STANDARD SPECIFICATION FOR UNDER GROUND FACILITIY SURVEY BY GROUND PENETRATION RADAR (GPR)

1.0 GENERAL

This specification covers the technical requirements for carrying out **"Underground facility survey by Ground penetration radar (GPR)"** for the specified area/areas indicated for assessing the existing underground facility of the power plant and its other systems. The work shall be executed in accordance with the specification and good standard of practice necessary to fulfil the objectives of the work strictly in accordance with the instruction and satisfaction of the engineer-in-charge.

2.0 SCOPE

The Detailed the scope of work shall include but not be limited to the following.

2.1 Carrying out underground facility survey by Ground penetration Radar (GPR) and preparation of plans (maps) and report of the entire area/areas indicated for assessing the existing underground facilities of the power plant and its other systems.

2.2 Providing instruments, tools & plants, materials, labours, qualified surveyors, clearance of jungles, cutting of trees, earth work, scaffoldings, transport, supervision by competent engineers/surveyors, testing of materials, full insurance and all other incidental items as may be necessary for successful completion of the surveying, mapping and construction works etc.

2.3 The survey should include mapping of underground utilities, viz, RCC/metallic pipe lines, sewer, gas, water, petroleum and chemical pipelines, HV and LV power cables, telecommunications ducts, telecommunications cables and any other buried/ surface plant or apparatus.

2.4 Furnishing underground facilities survey report/drawing of results and conclusions

2.5 Furnishing all field data and drawings on CD/DVD apart from hard copies.

2.6 Furnishing underground facilities survey report as described in details in the succeeding paragraphs is also included in the scope of work.

3.0 TENDER DRAWING

3.1 The enclosed layout (**Drg. No. PE-DG-465-601-C002**) indicate the tentative location of the area/areas to be surveyed for assessing the existing underground facility of the power plant and its other systems. The location/area(s) indicated in the drawing is subject to change that may be necessary during actual execution of the work. The work shall be carried out as per the instructions of the engineer-in-charge.

3.2 The bidder must visit the site prior to submitting his quotations to acquaint himself fully with the nature, type, scope of work and involvement therein. The rates quoted shall remain firm during the entire period of execution till completion of the work and any additional claim for lack of knowledge shall not be entertained.

4.0 SPECIFICATION

4.1 The work shall be executed according to the specification and good standard of practice necessary to fulfil the objectives of the survey work strictly in accordance with the instruction and satisfaction of the engineer-in-charge.

4.2 The specification shall be read in conjunction with the description of items in the schedule of quantities. The bidder shall refer to the employer for any discrepancy which may exist between the drawings, specification and corresponding items of the schedule for clarification before submission of quotation and the employer's decision as to the clarity of the point raised shall be final and binding on the bidder.

4.3 The work at site shall be carried out under the full time supervision by a qualified engineer/geophysicist. The engineer/geophysicist shall be responsible for and capable of co-ordinating the work of the surveying teams, setting out the work accurately, identifying immediately and positively the type of instruments to be deployed and the methodology of surveying to achieve speed and accuracy in the work and shall be fully conversant with the theory and techniques of underground facility survey covered by this contract.

4.4 The contractor shall be responsible for the proper execution of the work to such lines and grades as specified in the specification, drawings or as directed by the engineer-in-charge from time to time.

4.5 After arrival of the instruments to site, these shall not be moved out of the site by the contractor without the prior written permission and approval of the engineer-in-charge. In case the instruments are moved out of the site without the prior written permission and approval, the engineer-in-charge/owner reserves the right to deduct from the contractor's bill(s) the amount as considered reasonable and or to withheld the payments for the work done. The decision of the engineer-in-charge in this regard shall be final and binding on the contractor.

4.6 The system shall be used for surveying and mapping of buried utilities and infrastructure facilities. The Ground Penetrating Radar should be trolley/skid mounted for onsite usage for real time onsite detection of buried non-metallic/metallic pipes and cables etc. The unit should be of latest design based on multi frequency antennae in the range of about 100MHz and 1000MHz with different frequencies operating from the same antennae box/controller for simultaneous capture of both shallow and deep utilities in one scan. GPR system should include Man-Portable GPR, Data Acquisition/Processing Hardware & Software with 3D analysis facility.

4.7 Inspection depths should be maximum up to 6m depth below ground level for precise identification of underground utilities like power/ telecom cables, water supply pipes, sewer line, ducts, concrete structure etc. For this appropriate multichannel and multi-frequency antenna configuration/ combination should be quoted.

4.8 In areas where significant changes in elevation occur, elevations along the survey lines should be obtained.

4.9 The area of survey should be larger than the area of interest so that measurements are taken in both "background" conditions and over the area of interest. Survey lines should be laid out over the site. The survey lines should be oriented perpendicular to any linear feature (buried channel, pipeline, tank, trenches, faults, and fractures) that is expected. Line spacing should be adjusted according to the size of the target. In special cases, consideration of the antenna polarization (orientation) may be needed to optimize or minimize reflections from subsurface targets.

4.10 Lay out the survey lines should be in a straight line.

4.11 Place station marks at equal intervals along the survey line using survey flags and tape, measuring wheel, electronic measuring device, global positioning system, or other location system.

4.12 The survey lines should be referred to a permanent location so the grid can be revisited at a later date if necessary.

4.13 Under ground facility survey shall be done as per ASTM D 6432-11 (latest edition) and other relevant Indian/International codes.

4.14 Payment shall be made on the area actually surveyed as covered by the plan.

4.15 The contractor shall submit three copies of all the drawings for review and approval of the engineer-in-charge. After approval, (8 copies of the drawings, 2 soft copy in Auto Cad drawing format in CD shall be submitted.

5.0 SUBMISSION OF FIELD DATA AND REPORT

5.1 Contractor shall submit all data pertaining to the survey in original to the engineer-in-charge.

5.2 All field data shall be submitted to the engineer-in-charge from time to time as per progress of the work.

5.3 Three copies of draft report shall be submitted on the completion of the field work for review and approval of the engineer-in-charge. The report should give the introduction of the site, methodology adopted for areas

surveyed and any other calculation required for surveying and preparation of the survey drawings.

6.0 INSPECTION

The contractor shall make all arrangements of men, material, instruments, surveyors, necessary records and field data etc at the work site for checking of the work to the satisfaction of the engineer-in-charge or his authorised representative during the progress and on successful completion of the work. The contractor shall intimate well in advance before final decamping from work site so that the final work can be inspected by the engineer-in-charge. This will form a part of acceptance of the work for release of payments.