosure and acceptance of the bid by the *Owner*, **it is required that bidders list themselves as being the sub-contractor for all categories where he/she is qualified and intends to perform such work.** This form must be filled out completely with no additions or deletions. **Note that all subcontractors listed below must have a signed Affidavit of Employee Drug Testing Program included with this bid.**

<u>Subcontractor Category</u>	<u>Subcontractor</u>	<u>Address (City & State)</u>	<u>Subcontractors tax payer ID # or Delaware Business license #</u>
1. Electrical	_____	_____	_____
2. Concrete	_____	_____	_____
3. Pipe Railing	_____	_____	_____
4. Gas Piping	_____	_____	_____
5. Site Work / Excavation	_____	_____	_____

**Generator Replacement
Division of Forensic Science (DFS) Wilmington
200 South Adams Street; Wilmington, DE 19801
Contract No. MC1002000391**

BID FORM
NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date to the Office of Management and Budget, Division of Facilities Management.

All the terms and conditions of MC1002000391 have been thoroughly examined and are understood.

NAME OF BIDDER: _____

**AUTHORIZED REPRESENTATIVE
(TYPED):** _____

**AUTHORIZED REPRESENTATIVE
(SIGNATURE):** _____

TITLE: _____

ADDRESS OF BIDDER: _____

E-MAIL: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

**Generator Replacement
Division of Forensic Science (DFS) Wilmington
200 South Adams Street; Wilmington, DE 19801
Contract No. MC1002000391**

**AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

END OF SECTION

SECTION 26 32 13
ENGINE GENERATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Packaged engine generator system and associated components and accessories:
 - 1. Engine and engine accessory equipment.
 - 2. Alternator (generator).
 - 3. Generator set control system.
 - 4. Generator set enclosure.
- B. Packaged engine generator set.
- C. Exhaust silencer, emissions controls, and fittings.
- D. Remote control panel.
- E. Battery and charger.
- F. Sound enclosure.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 22 10 05 - Plumbing Piping: Gas piping.
- C. Section 26 05 26 - Grounding & Bonding Electrical Systems.
- D. Section 26 05 29 - Hangers & Supports for Electrical Systems.
- E. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- F. Section 26 36 00 - Transfer Switches.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction.
- B. NECA/EGSA 404 - Standard for Installing Generator Sets.
- C. NEMA MG 1 - Motors and Generators.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association.
- E. NFPA 30 - Flammable and Combustible Liquids Code.
- F. NFPA 37 - Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines.
- G. NFPA 70 - National Electrical Code.
- H. NFPA 99 - Health Care Facilities Code.
- I. NFPA 110 - Standard for Emergency and Standby Power Systems.
- J. UL 1236 - Battery Chargers for Charging Engine-Starter Batteries.
- K. UL 2200 - Stationary Engine Generator Assemblies.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate compatibility of generator sets to be installed with work provided under other sections or by others.
 - a. Transfer Switches: See Section 26 36 00 - Transfer Switches.

2. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment or other potential obstructions within the spaces dedicated for engine generator system.
 3. Coordinate arrangement of equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 4. Coordinate the work to provide electrical circuits suitable for the power requirements of the actual auxiliary equipment and accessories to be installed.
 5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Preinstallation Meeting: Convene one week before starting work of this section; require attendance of all affected installers.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features. Include alternator starting capabilities, engine fuel consumption rates, and cooling, combustion air, and exhaust requirements.
 1. Include generator set sound level test data.
 2. Include characteristic trip curves for overcurrent protective devices upon request.
 3. Include alternator thermal damage curve upon request.
- C. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing all factory and field connections.
- D. Evidence of qualifications for installer.
- E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.
- F. Manufacturer's factory emissions certification.
- G. Manufacturer's certification that products meet or exceed specified requirements.
- H. Source quality control test reports.
- I. Provide NFPA 110 required documentation from manufacturer where requested by authorities having jurisdiction, including but not limited to:
 1. Certified prototype tests.
 2. Torsional vibration compatibility certification.
 3. NFPA 110 compliance certification.
 4. Certified rated load test at rated power factor.
- J. Manufacturer's detailed field testing procedures.
- K. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.
 1. Include contact information for entity that will be providing contract maintenance and trouble call-back service.
- L. Executed Warranty: Submit documentation of final executed warranty completed in Owner's name and registered with manufacturer.
- M. Maintenance contracts.
- N. Project Record Documents: Record actual locations of system components, installed circuiting arrangements and routing, and final equipment settings.
- O. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 60 00 - Product Requirements, for additional provisions.
 2. Extra Fuses: One of each type and size.
 3. Extra Filter Elements: One of each type, including fuel, oil and air.
- P. Shop Drawings: Indicate electrical characteristics and connection requirements. Show plan and elevation views with overall and interconnection point dimensions, fuel consumption rate curves at various loads, ventilation and combustion air requirements, electrical diagrams including schematic and interconnection diagrams. Provide generator damage curve and protective relay(breaker) curves.
- Q. Product Data: Provide data showing dimensions, weights, ratings, interconnection points, and internal wiring diagrams for engine, generator, control panel, battery, battery rack, battery charger, exhaust silencer, vibration isolators, day tank, and remote radiator.
- R. Test Reports: Indicate results of performance testing.
- S. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- T. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- U. Manufacturer's Field Reports: Indicate procedures and findings.
- V. Operation Data: Include instructions for normal operation.
- W. Maintenance Data: Include instructions for routine maintenance requirements, service manuals for engine and day tank, oil sampling and analysis for engine wear, and emergency maintenance procedures.
- X. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
1. Extra Filter Elements: One of each type, including fuel, oil and air.
 2. Tools: One set of tools required for preventative maintenance of the engine generator system. Package tools in adequately sized metal tool box.

1.06 QUALITY ASSURANCE

- A. Comply with the following:
1. NFPA 70 (National Electrical Code).
 2. NFPA 110 (Standard for Emergency and Standby Power Systems); meet requirements for Level 1 system.
 3. NFPA 37 (Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines).
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience with engine generator systems of similar size, type, and complexity; manufacturer's authorized installer.
- E. Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.
- F. Products: Listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) or testing firm acceptable to authorities having jurisdiction as suitable for the purpose indicated.
- G. Conform to requirements of NFPA 70.
1. Maintain one copy of each document on site.

- H. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience with service facilities within 100 miles of Project.
- I. Supplier Qualifications: Authorized distributor of specified manufacturer with minimum three years documented experience.
- J. Products: Furnish products listed and classified by Underwriters Laboratories as suitable for purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store generator sets in accordance with manufacturer's instructions and NECA/EGSA 404.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's instructions to avoid damage to generator set components, enclosure, and finish.

1.08 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY & SERVICE CONTRACTS

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide minimum five year manufacturer warranty covering full parts and labor repair or replacement due to defective materials or workmanship.
- C. Provide 3 year service contract for manufacturer's recommended maintenance.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Packaged Engine Generator Set - Basis of Design: KOHLER.
- B. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Products other than basis of design are subject to compliance with specified requirements and prior approval of Engineer. By using products other than basis of design, Contractor accepts responsibility for costs associated with any necessary modifications to related work, including any design fees.
- D. Source Limitations: Furnish engine generator sets and associated components and accessories produced by a single manufacturer and obtained from a single supplier.
- E. Substitutions: See Section 01 60 00 - Product Requirements. Submit substitution request at least 10 days prior to bid opening. Substitution request shall include entire submittal package with explicit notations from vendor identifying all deviations from basis of design. Failure to comply will result in disqualification of substitution request.

2.02 PACKAGED ENGINE GENERATOR SYSTEM

- A. Provide new engine generator system consisting of all required equipment, sensors, conduit, boxes, wiring, piping, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. System Description:
 - 1. Application: Emergency/standby.

2. Configuration: Single packaged engine generator set operated independently (not in parallel).
 3. Total System Power Rating: 180 kW, standby.
- D. Packaged Engine Generator Set:
1. Type: Gaseous (spark ignition).
 2. Basis of Design: Kohler Power systems- Model 180REZXB.
 3. Power Rating: 180 kW, standby., Max alternate tempt. 125 deg centigrade.
 4. Voltage: As indicated on drawings.
 5. Main Line Circuit Breaker Number One:
 - a. Type: Thermal magnetic with solid state trip unit capable of protecting generator from low level faults.
 - b. Trip Rating: Select according to generator set rating.
- E. Generator Set General Requirements:
1. Prototype tested in accordance with NFPA 110 for Level 1 systems.
 2. Factory-assembled, with components mounted on suitable base.
 3. List and label engine generator assembly as complying with UL 2200.
 4. Power Factor: Unless otherwise indicated, specified power ratings are at 0.8 power factor for three phase voltages and 1.0 power factor for single phase voltages.
 5. Provide suitable guards to protect personnel from accidental contact with rotating parts, hot piping, and other potential sources of injury.
 6. Main Line Circuit Breakers: Provide factory-installed line side connections with suitable lugs for load side connections.
- F. Service Conditions: Provide engine generator system and associated components suitable for operation under the service conditions at the installed location.
1. Altitude: 1000 feet.
 2. Ambient Temperature: Between 20 and 104 degrees F.
 3. Available Natural Gas Pressure: 7 - 11 inches water column.
- G. Starting and Load Acceptance Requirements:
1. Cranking Method: Cycle cranking complying with NFPA 110 (15 second crank period, followed by 15 second rest period, with cranking limiter time-out after 3 cycles), unless otherwise required.
 2. Cranking Limiter Time-Out: If generator set fails to start after specified cranking period, indicate overcrank alarm condition and lock-out generator set from further cranking until manually reset.
 3. Start Time: Capable of starting and achieving conditions necessary for load acceptance within 10 seconds (NFPA 110, Type 10).
 4. Maximum Load Step: Supports 100 percent of rated load in one step.
 - a. Maximum Voltage Deviation with Load Step: 35 percent.
 - b. Maximum Frequency Deviation with Load Step: 5 percent.
- H. Exhaust Emissions Requirements:
1. Comply with federal (EPA), state, and local regulations applicable at the time of commissioning; include factory emissions certification with submittals.
 2. Do not make modifications affecting generator set factory emissions certification without approval of manufacturer and Engineer. Where such modifications are made, provide field emissions testing as necessary for certification.
- I. Sound Level Requirements:
1. Do not exceed 70.3 dBA when measured at 7 meters from generator set in free field (no sound barriers) while operating at full load; include manufacturer's sound data with submittals.

- J. Interface with Existing Work: connection with existing electrical distribution system of building and the owner-installed automatic transfer switch.
- K. Description: NFPA 110, engine generator system to provide source of power for Level 1 applications .
- L. System Capacity: 180 kW, 225 kVA at elevation of 100 feet above sea level, continuous rating using engine-mounted radiator.

2.03 ENGINE AND ENGINE ACCESSORY EQUIPMENT

- A. Provide engine with adequate horsepower to achieve specified power output at rated speed, accounting for alternator efficiency and parasitic loads.
- B. Engine Fuel System - Gaseous (Spark Ignition):
 - 1. Fuel Source: Natural gas.
 - 2. Engine Fuel Connections: Provide suitable, approved flexible fuel lines for coupling engine to fuel source.
 - 3. Provide components/features indicated and as necessary for operation and/or required by applicable codes, including but not limited to:
 - a. Carburetor.
 - b. Gas pressure regulators.
 - c. Fuel shutoff control valves.
 - d. Low gas pressure switches.
- C. Engine Starting System:
 - 1. System Type: Electric, with DC solenoid-activated starting motor(s).
 - 2. Battery(s):
 - a. Battery Type: Lead-acid.
 - b. Battery Capacity: Size according to manufacturer's recommendations for achieving starting and load acceptance requirements under worst case ambient temperature; capable of providing cranking through three complete periods of cranking limiter time-outs without recharging.
 - c. Provide battery rack, cables, and connectors suitable for the supplied battery(s); size battery cables according to manufacturer's recommendations for cable length to be installed.
 - 3. Battery-Charging Alternator: Engine-driven, with integral solid-state voltage regulation.
 - 4. Battery Charger:
 - a. Provide dual rate battery charger with automatic float and equalize charging modes and minimum rating of 10 amps; suitable for maintaining the supplied battery(s) at full charge without manual intervention.
 - b. Capable of returning supplied battery(s) from fully discharged to fully charged condition within 24 hours, as required by NFPA 110 for Level 1 applications while carrying normal loads.
 - c. Recognized as complying with UL 1236.
 - d. Furnished with integral overcurrent protection; current limited to protect charger during engine cranking; reverse polarity protection.
 - e. Provide integral DC output ammeter and voltmeter with five percent accuracy.
 - f. Provide alarm output contacts as necessary for alarm indications.
- D. Engine Speed Control System (Governor):
 - 1. Single Engine Generator Sets (Not Operated in Parallel): Provide electronic isochronous governor for controlling engine speed/alternator frequency.
 - 2. Frequency Regulation, Electronic Isochronous Governor: No change in frequency from no load to full load; plus/minus 0.25 percent at steady state.
- E. Engine Lubrication System:

1. System Type: Full pressure, with engine-driven, positive displacement lubrication oil pump, replaceable full-flow oil filter(s), and dip-stick for oil level indication. Provide oil cooler where recommended by manufacturer.
- F. Engine Cooling System:
1. System Type: Closed-loop, liquid-cooled, with unit-mounted radiator/fan and engine-driven coolant pump; suitable for providing adequate cooling while operating at full load under worst case ambient temperature.
 2. Fan Guard: Provide suitable guard to protect personnel from accidental contact with fan.
 3. Coolant Heater: Provide thermostatically controlled coolant heater to improve starting under cold ambient conditions; size according to manufacturer's recommendations for achieving starting and load acceptance requirements under worst case ambient temperature.
- G. Engine Air Intake and Exhaust System:
1. Air Intake Filtration: Provide engine-mounted, replaceable, dry element filter.
 2. Engine Exhaust Connection: Provide suitable, approved flexible connector for coupling engine to exhaust system.
 3. Exhaust Silencer: Provide critical grade or better exhaust silencer with sound attenuation not less than basis of design; select according to manufacturer's recommendations to meet sound performance requirements, where specified.
- H. Type: Water-cooled inline or V-type, four stroke cycle, electric ignition internal combustion engine.
- I. Rating: Sufficient to operate under 10 percent overload for one hour in an ambient of 90 degrees F at elevation of 1000 feet.
- J. Fuel System: Natural gas. Include manufacturer's approved regulator for pressure reduction from supply pressure.
- K. Engine speed: 1800 rpm.
- L. Governor: Isochronous type to maintain engine speed within 0.5 percent, steady state, and 5 percent, no load to full load, with recovery to steady state within 2 seconds following sudden load changes. Equip governor with means for manual operation and adjustment.
- M. Safety Devices: Engine shutdown on high water temperature, low oil pressure, overspeed, and engine overcrank. Limits as selected by manufacturer.
- N. Engine Starting: DC starting system with positive engagement, number and voltage of starter motors in accordance with manufacturer's instructions. Include remote starting control circuit, with MANUAL-OFF-REMOTE selector switch on engine-generator control panel.
- O. Engine Jacket Heater: Thermal circulation type water heater with integral thermostatic control, sized to maintain engine jacket water at 90 degrees F, and suitable for operation on 120 volts AC.
- P. Radiator: Radiator using glycol coolant, with blower type fan, sized to maintain safe engine temperature in ambient temperature of 110 degrees F. Radiator air flow restriction 0.5 inches of water maximum.
- Q. Engine Accessories: Lube oil filter, intake air filter, lube oil cooler, fuel transfer pump, fuel priming pump, gear-driven water pump. Include fuel pressure gage, water temperature gage, and lube oil pressure gage on engine/generator control panel.
- R. Mounting: Provide unit with suitable spring-type vibration isolators and mount on structural steel base.

2.04 ALTERNATOR (GENERATOR)

- A. Alternator: 4-pole, 1800 rpm (60 Hz output) revolving field, synchronous generator complying with NEMA MG 1; connected to engine with flexible coupling; voltage output configuration as indicated, with reconnectable leads for 3 phase alternators.
- B. Exciter:
 - 1. Exciter Type: Brushless; provide permanent magnet generator (PMG) excitation system; self-excited (shunt) systems are not permitted.
- C. PMG Excitation Short-Circuit Current Support: Capable of sustaining 300 percent of rated output current for 10 seconds.
 - 1. Voltage Regulation (with PMG excitation): Plus/minus 0.5 percent for any constant load from no load to full load.
- D. Temperature Rise: Comply with UL 2200.
- E. Insulation System: NEMA MG 1, Class H; suitable for 105 deg Centigrade alternator temperature rise.
- F. Enclosure: NEMA MG 1, drip-proof.
- G. Total Harmonic Distortion: Not greater than five percent.

2.05 GENERATOR SET CONTROL SYSTEM

- A. Provide microprocessor-based control system for automatic control, local and remote monitoring, and protection of generator set. Include sensors, wiring, and connections necessary for functions/indications specified.
- B. Control Panel:
 - 1. Control Panel Mounting: Unit-mounted unless otherwise indicated; vibration isolated.
 - 2.
 - 3. Generator Set Control Functions:
 - a. Automatic Mode: Initiates generator set start/shutdown upon receiving corresponding signal from remote device (e.g. automatic transfer switch).
 - b. Manual Mode: Initiates generator set start/shutdown upon direction from operator.
 - c. Reset Mode: Clears all faults, allowing generator set restart after a shutdown.
 - d. Emergency Stop: Immediately shuts down generator set (without time delay) and prevents automatic restarting until manually reset.
 - e. Cycle Cranking: Programmable crank time, rest time, and number of cycles.
 - f. Time Delay: Programmable for shutdown (engine cooldown) and start (engine warmup).
 - g. Voltage Adjustment: Adjustable through range of plus/minus 5 percent.
 - 4. Generator Set Status Indications:
 - a. Voltage (Volts AC): Line-to-line, line-to-neutral for each phase.
 - b. Current (Amps): For each phase.
 - c. Frequency (Hz).
 - d. Real power (W/kW).
 - e. Reactive power (VAR/kVAR).
 - f. Apparent power (VA/kVA).
 - g. Power factor.
 - h. Duty Level: Actual load as percentage of rated power.
 - i. Engine speed (RPM).
 - j. Battery voltage (Volts DC).
 - k. Engine oil pressure.
 - l. Engine coolant temperature.
 - m. Engine run time.

- n. Generator powering load (position signal from transfer switch).
- 5. Generator Set Protection and Warning/Shutdown Indications:
 - a. Comply with NFPA 110; configurable for NFPA 110 Level 1. including but not limited to the following protections/indications:
 - 1) Overcrank (shutdown).
 - 2) Low coolant temperature (warning).
 - 3) High coolant temperature (warning).
 - 4) High coolant temperature (shutdown).
 - 5) Low oil pressure (warning).
 - 6) Low oil pressure (shutdown).
 - 7) Overspeed (shutdown).
 - 8) Low fuel level (warning).
 - 9) Low coolant level (warning/shutdown).
 - 10) Generator control not in automatic mode (warning).
 - 11) High battery voltage (warning).
 - 12) Low cranking voltage (warning).
 - 13) Low battery voltage (warning).
 - 14) Battery charger failure (warning).
 - b. In addition to NFPA 110 requirements, provide the following protections/indications:
 - 1) High AC voltage (shutdown).
 - 2) Low AC voltage (shutdown).
 - 3) High frequency (shutdown).
 - 4) Low frequency (shutdown).
 - 5) Overcurrent (shutdown).
 - c. Provide contacts for local and remote common alarm.
 - d. Provide lamp test function that illuminates all indicator lamps.
- 6. Other Control Panel Features:
 - a. Event log.
 - b. Communications Capability: Compatible with system indicated. Provide all accessories necessary for proper interface.
 - c. Remote monitoring capability via PC.
- C. Remote Annunciator:
 - 1. Remote Annunciator Mounting: Wall-mounted; Provide flush-mounted annunciator for finished areas and surface-mounted annunciator for non-finished areas unless otherwise indicated in NEMA 1 metal enclosure.
 - 2. Generator Set Status Indications:
 - a. Generator powering load (via position signal from transfer switch).
 - b. Communication functional.
 - 3. Generator Set Warning/Shutdown Indications:
 - a. Comply with NFPA 110 for Level 1 systems including but not limited to the following indications:
 - 1) Overcrank (shutdown).
 - 2) Low coolant temperature (warning).
 - 3) High coolant temperature (warning).
 - 4) High coolant temperature (shutdown).
 - 5) Low oil pressure (warning).
 - 6) Low oil pressure (shutdown).
 - 7) Overspeed (shutdown).
 - 8) Low fuel level (warning).
 - 9) Low coolant level (warning/shutdown).
 - 10) Generator control not in automatic mode (warning).

- 11) High battery voltage (warning).
 - 12) Low cranking voltage (warning).
 - 13) Low battery voltage (warning).
 - 14) Battery charger failure (warning).
- b. Provide audible alarm with silence function.
 - c. Provide lamp test function that illuminates all indicator lamps.
- D. Remote Emergency Stop: Provide approved red, mushroom style remote emergency stop button where indicated or required by authorities having jurisdiction.

2.06 GENERATOR SET ENCLOSURE

- A. Enclosure Type: Sound attenuating, weather protective.
- B. Enclosure Material: Panels made of 14 gauge, low carbon, hot rolled ASTM A569 steel construction, posts made of 12 gauge, low carbon, hot rolled ASTM A569 steel..
- C. Hardware Material: Stainless steel.
- D. Color: Manufacturer's standard.
- E. Access Doors: Lockable, with all locks keyed alike.
- F. Openings: Designed to prevent bird/rodent entry.
- G. External Drains: Extend oil and coolant drain lines to exterior of enclosure for maintenance service.
- H. Sound Attenuating Enclosures: Line enclosure with non-hydroscopic, self-extinguishing sound-attenuating material.
- I. Exhaust Silencers: Where exhaust silencers are mounted within enclosure in main engine compartment, insulate silencer to minimize heat dissipation as necessary for operation at rated load under worst case ambient temperature.
- J. Enclosure Space Heater: Provide thermostatically controlled enclosure space heater to prevent condensation and improve starting under cold ambient conditions; size according to manufacturer's recommendations for achieving starting and load acceptance requirements under worst case ambient temperature.

2.07 SOURCE QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Perform production tests on generator sets at factory to verify operation and performance characteristics prior to shipment. Include certified test report with submittals.
- C. Generator Set production testing to include, at a minimum:
 1. Operation at rated load and rated power factor.
 2. Single step load pick-up.
 3. Transient and steady state voltage and frequency performance.
 4. Operation of safety shutdowns.

2.08 ACCESSORIES

- A. Exhaust Silencer: Residential type silencer, with muffler companion flanges and flexible stainless steel exhaust fitting, sized in accordance with engine manufacturer's instructions.
- B. Batteries: Heavy duty, diesel starting type lead-acid storage batteries, 1100 amps min. at -18 deg C to 0 deg C ampere-hours minimum capacity. Match battery voltage to starting system. Include necessary cables and clamps.
- C. Battery Tray: Treated for electrolyte resistance, constructed to contain spillage.
- D. Battery Charger: Current limiting type designed to float at 2.17 volts per cell and equalize at 2.33 volts per cell. Include overload protection, full wave rectifier, DC voltmeter and ammeter,

and 120 volts AC fused input. Provide wall-mounted enclosure to meet NEMA 250, Type 1 requirements.

- E. Line Circuit Breaker: Molded case circuit breaker on generator output with integral thermal and instantaneous magnetic trip in each pole, sized in accordance with NFPA 70; UL listed. Include battery-voltage operated shunt trip, connected to open circuit breaker on engine failure. Unit mount in enclosure to meet NEMA 250, Type 1 requirements.
- F. Engine-Generator Control Panel: NEMA 250, Type 1 generator mounted control panel enclosure with engine and generator controls and indicators. Include provision for padlock and the following equipment and features:
 - 1. Frequency Meter: 45-65 Hz. range, 3.5 inch dial.
 - 2. AC Output Voltmeter: 3.5 inch dial, 2 percent accuracy, with phase selector switch.
 - 3. AC Output Ammeter: 3.5 inch dial, 2 percent accuracy, with phase selector switch.
 - 4. Output voltage adjustment.
 - 5. Push-to-test indicator lamps, one each for low oil pressure, high water temperature, overspeed, and overcrank.
 - 6. Engine start/stop selector switch.
 - 7. Engine running time meter.
 - 8. Oil pressure gage.
 - 9. Water temperature gage.
 - 10. Auxiliary Relay: 3PDT, operates when engine runs, with contact terminals prewired to terminal strip.
 - 11. Additional visual indicators and alarms as required by NFPA 110.
 - 12. Remote Alarm Contacts: Pre-wire SPDT contacts to terminal strip for remote alarm functions required by NFPA 110.
- G. Remote Annunciator Panel: Surface mounted panel with brushed stainless steel. Provide audible and visible indicators and alarms required by NFPA 110.
- H. Emissions controls: Catalyst based, meeting State of Delaware Department of Natural Resources and Environmental Controls standards for stand-by generators.
- I. Sound Enclosure: Lift based steel construction with hinged doors, Acoustic insulation meeting UL94HF1 flammability classification and repels moisture absorption. Maximum sound level shall be @ 70.3 dB at 23 feet.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that the ratings and configurations of generator sets and auxiliary equipment are consistent with the indicated requirements.
- C. Verify that rough-ins for field connections are in the proper locations.
- D. Verify that mounting surfaces are ready to receive equipment.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in a neat and workmanlike manner in accordance with NECA 1.
- B. Install products in accordance with manufacturer's instructions.
- C. Install generator sets and associated accessories in accordance with NECA/EGSA 404.
- D. Arrange equipment to provide minimum clearances and required maintenance access.

- E. Unless otherwise indicated, mount generator set on properly sized 6 inch high concrete pad constructed in accordance with Section 03 30 00. Provide suitable vibration isolators, where not factory installed.
- F. Provide required support and attachment in accordance with Section 26 05 29 Hangers and Supports For Electrical Systems.
- G. Use manufacturer's recommended oil and coolant, suitable for the worst case ambient temperatures.
- H. Provide gas piping in accordance with Section 22 10 05 - Plumbing Piping.
- I. Provide engine exhaust piping where not factory installed.
 - 1. Include piping expansion joints, piping insulation, thimble, condensation trap/drain, rain cap, hangers/supports, etc. as indicated or as required.
 - 2. Do not exceed manufacturer's maximum back pressure requirements.
- J. Install exhaust silencer where not factory installed.
- K. Provide grounding and bonding in accordance with Section 26 05 26 - Grounding and Bonding For Electrical Systems.
- L. Identify system wiring and components in accordance with Section 26 05 53 - Identifications For Electrical Systems.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Provide services of a manufacturer's authorized representative to prepare and start systems and perform inspection and testing. Include manufacturer's detailed testing procedures and field reports with submittals.
- C. Notify Owner and Architect at least two weeks prior to scheduled inspections and tests.
- D. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- E. Provide all equipment, tools, and supplies required to accomplish inspection and testing, including load bank and fuel.
- F. Preliminary inspection and testing to include, at a minimum:
 - 1. Inspect each system component for damage and defects.
 - 2. Verify tightness of mechanical and electrical connections are according to manufacturer's recommended torque settings.
 - 3. Check for proper oil and coolant levels.
- G. Prepare and start system in accordance with manufacturer's instructions.
- H. Perform acceptance test in accordance with NFPA 110.
- I. Inspection and testing to include, at a minimum:
 - 1. Verify compliance with starting and load acceptance requirements.
 - 2. Verify voltage and frequency; make required adjustments as necessary.
 - 3. Verify phase sequence.
 - 4. Verify control system operation, including safety shutdowns.
 - 5. Verify operation of auxiliary equipment and accessories (e.g. battery charger, heaters, etc.).
- J. Provide field emissions testing where necessary for certification.
- K. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

- L. Provide full load test utilizing portable test bank for four hours minimum. Simulate power failure including operation of transfer switch, automatic starting cycle, and automatic shutdown and return to normal.
- M. Test alarm and shutdown circuits by simulating conditions.

3.04 ADJUSTING

- A. Adjust generator output voltage and engine speed.

3.05 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.06 CLOSEOUT ACTIVITIES

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.
- B. See Section 01 79 00 - Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate proper operation of system to Owner, and correct deficiencies or make adjustments as directed.
- D. Training: Train Owner's personnel on operation, adjustment, and maintenance of system.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of four hours of training.
 - 3. Instructor: Manufacturer's authorized representative.
 - 4. Location: At project site.
- E. After successful acceptance test and just prior to Substantial Completion, replace air, oil, and fuel filters and fill fuel storage tank.

3.07 PROTECTION

- A. Protect installed engine generator system from subsequent construction operations.

3.08 MAINTENANCE

- A. See Section 01 70 00 - Execution And Closeout Requirements, for additional requirements relating to maintenance service.
- B. Maintain an on-site log listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced.
- C. Provide a separate maintenance contract for specified maintenance service.
- D. Provide service and maintenance of engine generator for one year from Date of Substantial Completion.

END OF SECTION

SECTION 26 36 00
TRANSFER SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Transfer switches for low-voltage (600 V and less) applications and associated accessories:
 - 1. Automatic transfer switches.
 - 2. Remote annunciators.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 26 05 26 - Grounding & Bonding Electrical Systems.
- C. Section 26 05 29 - Hangers & Supports for Electrical Systems.
- D. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 26 32 13 - Engine Generators: For interface with transfer switches.
 - 1. Includes code requirements applicable to work of this section.
 - 2. Includes related demonstration and training requirements.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- C. NEMA ICS 10 Part 1 - Industrial Control and Systems Part 1: Electromechanical AC Transfer Switch Equipment.
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems.
- E. NFPA 70 - National Electrical Code.
- F. NFPA 110 - Standard for Emergency and Standby Power Systems.
- G. UL 1008 - Transfer Switch Equipment.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate compatibility of transfer switches to be installed with work provided under other sections or by others.
 - a. Engine Generators: See Section 26 32 13 - Engine Generators.
 - 2. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
 - 3. Coordinate arrangement of equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Coordinate the work with placement of supports, anchors, etc. required for mounting.
 - 5. Closed Transition Transfer Switches:
 - a. Coordinate source interconnection requirements with Utility Company.
 - b. Where applicable, coordinate the work to provide engine generators with isochronous governors suitable for closed transition transfer.
 - c. Coordinate the work to provide shunt trip breakers necessary for protection from source interconnection for longer than specified maximum interconnection time.
 - d. Arrange for inspections necessary to obtain Utility Company approval of installation.
 - 6. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features.
 - 1. Where applicable, include characteristic trip curves for overcurrent protective devices upon request.
- C. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing all factory and field connections.
- D. Specimen Warranty: Submit sample of manufacturer's warranty.
- E. Evidence of qualifications for installer.
- F. Evidence of qualifications for maintenance contractor (if different entity from installer).
- G. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.
- H. Manufacturer's certification that products meet or exceed specified requirements.
- I. Source quality control test reports.
- J. Manufacturer's detailed field testing procedures.
- K. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.
 - 1. Include contact information for entity that will be providing contract maintenance and trouble call-back service.
- L. Executed Warranty: Submit documentation of final executed warranty completed in Owner's name and registered with manufacturer.
- M. Maintenance contracts.
- N. Project Record Documents: Record actual locations of system components, installed circuiting arrangements and routing, and final equipment settings.
- O. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

- A. Comply with the following:
 - 1. NFPA 70 (National Electrical Code).
 - 2. NFPA 110 (Standard for Emergency and Standby Power Systems); meet requirements for system Level specified in Section 26 32 13 - Engine Generators.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
 - 1. Authorized service facilities located within 200 miles of project site.
- D. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience with power transfer systems of similar size, type, and complexity; manufacturer's authorized installer.

- E. Products: Listed, classified, and labeled by Underwriters Laboratories Inc. (UL) or testing firm acceptable to authorities having jurisdiction as suitable for the purpose indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store transfer switches in accordance with manufacturer's instructions.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's instructions to avoid damage to transfer switch components, enclosure, and finish.

1.08 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide minimum one year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Transfer Switches - Basis of Design: ASCO 4000 series).
- B. Transfer Switches - Other Acceptable Manufacturers:
 - 1. ASCO Power Technologies, a brand of Emerson Network Power: www.emersonnetworkpower.com.
 - 2. Eaton Corporation: www.eaton.com.
- C. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Products other than basis of design are subject to compliance with specified requirements and prior approval of Engineer. By using products other than basis of design, Contractor accepts responsibility for costs associated with any necessary modifications to related work, including any design fees.
- E. Source Limitations: Furnish transfer switches and accessories produced by a single manufacturer and obtained from a single supplier.

2.02 TRANSFER SWITCHES

- A. Provide complete power transfer system consisting of all required equipment, conduit, boxes, wiring, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Applications:
 - 1. Utilize open transition transfer unless otherwise indicated or required.
- D. Construction Type: Either "contactor type" (open contact) or "breaker type" (enclosed contact) transfer switches complying with specified requirements are acceptable.
- E. Automatic Transfer Switch:
 - 1. Basis of Design: ASCO 4000 series).
 - 2. Transfer Switch Type: Automatic transfer switch.
 - 3. Transition Configuration: Open-transition (no neutral position).
 - 4. Voltage: As indicated on the drawings.
 - 5. Ampere Rating: As indicated on the drawings.

6. Neutral Configuration: Solid neutral (unswitched), except as indicated.
 7. Load Served: As indicated on the drawings.
 8. Primary Source: Utility (fed from transformer).
 9. Alternate Source: Engine generator (fed from on site generator).
- F. Comply with NEMA ICS 10 Part 1, and list and label as complying with UL 1008 for the classification of the intended application (e.g. emergency, optional standby).
- G. Do not use double throw safety switches or other equipment not specifically designed for power transfer applications and listed as transfer switch equipment.
- H. Load Classification: Classified for total system load (any combination of motor, electric discharge lamp, resistive, and tungsten lamp loads with tungsten lamp loads not exceeding 30 percent of the continuous current rating) unless otherwise indicated or required.
- I. Switching Methods:
1. Open Transition:
 - a. Provide break-before-make transfer without a neutral position that is not connected to either source, and with interlocks to prevent simultaneous connection of the load to both sources.
 2. Obtain control power for transfer operation from line side of source to which the load is to be transferred.
- J. Service Conditions: Provide transfer switches suitable for continuous operation at indicated ratings under the service conditions at the installed location.
1. Altitude: 1000 feet.
- K. Enclosures:
1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1 or Type 12.
 2. Provide lockable door(s) for outdoor locations.
 3. Finish: Manufacturer's standard unless otherwise indicated.
 4. Construction: Free standing ,floor mounted ,code gauge formed steel construction.
 5. Features: Accessories or screen to prevent entry of bird/rodent.
- L. Short Circuit Current Rating:
1. Withstand and Closing Rating: Provide transfer switches, when protected by the supply side overcurrent protective devices to be installed, with listed withstand and closing rating not less than the available fault current at the installed location as indicated on the drawings.
- M. Automatic Transfer Switches:
1. Description: Transfer switches with automatically initiated transfer between sources; electrically operated and mechanically held.
 2. Control Functions:
 - a. Automatic mode.
 - b. Test Mode: Simulates failure of primary/normal source.
 - c. Voltage and Frequency Sensing:
 - 1) Undervoltage sensing for each phase of primary/normal source; adjustable dropout/pickup settings.
 - 2) Undervoltage sensing for alternate/emergency source; adjustable dropout/pickup settings.
 - 3) Underfrequency sensing for alternate/emergency source; adjustable dropout/pickup settings.
 - d. Outputs:

- 1) Contacts for engine start/shutdown (except where direct generator communication interface is provided).
- 2) Auxiliary contacts; one set(s) for each switch position.
- e. Adjustable Time Delays:
 - 1) Engine generator start time delay; delays engine start signal to override momentary primary/normal source failures.
 - 2) Transfer to alternate/emergency source time delay.
 - 3) Retransfer to primary/normal source time delay.
 - 4) Engine generator cooldown time delay; delays engine shutdown following retransfer to primary/normal source to permit generator to run unloaded for cooldown period.
- f. In-Phase Monitor (Open Transition Transfer Switches): Monitors phase angle difference between sources for initiating in-phase transfer.
- g. Engine Exerciser: Provides programmable scheduled exercising of engine generator selectable with or without transfer to load; provides memory retention during power outage.
3. Status Indications:
 - a. Connected to alternate/emergency source.
 - b. Connected to primary/normal source.
 - c. Alternate/emergency source available.
4. Other Features:
 - a. Event log.
 - b. Communications Capability: Compatible with system indicated. Provide all accessories necessary for proper interface.
 - c. Remote monitoring capability via PC.
5. Automatic Sequence of Operations:
 - a. Upon failure of primary/normal source for a programmable time period (engine generator start time delay), initiate starting of engine generator where applicable.
 - b. When alternate/emergency source is available, transfer load to alternate/emergency source after programmable time delay.
 - c. When primary/normal source has been restored, retransfer to primary/normal source after a programmable time delay. Bypass time delay if alternate/emergency source fails and primary/normal source is available.
 - d. Where applicable, initiate shutdown of engine generator after programmable engine cooldown time delay.
- N. Remote Annunciators:
 1. Remote Annunciator Mounting: Wall-mounted; Provide flush-mounted annunciator for finished areas and surface-mounted annunciator for non-finished areas unless otherwise indicated.
 2. Transfer Switch Status Indications:
 - a. Connected to alternate/emergency source.
 - b. Connected to primary/normal source.
 - c. Alternate/emergency source available.
- O. Interface with Other Work:
 1. Interface with engine generators as specified in Section 26 32 13 - Engine Generators.
 - 2.
 3. Interface with elevators as specified in Section 14 20 10.
 - a. Utilize signal before transfer contacts to disconnect elevator(s) served prior to transfer.
 4. Interface with building automation system.

2.03 SOURCE QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Perform production tests on transfer switches at factory to verify operation and performance characteristics prior to shipment. Include certified test report with submittals.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that the ratings and configurations of transfer switches are consistent with the indicated requirements.
- C. Verify that rough-ins for field connections are in the proper locations.
- D. Verify that mounting surfaces are ready to receive transfer switches.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in a neat and workmanlike manner in accordance with NECA 1.
- B. Install transfer switches in accordance with manufacturer's instructions.
- C. Arrange equipment to provide minimum clearances and required maintenance access.
- D. Provide required support and attachment in accordance with Section 26 05 29 - Hangers and Supports For Electrical Systems.
- E. Install transfer switches plumb and level.
- F. Unless otherwise indicated, mount floor-mounted transfer switches on properly sized 3 inch high concrete pad constructed in accordance with Section 03 30 00 - Cast In-Place Concrete.
- G. Provide grounding and bonding in accordance with Section 26 05 26 - Grounding and Bonding For Electrical Systems.
- H. Identify transfer switches and associated system wiring in accordance with Section 26 05 53 - Identification For Electrical Systems.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Provide services of a manufacturer's authorized representative to observe installation and assist in inspection and testing. Include manufacturer's detailed testing procedures and field reports with submittals.
- C. Prepare and start system in accordance with manufacturer's instructions.
- D. Automatic Transfer Switches:
 - 1. Inspect and test in accordance with NETA ATS, except Section 4.
 - 2. Perform inspections and tests listed in NETA ATS, Section 7.22.3. The control wiring insulation-resistance tests listed as optional are not required.
- E. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

3.04 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.05 CLOSEOUT ACTIVITIES

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

- B. See Section 01 79 00 - Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate proper operation of transfer switches to Owner, and correct deficiencies or make adjustments as directed.
- D. Training: Train Owner's personnel on operation, adjustment, and maintenance of transfer switches.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of four hours of training.
 - 3. Instructor: Manufacturer's authorized representative.
 - 4. Location: At project site.
- E. Coordinate with related generator demonstration and training as specified in Section 26 32 13 - Engine Generators.

3.06 PROTECTION

- A. Protect installed transfer switches from subsequent construction operations.

3.07 MAINTENANCE

- A. See Section 01 70 00 - Execution Requirements, for additional requirements relating to maintenance service.
- B. Provide to Owner a proposal as an alternate to the base bid, a separate maintenance contract for the service and maintenance of transfer switches for two years from date of Substantial Completion; Include a complete description of preventive maintenance, systematic examination, adjustment, inspection, and testing, with a detailed schedule.
- C. Conduct site visit at least once every three months to perform inspection, testing, and preventive maintenance. Submit report to Owner indicating maintenance performed along with evaluations and recommendations.
- D. Provide trouble call-back service upon notification by Owner:
 - 1. Provide on-site response within 4 hours of notification.
 - 2. Include allowance for call-back service during normal working hours at no extra cost to Owner.
 - 3. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.
- E. Maintain an on-site log listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced.

END OF SECTION