TECHNICAL SPECIFICATIONS

EQUIPMENT MAINTENANCE

1.01 GENERAL:

A. The services shall consist of performing required operational and preventive maintenance services of the generators and transfer switches at various Oahu projects. The service shall include quarterly inspections, annual inspections, and one (1) three-year inspection per generator. The term of this agreement shall be for a period of three (3) years beginning on the date of the Notice to Proceed.

B. Such services are to be conducted in accordance with the best practices of the industry governing the operation and maintenance of generators and in accordance with manufacturer's instructional manuals, so as to assure the final effluent is within the State Department of Health and EPA requirements.

C. Such services will include furnishing and paying for labor, materials, minor parts, and tools necessary to properly operate and maintain the existing generators and transfer switches, including but not limited to overall inspection, oil sample, change and disposal of oil, batteries, fuel and filters, radiators cap, battery cable, anti-freeze, hoses and belts. Minor parts shall mean those parts costing less than $50.00 and major parts shall mean parts costing individually $50.00 or more as shown on the manufacturer's price list.

D. Only new standard parts manufactured by the maker of each unit or parts of equal quality shall be used. The CONTRACTOR will be furnished or compensated by the HPHA for any major parts or equipment replacement. The CONTRACTOR must maintain a running log checklist for each generator and transfer switch, recording the date of each operational and maintenance service work performed and who performed the work. The log book shall be kept in the generator room at the project site.

E. Generators and transfer switches may be added to or deleted from this Contract upon written notice from the HPHA Purchasing Office. The costs for additions will be consistent with similar costs for like service under this Contract.

1.02 SCOPE OF WORK

A. The work shall include the inspection and testing of units described in Section 3.01 EQUIPMENT SCHEDULE below. Each unit shall have one (1) annual and three (3) quarterly inspections each year. The inspection level for each visit is described herein.
INSPECTION REPORTS:

For each generator, a typewritten recorded log report containing all test results, technician's comments, and other pertinent information shall be completed. Equipment shall be identified in the report by manufacturer, model number and serial number. Applicable reports shall include "as-found" and "as-left" conditions. A copy of the technicians' field report shall be delivered to the HPHA within 10 days after completion of each service visit. Upon completion of each quarterly inspection, each annual inspection and the three year inspection, the completed reports for all generators and transfer switches listed in section 3.01, shall be compiled per project and bound together into a single document. The HPHA shall be furnished with two identical copies of this compiled report along with one electronic copy. An electronic copy shall be submitted on a CD in Microsoft Word format. The two bound inspection reports and one electronic report shall be submitted to the HPHA no later than ten days after completion of last inspection.

Inspection report for each generator shall be submitted with the quarterly invoices. Payments shall not be processed until the required records of each service visit are received by the HPHA's project Engineer.

B. Submit labor rates for repairs outside of the specific scope of work of this Contract the awarded vendor will be required to honor these rates. Repairs not exceeding a total of $500.00 may be performed with the written authorization of the HPHA's project engineer. Such repairs will be billed at the above labor rate with the material price not to exceed the vendor's actual cost plus 10%. The HPHA reserves the right to request documentation of the vendor's actual cost.

1.03 SCHEDULING

A. The units are located in various Oahu locations. Work shall be scheduled between 8:00 a.m. and 4:00 p.m. Monday through Friday. All work shall be scheduled at the HPHA's convenience and in cooperation with the HPHA's project engineer and area manager. Response to each emergency condition shall not exceed more than two (2) hours from the time it was called in by the HPHA. The CONTRACTOR shall provide priority to the HPHA on all the scheduled repairs.

B. Transfer switch load testing shall be scheduled through the HPHA's project engineer and area manager to insure certain critical loads are not interrupted.

C. The annual service work shall be completed within thirty days prior to the end of the 12-month period.

D. The first quarterly inspections shall occur within 80-100 days of the start of the 12-month period.
1.04 SAFETY

A. The CONTRACTOR in cooperation with the HPHA personnel shall develop and review a work plan in accordance with OSHA regulations for each day's work.

B. The CONTRACTOR shall take all necessary precautions to protect the public and tenants from injury resulting from its work.

C. The CONTRACTOR shall take whatever steps may be necessary to safeguard its work, the property of the HPHA as well as other individuals in the vicinity of the work area during the execution of this Contract. It shall be responsible for and make good on any and all damages and for losses to work or property caused by its or its employee's negligence.

1.05 STORAGE OF MATERIAL AND EQUIPMENT

A. The CONTRACTOR shall store materials and equipment at the jobsite only upon the approval of the HPHA Project Engineer. The HPHA shall not be responsible for the loss or damage of any materials and equipment stored on site.

1.06 REFERENCE STANDARDS

A. The work shall comply with the manufacturer's recommendations, these specifications, and the applicable National Electrical Manufacturers Association (NEMA), American National Standards Institute (ANSI) and American Society for Testing and Material (ASTM) standards. Work shall be carried out in compliance with applicable safety regulations.

B. All inspections shall conform to:


NFPA 70B: Recommended Practice for Electrical Equipment Maintenance 1999 Edition, Sections 6-8.4, 14 and 22-2.5

NFPA 70 E: Standard for Electrical Safety Requirements for Employee Workplaces, 2000 Edition
2. REQUIREMENTS:

2.01 GENERAL:

A. The work described under any of the following sections shall not commence for any particular item of equipment until the testing and inspection plan has been discussed and with the HPHA's project engineer.

B. Variations from the following general procedures will be allowed if all tests, adjustments, cleaning and lubrication are accomplished.

C. This section refers to manufacturer's published instruction manuals for specific requirements for each item of equipment. The items included in this section are intended to indicate the required level of inspection, maintenance, and testing rather than specific procedures.

D. For all inspection, maintenance, and testing tasks, written notation(s) of condition found, condition left, and any action taken.

E. All replacement parts shall be Original Equipment Manufacturer (OEM) parts with the exception of certain belts, filters, fittings, and hoses, as long as a quality name brand part is used. Variations may be allowed with authorization of the HPHA's project engineer.

2.02 Specification for Services of Emergency Generators:

The Contractor shall submit a schedule of service for all emergency generators and shall maintain a log or record keeping system to document all gauge readings, problem, repairs, and maintenance performed on the equipment.

A. Quarterly Service: Before Starting Engine: The general operational and maintenance service shall be performed during each visit and shall include, but not be limited to, the following:

1. Engine Crankcase - Check Oil level, maintain oil level between the ADD and FULL marked on the engine stopped side of the oil level gauge.

2. Cooling System - Check coolant level. Maintain level within 1/2 inch to bottom of filter neck or proper level on sight gauge.

3. Walk-Around inspection - Inspect engine, radiator and generator for debris, loose or broken fittings, hoses or wires and guards. Repair as necessary.

4. Air Cleaner Indicator - Check the indicator. Change elements if indicator diaphragm remains in the locked position.

5. Battery Charger - Check for proper operation.

7. Belts - Inspect for worn, broken or loose belts. Adjust if necessary.

8. Batteries - Clean top of batteries. Check electrolyte level (unless maintenance free). Check for loose connections. Measure and record specific gravity and voltage.

9. Block Heater - Check for proper operation. Maintain 90°F coolant temperature in the block at all times.

10. Governor - Check and maintain oil level.

11. Gauges - Check the condition of all gauges. Repair or replace any broken gauge.

12. Air System - Drain water; check air pressure.

13. Control Panel - Visually inspect; check for loose, broken or damaged wiring or components.

14. Generator - Check for moisture, dust, oil greases, and debris on main stator windings, exciter, and PMG. Clean as needed.

B. Quarterly Service: With Engine Running

1. Start the Engine - The following operational checks are intended to check the generator operation and the engine starting, lubricating and fuel systems as well as overall operation.

2. Oil Pressure Gauge - Check for proper operating oil pressure. Refer to the Operation and Maintenance guide for the correct pressure reading.

3. Fuel Pressure Gauge - Check for proper operating fuel pressure. Refer to the Operation and Maintenance guide for the correct pressure reading.

4. Engine Crankcase - Check the oil level; maintain the oil level between the ADD and FULL marks on the "Engine Running" side of the dipstick.

5. Frequency (rpm) and Generator Voltage - Check and record readings.

6. Generator Louvers - Check for proper operation (able to open and close freely).

7. Generator Air Inlet Filter - If differential pressure exceeds 0.6 inches of water, stop the engines and clean the elements by soaking in hot water with detergent. Rinse with clear water. Recharge the elements with a thin layer of light weight machine oil (WD-40 or equivalent).
8. Leaks and Noises - Check for leaks and unusual noises. Replace muffler as needed.

9. Main Stator Winding Temperature with Winding Defectors - Check and record main stator winding temperatures with engine under load.

10. Bearing Bracket Temperature - Check and record bearing bracket temperature with the engine under load.

C. Quarterly Service: After Stopping the Engine

1. Automatic Switches - Check that all switches are in proper position for automatic start.

2. Exhaust Rain flap free movement, closes properly. Treat & paint for rust.

3. Fuel Tank - Check the fuel level; refill if below 75% full.

4. Battery Charger - Record charging amperage reading.

5. Malfunctions - Report any malfunction and make necessary repairs.

D. Annual Service: Before Starting the Engine

1. Perform all Quarterly Service Before Starting the Engine maintenance procedures first.

2. Walk-Around Inspection - Inspect engine, radiator and generator for debris, loose or broken fittings, hoses or wires and guards. Repair as necessary.

3. Cooling System – Sample coolant solution. Drain, clean, and flush if necessary and replace thermostat. Proper dispose of coolant solution. Refill with coolant solution and conditioner. Maintain level within 1/2 inch to bottom of filter neck or proper level on sight gauge. Replace any coolant element or add liquid coolant conditioner.


5. Air Cleaner Element - Inspect and clean or replace element.

6. Governor - Check and maintain required oil level.

7. Engine Crankcase - Check oil level. Maintain oil level between the ADD and FULL mark on the "Engine Stopped" side of the dipstick.

8. Crankcases Breather - Clean.

10. Linkages - Check and adjust all linkages, if necessary. Lubricate all linkage fittings with MPGM grease.

11. Engine Protective Devices - Check; test for proper operation.

12. Batteries Clean top of batteries. Check electrolyte level (unless maintenance free). Check for loose connections. Measure and record specific gravity and voltage. Replace as necessary to meet generator requirements. Proper dispose of battery.

13. Hoses and Belts – Check and replace as necessary.


15. Generator - Check for moisture, dust, oils, greases and debris on main stator windings, exciter, and PMG. Clean as needed. Check generator windings with mehohmmeter and record reading for reference.


17. Turbocharger – Inspect for proper operation. Check the end play and radial clearance on the turbine wheel and shaft.

18. Refer to the Generator Service Manual for information relating to use of the mehohmmeter and low resistance readings.

E. Annual Service: With Engine Running

1. Perform all Quarterly Service With Engine Running maintenance procedures first.

2. Start the Engine - Operate the engine and check all gauges, oil pressure, fuel pressure, rpm (frequency), generated voltage and engine jacket water temperature, for correct readings.

3. Engine Crankcase - Check the oil level. Maintain the oil level between the ADD and FULL mark on the "Engine Running" side of the dipstick.

4. Generator Louvers - Check for proper operation (able to open and close freely).

5. Exhaust System – Check for leaks and unusual noises. NOTE: Engine must be stopped before making necessary repairs.
6. Generator Air Inlet Filter - If differential pressure exceeds 0.6 inches of water, stop the engine and clean the elements by soaking in hot water with detergent. Rinse with clean water. Recharge the elements with a thin layer of light weight machine oil (WD-40 or equivalent).

7. Engine Mounts - Inspect for proper installation and loose fasteners. Check for proper torque.

8. Leaks and Noises - Check for leaks and unusual noises. NOTE: the engine must be stopped before making necessary repairs.

9. Load Test - Load the engine to the full rated load. Operate at this level for minimum of two hours. After approximately one hour, record the reading of all gauges: oil pressure, fuel pressure, oil level, rpm (frequency), generated voltage, service meter, engine jacket water temperature, exhaust temperature and manifold vacuum. Engine slobbering can occur if the load testing is not conducted.

10. Main Stator Winding Temperature with Winding Detectors - Check and record main stator winding temperatures with engine under load. NOTE: Normal temperature values for stand by units are 356°F for the alarm and 401°F for the shutdown.

11. Bearing Bracket Temperature - Check and record bearing bracket temperature with the engine under load. NOTE: Normal temperature values for the bearing bracket are 185°F for the alarm and 203°F for the shut down.

F. Annual Service: After Stopping the Engine

1. Perform all Quarterly Service After Stopping the Engine maintenance procedure first.

2. Walk-Around Inspection - Repair or adjust. Make repairs or adjustments to the engine and generator set as necessary. Report any malfunction and make necessary repairs.

3. Schedule Oil Sampling (S.O.S) - Obtain sampling for analysis.

4. Engine Oil and Filter(s) - Change oil. Replace filter(s), cut old filter open and inspect for foreign material. Properly dispose of oil and oil filters.

5. Generator Air Inlet Filter - Remove the filter elements and soak in hot water with detergent until clean. Rinse with clean water. Recharge the elements with a thin layer of light weight machine oil (WD-40 or equivalent).

7. Fuel Tank - Check the fuel level; refill if below 75% full.
8. Battery Charger - Record charging amperage and voltage readings.
9. Automatic Switches - Check that all switches are in proper position for automatic start.

3.01 EQUIPMENT SCHEDULE:

A. GENERATOR INFORMATION
   [See Appendix A for additional information]

1. Kalakaua Homes: 1583 Kalakaua Ave. Honolulu, HI 96826 CATERPILLAR, Model 3208, Diesel, 100 KW, 480 V, 3 PH
2. Kalanihuiia: 1220 Aal a St. Honolulu, HI 96817 KMAG 18, Model 100SX9E, Diesel, 100 KW, 208/120 V, 3Ph.
3. Makua Alii: 1541 Kalakaua Ave. Honolulu, HI 96826 KMAG, Model 100SX9E, Diesel, 100 KW, 208/120 V, 3Ph.
4. Paoakalani: 1545 Kalakaua Ave. Honolulu, HI 96826 KMAG 18, Model 75SX9E, Diesel, 90 KW, 208/120 V, 3Ph.
5. Pumehana: 1212 Kinai St. Honolulu, HI 96814 KMAG 18, Model 60SX9E, Diesel, 75 KW, 208/120 V, 3Ph.
6. Punchbowl Homes: 730 Captain Cook Ave. Honolulu, HI 96813 KMAG 18, Model 60SX9E, Diesel, 75 KW, 208/120 V, 3Ph.
7. Hale Poai: 1001 N. School Street, Honolulu, HI 96817 KMAG, Model 100SX9E, Diesel, 100 KW, 208/120 V, 3Ph.
8. Ho'olulu: 94-943 Kau'olū Pl. Waipahu, HI 96797 GENERAC, Model 94401454-S, Diesel, 100 KW, 208/120 V, 3Ph.
10. La'iola Building A & B: 1 & 15 Ihoihio Pl. Wahiawa, HI 96786 CATERPILLAR, Model 3208, Diesel, 75 KW, 208 V, 3 PH

B. Notification of the HPHA Staff and Residents

When necessary, the Contractor shall notify the Area Manager at least 72 hours in advance of any work that would produce excessive noise or may produce utility outages.
3.02 CLEAN-UP:

At completion of each operational and/or maintenance service or emergency service, the Contractor shall clean up and remove all rubbish, grease and debris from the premises resulting from this work, and shall keep the entire area clean and neat.

END OF SECTION
APPENDIX A1: AMP 34

A1.2: Makua Ali'i
APPENDIX A1: AMP 34

A1.3: Paoakalani
APPENDIX A2: AMP 35

A2.1: Kalanihuia
APPENDIX A2: AMP 35

A2.2: Pumehana
APPENDIX A2: AMP 35

A2.3: Punchbowl Homes
APPENDIX A3: AMP 42

A3.1: Hale Poai
APPENDIX A3: AMP 42

A3.2: Ho'olulu
APPENDIX A3: AMP 42

A3.3: Kamalu
APPENDIX A3: AMP 42

A3.4: Laiola