



Bay Architects

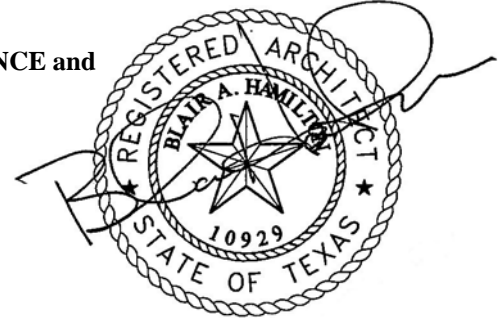
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ADDENDUM NO. 08

18 August 2010

Project: **NEW TRANSPORTATION, MAINTENANCE and AGRICULTURAL BUILDINGS**
Channelview Independent School District

Issued by: **Bay Architects, Inc.**
18201 Gulf Freeway
Webster, TX 77598
281-286-6605



Bay Project No.: **0937**

08/18/10

Prepared for: **Prospective Proposers**

PART A: NOTICE TO PROPOSERS:

1. Receipt of this Addendum shall be acknowledged on the Proposal Form. Failure to do so may subject Proposers to disqualification. Each proposer shall make necessary adjustments and submit his proposal with full knowledge of all modifications, clarification, and supplemental data included therein.
2. This Addendum forms part of the Contract Documents and shall be incorporated integrally therewith. Where provisions of the following supplemental data differ from those of previously issued documents, this Addendum shall govern.
3. The following Contract Documents have been issued to date delineating the Work (Project).

| | |
|-------------------------|----------------|
| Contract Documents | 8 July 2010 |
| Addendum No. 01 – ARCH | 4 August 2010 |
| Addendum No. 02 – MEP | 4 August 2010 |
| Addendum No. 03 – CIVIL | 5 August 2010 |
| Addendum No. 04 – CIVIL | 11 August 2010 |
| Addendum No. 05 – ARCH | 13 August 2010 |
| Addendum No. 06 – MEP | 13 August 2010 |
| Addendum No. 07 – MEP | 17 August 2010 |

4. This Addendum consists of: three (3) 8-1/2x11 written pages; fourteen (14) 8-1/2x11 pages Sections AC and 16626; and no attached sketches or drawings; as prepared by Bay Architects, Inc. Total pages included in this Addendum: 17 pages.

PART B: CHANGES TO PRIOR ADDENDUM

“Any changes to prior issued addendum materials are listed here.”

5. None

PART C: CHANGES TO THE PROJECT MANUAL

6. Table of Contents: page 5, item III. Specifications, Division 16 Electrical, add: 16626 Natural Gas Standby Generator Sets and Transfer Switch.....1-11
7. Section AC – Proposal Form: attached to this addendum for use by proposers. (3 pages)
8. Section BA – Contract Documents, page BA-6, AIA A101 Standard Form of Agreement Between Owner and Contractor where the basis of payment is Stipulated Sum, 5.1.6.1: revise first sentence to define retainage as “five percent (5%).
9. Section BA – Contract Documents, page BA-6, AIA A101 Standard Form of Agreement Between Owner and Contractor where the basis of payment is Stipulated Sum, 5.1.6.2: revise first sentence to define retainage as “five percent (5%).
10. Section 04200 – Unit Masonry, page 3, 2.2-B-01: revise nominal depth of CMU from 4” to 8”.
11. Section 09260 – Gypsum Board Systems, page 3, 2.1-C-01: revise 0.0369” to 0.0346”
12. Section 09260 – Gypsum Board Systems, page 3, 2.1-D, add the following:
01 Based on the above criteria, 20 gage studs manufactured from 30 mil steel shall not be acceptable.
13. Section 13120 – Pre-Engineered Steel Buildings, page 2, 1.5-C: delete the word “twice”.
14. Section 16626 – Natural Gas Standby Generator w/Transfer Switch, add this section in its entirety as attached. (11 pages)
15. Section 17660 – Data and Voice Structured Cabling System – LAN, Article 1.5 paragraph A. delete subparagraphs 1, 2, 3, 5, 6, 7, 8, and 9.

PART D: CHANGES TO THE DRAWINGS

16. G1.02 – Life Safety Plans - Maintenance Building A, detail 6 – Code Information, item IV – Fire Resistive Elements: revise all 1 HR designations to N/A.
17. G1.04 – Life Safety Plans - Agricultural Building, detail 6 – Code Information, item IV – Fire Resistive Elements: revise all 1 HR designations to N/A.
18. S1.01 – Foundation Plan - Transportation, detail 1 – Foundation Plan - Transportation: revise note describing slab thickness and reinforcement to delete “at top & bottom”. Slab reinforcing shall be single mat.
19. S1.02 – Foundation Plan – Maintenance Shops Area “A”, detail 1 – Foundation Plan - Maintenance Shops Area “A”: revise notes (2 places) describing slab thickness and reinforcement to delete “at top & bottom”. Slab reinforcing shall be single mat.

20. S1.02 – Foundation Plan – Maintenance Area “B”, detail 1 – Foundation Plan - Maintenance Area “B”: revise notes (2 places) describing slab thickness and reinforcement to delete “at top & bottom”. Slab reinforcing shall be single mat.

PART E: RE-ISSUED SHEETS

21. None

PART F: NEW ISSUED SHEETS

22. None

END OF ADDENDUM

SECTION AC

PROPOSAL FORM

**PACKAGE B: NEW MAINTENANCE, TRANSPORTATION,
AND AGRICULTURAL BUILDINGS
CHANNELVIEW INDEPENDENT SCHOOL DISTRICT**

Submitted by: _____

Date: _____ Phone No.: _____

To: Board of Trustees
Channelview Independent School District
1403 Sheldon Road
Channelview, Texas 77530

Having examined Proposal and Contract Documents prepared by Bay Architects, Inc., dated July 8, 2010, and having examined site conditions, the undersigned proposes to furnish all labor, equipment and materials and perform all work for the completion of the above-named project for the sum indicated below.

In submitting his Proposal, the undersigned agrees to the following:

- 01 Hold base proposal open for acceptance 30 days.
- 02 Hold alternate proposals open for acceptance 120 days.
- 03 Accept rights of Owner to reject any or all proposals, to waive formalities and to accept proposal which Owner considers most advantageous.
- 04 Enter into and execute the contract, if awarded, for the Base Proposal and accepted Alternate Proposals.
- 05 Complete work in accordance with the Contract Documents within the stipulated contract time.

I. BASE PROPOSAL

Undersigned agrees to complete the work for the lump sum amounts of:

_____ Dollars \$ _____
(Amount written in words governs) (Amount in figures)

II. CONTRACT TIME

Undersigned agrees to commence work in _____ calendar days and be substantially complete within _____ calendar days.

III. ALTERNATES

If the Owner elects to accept any or all of the Alternates, the undersigned agrees to modify the Base Proposal as stipulated below.

ALTERNATE NO. 1 – Agricultural Building - Additional Pre-Engineered Building Bay

Add/Deduct _____ Dollars \$ _____
(Amount Written in Words Governs) (Amount in Figures)

THIS FORM MUST BE SUBMITTED IN DUPLICATE BY 2:00PM ON AUGUST 19, 2010

ALTERNATE NO. 2 – Agricultural Building – Two Additional Pre-Engineered Building Bays

Add/Deduct _____ Dollars \$ _____
(Amount Written in Words Governs) (Amount in Figures)

ALTERNATE NO. 3 – Transportation Building - Additional Bus Parking

Add/Deduct _____ Dollars \$ _____
(Amount Written in Words Governs) (Amount in Figures)

IV. UNIT PRICES

For work to be added or deleted from the scope of work as described in Section 01030 Alternates and Unit Prices, the Contractor agrees to perform the work based on the following unit prices (amount in figures):

A. UNIT PRICES – SITE CONCRETE

Provide unit pricing for the following site concrete work:

- 01 Add / Delete 60" Wide Sidewalks _____ Lin. Foot (LF)
- 02 Add / Delete Non-Traffic Concrete Flatwork _____ Sq. Foot (SF)
- 03 Add / Delete Medium Duty (5") Concrete Paving _____ Sq. Foot (SF)
- 04 Add / Delete Heavy Duty (7") Concrete Paving _____ Sq. Foot (SF)
- 05 Add / Delete 6" Concrete Curb _____ Lin. Foot (LF)

B. UNIT PRICES – ELECTRICAL

Provide unit pricing for the following electrical work:

- 01 Add / Delete 120V Duplex Rec. On Nearby Circuit _____ Each (EA)
- 02 Add / Delete 120V Duplex Rec. On Dedicated Circuit _____ Each (EA)
- 03 Add / Delete 220V Rec. On Dedicated Circuit _____ Each (EA)
- 04 Add / Delete Two-Way Light Switch _____ Each (EA)
- 05 Add / Delete Data Port Wired to Nearest IDF / MDF _____ Each (EA)
- 06 Add / Delete J-Box with 1-1/4" Conduit stubbed to above Ceiling _____ Each (EA)

V. ADDENDA: The undersigned acknowledges receipt of Addenda Numbers. (Y/Yes; N/No)

- | | |
|--------------------------------------|-------------------------------------|
| _____ No.: 01-ARCH, Dated: 08/04/10 | _____ No.: 05-ARCH, Dated: 08/13/10 |
| _____ No.: 02-MEP, Dated: 08/04/10 | _____ No.: 06-MEP, Dated: 08/13/10 |
| _____ No.: 03-CIVIL, Dated: 08/05/10 | _____ No.: 07-MEP, Dated: 08/17/10 |
| _____ No.: 04-CIVIL, Dated: 08/11/10 | _____ No.: 08-MISC, Dated 08/18/10 |

VI. CHANGES IN THE WORK

The undersigned understands that changes in the work shall be performed in accordance with the Supplementary Conditions.

VII. LIQUIDATED DAMAGES

The undersigned understands that liquidated damages as defined in the Supplementary Conditions will be included in the form of Agreement between Owner and Contractor and that the contractor will be bound thereto.

THIS FORM MUST BE SUBMITTED IN DUPLICATE BY 2:00PM ON AUGUST 19, 2010

It is understood that the right is reserved by the Owner to reject any or all proposals, or waive any informalities in Receipt of Proposals.

The undersigned certifies that the amounts contained in this Competitive Sealed Proposal have been carefully checked and are submitted as correct and final.

Type of Proposer's Organization:

(Corporation, Co-Partnership, Individual, etc.)

Proposer: _____
(Print or Type)

(Signature of Proposer)

Title of Office: _____
(Print or Type)

Legal Address: _____
(Print or Type)

Zip Code: _____ Tel.: (____) _____ - _____
(Print of Type)

ATTEST:

(Secretary, if Proposer is a Corporation)

SEAL:
(If Corporation)

COMPETITIVE SEALED PROPOSAL MUST BE MADE IN DUPLICATE

The Proposal Form must be accompanied by:

- a. Section AD Proposal Bond or Certified Check in the amount of 10% of the greatest amount proposed.
- b. Section AG Affidavit of Non-Discriminatory Employment.
- c. Section AL Proposal Evaluation Waiver.
- d. Section AP Contractor's Personnel and Safety Record.
- e. Resumes of Proposed Superintendent and Project Manager.

END OF SECTION

THIS FORM MUST BE SUBMITTED IN DUPLICATE BY 2:00PM ON AUGUST 19, 2010

SECTION 16626

NATURAL GAS STANDBY GENERATOR SETS and TRANSFER SWITCH

(THIS SECTION ISSUED IN ITS ENTIRETY IN ADDENDUM NO. 08)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Conditions of the Contract and applicable requirements of Division 1 and Section 16010 govern this Section.

1.2 WORK INCLUDED

- A. Furnish and install standby engine-driven generator system, complete with wiring and controls as shown on the drawings and as specified herein.
- B. The standby emergency system shall consist of an engine-driven generator set, complete for outdoor installation, automatic transfer switches and associated fuel system.

1.3 QUALITY ASSURANCE

- A. Acceptable Manufacturers:
 - 1. Engine-Driven Generator Sets:
 - a. Onan/Cummins/Southern Plains Power.
 - 2. Automatic Transfer Switch.
 - a. Onan
 - b. Standby electric generating system manufacturer (as an integral part of a complete system).
- B. NEC and NFPA Compliance: Comply with applicable portions of the NEC (NFPA 70) including, but not limited to, emergency and standby power generation systems (NFPA 99 & 110), and with NFPA 37 Installation and Use of Stationary Combustion Engines and Gas Turbines.
- C. IEEE Compliance: Comply with applicable Institute of Electrical and Electronics Engineers, Inc. (IEEE) standards pertaining to generator construction.
- D. EPA Compliance: Comply with all EPA Standards for permanently installed natural gas emergency generators.
- E. Testing: The generator set shall receive the manufacturer's standard factory load testing.
- F. Supplier: All equipment provided shall be supplied by an authorized distributor of the manufacturer who has been continuously engaged in the distribution of industrial grade Power System products for a minimum of 15 years. The supplier shall provide initial start-up services, conduct field acceptance testing, and warranty service. The supplier be authorized to perform warranty service on all products provided. Within 50 mile of the job site, the supplier shall maintain; a minimum of 6 factory trained and qualified field technicians; a proper supply of spare parts for the supplied equipment; a shop with overhaul capabilities; and be able to provide 24 hour, 7 day per week, 365 day per year field service capability.

1.4 SUBMITTALS

- A. Submit manufacturer's certified computer generated performance and capacity data in accordance with specification requirements.

- B. Submit manufacturers' "Installation, Start-Up and Service" instructions:
 - 1. Recommended conductors, overcurrent protection and disconnect size
 - 2. Electrical interlocks
- C. Submit recommended clearance dimensions.
- D. Submit internal wiring diagram of Control Center.
- E. Submit sequence of operation in narrative form.

PART 2 - PRODUCTS

2.1 ENGINE-GENERATOR SETS

- A. The engine-generator set shall be furnished as a complete working system. The model provided shall be a standard model that is quality assurance tested and prototype tested, not one of a kind without supporting literature.
- B. Engine shall be liquid cooled, reciprocating engine, 12V DC electric start, natural gas fueled, electronic isochronous governed with manual speed adjustment plus/minus 5%, with belt-driven battery charging alternator.
- C. The set shall provide the following performance:
 - 1. Rated power for the duration of any utility power outage, in ambient conditions to 50-foot altitude and an outside air ambient temperature of 10 degrees F to 110 degrees F. Liquid coolant system ratings for natural gas sets through 140KW shall be rated at 122 degrees F ambient.
 - 2. Start and accept rated load within 10 seconds of utility power outage.
 - 3. Voltage regulation of plus/minus 2% no load to full load with random voltage variation, at any constant load, less than plus/minus 1%.
 - 4. Isochronous frequency regulation, less than plus/minus 0.5% at any steady state load from no load to full load.
- D. Engine Coupling: Engine shall be directly connected to the generator through a suitable flexible coupling.
- E. Generator:
 - 1. The generator shall be a standard make, 4-pole, revolving field, single bearing, synchronous, brushless type with the following characteristics:
 - a. Capacity as shown on the drawings and shall operate at 1800 rpm.
 - b. Dripproof, self-ventilating, permanently aligned and complete with rotating brushless exciter and shall be of ball bearing construction and connected to the engine with flexible disc coupling.
 - c. Conform to the latest applicable IEEE and NEMA standards.
 - d. Provided with generator overload protection or generator manufacturer's overload protective circuitry.
 - e. A line circuit breaker for cable protection shall be provided when shown on drawings. Circuit breaker manufacturer shall be the same as switchgear manufacturers specified and submitted to be used on this project.
 - f. Voltage Regulator: Include a full wave rectified automatic digital voltage regulation system matched and prototype tested by the engine manufacturer with the governing system provided. It shall be immune from mis-operation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase RMS sensing and shall control buildup of AC generator

- voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching characteristic, which shall reduce output voltage in proportion to frequency below an adjustable frequency threshold. Torque matching characteristic shall be adjustable for roll-off frequency and rate, and be capable of being curve-matched to the engine torque curve with adjustments in the field.
- g. Alternator: The generator shall be capable of withstanding a three phase load of 300% rated current for 10 seconds, and sustaining 150% of continuous load current for 2 minutes with field set for normal rated load excitation.
2. Provide the generator with the following:
- NEMA Class F or H insulation as defined by NEMA MG1.65
 - Temperature rise by resistance and embedded detector measurements at rated load within NEMA MG1-22.40 definition.
 - Pre-lubricated, maintenance free ball bearing, lubricated for life.
 - Direct drive centrifugal blower cooling.
 - RFI filters on the exciter to eliminate radio frequency interference on electronic equipment.
 - Thermostatically controlled block strip heater mounted for condensation control.
- F. Sub-Base: The engine power plant shall be mounted on an I beam, box type sub-base of fabricated steel construction. The assembly shall be installed on a vibration-absorbing base on a concrete pad as shown on the drawings.
- G. Automatic Starting Sequence of Events:
- Upon drop in normal source voltage to 65 to 70% of rated voltage, or upon failure of the normal source of electrical supply, the engine shall be automatically cranked and brought up to the full operating speed.
 - The cranking motor circuit shall be instantly broken when the engine starts.
 - Within 10 seconds the generator shall be brought up to operating speed; the generator voltage shall operate the automatic transfer switch, disconnecting the load from the normal source of supply and connecting the emergency power to the load.
 - Upon restoration of the normal source voltage to 92 to 95% of rated voltage or restoration of normal source of supply, the sequence shall be reversed, restoring the transfer switch to the automatic normal operating position, disconnecting the load from the emergency generator and reconnecting the load to the normal source of supply. The emergency generator set will continue to operate for a period of from 1 to 5 minutes after the restoration of the normal source of supply. Should the engine fail to start upon the first crank, there shall be two additional cranking attempts made with a 15 second rest between cranks, after which the cranking cycle shall cease and an alarm shall sound to indicate malfunctioning of the system.
 - The controls shall automatically stop the engine in the event the cooling water temperature becomes too high, if the coolant level becomes too low, if the oil pressure drops below a pre-determined pressure, or if the engine overspeeds. Upon the failure of the engine for any of the above reasons, an indicating lamp will operate indicating the condition under which the engine was shut down. Also, the alarm signal shall be energized.
- H. Engine Control Panel & Accessories:
- Provide a comprehensive monitoring and control system integral to the Generator Set control to guard the electrical integrity of the alternator and power system. Provide single and 3-phase fault current regulation, so that downstream protective devices have the maximum current available to quickly clear fault conditions, without subjecting the alternator to potentially catastrophic failure conditions. Include provisions to either prevent over voltage due to single phase faults, or to shut down the generator set if line to neutral voltage on any phase exceeds 115% for more than 0.5 seconds. Acceptable methods are a fully rated (100%) 600 volt Circuit Breaker, mounted in the generator enclosure, Schneider Electric - Square D Programmable Micrologic of size as indicated on drawings with handheld programmer or inherent protection provided by microprocessor-based GenSet

AmpSentry protection. Submittals shall demonstrate that the protective device provides proper protection for the alternator by a comparison of the trip characteristic of the breaker with the thermal damage characteristic of the alternator. Field circuit breakers shall not be acceptable for generator overcurrent protection. The control system shall actively control the fuel rate and excitation as appropriate to the state of the generator set. Fuel rate shall be regulated as a function of starting, accelerating to start disconnect speed, accelerating to rated speed. The governing system shall include a programmable warm up at idle and cool-down at idle function. While operating in idle state, the control system shall disable the alternator excitation system. An electronic governor system shall provide automatic isochronous frequency regulation. The governing system dynamic capabilities shall be controlled as a function of engine coolant temperature to provide fast, stable operation at varying engine operating temperature conditions. The Control Panel shall include, but is not be limited to, the following instruments and protective devices:

- a. AC Ammeter.
 - b. Phase Selector Switch.
 - c. Current Transformers.
 - d. AC Voltmeter.
 - e. Automatic Solid State Voltage Regulator with immunity to severe induced waveshape distortion from nonlinear leads.
 - f. Rheostat for Adjusting voltage $\pm 5\%$ of Rated Voltage.
 - g. Engine Malfunction Warning Lights/Audible Alarm:
 - 1) Anticipating High Engine Temperature.
 - 2) Anticipatory Low Oil Pressure.
 - 3) Low Fuel.
 - 4) Control Switch not in Automatic Position.
 - 5) Low Water Temperature.
 - 6) Low Oil Pressure.
 - 7) High Water Temperature.
 - 8) Engine Overcrank.
 - 9) Engine Overspeed.
 - h. Frequency Meter.
 - i. Non-resetable Elapsed Time Meter with a 9,999.9 Hour Maximum Indication.
 - j. Coolant Temperature Gauge.
 - k. Oil Pressure Gauge.
 - l. Provisions for Remote Emergency Shutdown.
 - m. Combination alarm shutdown system with manual reset and indicating lights for high engine temperature, low oil pressure, engine overspeed, and engine failed to start. Include an additional set of contacts for remote alarms.
 - n. Manual run/off/automatic selector switch for control of engine with flashing red light, and shall allow manual starting of plant without assuming load.
2. Provide low coolant level shutdown, which shall activate high engine temperature lamp and shutdown.
 3. Solid-state cranking cycle device preset at 15 second cranking cycle and 15 second rest cycle followed by a 15 second cranking cycle. If engine fails to start after 3 crank cycles and 2 rest cycles, an overcranking alarm shall sound and cranking cycle shall stop. Provide adjustments in accordance with manufacturers recommendations, but cumulative crank-rest timing shall not be less than 75 seconds.
 4. In the event of engine failure, the panel shall close alarm circuit, indicate the fault on the appropriate lamp and shut down the engine. The panel shall include a manual reset switch so that the panel can be reset immediately after a fault condition. Reset devices that require a waiting period are not acceptable.

I. Options and accessories shall include the following:

1. Housing: The complete engine generator set shall be enclosed in a free-standing weather protective, aluminum (0.063-inch) panel construction housing with lockable, removable hinged door panels, hinged instrument panel door and 12V panel light. Housing shall be

wind rated to 150 mph.

- a. All parts shall be adequately protected against oxidation and corrosion and finish painted with durable machinery enamel, minimum of 3 mils applied in a maximum of 1-1/2 mils per application.
 - b. Include within the enclosure a switched 100W vapor-tight luminarie on each side of the engine and a GFCI receptacle.
 - c. The enclosure must maintain the engine and generator at 32°F or be equipped with space heaters to maintain starting batteries between 50°F and 90°F.
2. 12V battery starting with maintenance free lead acid batteries with dual rate solid state automatic battery charger, with equalize timer, low and high battery voltage indicators and alarm terminals, charger malfunction indicator and alarm. Batteries shall be capable of providing two 45 second continuous cranking cycles. Provide battery racks, and charger shall be protected from any other charging source.
 3. Muffler, critical silencing, with condensation drain; stainless steel flexible exhaust connector. Silencer shall mount horizontally on structural support (of housing) with 90° elbow termination with rain cap.
 4. Premium exhaust rain cap, cast aluminum, stainless steel hardware, brass bushing hinge.
 5. Gas line accessories as required for the set to include but not limited to gas line strainer, 12" braided metallic flexible fuel line, battery power operated gas line shut-off solenoid valve, pressure reducing regulator fuel pressure gauge.
 - a. Contractor shall provide natural gas fuel piping for the emergency generator set. Contractor shall install natural gas line fittings obtained from electrical contractor (as supplied with the engine generator). Plumbing line work for natural gas for the engine generator shall be with as few elbows and bends as possible (as near a straight line run from the gas supply tee-off as possible).
 6. Water jacket heater, 120 VAC, 1 phase, 1500 watts minimum.

J. Remote Alarm Annunciator: Audible and Visual Alarm for Engine-Generator Malfunction

1. Silence – Lamp Test Switch
2. LED Indicator lamps for:
 - a. High battery voltage
 - b. Low battery voltage
 - c. Normal battery voltage
 - d. Generator running
 - e. Normal utility power
 - f. EPS supplying load
 - g. Pre-Low oil pressure
 - h. Pre-high coolant temperature
 - i. High coolant temperature
 - j. Low engine temperature
 - k. Over-speed
 - l. Over-crank
 - m. Not in Automatic
 - n. Battery charger malfunction
 - o. Fault

K. Testing: The unit shall be given a complete shop test before shipment. It shall be installed on the job under supervision of the manufacturer's representative, and shall receive start-up/commissioning service from that representative.

1. The unit shall be started cold and run for a one-hour test with building load connected.
2. Retransfer the load after test.
3. After this test, the set shall cool for five minutes, then must start and carry full building load for four hours.
4. Demonstrate the cranking cycle and all engine safety devices. The Owner's authorized representative shall be instructed in the operation and maintenance of the unit.

- L. Instruction Data and Drawings: Commercial type operating instructions shall be provided consisting of operating and maintenance manuals, parts books, dimensional drawings and wiring diagrams. Three copies of dimensional drawings and wiring diagrams shall be provided as specified.
 - 1. Operating Instructions: Provide and install in a suitable enclosure operating instructions for the engine generator set.
 - 2. Contractor shall fill the radiator with a combination of water and ethylene-glycol to protect the radiator to -20°F after completion of the test.
- M. Programming: Program the exerciser to operate for 30-minutes every Tuesday morning at 8:00 a.m. with no-load. Program the test button to transfer with load.

2.2 AUTOMATIC TRANSFER SWITCHES

- A. Rating and Construction:
 - 1. Refer to the project drawings for specifications on the sizes and types of transfer switch equipment, withstand and closing ratings, number of poles, voltage and ampere ratings, enclosures and accessories. All transfer switches shall be electrically operated and mechanically held.
 - 2. All transfer switches and accessories shall be UL listed and labeled, tested per UL Standard 1008, and CSA Approved, and comply with NEMA ICS 2-447. When protected by molded case breaker withstand and closing ratings shall not be less than the following RMS symmetrical amps at 600 VAC:

| Switch Size in Amps | WCR @ 480 Volts |
|---------------------|-----------------|
| Up to 125 | 22,000 |
| 150 to 260 | 35,000 |
| 300 to 400 | 65,000 |
| 600 to 800 | 65,000 |
| 1000 to 1200 | 100,000 |
| 1600 and larger | 100,000 |

- 3. Provide one of the following standard products:
 - a. Onan OTPC Series
 - b. Kohler K Code Series
 - c. ASCO 940 Series
 - d. Russelectric RMT/RMTD Series
 - e. Zenith ZTSD Series
- 4. Electrical operation shall be accomplished by a momentarily energized single solenoid operating mechanism which receives power from the source to which the load is being transferred. Fuse or thermal protection of the main operator is prohibited. The operating transfer time shall be 1/6 of a second or less. Mechanical locking in each position shall be accomplished without the aid of permanent magnets, latching solenoid, or motor operators.
- 5. Operation shall be inherently double-throw whereby all contacts move simultaneously and with no programmed delay in a neutral position. Electrical spacing shall be equal to or exceed those listed in table 15.1 of UL 1008. Only those main contact structures specifically manufactured for transfer switch service shall be acceptable. An overload or short circuit shall not cause the switch to go to a neutral position.
- 6. Inspection of all contacts (movable and stationary) shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. A manual operating handle shall be provided for maintenance purposes. The maintenance handle shall permit the operator to stop the contacts at any point throughout the entire travel to properly inspect and service the contacts when required.
- 7. All switches for solid neutral systems (shown as 3 pole on the Drawings) shall have full rated insulated neutral plates. All switches for systems with switched neutrals (shown as 4 pole on the Drawings) shall have fully rated neutral transfer contacts that momentarily interconnect the neutrals of the sources and load for 100 milliseconds maximum, during

the transfer/retransfer operation. The neutrals shall remain so interconnected until the line contacts close on the alternate source. Line and neutral contacts shall be driven by a single main operator.

B. Controls and Accessories:

1. Controls shall provide for the automatic starting sequence of the generator set.
2. Automatic controls shall signal the engine-generator set to start upon signal from normal source sensors. Solid state time delay start, adjustable from 0 to 5 seconds (factory set at 2 seconds) shall avoid nuisance start-ups. Battery voltage starting contacts shall be gold, dry type contacts factory wired to a field wiring terminal block.
3. The switch shall transfer when the emergency source reaches the set point voltage and frequency. Provide a solid state time delay on transfer, adjustable from 0 to 120 seconds.
4. The switch shall retransfer the load to the normal source after a time delay retransfer, adjustable from 0 to 30 minutes. Retransfer time delay shall be immediately bypassed if the emergency power source fails.
5. Control shall be solid state and designed for a high level of immunity to power line surges and transients, demonstrated by test to IEEE Standard 587-1980. The control shall have optically isolated logic inputs, high isolation transformers for AC inputs, and relays on all outputs. Control shall be quick disconnect for ease of service.
6. Solid state undervoltage sensors shall simultaneously monitor all phases of both sources. Pick-up and dropout settings shall be adjustable. Voltage sensors shall allow for adjustment to sense partial loss of voltage on any phase. Voltage sensors shall have field calibration of actual supply voltage to nominal system voltage.
7. For transfer switches serving non-disconnected motor loads, equip with a field adjustable time delay during switching in both directions, during which time the load is isolated from both power sources, to allow load residual voltage to decay before closure to the opposite source. The delay feature shall have an adjustable range covering 0 to 7.5 seconds. Transfer switches serving life safety equipment shall have this time delay set at 0 at startup/commissioning.
8. Controls shall signal the engine-generator set to stop after a time delay, adjustable from 0 to 10 minutes, beginning on return to the normal source.
9. Power for transfer operation shall be from the source to which the load is being transferred.
10. The control shall include latching diagnostic indicators to pinpoint the last successful step in the sequence of control functions, and to indicate the present status of the control functions in real time.
11. The control shall include provisions for remote transfer inhibit and area protection.
12. Provide front panel devices mounted on cabinet front consisting of:
 - a. A key operated selector switch to provide the following positions and functions:
 - 1) Test - Simulates normal power loss to control for testing of generator set. Controls shall provide for a test with or without load transfer.
 - 2) Normal - Normal operating position.
 - 3) Retransfer - Momentary position to override retransfer time delay and cause immediate return to normal source, if available.
13. Exerciser Clock: Provide solid state exerciser clock to set the day, time, and duration of generator set exercise/test period. Provide a with/without load selector switch for the exercise period.
14. Provide Phase Sequence Monitor/Balance Module to protect against inadvertent phase rotation hookup and monitor for voltage phase imbalance between phases.
15. Each transfer switch shall be provided with a control panel to allow the operator to view the status and control operation of the transfer switch. The control panel shall be a sealed membrane panel rated NEMA 3R/IP53 or better (regardless of enclosure rating) that is permanently labeled for switch and control functions. The control panel shall communicate with the engine generator, including display of all engine and alternator data, and other transfer switch data in the power system. The control panel shall allow

starting and stopping of the generator set via the transfer switch control panel in both test and emergency modes.

16. Submittals:
 - a. Submittal drawings and information on the transfer switches including installation drawings, wiring diagrams, dimensions, weights, etc. shall be provided. Full descriptive information on accessory items shall be furnished. All submittals shall be reviewed by the Engineer and approved prior to fabrication.
17. Instruction Data and Drawings:
 - a. Commercial type operating instructions shall be provided consisting of operating and maintenance manuals, parts books, dimensional drawings and wiring diagrams.
 - b. Operating Instructions: Provide and install in a plexiglass enclosure complete operating instructions for each type of transfer switch.

2.3 REMOTE ANNUNCIATION PANEL

- A. Flush mounted with stainless steel plate containing the following:
 1. Trouble sonnet horn with silence switch.
 2. Illuminated annunciators with nameplates in accordance with the following table:

| Lamp Legend | Generator Set Condition Indicated | Light | Audible Alarm |
|-----------------------------|--|--------------|---------------|
| High Battery Voltage | Battery charger too high | Red | No |
| Low Battery Voltage | Battery voltage too low | Red | No |
| Normal Battery Voltage | Battery voltage ok | Green | No |
| Generator Running | Generator has output voltage | Green | No |
| Normal Utility Power | Utility power supplying the load | Green | No |
| EPS Supplying Load | Genset supplying the load | Green | No |
| Pre-Low Oil Pressure | Oil pressure approaching low limit | Yellow | Yes |
| Low Oil Pressure | Engine has shut down due to low oil pressure | Red | Yes |
| Pre-High Coolant Temp. | Temperature of coolant approaching high limit | Yellow | Yes |
| High Coolant Temp. | Genset has shut down due to high coolant temp. | Red | Yes |
| Low Engine Temp. | Engine heater has malfunctioned | Red | Yes |
| Overspeed | Engine has shut down due to overspeed | Red | Yes |
| Overcrank | Engine failed to start | Red | Yes |
| Not In Auto | Engine control switch not in AUTO position | Flashing Red | Yes |
| Battery Charger Malfunction | Charger is signaling a failure | Red | Yes |
| Low Fuel | Fuel level below preset minimum | Red | Yes |
| Fault | Customer preselected condition | Red | Yes |

- B. Name plates shall be laminated black with white letters engraved. Letter size shall be a minimum of 3/8" high.
- C. Illuminated annunciators shall be 1 inch minimum.

2.4 ELECTRICAL AND MECHANICAL PERFORMANCE

- A. The switch must comply with UL 1008 and NEMA Standard Publication ICS 2-447. In addition, the switch must meet or exceed the following requirements and if so requested, be verified by certified laboratory test report.

1. Temperature Rise: Measurements shall be made after the overload and the endurance tests.
2. Withstand: UL listed to withstand the magnitude of fault current available at the switch terminals when coordinated with respective protective devices at an X/R ratio of 6.6 or less. The main contacts of the transfer switch shall not trip open or weld when subjected to fault currents.
3. Dielectric: Test, following the withstand current rating test, at 1960 volts AC rms minimum.
4. Transient Withstandability: Control panel voltage surge withstand capability test per IEEE Standard 472-1974 and voltage impulse withstand test per NEMA Standard publication ICS-1-109.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install standby engine driven generator set where shown, in accordance with the equipment manufacturer's written instructions and recognized industry practices, to ensure that the set complies with the specified requirements and serve the intended purposes.
- B. Standard: Comply with NEMA standards, requirements of the NEC, and applicable portions of NECA Standard of Installation pertaining to installation of standby engine-driven generator sets and accessories.
- C. Vibration Isolation:
 1. Outside Mounted: Ribbed Neoprene Vibration Isolation
 2. Roof Mounted: Install units on properly sized spring-type vibration mounts and ribbed Neoprene vibrations isolators.
 3. Generator installed inside building: Install units on properly sized spring-type vibration mounts and ribbed Neoprene vibration isolators.
- D. Concrete Pad: Install generator set on a reinforced concrete pad. The generator pad shall extend 6" beyond the generator set base, unless shown otherwise. Furnish the exact position of any block outs, mounting bolts, and the dimensions and location of the generator pad in a timely manner so as to prevent delay of the concrete work. Refer to Section 16010 for housekeeping pads and Division 3 for Concrete Work.
- E. Options and Accessories: Provide circuits, conductors, and raceways as required for generator options and accessories as specified. Provide separate circuits from the emergency lighting and appliance panel board to the generator, heaters, lighting, battery chargers, etc. as required, for a fully operational system.
- F. Provide remote alarm annunciator. Coordinate final location of ATS with Owner / Architect prior to installation. It may be installed adjacent to fire alarm panel, or within Administration or Custodial areas of the building.
- G. Provide dry contacts and outputs to monitor transfer switch and generator alarm conditions.

3.2 GROUNDING

- A. Install the generator as a non-separately derived system. Do not ground the generator neutral to the generator frame. Ground the generator frame to the building grounding system and provide a driven ground electrode at the generator location.

3.3 CONTROLS

- A. Provide generator start-up control wiring and raceway from each automatic transfer switch to the respective standby generator set as required.

3.4 TESTING

- A. Provide testing in accordance with NFPA 110. Upon completion of installation of engine-driven generator set and after building circuitry has been energized with normal power source. Provide manufacturer's start-up service to test emergency power system to demonstrate standby capability and compliance with specified requirements, including automatic start-up, controls and full load acceptance. Test shall include operation of standby power system with voltage check while the system is loaded to ensure proper operation of the emergency generator, transfer switches, and other system components. Operation of the system shall simulate standby power conditions, that is, loss of main electrical power to the building. Test period shall be a minimum of 4 hours continuous trouble-free operation with at least four automatic transfer switch operations (each switch) within the period of operation.
- B. Contractor shall furnish all instruments and personnel required for test. Submit 4 copies of certified test results to Architect/Engineer for review. Test reports shall include date and time of test, relative humidity, temperature and weather conditions.

3.5 MISCELLANEOUS

- A. Provide circuits and receptacles to serve loads as directed by Owner / Architect, including, but not limited to:
 - 1. Telephone equipment
 - 2. Public Address Communication & Master Clock System
 - 3. Fire Alarm and Detection System
 - 4. Security Systems
 - 5. Video Surveillance CCTV System including remote camera power supplies
 - 6. Technology/Computer data MDF/IDF equipment
 - 7. MDF/IDF dedicated HVAC equipment
 - 8. Selected refrigeration equipment
 - 9. Building Access control System including remote power supplies.
 - 10. Mount annunciator alarm as directed by Owner / Architect. Coordinate final location of ATS with Owner / Architect prior to installation.

3.6 PROGRAMMING

- A. Program automatic transfer switches for delayed transfer to emergency and sequential operation to transfer loads by priority based on manufacturer recommendation or as indicated below:
 - 1. Life Safety Loads – less than 10 seconds
 - 2. Critical Loads – more than 15 seconds, less than 30 seconds
 - 3. Equipment Loads – more than 40 seconds, less than 60 seconds
 - 4. Non-Legally required loads – more than 75 seconds, less than 120 seconds
- B. Program automatic transfer switch voltage and frequency pick-up and drop out for load shedding based on load priority for voltage and frequency based on manufacturer recommendations or as indicated below:
 - 1. Life Safety pick-up 10%; drop out 20%
 - 2. Critical Loads pick-up 10%; drop out 15%
 - 3. Equipment Loads pick-up 8%; drop out 15%
 - 4. Non-Legally required loads pick-up 5%; drop out 10%

3.7 WARRANTY

- A. Provide five-year parts and labor warranty from date of substantial completion for generator set(s) and transfer switch(es).

END OF SECTION