

**ADVERTISEMENT FOR BIDS**  
Issue Date 3/20/2019

The City of Fayetteville will accept sealed bids from qualified Contractors for furnishing all labor, equipment, materials and other things necessary to complete the **North 85 Pump Station Rehabilitation and Pump Station D Electrical Rehabilitation**.

Bids will be received at the City of Fayetteville, 240 South Glynn Street, Fayetteville, Georgia 30214 until 2:00 PM local time, on Thursday, April 25, 2019, at which time the bids will be opened and read aloud. Bidding documents may be obtained from the City of Fayetteville Finance Department. Contact Ms. Danielle Ballard at 770-719-4152 for the bid package or questions regarding bid procedures. Bid Packages are available for viewing at [www.intse.com](http://www.intse.com) at no charge. If however a contractor wants to be an approved bidder, he/she will need to contact Ms. Ballard. It is **MANDATORY** that all prospective bidders purchase the Project Manual and Construction Drawings from the City of Fayetteville to be an approved bidder; cost to receive a qualified bid package shall be \$25 for a CD, or \$100 for a hard copy.

There will be an encouraged "pre-bid" meeting on Thursday, April 11, 2019 at 10:00 AM at the City of Fayetteville, 240 South Glynn Street, Fayetteville, Georgia 30214. All contractors submitting a bid are encouraged to attend.

North 85 Pump Station improvements include the installation of a natural gas generator set and automatic transfer switch, replacement of main breaker, pump control panel, surge protection device, SCADA panel, and security light. The project will require bypass pumping.

Pump Station D improvements include replacement of main breaker, pump control panel, surge protection device, SCADA panel, and security light. Project is to be completed without taking the existing pump station out of service.

Questions of a technical nature should be submitted in writing to design engineer, Mr. Jarred M. Jackson, P.E. at Integrated Science & Engineering via e-mail: [jjackson@intse.com](mailto:jjackson@intse.com). The City of Fayetteville will not issue or cause to be issued any addenda modifying the Project Manual or Construction Drawings within a period of 72 hours prior to the advertised time for opening bids, excluding Saturdays, Sundays, and State of Georgia Legal Holidays. The final date for submittal of any questions or clarifications should be no later than April 19, 2019.

**ADDENDUM # 1**  
**North 85 Pump Station Rehabilitation**  
**And**  
**Pump Station D Electrical Rehabilitation Project**  
**City of Fayetteville**

**Bids Due:** April 25, 2019 at 2:00 p.m.  
**ISE Project #:** 1019.1902

Date: April 22, 2019

***PLEASE MAKE THE FOLLOWING CHANGES TO THE CONTRACT DOCUMENTS.  
ALL DOCUMENTS ATTACHED:***

1. Question: *"Do you have a construction cost/estimated budget?"*

Answer: No.

2. Question: *"Do you have a plan holders list?"*

Answer: See the attached plan holders list.

3. Question: *"Do you have Union requirements?"*

Answer: No.

4. Question: *"Please consider changing Item 12, second sentence, on both Sheets E-100 and E-200, to read "New panel shall fit over existing conduit stub-ups and be designed, fabricated and furnished by Stacon, Inc. to match existing but upgraded current equipment and include the following..." Is Stacon, Inc. an approved equal pump control panel provider?"*

Answer: Note 12, Sheet E-100 and Note 10, Sheet E-200 referencing the pump control panel provider remain unchanged. Pump control panels provided directly by Stacon shall be considered an approved equal, so long that supplied material meets all requirements outlined in the construction plans and technical specifications.

5. Question: *"Can you confirm that AGL will be installing the connection to the existing 4" gas line, the service line from the 4" main to the meter, and the meter?"*

Answer: AGL will be responsible for installing the gas line from the existing 4" gas main to the meter, including the connection to the gas main at N 85 Parkway, the service line from the main to the meter, and the gas meter.

6. Question: *"Can you confirm that the low bidder will not be responsible for any cost of work done by AGL, only coordination?"*

Answer: The contractor will only be responsible for coordination of work by AGL. All costs for work performed by AGL will be paid by the City of Fayetteville.

7. Question: *"Will the low bidder be responsible for the gas line from the meter to the generator cost and install?"*

Answer: The awarded contractor will be responsible for all labor and materials associated with the installation of the gas line from the AGL gas meter to the generator, including labor and materials

for installation of regulator, fuel shut off valves, sediment trap with screwed cap, and painting of steel piping with two coats of yellow epoxy paint.

8. Question: *"Can you supply a size and type of gas pipe required for the line from the meter to the generator?"*

Answer: The natural gas service line shall be ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B steel pipe. Installation of natural gas service shall be in accordance with the International Fuel Gas Code. The proposed size of the natural gas service line is 1-1/4 inch. However, during shop drawing review of selected generator, the size of the natural gas service line from the gas meter to the generator shall be coordinated with AGL to insure gas service is sized for 7-11" of water column at the generator's required natural gas flow at 100% load.

9. Question: *"No information is included in the temporary bypass pumping section of the specs or in the drawings for lift station D. Can you provide flows for D?"*

Answer: Temporary bypass pumping will not be used at Pump Station D because there is currently no bypass pump connection on site. Instead, a temporary 88 HP starter will be used to power one of the existing pumps in the wet well. See Note 13, Sheet E-200 of the construction plans for more details.

10. Question: *"In regards to the 4" gas line install on North 85, does the piping need to be steel or can polyethylene pipe be used?"*

Answer: The natural gas service line to the from the meter to the generator shall be ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B steel pipe.

11. Question: *"How long can the generator run Pump Station D?"*

Answer: The generator's propane tank volume was designed to operate the generator at full load for 24 hours. Contractor will be responsible for monitoring propane tank levels during project construction, refilling propane tank if necessary during construction, and refilling the propane tank upon completion of project construction. Payment for this work shall be included in Payment Item No. 10 – Electrical Complete. Technical Specification 01 20 00 – Price and Payment Procedures, Section 1.04, Note 10 has been modified accordingly, attached.

12. Question: *"Will a plumbing permit be required for the gas line installation at North 85 pump station?"*

Answer: Yes, a plumbing permit will be required, and can be obtained from the City of Fayetteville. In addition to plumbing permit, an electrical permit will also be required. Permit fees for both plumbing and electrical permits will be waived by City of Fayetteville.

13. Question: *"Will contractor be responsible for keeping the chemical feed running while the station is out of power at north 85 pump station?"*

Answer: Yes, the contractor will be responsible for keeping the chemical feed pump in operation while the station is out of power. Technical Specification 01 20 00 – Price and Payment Procedures, Section 1.04, Note 7 has been modified accordingly, attached.

14. Question: *"Can the substantial completion date be changed to thirty days after receipt of the required control panels and generator?"*

Answer: At this time, substantial completion date will remain at 120 days from the Date of Commencement. However, once project is awarded and the selected contractor submits material shop drawings and proposed project schedule, the substantial completion date can be reconsidered due to material lead times via formal request.

15. Question: *"How long is the required generator warranty?"*

Answer: 5 years, as outlined in Note 13, Sheet E-100. Technical Specification 26 32 13 – Natural Gas Generator and ATS, Section 3.5 has been modified accordingly, attached.

16. Question: *"Will a Georgia Utilities Contractor's License be required?"*

Answer: Yes. Bid packages must bear on the outside the name and address of the qualified bidder, and Georgia Utilities Contractor's License Number; bids not bearing this information will not be opened.

**END OF ADDENDUM NO. 1**



**PART 1 GENERAL**

**1.01 SUMMARY**

This section contains procedures for measuring work performed by the contractor and subsequent payment of that work. It also contains descriptions related to measurement and payment.

**1.02 SECTION INCLUDES**

- A. Descriptions
- B. Unit Price Payment Items
- C. Cash Allowances
- D. Testing and Inspection Allowances
- E. Schedule of Values
- F. Existing Conditions Photographs and Video
- G. Application for Payment
- H. Change Procedures
- I. Defect Assessment

**1.03 DESCRIPTIONS**

- A. The Bid lists each item of the Project for which payment will be made. No payment will be made for any items other than those listed in the Bid.
- B. Required items of work and incidentals necessary for the satisfactory completion of the work which are not specifically listed in the Bid, and which are not specified in this Section to be measured or to be included in one of the items listed in the Bid, shall be considered as incidental to the work. All costs thereof, including Contractor's overhead costs and profit, shall be considered as included in the lump sum or unit prices bid for the various Bid items. The Contractor shall prepare the Bid accordingly.
- C. Work includes furnishing all plant, labor, equipment, tools and materials, which are not furnished by the Owner and performing all operations required to complete the work satisfactorily, in place, as specified and as indicated on the Drawings.
- D. Measurement of an item of work will be by the unit indicated in the Bid.

- E. Final payment quantities shall be determined from in-place quantities. The precision of final payment quantities shall match the precision shown for that item in the Bid.
- F. Payment will include all necessary and incidental related work not specified to be included in any other item of work listed in the Bid.
- G. Unless otherwise stated in individual sections of the Specifications or in the Bid, no separate payment will be made for any item of work, materials, parts, equipment, supplies or related items required to perform and complete the work. The costs for all such items required shall be included in the price bid for item of which it is a part.
- H. Payment of lump sum items shall be based upon progress of the Work as developed through proper updating of the construction Schedule. Estimates of percent complete established by the Engineer and Contractor shall be the basis by which earned value will be calculated and payments will be authorized.
- I. Payment of unit price items will be made by extending unit prices multiplied by quantities provided and then summing the extended prices to reflect actual work. Such price and payment shall constitute full compensation to the Contractor for furnishing all plant, labor, equipment, tools and materials not furnished by the Owner and for performing all operations required to provide to the Owner the entire Project, complete in place, as specified and as indicated on the Drawings.

#### **1.04 UNIT PRICE ITEMS**

- 1. General Conditions (for both projects). General Conditions shall include, but not be limited to, Payment & Performance Bonds, Builders Risk Insurance, Owners/Contractors Protective Insurance, Workers Comprehensive Insurance, Pre-Construction Photographs and Video, Post-Construction Photographs and Video, Project Mobilization, Permit Fees, Stake Out Surveying, Schedule of Values, Project Schedule, and Initiation of Shop Drawings. This item includes both project sites.
  - A. Measurement: Shall be by demonstration to Owner and Engineer that above items have been accomplished.
  - B. Payment shall be in full when measurement has been demonstrated less retainage as required by the Contract Documents. Amount may not exceed 6% of the total contract amount.
- 2. New Generator Set & Gas Line per the Contract Documents. Shall include, but not be limited to, all equipment, materials, and labor required to install 250kW natural gas generator set, generator control panel, 350A generator main circuit breaker, concrete generator pad, secondary natural gas regulator, natural gas piping, gas utility service coordination (AGL meter fee paid by City of Fayetteville), automatic transfer switch in NEMA 4X SS enclosure, generator enclosure, 4 hour on-site load bank test, owner training/start-up services, and associated appurtenances.
  - A. Measurement: Shall be in accordance with the accepted Schedule of Values
  - B. Payment will be in full when the natural gas generator set has been installed and is operable.

3. Additional #57 Stone Within Fence per the Contract Documents. Shall include all equipment, materials, and labor needed to install geotextile fabric and 6-inches of #57 stone over the entire fenced area at North 85 PS.
  - A. Measurement: Shall be in accordance with the accepted Schedule of Values.
  - B. Payment will be made in full when installation of #57 stone is complete.
4. Demolition Complete per the Contract Documents shall include all equipment and labor required to demolish, remove, and dispose from project site all items required to complete project scope for North 85 PS Upgrades. This shall include, but not be limited to, existing chain link fence demolition and existing electrical panel demolition.
  - A. Measurement: Shall be in accordance with the accepted Schedule of Values.
  - B. Payment shall be in full when demolition, removal, and disposal of all necessary items from project site have been completed.
5. Temporary Bypass Pumping per the Contract Documents shall include all equipment and labor required to perform bypass pumping for the duration of construction for the North 85 PS Upgrades work. There shall be no sewer service interruptions.
  - A. Measurement: Shall be in accordance with the accepted Schedule of Values.
  - B. Progress payments shall be based on the actual percentage of work satisfactorily completed during the progress payment period in accordance with the approved Schedule of Values. Final Payment shall be the balance of the stated Lump Sum as adjusted by approved Change Orders.
6. Security Light per the Contract Documents. Shall include all equipment, material, and labor required for complete installation of a break-away security light at North 85 PS.
  - A. Measurement: Shall be in accordance with the accepted Schedule of Values.
  - B. Payment will be made in full upon complete installation of Security Light.
7. Electrical Complete per the Contract Documents. Shall include, but not be limited to, all equipment, materials, and labor required for installation of new pump control panel, SCADA RTU panel, one year of pre-paid SCADA service, conduit, surge protection device, main breaker, pressure transducer and stilling well, float switches, utility rack, complete ground grid, owner training/start-up services, and associated appurtenances as shown on the construction plans to provide an operating pump station at North 85 PS. Contractor shall be required to provide temporary power to chemical feed pump for duration of project construction.
  - A. Measurement: Shall be in accordance with the accepted Schedule of Values.
  - B. Payment shall be in full when Electrical Complete has been installed less retainage as required by the Contract Documents.

8. Engineer Directed Changes will be an allowance used to pay for changes made by the Engineer during the project.
  - A. Measurement: Mutually agreed upon price via itemized summary used to pay for changes made by the Owner/Engineer during the project.
  - B. Payment will be made at conclusion of work for proposed changes.
9. Demolition Complete per the Contract Documents. Shall include all equipment and labor required to demolish, remove, and dispose from project site all items required to complete project scope for Pump Station D Upgrades. This shall include, but not be limited to, existing electrical panel demolition and existing main breaker demolition. Line item shall include final site stabilization of all disturbed areas.
  - A. Measurement: Shall be in accordance with the accepted Schedule of Values.
  - B. Payment shall be in full when demolition, removal, and disposal of all necessary items from project site and final site stabilization has been completed.
10. Electrical Complete per the Contract Documents. Shall include, but not be limited to, all equipment, materials, and labor required for installation of new pump control panel, SCADA RTU panel, one year of pre-paid SCADA service, conduit, surge protection device, main breaker, pressure transducer and stilling well, float switches, utility rack, replacement of disturbed #57 stone, owner training/start-up services, and associated appurtenances as shown on the construction plans to provide an operating pump station at Pump Station D. This line item also includes material and installation of a temporary 88hp combination starter, disconnect switch, and other appurtenances necessary to provide continuous operation of the pump station throughout construction. Contractor shall be responsible for monitoring generator propane tank levels during project construction, refilling propane if necessary during construction, and refilling the propane tank upon project completion.
  - A. Measurement: Shall be in accordance with the accepted Schedule of Values.
  - B. Payment shall be in full when Electrical Complete has been installed less retainage as required by the Contract Documents.
11. Security Light per the Contract Documents. Shall include all equipment, material, and labor required for complete installation of a break-away security light at Pump Station D.
  - A. Measurement: Shall be in accordance with the accepted Schedule of Values.
  - B. Payment will be made in full upon complete installation of Security Light.
12. Engineer Directed Changes
  - A. Measurement: Mutually agreed upon price via itemized summary used to pay for changes made by the Owner/Engineer during the project.

- B. Payment will be made at conclusion of work for proposed changes.

## **1.05 CASH ALLOWANCES**

- A. General
  - 1. The Contractor shall include in the Bid Total all allowances stated in the Contract Documents if any. These allowances shall cover the net cost of the services provided by a firm selected by the Owner. The Contractor's handling costs, labor, overhead, profit and other expenses contemplated for the original allowance shall be included in the items to which they pertain and not in allowances.
  - 2. No payment will be made for nonproductive time on the part of testing personnel due to the Contractor's failure to properly coordinate testing activities with the work schedule or the Contractor's problems with maintaining equipment in good working condition.
  - 3. No payment shall be provided for services which fail to verify required results.
- B. Should the net cost be more or less than the specified amount of the allowance, the Contract will be adjusted accordingly by change order. The amount of change order will not recognize any changes in handling costs at the site, labor, overhead, profit and other expenses caused by the adjustment to the allowance.
- C. Documentation
  - 1. Submit copies of the invoices with each periodic payment request from the firm providing the services.
  - 2. Submit results of services provided which verify required results.

## **1.06 SCHEDULE OF VALUES**

- A. Submit printed schedule on EJCDC C-620 or Contractor's standard form or electronic media printout will be considered for this use.
- B. Submit Schedule of Values within 20 days after date established in Notice to Proceed.
- C. Format: Use Table of Contents of this Project Manual. Identify each line item with number and title of major Specification Section. Also identify site mobilization, and bonds and insurance.
- D. Include in each line item amount of allowances as specified in this Section. For unit cost allowances, identify quantities taken from Contract Documents multiplied by unit cost to achieve total for each item.
- E. Include within each line item, direct proportional amount of Contractor's overhead

and profit.

- F. Revise schedule to list approved Change Orders with each Application for Payment.

### **1.07 EXISTING CONDITIONS PHOTOGRAPHS AND VIDEO**

- A. Contractor shall provide to Owner complete and detailed photographs and video of entire project site, indicating existing site conditions. Contractor to submit with Schedule of Values.

### **1.08 APPLICATION FOR PAYMENT**

- A. For each item, provide a column for listing each of the following:
  - 1. Item Number.
  - 2. Description of work
  - 3. Scheduled Values.
  - 4. Previous Applications.
  - 5. Work in Place and Stored Material under this Application.
  - 6. Authorized Change Orders.
  - 7. Total Completed and Stored to Date of Application.
  - 8. Percentage of Completion.
  - 9. Balance to Finish.
  - 10. Retainage.
  - 11. Construction Photographs.
- B. Submittal Procedures
  - 1. Submit six (6) copies of each Application for Payment.
  - 2. Submit and updated construction schedule with each application for Payment.
  - 3. Payment Period: Submit on the 25<sup>th</sup> of each month.
  - 4. Submit with transmittal letter as specified for Submittals in Section 01 33 00.
  - 5. Submit waivers showing that suppliers and sub-contractors have been paid the amount due from the previous invoice.
  - 6. The first application will be processed after owner agreement with the construction schedule.
- C. Substantiating Data for Progress Payments
  - 1. When the Engineer requires substantiating data, submit suitable information with a cover letter identifying:

- a. Project.
- b. Application for Payment number and date.
- c. Detailed list of enclosures.
- d. For stored products:
  - 1) Item number and identification as shown on the Application for Payment.
  - 2) Description of specific material
  - 3) Invoices for stored products
2. Submit one copy of data and cover letter for each copy of the Application for Payment.
3. Maintain an updated set of drawings to be used as record drawings in accordance with Section 01 70 00. Exhibit the updated record drawings for review by the Engineer.

## **1.09 CHANGE PROCEDURES**

- A. Submittals: Submit name of individual who is authorized to receive change documents and is responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.
- B. Carefully study and compare Contract Documents before proceeding with fabrication and installation of Work. Promptly advise Engineer of any error, inconsistency, omission, or apparent discrepancy.
- C. Requests for Interpretation (RFI) and Clarifications: Allot time in construction scheduling for liaison with Engineer; establish procedures for handling queries and clarifications.
  1. Use CSI Form 13.2A - Request for Interpretation or Contractor's standard for requesting interpretations.
  2. Engineer may respond with a direct answer on the Request for Interpretation form.
- D. Engineer will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions in Section H Article 11.
- E. Engineer may issue Notice of Change in Section H Article 11 including a detailed description of proposed change with supplementary or revised Drawings and Specifications, a change in Contract Time for executing the change. Contractor will prepare and submit estimate within <   7   > days.
- F. Contractor may propose changes by submitting a request for change to Engineer, describing proposed change and its full effect on the Work. Include a statement describing reason for the change and the effect on Contract Sum/Price and Contract

Time with full documentation.

- G. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in Conditions of the Contract in Section H Article 11.
- H. Correlation of Contractor Submittals:
  - 1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum/Price.
  - 2. Promptly revise Progress Schedules to reflect change in Contract Time, revise subschedules to adjust times for other items of Work affected by the change, and resubmit.
  - 3. Promptly enter changes in Record Documents.

### **1.10 DEFECT ASSESSMENT**

- A. Replace the Work, or portions of the Work, not conforming to specified requirements.
- B. If, in the opinion of Engineer, it is not practical to remove and replace the Work, Engineer will direct appropriate remedy or adjust payment.
- C. The defective Work may remain, but unit sum/price will be adjusted to new sum/price at discretion of Engineer and Owner.
- D. Defective Work will be partially repaired according to instructions of Engineer and Owner, and unit sum/price will be adjusted to new sum/price at discretion of Engineer and Owner.
- E. Individual Specification Sections may modify these options or may identify specific formula or percentage sum/price reduction.
- F. Authority of Engineer and Owner to assess defects and identify payment adjustments is final.
- G. Nonpayment for Rejected Products: Payment will not be made for rejected products for any of the following reasons:
  - 1. Products wasted or disposed of in a manner that is not acceptable.
  - 2. Products determined as unacceptable before or after placement.
  - 3. Products not completely unloaded from transporting vehicle.
  - 4. Products placed beyond lines and levels of the required Work.
  - 5. Products remaining on hand after completion of the Work.
  - 6. Loading, hauling, and disposing of rejected products.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

## **NATURAL GAS GENERATOR SET**

### **PART 1 GENERAL**

#### **1.1 RELATED DOCUMENTS**

Drawings and general provisions of the Contract apply to this Section.

#### **1.2 SCOPE OF WORK**

Provide a pipeline natural gas-powered engine-generator set of the latest commercial type and design.

#### **1.3 MATERIALS**

A. The Supplier shall furnish:

1. A Standby rated natural gas engine-generator set, along with accessories, per this Specification.
2. A NEMA 4X Stainless Steel Automatic Transfer Switch per Specification included.
3. Labor to test the generator with resistive load banks upon completion of installation.
4. Provide a 4 hour on-site load bank test.
5. Owner training services.

#### **1.4 MANUFACTURER**

The generator set shall be a factory package of one manufacturer who has been regularly engaged in the design and production of generator sets for a minimum of 10 years. To qualify as a manufacturer, the supplier must manufacture the engine, the generator, or both items.

Manufacturer shall be Onan, Kohler, or MTU.

#### **1.5 SUPPLIER**

The completed engine-generator set shall be supplied by the Manufacturer's authorized distributor only.

## 1.6 POWER RATING

Power rating of the engine-generator set shall be based on operation at rated rpm when equipped with all necessary operating accessories, such as air cleaners, oil pump, jacket water pump, governor, alternating current generator, and exciter regulator. Radiator fan shall be included as necessary operating accessory.

A prototype test to the demands of NFPA 110, Level 1 and an endurance test of at least 1,000 hours at 100% of the Standby rating shall have been conducted for the engine-generator set being bid.

Package will be EPA certified for emergency power applications with air/fuel ratio controls built into the control panel.

## 1.7 SUBMITTAL DATA

- A. Make and model of engine-generator.
- B. Makes and models of switchgear and other major auxiliary equipment, including automatic transfer switch, vibration isolators, and radiator.
- C. Manufacturer-produced dimension drawings of the complete engine-generator set clearly showing entrance points for each of the interconnections required.
- D. Combustion air requirements.
- E. Location and descriptions of the supplier's parts and service facilities within a 50 mile radius of the job site, including parts inventory and number of qualified engine-generator set service personnel.
- F. Actual electrical diagrams, including schematic diagrams and interconnection wiring diagrams for all equipment to be supplied.
- G. Manufacturer warranty statements.
- H. Engine altitude deration information.
- I. Financing proposal which will include interest-free payment alternatives.
- J. Service agreements for the routine maintenance or total maintenance and repair of the engine-generator set shall be offered for a period of no less than 10 years.

## PART 2 - PRODUCTS

### 2.1 GENERAL

#### References and Standards

The generator set covered by these specifications shall be designed, tested, rated, assembled and installed in strict accordance with all applicable standards below:

ISO8528-5

BS5514

SAE J1349

ISO3046-1

DIN6271

UL2200

Designed to allow for installed compliance to NFPA 70, NFPA99 and NFPA 110

## **2.2 ENGINE**

- A. The engine shall be pipeline natural gas fueled, four cycle, water-cooled, while operating with nominal speed not exceeding 1800 RPM.
- B. The engine shall be equipped with an isochronous electronic governor to maintain + or - 0.7% steady state frequency variation from steady state no load to steady state full load.
- C. Mounting: The engine-generator set shall be mounted on a structural base supplied by the manufacturer.
- D. Protective Devices: Safety shutoffs for high water temperature, low oil pressure, electrical over-speed, and engine over-crank shall be provided.
- E. Enclosure: The generator shall be enclosed by a weather-protective enclosure fabricated of 14-gauge steel. The enclosure shall have a minimum of five hinged lockable doors for access to the equipment. Doors shall be lift-off removable type with bolted stainless-steel hinges and hardware. The use of pop rivets as fasteners is not acceptable.

All enclosure access points must use oil and rubber gasketing to provide protection against environmental wear.

Minimum wind ratings of 100 mph are required.

Proper intake and exhaust louvers shall be provided. Critical grade silencer must be enclosed within the unit in a separate discharge box with thermal grade wrapping. The enclosure shall be primed and painted with two coats of baked-on enamel paint; enclosure color shall be white.

## **2.3 GENERATOR**

- A. Rating: The generator shall be rated for standby electrical service as follows: See Drawing.
- B. Type: The generator shall be three-phase, single-bearing, synchronous type, wet wound, tropicalized, and built to NEMA standards. The process for winding, insertion and varnish is machine precision wound and machine finished.

The exciter field will be brushless type. Class H insulation shall be used on the stator and rotor, and both shall be further protected with an asphalt modified epoxy on all end coils. The rating will be at a generator temperature rise not to exceed 120° C at 40° C ambient so as to provide an extended life.

The generator shall also include a resettable thermal protector and fuse for exciter/regulator protection against extended low power factor loads and faults. The generator rotor shall be dynamically balanced within 0.0005" peak-to-peak amplitude displacements at both ends of shaft and shall sustain 25% over-speed.

- C. Alternator shall be 12 lead reconnectable windings.
- D. Regulator: A digital automatic volts-per-Hz type, solid-state exciter/regulator, manufactured by the generator manufacturer, shall be included and shock mounted inside the generator control panel enclosure. Voltage regulation shall be  $\pm 0.25\%$  from no load to full-rated load. Readily accessible voltage droop, voltage level, and voltage gain controls shall be included in the module. Voltage level adjustment shall be a minimum of  $\pm 10\%$ .

The module shall include the following protective features:

1. Current limit circuits shall restrain the exciter field current while allowing full forcing voltage to be applied to obtain rapid response during transient conditions or service overloading on the generator.
2. A time-delay circuit shall sense the current limit operation and cut off all field current to the generator after 10 seconds.

## 2.4 COOLING SYSTEM

- A. Radiator: An engine-mounted radiator with Puller-type fan shall be provided to maintain safe operation at 110°F ambient temperature. Total airflow restriction to and from the radiator shall not exceed 0.5" H<sub>2</sub>O (0.12 KPA). The radiator shall have two core sections to service the engine jacket water and aftercooler circuits. Both cores are to be enclosed in a single housing. The aftercooler core shall be designed for 130°F maximum water temperature.
- B. Cooling System Treatment: The engine cooling system shall be pre-treated by the engine supplier for the inhibition of internal corrosion. A solution of 50% ethylene glycol shall be added.

## 2.5 FUEL SYSTEM

The engine/generator shall be capable of operation on LP Gas. A normally closed 12 VDC gas valve and secondary pressure regulator will be factory installed. A braided flexible fuel connector will be furnished for installation between the gas valve and the gas piping.

## **2.6 EXHAUST SILENCER**

Critical grade silencer must be enclosed within the unit in a separate discharge box with thermal grade wrapping.

## **2.7 STARTING MOTOR**

The engine shall be equipped with an electric starting system with positive engagement drive and of sufficient capacity to crank the engine at a speed which will start the engine under operating conditions. The starting pinion will disengage automatically when the engine starts.

## **2.8 AUTOMATIC CONTROLS**

Fully automatic generator set start-stop controls in the generator control panel shall be provided. Controls shall provide shutdown for low oil pressure, high water temperature, low coolant level, over-speed, over-crank, over-voltage and one auxiliary contact for activating accessory items. Controls shall include cranking cycle without lockout and manual reset feature.

The same panel will provide voltage regulation.

## **2.9 JACKET WATER HEATER**

An engine-mounted thermal circulation water heater incorporating an adjustable thermostatic switch shall be furnished to maintain engine jacket water to 90°F (32.2°C). Jacket heater shall be 1500 Watts, 120V.

## **2.10 BATTERY AND BATTERY CHARGER**

- A. A lead/acid storage battery set of the heavy-duty diesel starting type shall be provided. Battery voltage shall be compatible with the starting system. A battery rack constructed in conformance with the NEC requirements and necessary cables and clamps shall be provided.
- B. A current-limiting, float-equalize charger shall be installed inside the generator enclosure to automatically recharge batteries. The charger shall float at 2.17 volts per cell and equalize at 2.33 volts per cell. It should include overload protection, silicon diode full wave rectifiers, voltage surge suppressors, DC ammeter, and fused AC output, and battery malfunctions alarm relay. AC input voltage shall be 120 volts, single phase. Amperage output shall be no less than 10 amperes.

## **2.11 MAIN LINE CIRCUIT BREAKER**

- A. A main line circuit breaker carrying the UL mark shall be factory installed. The circuit breaker shall meet standards established by UL, NEMA, and the NEC. The breaker shall be rated per the manufacturer's recommendations.

- B. The trip unit for each pole shall have elements providing inverse time delay during overload conditions and instantaneous magnetic tripping for short circuit protection.
- C. Generator/exciter field circuit breakers do not meet the above electrical standards and are unacceptable for line protection.

## 2.12 GENERATOR CONTROL PANEL

- A. Control panel shall be obtained from same manufacturer as generator set and shall include factory warranty and manufacturer's parts and service support.

Control panel will operate in -40 to +70 degrees C.

- B. Generator-mounted Control Panel: Designed and built by the system manufacturer and incorporating 100% solid-state circuitry, sealed dust-tight, watertight modular components and instrumentation. The panel shall be shock mounted to the generator.

It shall comply with IEC, IEC 144, IP22, NEMA 1 for external environmental resistance and IP44/NEMA 12 resistance for internal sealed modules. The panel shall include the following equipment:

1. General AC Output Metering Devices:
  - AC voltmeter 3-1/2" 2%
  - AC ammeter 3-1/2" 2%
  - Dial Frequency Meter 3-1/2" 2%
  - Voltmeter-Ammeter Phase selector switch, 4 Position
2. Engine Monitoring Devices:
  - Water temperature gauge
  - Running time meter
  - Oil pressure gauge
3. Start/Stop Controls:
  - 1 start-stop switch, cycle cranking with cooldown timer, auto start-stop, manual start, off, and reset positions.
  - 1 voltage adjust rheostat
  - 1 alarm horn with silence switch. Horn must be 100 dB.
  - 1 panel light and on/off switch for same
  - 1 alarm module with five red flashing lights to annunciate shutdowns for over-speed, low oil pressure, high water temperature, and over-crank
  - Two communication ports, Modbus supported
  - All input signals from sensors will use 4-20 mA input signal.

Load imbalance thermal protection shall be provided.

- C. Voltage regulator shall be internal to control panel in order to protect from environmental damage.
- D. Convenience receptacles will be provided for the easy connection of auxiliary heaters.

## **2.13 AUTOMATIC LOAD TRANSFER SWITCH**

- A. See Below

## **PART 3 – EXECUTION**

### **3.1 AFTER SALES PRODUCT SUPPORT**

On completion of the installation, three copies of parts books covering the engine, generator, and major auxiliary equipment shall be provided to the Owner.

Procedures on operating and maintenance of the standby power system shall be explained to operating personnel.

### **3.2 START-UP AND TESTING**

Coordinate all start-up and testing activities with the Engineer and Owner. After installation is complete and normal power is available, the manufacturer's local dealer shall perform the following:

Perform a four hour load bank test at a 1.0 PF at full nameplate rating. Loadbank, cables and other equipment required for this test to be supplied by the genset supplier.

### **3.3 GENERATOR SET DISTRIBUTOR**

It is essential that the engine-generator supplier maintain a local parts and service facility within 50 miles of this installation. Further, the supplier shall have factory-trained service technicians to furnish all installation, test, and start-up supervision necessary for final approval and acceptance as well as perform maintenance and repairs on all components as required.

Supplier must have a factory fill rate for emergency orders of >90% of all parts within two business days. Manufacturer must guarantee availability of spares for a period of no less than 10 years after final production of the model offered.

Distributor must make technical support available 7 x 24 hours; in addition, the manufacturer must have 7 x 24 emergency phone support available.

### **3.4 SERVICE**

The supplier shall maintain a national service organization that is factory trained and certified. In addition, the genset dealer organization shall be available 24 hours per day, 365 days per year.

### **3.5 WARRANTY**

The engine-generator set shall be warranted against defects in materials and workmanship for a period of five years for standby applications; coverage to include both 100% parts and labor. Limits will be based upon the date of delivery to user.

If a defect in material or workmanship arises during the warranty period the Supplier will during normal working hours:

- Replace or, at the Supplier's discretion, repair the defective parts.
- Provide for reasonable and customary labor costs to correct the defect.
- Provide for the cost of service supplies such as coolant oil and filters which are made unserviceable by the defect.
- Provide travel labor, up to six hours and 250miles/400km round trip, if the generator set is inoperative due to a defect and, in the opinion of the Supplier, it cannot reasonably be transported to an appropriate service location.

The distributor will make rental units available if warranty repairs take longer than 60 days.

### **3.6 TOOLING**

The distributor shall maintain all tooling required by the manufacturer to complete warranty and service repairs.

## **AUTOMATIC TRANSFER SWITCH**

### **PART 1 – GENERAL**

#### **1.1 SCOPE**

- A. It is the intent of this specification to secure a transfer switch that has been prototype tested, factory built, production tested and site tested. A transfer switch with the number of poles, voltage and current ratings shown on the plans and specified herein shall be provided.

#### **1.2 CODES AND STANDARDS**

- A. The automatic transfer switch shall conform to the requirements of:

1. UL 1008: Underwriters Laboratories standard for automatic transfer switches
2. CSA: C22.2 No. 178 certified at 600 VAC
3. IEC: 947-6-1 certified at 480 VAC
4. NFPA 70: National Electrical Code including use in emergency and standby systems in accordance with Articles 517, 700, 701, 702
5. NFPA 99: Essential electrical systems for health care facilities
6. NFPA 101: Life safety code
7. NFPA 110: Standard for emergency and standby power systems
8. IEEE 241: I.E.E.E. recommended practice for electrical power systems in commercial buildings
9. IEEE 446: I.E.E.E. recommended practice for emergency and standby power systems
10. NEMA ICS10: AC automatic transfer switch equipment (supersedes ICS2-447)
11. UL 50/508: Enclosures
12. ICS 6: Enclosures
13. ANSI C33.76: Enclosures
14. NEMA 250: Enclosures
15. IEEE 472: (ANSI C37.90A): Ringing wave immunity
16. EN55022 (CISPR11): Conducted and radiated emissions (exceeds EN55011 & MILSTD 461 Class 3)
17. EN61000-4-2: (Level 4): ESD immunity test Class B:
18. EN61000-4-3: (ENV50140): Radiated RF, electromagnetic field immunity test
19. EN61000-4-4: Electrical fast transient/burst immunity test
20. EN61000-4-5: IEEE C62.41: Surge immunity test (1.2 x 50 $\mu$ s, 5 & 8 kV)
21. EN61000-4-6: (ENV50141): Conducted immunity test
22. EN61000-4-11: Voltage dips and interruption immunity
23. IEE-693-2005: Seismic certified at high level with 2.5 amplification factor
24. IBC-2003: At  $I_p=1.5$  for  $z/h$  less than or equal to 1 (in accordance with ICC-ES-AC156)

## **PART 2 – PRODUCTS**

## 2.1 PERFORMANCE AND CONSTRUCTION

- A. The automatic transfer switch shall be of double throw construction operated by a reliable solenoid driven mechanism. There shall be a direct mechanical coupling to facilitate transfer in 6 cycles or less.
- B. The normal and emergency contacts shall be mechanically interlocked such that failure of any coil or disarrangement of any part shall not permit a neutral position.
- C. The contact structure shall consist of a main current carrying contact, which is a silver alloy with a minimum of 50% silver content. The current carrying contacts shall be protected by silver tungsten arcing contacts on all sizes above 600 Amps.
- D. A dielectric test at the conclusion of the withstand and closing tests shall be performed.
- E. The automatic transfer switch manufacturer shall certify sufficient arc interrupting capabilities for 50 cycles of operation between a normal and emergency source that are 120 degrees out of phase at 480 volts, 600% of rated current at .50 power factor. This certification is to ensure that there will be no current flow between the two isolated sources during switching.
- F. All relays shall be continuous duty industrial type with wiping contacts. Coils, relays, timers and accessories shall be readily front accessible. The control panel and power section shall be interconnected with a harness and keyed disconnect plugs for maintenance.
- G. Main and arcing contacts shall be visible without major disassembly to facilitate inspection and maintenance.
- H. A manual handle shall be provided for maintenance purposes with the switch de-energized. An operator disconnect switch shall be provided to defeat automatic operation during maintenance, inspection or manual operation.
- I. Switches composed of molded case breakers, lighting contactors or components thereof will not be acceptable.
- J. The current rating shall be a continuous rating when the switch is installed in an enclosure, and shall conform to NEMA temperature rise standards.
- K. The unit shall be rated based on all classes of loads, i.e., resistive, tungsten, ballast and inductive loads. Switches rated 400 amperes or less shall be UL listed for 100% tungsten lamp load.
- L. Temperature rise tests in accordance with UL 1008 shall have been conducted after the overload and endurance tests to confirm the ability of the units to carry their rated currents within the allowable temperature limits.
- M. See drawings for NEMA enclosure type.

## 2.2 CONTROL

- A. The control panel shall be opto-isolated from electrical noise and provided with

the following inherent control functions and capabilities:

1. Easy-to-view 4 x 20 LCD display with long lasting LED indicators.
  2. Control panel shall display voltage and frequency of both sources.
  3. The user shall be able to view the last 16 recorded events.
  4. Capability for external communication and network interface.
  5. Adjustments to all settings shall be made from the front of the panel without opening the door.
- B. The transfer switch shall be equipped with a microprocessor based control panel. The control panel shall perform the operational and display functions of the transfer switch. The display functions of the control panel shall include ATS position, source availability, sequence indication and diagnostics.
- C. All programmable and control functions shall be pass code protected and accessible through the keypad.
- D. The control panel shall be provided with a simple user interface for transfer switch monitoring, control and field changeable functions and settings.
- E. Touch pad test switch with Fast Test/Load/No Load selection capability to simulate a normal source failure.
- F. The controller shall provide digital timer adjustments with 1-second resolution. Voltage and Frequency shall be adjustable to 1% resolution to facilitate accurate transfer.
- G. To ensure reliable and consistent user operation the controls must be equipped with nonvolatile memory and allow automatic daylight savings time adjustment.

## **PART 3 – OPERATION**

### **3.1 SEQUENCE OF OPERATION**

- A. The ATS shall incorporate adjustable three phase under voltage sensing on the normal source (or single phase, as appropriate for a single phase ATS).
- B. When the voltage of any phase of the normal source is reduced to 80% (adjustable) of nominal voltage, for a period of 0-10 seconds (programmable) a pilot contact shall close to initiate starting of the engine-generator.
- C. The ATS shall incorporate adjustable under voltage and under frequency sensing on the emergency source.
- D. When the emergency source has reached a voltage value of 90% of nominal and achieved frequency within 95% of the rated value, the load shall be transferred to the emergency source after a programmable time delay.
- E. When the normal source has been restored to not less than 90% of rated voltage on all phases, the load shall be retransferred to the normal source after a time

delay of 0 to 60 minutes (programmable). The generator shall run unloaded for 5 minutes (programmable) and then automatically shut down. The generator shall be ready for automatic operation upon the next failure of the normal source.

- F. If the engine-generator should fail while carrying the load, retransfer to the normal source shall be made instantaneously upon restoration of proper voltage (90%) on the normal source.
- G. Inspection and operational testing/demonstration of the ATS shall be conducted in the presence of the owner's representative to indicate the ATS satisfies these specifications.

### **3.2 ATS FEATURES**

In addition to the operational elements required to satisfy the sequence of operation and other functions specified herein, the following ATS features shall be provided:

- A. Adjustable time delay to override momentary normal source failure prior to engine start. Field programmable 0-10 seconds factory set at 3 seconds.
- B. Adjustable time delay on retransfer to normal source, programmable 0-60 minutes factory set at 30 minutes. If the emergency source fails during the retransfer time delay, the transfer switch controls shall automatically bypass the time delay and immediately retransfer to the normal position.
- C. A time delay on transfer to emergency, programmable 0-5 minutes, factory set at 1 second.
- D. An in-phase monitor shall be provided. The monitor shall compare the phase angle difference between the normal and emergency sources and be programmed to anticipate the zero crossing point to minimize switching transients.
- E. An exerciser timer with momentary test pushbutton shall be incorporated within the microprocessor and shall be capable of starting the engine-generator set and transferring the load (when selected) for exercise purposes on a daily, weekly or monthly basis. The exerciser shall contain a battery for memory retention during an outage.
- F. Provide a momentary pushbutton to bypass the time delays on transfer and retransfer and programmable commit/no commit control logic.
- G. The controller shall accept a remote peak shave or test input to signal the transfer switch to the emergency position.
- H. A set of customer contacts shall be provided to indicate both emergency and normal source position.

## **PART 4 – EXECUTION**

#### **4.1 GENERAL**

The transfer switch shall be installed as shown on the plans, in accordance with the manufacturer's recommendations and all applicable codes.

#### **4.2 FACTORY TESTS**

The transfer switch manufacturer shall perform a complete functional test on the switch, controller and accessories prior to shipping from the factory. A certified test report shall be available upon request.

#### **4.3 SERVICE**

The supplier of the ATS shall be the same as that of the engine-generator set and shall maintain a national service organization that is factory trained and certified for transfer switch equipment. In addition, the genset dealer organization shall be available 24 hours per day, 365 days per year.

#### **4.4 WARRANTY**

The automatic transfer switch shall be warranted against defective workmanship for a period of two years, including both parts and labor.

**END OF SECTION**

