

SPECIFICATIONS
FOR
BATTERY SYSTEM INSPECTION, TESTING,
MAINTENANCE AND REPAIR SERVICES

Great Lakes Water Authority

11/03/15

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GENERAL SPECIFICATION

1. Scope of Work

The work included under these specifications consist of furnishing all labor, materials, tools, equipment and technical services to perform inspection, testing, calibration, maintenance and repairs of battery systems for the facilities of the Great Lakes Water Authority per this General and Detailed Specifications.

2. Right to Reject

The Great Lakes Water Authority reserves the right to reject any or all proposed work.

3. Right to Purchase

The Great Lakes Water Authority reserves the right to accept any or all proposed work at the contract quoted price.

4. Project Manager

The designate Project Manager shall have the authority and power:

- A. To determine the amount, kind, quality and acceptability of the work to be paid for hereunder, and to reject such work which does not conform to the Specification.
- B. To determine all questions in relation to the work, to interpret the Specifications and to resolve all patent inconsistencies or ambiguities therein.
- C. To make changes in the work as he deems necessary provided that the general character of the work as a whole is not materially affected thereby.
- D. To determine the adequacy of the Vendor's construction methods and materials.

E. To require:

- a) the application of the Vendor's forces to any portion of the work, or
- b) the forces increased or diminished, or
- c) the work temporarily stopped when, in his judgment such may be necessary to assure proper performance of the Contract

GS-I

5. Deliveries, Storage, and Handling of Materials & Equipment

All material and equipment shall be handled in a manner to avoid damage or breakage and delay in the completion of the work. The Contractor shall repair or replace, without cost to the Great Lakes Water Authority and to the satisfaction of the Project Manager, all items damaged or broken as a result of his operation.

The Contractor shall notify **the designated project manager** no less than two days in advance of the delivery of any equipment.

All materials to be incorporated in the work shall be properly arranged, covered, and protected and the Contractor shall be solely responsible for the safety of it. Materials improperly stored shall not be included in estimates for partial payment, or if already included, shall be deducted from subsequent estimates. Materials may be stored on the site in locations designated by the Project Manager.

Marking: Unless otherwise specified, shipping containers shall be marked with the name of the material, the class and quantity contained therein, the name of the contractor, and the number of the Contract and/or Great Lakes Water Authority Purchase Order.

6. Coordination of the Work

The coordination of all work on the site shall be subject to the approval of the Project Manager.

The Contractor shall coordinate the work under this contract with facilities operations and with work being done under any other contracts in progress on the site, or by utilities in the area. The contractor shall cooperate fully with others engaged in the work and shall so schedule and arrange his work as to permit the entire work at the site to progress in the most efficient manner.

7. Payment

Partial payments or progress payments will be made upon completion of work described under each of the parts of detailed specifications and upon the acceptance of this work by the Project Manager.

8. Guarantee

The contractor shall guarantee all material and workmanship in writing for the period of one (1) Year from the date of completion of the work. The guarantee shall include quality, performance and compliance with all applicable national codes and standards especially the IEEE Standard -450-1980.

9. Work Authorization

The contractor will proceed with work only upon written authorization from the Project Manager.

10. Testing and Inspection

Contractor shall perform all testing necessary (in the presence of the Project Manager) to insure that the work performed under the contract is satisfactory and in conformity with requirements of these specifications.

11. Plant Vehicle Speed Limit

Contractor shall observe vehicle speed limit of 10 M.P.H. while driving on the Department's grounds.

12. Cleaning of Sites

Upon completion of work, the Contractor shall promptly remove all equipment, construction materials, and debris from the work sites. Contractor shall be responsible for restoration and cleanup of these sites.

13. Submittals

All test, inspections and repair reports shall be documented for each activity for a particular piece of equipment and shall be submitted in triplicate to the Project Manager. The test and inspection reports shall also point out all abnormal values of tests, associated interpretations and necessary recommendations. The Report format shall be as detailed under the Detailed Specifications.

DETAILED SPECIFICATIONS

Part 1 - GENERAL

1.0 Scope of Work

The work included under these specifications consist of furnishing all labor, materials, tools, equipment and technical services to perform inspection, testing, calibration, maintenance and repairs of battery systems for all the facilities of the Great Lakes Water Authority per the specifications.

Part 2 - PRODUCTS

Not Used

Part 3 -EXECUTION

3.01 Part - I

The Contractor shall perform all the work under this part, which consists of the following tasks:

- 1) Inspect for the general appearance and cleanliness of the battery and its immediate area. Clean all the cell tops and exposed sides of the battery cells.
- 2) Measure Battery charger output voltage and current with test meters and compare the readings with the charger D.C. voltmeter and ammeter readings. Recalibrate metering instruments if the calibration checks require it.
- 3) Inspect and record electrolyte levels of all cells of the battery. Add "an approved quality water", as suggested by the battery manufacturers to those cells where electrolyte level is found to be lower than the "low" level mark, prior to the start of the recommended equalizing charge. After the equalize charge is about 2/3 complete, add the "approved water" to bring the electrolyte level up to the "high" level mark.
- 4) Inspect for any electrolyte leakage in the battery cells. Inspect for the cracks in the battery cells case.
- 5) Measure the ambient temperature of the battery room and inspect for the conditions of the ventilation equipment.
- 6) Measure Pilot cell voltage, specific gravity and the electrolyte temperature.
- 7) Measure temperature compensated specific gravity of the electrolyte for every 6th battery cell.

- 8) Inspect battery bolt connections for their tightness. Retighten any loose connections per manufacturer's published torque values. Inspect battery connections for cleanliness. Clean battery posts and cells links, if found dirty during inspection.
- 9) Inspect battery connections for any corrosion build-up. If the corrosion build-up is evidenced then, disassemble the battery connection, clean and dip it in a corrosive resistance agent before its reassemble.
- 10) Measure the intercell terminal connections resistance for the battery. Retighten connections per manufacturer's published torque values if the connection resistance measures more than 30 micro-ohms. The deviation of the intercell connection resistances shall not exceed the values published by IEEE standard 450-2980.
- 11) Measure Float voltage of each cell and the total battery terminal voltage. 12) Measure temperature of electrolyte of the representative cell of each battery. Provide an appropriate corrective action if the variation of electrolyte temperature in the various representative cells exceeds more than 5° F.
- 13) Submit, within three (3) weeks from the completion of the Part-I work, for items 1) thru 12) shown above, a written report, in triplicate, to the Project Manager for his review, approval and acceptance. The report shall describe the inspection procedures, the test procedures, observations, test results and the recommended corrective actions to correct any deficiencies discovered during the inspection and test periods. After an approval is granted to proceed with specific actions on such recommendations, the Contractor shall carry out such actions to establish a fully operational battery system to the satisfaction of the Project Manager. All documentation specified herein shall also be submitted in approved electronic format.

3.2 Part II

The work under this part shall consist of the following tasks:

- 1) Perform all the Work as outlined per item 1) thru 13) of Part-I above.
- 2) Visually inspect in detail, each cell condition, per manufacturer's recommendation. Specifically, check for the Sediment build-up at the bottom of the cell, presence of sulfating on the plates, swelling of the plates, and the color of the plates.
- 3) Check to see that the torque values of all cell-to-cell bolted connections are in accordance with the manufacturer's guidelines.

- 4) Inspect the battery rack for its integrity, level surface and presence of any corrosion or rust.
- 5) Measure the temperature compensated specified gravity readings for each cell and compare with the manufacturer's published data.
- 6) Perform battery capacity test consisting of a controlled current discharge of each battery system at the rates specified per manufacturer's published technical data and the following:
 - a) Equalize charge the battery prior to conducting a test discharge. Sets equalize charge voltage setting as suggested by the manufacturer's published technical data.
 - b) The discharge current shall be maintained within $\pm 1\%$ of the published manufacturer's rating. The battery capacity test shall be terminated, when the ratio of battery terminal voltage is less than 1.75, or an individual cell terminal voltage is less than 1.50, whichever occurs first. (These values are applicable for lead acid type batteries only. For NiCad batteries refer to manufacturer's data).
 - c) The battery capacity test system shall consist of a controller and a variable resistor load unit programmed for the constant current load. The alarm circuits of the test system shall warn the test operator of any performance-related problems. The test system shall also include a built in data logger to monitor and record overall battery voltage, individual cell voltages, current and the time before, during and immediately after the test.
 - d) The data acquired during the battery capacity test shall be analyzed to determine the Ampere-Hour capacity, when normalized to 77° F, shall then be compared with the manufactured published data for each battery.

Submit, within four (4) weeks from the completion of the Part-II Work, for items 1) thru 6) shown above, a written report, in triplicate, to the Project Manager for his review, approval and acceptance. The report shall describe the inspection procedures, test procedures, observations, test results and the recommended corrective actions to correct any deficiencies discovered during the inspection. After an approval is granted to proceed with specific actions on such recommendations, the Contractor shall carry out such actions to establish a fully operational battery system to the satisfaction of the Project Manager. All documentation specified herein shall also be submitted in approved electronic format.

- 7) Clean up batteries and battery trays after testing.

3.3 Work Schedule

The work schedule shall proceed in the following manner once the contract is awarded as well as when the contract renewal option is executed:

<u>Contract Year</u>	<u>Scheduled Inspection</u>	<u>Work Part</u>
1.	Start date	Part I
2.	1 year later	Part II
3.	2 years later	Part I

The Contractor shall submit Part II inspections and work schedules for each station to be approved by the Project Manager. Equipment Shutdown Request (ESR) form shall be submitted to the project manager for approval if a battery system shutdown is needed.

The Contractor shall notify a designated project manager at least two (2) hours in advance when entering and leaving the facility. Their technicians and workers should also notify the designated project manager before and immediately after disabling or enabling any equipment.

3.4 Allowance for Repairs

An allowance of forty thousand dollars (\$40,000.00) shall be included in the bid of this Contract. This allowance shall be used for new replacement batteries, repair of chargers and other recommended repairs identified in the submitted official test reports. The Contractor shall submit a quote to the authorized GLWA person for approval prior to the performance of the work.