# ODISHA POWER GENERATION CORPORATION LIMITED

(A Government Company of the State of Odisha)

## REQUEST FOR PROPOSAL
## FOR
## SELECTION OF AGENCY
## FOR
## CONDUCTING TOPOGRAPHIC SURVEY AND GEOTECHNICAL INVESTIGATION
## FOR
## ASH POND AND ASH PIPELINE CORRIDOR OF OPGC STAGE-III PROJECT AT ITPS JHARSUGUDA, ODISHA

**BID ID No. OPGC/CO/GEOTECH ASH POND/10112026**


**ODISHA POWER GENERATION CORPORATION LIMITED**

(A Government Company of the State of Odisha)

CIN: U40104OR1984SGC001429

Regd. Office: Zone A, 7th Floor, Fortune Towers, Chandrasekharpur, Bhubaneswar, Odisha 751023, INDIA.



AMRIT ANAND CHAND

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## DISCLAIMER

*The information contained in this Request for Proposal ("**RFP**") or provided subsequently to the Bidder(s), whether verbally or in documentary or any other form, by or on behalf of the Owner or any of its employees or advisors, is provided to Bidder(s) on the terms and conditions set out in this RFP and such other terms and conditions subject to which such information is provided.*

*This RFP is not an agreement and is neither an offer nor invitation by the Owner to the prospective Bidders or any other person. The purpose of this RFP is to provide interested parties with information that may be useful to them in the formulation of their Bid pursuant to this RFP. This RFP includes statements, which reflect various assumption, assessments arrived at by the Owner in relation to the Project. Such assumptions, assessments, statements and information contained in this RFP may not be complete, accurate, adequate or correct. Each Bidder should therefore, conduct its own investigations and analysis and should check the accuracy, adequacy, correctness, reliability and completeness of the assumptions, assessments, statements and information contained in this RFP and obtain independent advice from appropriate sources.*

*Information provided in this RFP to the Bidder(s) is on a wide range of matters, some of which may depend upon interpretation of law. The information given is not intended to be an exhaustive account of satisfactory requirements and should not be regarded as a complete or authoritative statement of law. The Owner accepts no responsibility for the accuracy or otherwise for any interpretation or opinion on law expressed herein.*

*The Owner, its employees and advisors make no representations or warranty and shall have no liability to any person, including any Bidder, under any law, statute, rules or regulations or tort, principles of restitution or unjust enrichment or otherwise for any loss, damages, cost or expense which may arise from or be incurred or suffered on account of anything contained in this RFP or otherwise, including the accuracy, adequacy, correctness, completeness or reliability of the RFP and any assessment, assumption, statement or information contained therein or deemed to form part of this RFP.*

*The Owner also accepts no liability of any nature whether resulting from negligence or otherwise howsoever caused arising from reliance of any Bidder upon the statements contained in this RFP. The Owner may, in its absolute discretion but without being under an obligation to do so, update, amend or supplement the information, assessment or assumptions contained in this RFP.*

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## 1.0 BACKGROUND & PROJECT INFORMATION

Odisha Power Generation Corporation Limited ("OPGC"), a Government Company of the State of Odisha having its Corporate Office at Bhubaneswar, is currently owns and operates four (4) units with total capacity of 1740 MW (Units#1&2- 2x210 MW and Units#3&4- 2x660 MW) at IB Thermal Power Station (ITPS), Banharpali, Jharsuguda-768234, Odisha.

As part of its capacity addition program, OPGC is expanding its Thermal Power Project by establishing 2x660 MW coal-based Units#5&6, Stage-III at IBTPS with ultra supercritical technology adjacent to the existing Stage-I and Stage-II plants at the above location. The Project shall be developed, owned and operated by OPGC. For disposal of Ash, 270 Acres of land has been identified for the development of the proposed Ash Pond.

For preparation of DPR and RFP documents for the development of the ash pond Geotechnical Investigations and Topographic Survey are the pre-requisite work and the same are required as inputs for the above-mentioned documents.

It is essential to appoint an Agency to conduct the Topographic Survey and Geotechnical investigation for the proposed Ash Pond & Ash Pipeline corridor of OPGC Stage-III Project prior to initiate DPR and other construction activities.

## 2.0 REQUEST FOR PROPOSAL

OPGC requires the services of a reputed Agency (the "Agency") as detailed in Section 3.0 below. OPGC invites Proposals (hereinafter referred as the "**RFP**") through on-line document submissions to participate in this tendering through the single stage two envelope Bidding process at the Government e-Tender portal ("**e-Tender Portal**") at website https://tendersodisha.gov.in from reputed, experienced, eligible and qualified Agency ("**Bidder(s)**" or "Agency(s)"), to evince their interest for conducting Topographic Survey and Geotechnical investigation for the proposed Ash Pond & Ash Pipeline corridor of OPGC Stage-III Project. Interested Bidders are requested to submit their Proposals along with their credentials and financial details, as per the enclosed formats and terms & conditions described in this RFP.

Interested Bidders should provide sufficient and relevant information demonstrating that they meet the specified Qualification Criteria for providing the Services.

## 3.0 SCOPE OF SERVICE

The detailed Scope of Services ("**Services**") of the Agency shall include the work mentioned in Appendix-A and shall include all related works required to perform the Services mentioned therein.

## 4.0 QUALIFICATION REQUIREMENT

Bidders shall meet the following minimum Qualification Requirements (QR) to become a Qualified Bidder.

| Sl. | QUALIFICATION REQUIREMENT (QR) | REQUIRED DOCUMENTS |
|---|---|---|
| **A.** | **General QR** | |
| i. | The Bidder shall be a Company incorporated under the Companies Act, 1956/2013, OR a Limited Liability Partnership registered under the Limited Liability Partnership Act, 2008, OR a Partnership Firm registered under the Indian Partnership Act, 1932. | Bidder shall submit copies of<br>a. Certificate of Incorporation; OR<br>b. Certificate of Registration; OR<br>c. Other valid legal documents in support of Bidder as per applicable ACT. |

| | | |
|---|---|---|
| ii. | The Bidder shall not stand banned, blacklisted or debarred by the Government of Odisha, Government of India or any of their Public Sector Undertakings as on the date of bid submission and up to the date of award. | Bidder shall submit self-declaration in the covering letter. |
| iii. | The Bidder shall possess valid registrations under the Employees' Provident Funds and Miscellaneous Provisions Act, 1952 and the Employees' State Insurance Act, 1948, as applicable, and shall possess valid PAN and GST registration. | Copies of the applicable registration certificates shall be submitted with the techno-commercial bid. |
| iv. | The Bidder shall not be under liquidation and shall not have been declared insolvent under the Insolvency and Bankruptcy Code, 2016. | Bidder shall submit self-declaration in the covering letter. |
| **B** | **Technical QR** | |
| v. | **Experience and Past Performance**<br><br>The Bidder shall have successfully completed *Similar Services during the preceding seven (7) years reckoned from the original scheduled date of techno-commercial bid opening, meeting any one of the following:<br>a. **Three (3)** completed Similar Services, each having a value of not less than **INR 34 Lakh**; OR<br>b. **Two (2)** completed Similar Services, each having a value of not less than **INR 42 Lakh**; OR<br>c. **One (1)** completed Similar Service having a value of not less than **INR 67 Lakh**. | Bidder shall submit Self-attested copies of the following:<br>a. Contract/Work Order/Agreement indicating the name and scope of the assignment; and<br>b. Completion certificate issued by the client indicating successful completion, completion date and executed contract value. |
| vi. | **Key Personnel Capability**<br><br>The Bidder shall have the following personnel on its regular payroll for at least one year as on the original scheduled date of techno-commercial bid opening:<br>a. At least one (1) qualified geotechnical engineer with degree in Geotechnical Engineering and having minimum Five (5) years' work experience in the area of geotechnical investigation.<br>b. One (1) qualified engineering geologist with degree in Geology/Engineering Geology or Civil engineer with experience in geotechnical engineering with degree, having minimum two (2) years' work experience in the area of geotechnical investigation. | Bidder shall submit Self-attested copies of Employer-certified Curricula vitae, qualification certificates for proposed personnel. |
| vii. | **Equipment and Laboratory Capability**<br><br>The Bidder should own the following equipment / test setup / facility:<br>a. Rotary boring rigs - One (1) Nos.<br>b. Electrical Resistivity Test setup - One (1) No. | Bidder shall submit Self certified list of machineries. |

| | | |
|---|---|---|
| | c. Laboratory set up equipped for testing the physical, engineering and chemical properties of soil and rock. | |
| **C** | **Financial QR** | |
| i. | The Bidder shall have an Average Annual Turnover of not less than **INR 251 Lakh** during the last three (3) completed Financial Years, i.e. FY 2023-24, FY 2024-25 and FY 2025-26, as on the date of bid opening. | Bidder shall submit<br>a. Copies of Audited financial statements of these Financial Years; and<br>b. A certificate from a practising Chartered Accountant, on the CA's letterhead, confirming the turnover for each of the above Financial Years and the Average Annual Turnover. |
| ii. | The Net Worth of the Bidder shall be positive in the immediately preceding completed financial year. Further, the Bidder shall not have incurred losses continuously during the last three (3) completed financial years resulting in erosion of Net Worth by thirty percent (30%) or more. | The Bidder shall submit audited financial statements and a certificate from a practising Chartered Accountant, on the CA's letterhead, confirming the Net Worth. |

(*) "Similar Services" shall mean geotechnical investigation in soil in any project, involving the below activities:

- Boring and drilling in soil and rock, sampling and preparation of bore logs/core logs;
- Laboratory testing of soil, rock and groundwater samples
- Interpretation of investigation data and preparation of factual and interpretive reports.
- The Bidder shall have completed at least one assignment involving topographic survey using Total Station and/or survey-grade DGPS/GNSS.

**Note:**

a. Bids submitted by a Consortium, Joint Venture (JV), association of firms or any other form of joint arrangement shall not be permitted. The Bidder shall participate in its own capacity and shall independently meet all stipulated Qualifying Requirements. Specific lease/hire/tie-up arrangements permitted under Clause B (vii) shall not constitute a JV or consortium.
b. A service completed within the stipulated seven-year period shall be considered even if it commenced earlier. Credentials of subcontractors shall not be considered for meeting the Technical QR.

Bidders meeting the above-mentioned qualification criteria shall be considered as Qualified Bidder. Proposals of all the Bidders not meeting the above criteria shall be rejected. Bidders are required to provide detailed information/supporting documents with respect to compliance with the above criteria.

Owner reserves the right to seek additional information/clarification/explanation with respect to the document submission, if required.

## 5.0 PROPOSAL SUBMISSION PROCESS

### 5.1 Bid Processing Fee/Tender Fee

Interested bidder can participate in the bidding process by paying the requisite non-refundable Bid Processing Fee/Tender Fee of **INR 2,360/- including GST** (Indian Rupees Two Thousand Three Hundred Sixty Only) to OPGC in form of Demand Draft in favour of "Odisha Power Generation Corporation Ltd." Payable at any Commercial Bank, Bhubaneswar or through online

transfer (NEFT/RTGS) before Proposal Submission Date to OPGC Bank Account as mention in Appendix-B to ITB. Interested Bidder must pay and prepare the DD before Bid Submission Date & Time and submit original DD to OPGC as offline submission in a separate sealed envelope strictly before the Bid Opening Date & Time, otherwise Bid stands summarily rejected. This is in addition to uploading of the scanned copy of the DD in online portal.

Proposals not accompanied by the requisite Bid Processing Fee/ Tender Fee submission within the stipulated timeline as stated in Section 9.0 shall not be entertained and in such case Proposal will be outrightly rejected.

The RFP documents are non-transferable and shall be bought by the Bidder, who will be Bidding. The Bidder must pay the Bid Processing/Tender Fee from the bidder's own account. Hard copy of RFP document shall not be issued.

Techno Commercial Proposal not accompanied by the requisite Bid Processing Fee **or** Techno Commercial Proposal not accompanied by adequate Bid Security will not be entertained and in such case **whole Proposal will be rejected.**

**The Techno Commercial Proposals submitted without Bid Processing Fee/ Bid Security as above shall be rejected and shall not be considered for this bidding process and for further evaluation.**

## 5.2 Process in Brief

RFP Document may be downloaded by any interested Bidder from the e-Tender Portal https://tendersodisha.gov.in as per the specified schedule. The tender is invited under e-tendering process.

The Bidders can enroll themselves on the e-Tender Portal at website https://tendersodisha.gov.in. The use of Digital Signature Certificate ("DSC") Class-3 key is mandatory for e-tendering activities. Accordingly, Bidders should have DSC Class-3 key to participate in e-tendering. Bidders, if required, can obtain DSC Class-3 key from agencies authorized by the Government of India. Bidders are requested to visit the e-Tender Portal for reference to user manuals with detailed guidelines on registration and participation in the e-tendering process. Bids/Proposals shall ONLY be submitted online at the e-Tender Portal on the website https://tendersodisha.gov.in.

The Bidders meeting the Qualification Requirement specified under section 4.0 are required to submit their Techno Commercial Proposal and Price Proposal to Owner as per the Bidding Timeline specified under Section 9.0 along with requisite Tender fee specified in Section 5.1 and Bid Security specified in section 7.1 of this RFP. Firstly, Techno Commercial Proposal will be opened.

The Techno Commercial Proposal will then be evaluated for responsiveness and compliance with the Qualification Requirement and other Techno Commercial requirement as specified under section 6.1 of this RFP.

The Bidder(s) should possess the Minimum Qualifying Requirement as mentioned above. In case of the bidder not meeting the above Minimum Qualifying Requirement, no further evaluation of the bid will be carried out and the bidder will be **Disqualified**.

This is a No Deviation Bid and Bidders are required to submit their bid without any deviation. Owner reserves its right to reject the Techno Commercial Proposal submitted by the Bidders, who have taken deviations to Scope and Commercial Terms & Conditions. Bidder will be asked

to withdraw the deviation which are not acceptable to Owner without any extra price implication. Proposal with deviations not acceptable to Owner unless withdrawn shall be rejected. The Bidders complying the Qualification Requirement and satisfying the Techno Commercial requirements will be declared as **"Qualified Bidder"** in line with the Techno Commercial Evaluation criteria specified in section 6.1 and above.

The Price evaluation process shall commence thereafter as detailed in Section 6.2. Based on the outcome of the price determination process, Successful Bidder will be declared in accordance with terms of the RFP, accordingly Letter of Award (LOA) shall be issued to the Successful Bidder.

### 5.3 Proposal Submission

OPGC intends to conduct a competitive bidding process on open tender basis. Bidders are required to submit their Proposals in two parts.

**A. TECHNO-COMMERCIAL PROPOSAL (FIRST PART)**

Details to be submitted as per the format identified as Appendix-1 and Appendix-6 of Annexure-A to ITB along with details of Bid Processing/Tender Fee, Bid Security and supporting documents along with Unpriced copy of Price Proposal format. Techno-Commercial Proposal should not contain any price content entry in any manner. In case, the Techno-Commercial Proposal is found to contain any price content, such bid shall be liable for rejection.

**B. PRICE PROPOSAL (SECOND PART)**

Details to be submitted in online Price Bid BOQ (appropriate excel file) as per the format identified as Annexure-B of the ITB. Price Proposal shall be submitted through on-line Government e-procurement portal ("**e-Tender Portal**") at website https://tendersodisha.gov.in.

Bidder shall submit and upload their proposal (i) Techno-Commercial Proposal with electronic copies of Bid Processing/Tender Fee & Bid Security/EMD and (ii) Price Proposal on-line through Government e-procurement portal ("**e-Tender Portal**") at website https://tendersodisha.gov.in.

In case, the Techno-Commercial Proposal is found to contain any price content, such proposal shall be liable for rejection and will not be considered for further evaluation. The price details/commercial proposal details should not be given in the Techno-Commercial Proposal (First Part). If any of the bidder have given any price/commercial details in their Unpriced copy of Price Proposal format under Techno-Commercial Proposal, their offer is liable for rejection and will not be considered for further evaluation.

Hard copy documents in original of Bid Processing/Tender Fee (if paid by Demand Draft DD) and Bid Security/EMD Instrument (if paid by, Bank Guarantee or Insurance Surety Bond or Demand Draft or FDR) shall be submitted to OPGC at the following address within **cut-off date as mentioned in the Bidding Schedule as per section 9.0 of the RFP** and balance documents like Power of Attorney/Authorisation documents & Integrity Pact as per the prescribed format if applicable in the RFP, shall be provided to OPGC against clarifications at the following address.

**GM- SCM (Corporate Contracts)**
Odisha Power Generation Corporation Limited
Zone-A, 7th Floor, Fortune Towers, Chandrasekharpur,
Bhubaneswar -751023, Odisha, INDIA

**No other hard copy documents (other than above) should be submitted directly to OPGC.**

### 5.4 Pre-Bid Meeting & Clarifications

Bidder may seek queries wrt Instruction to the Bidder, Scope of Services, Technical Specifications & Key Commercial Terms to Owner. OPGC may arrange a Pre-Bid meeting on virtual mode amongst all interest Bidders, if any important clarification needs to be addressed by Owner. The interested parties are required to send their queries, if any, on the RFP by e-mail to authorized person at contracts.corp@opgc.co.in before the scheduled pre-bid meeting date as mentioned in the Bidding Schedule as per section 9.0 of RFP.

## 6.0 EVALUATION PROCESS

### 6.1 Evaluation of Techno Commercial Proposal

The Techno-Commercial Proposals will be evaluated first for Compliance with the requirement of this RFP including the scope of services specified in Appendix-A to ITB and Commercial Terms specified in Annexure-C. Any deviations with respect to terms of this RFP may lead to "**Rejection"**.

Bidder shall submit its proposal in full compliance. No deviation shall be taken anywhere in the proposal. If any deviations are found OPGC may, in its sole discretion, reject the Bidder's proposal.

Techno Commercial Proposal of the Bidders, which are found acceptable, will be further reviewed and evaluated. Subsequently, Qualified Bidder shall be determined based on the provision specified in Qualification Requirement, Compliance and responsiveness of the Proposal and their Price Proposals shall be opened.

Save and except as provided in this RFP, the Owner shall not entertain any correspondences with any Bidder in relation to the evaluation of the Techno Commercial Proposal and determination of the Qualified Bidder.

### 6.2 Evaluation of Price Proposal

Price evaluation shall be done based on quoted all-inclusive Price by the Bidder. The Successful Bidder shall be selected amongst the Qualified Bidders based on all-inclusive lowest evaluated Price (L-1) basis. The Bidder quoting the evaluated lowest Price in the Price Proposal will be declared as the Successful Bidder.

Save and except as provided in this RFP, the OPGC shall not entertain any correspondence with any Bidder in relation to the acceptance or rejection of any Price Proposal.

### 6.3 Award of Contract

Based on the above parameters, OPGC shall declare the L1 Bidder as Successful Bidder and appoint Successful Bidder as Agency by issuing Letter of Award (LOA). Key commercial terms of the engagement are provided in Annexure- C. The Bidder will be required to commence the services specified in the scope immediately upon issuance of the LOA and intimation from Owner.

## 7.0 SECURITIES

### 7.1 BID SECURITY/EMD

#### 7.1.1 Bid Security to be submitted by Bidders

Bidders must furnish a Bid Security in favor of OPGC in the aggregate amount of **INR 1,67,000/-** (Indian Rupees One Lakhs Sixty-Seven Thousands only). The Bid Security must be in form as indicated in Section 7.1.2 of the RFP and must be issued by a recognized bank/insurer domiciled or licensed to conduct business in India and acceptable to Owner. It is advisable for

Bidders to check with OPGC in advance of Bid Submission Date as to the acceptability of the proposed issuing bank/insurer.

### 7.1.2 Forms of Bid Security

Bidder shall furnish the Bid Security of an amount of **INR 1,67,000/-** (Indian Rupees One Lakhs Sixty-Seven Thousands only) in the form of online payment (NEFT/RTGS) in favour of OPGC to OPGC bank account as mentioned in the Appendix-B to ITB or Account Payee Demand Draft (DD) in favour of OPGC payable at any Commercial Bank, Bhubaneswar or Fixed Deposit Receipt (FDR) in favour of OPGC or an irrevocable, unconditional and enforceable Insurance Surety Bond (ISB) from an Insurer or an irrevocable, unconditional and enforceable Bank Guarantee (BG/e-BG), from a scheduled commercial bank having a branch in Bhubaneswar as per the format acceptable to OPGC specified in Appendix-1 to Annexure-A, ITB. Bidders are advised to confirm the acceptability of the bank with the Owner before issuance of the Bid Security.

The Bid Security (BG/e-BG or ISB or FDR or DD or online payment) must be prepared/transferred before Bid Submission Date & Time otherwise Bid stands summarily rejected.

The Bid Security shall be shall be valid for a period of at least 90 days from the Proposal Submission Date as notified by OPGC and shall have additional claim period of ninety (90) days, beyond the validity period. No interest shall be payable by the Owner on the above Bid Security.

### 7.1.3 Consequence of Non-Submittal of Bid Security

Non-submission of requisite Bid Security shall not be considered for further opening of the Techno Commercial Proposal. Submission of Bid Security of inadequate value and/or validity will not be acceptable and in such case Proposal submission of such Bidder shall be rejected. The Bid Security will be verified by OPGC with the concerned issuing bank/insurer and if any discrepancy is found and not acceptable to OPGC, the Proposal submitted by the Bidder will be out rightly rejected.

### 7.1.4 Bid Security Forfeiture

The Bid Security furnished by the Bidder shall be forfeited/invoked in following cases.

a. If a Bidder revokes, withdraws or modifies unilaterally its Techno Commercial Proposal and/or Price Proposal during the period of their validity period; or
b. If, during evaluation of Price Proposals, OPGC ascertains that there is discrepancy in the price Proposal due to arithmetical error, and on communicating such error to the Bidder, the Bidder does not accept the proposed correction of errors; or
c. If the Bidder refuses to withdraw any deviations, specified in the Price Proposal or in the Techno Commercial Proposal contrary to provision of ITB, without any cost to OPGC; or
d. if, in the event that the Techno Commercial Proposal; validity period is extended by Bidder, and the Bidder fails to comply with any condition of re-validation or confirmation or fails to deliver a replacement Bid Security within the timeframe notified by Owner; or
e. In the case of Successful Bidder, if it fails within the specified time limit to execute the Contract as per the scope of services and terms & conditions of this RFP or to submit Performance Security as required thereunder. Bid Security must be extended to cover such period as may be required under contract for providing the Performance Security.
f. If the Bidder or his representatives commits any violation of the Section 6.0 or 10.0 of this ITB while participating in the Biding Process.
g. In the case of Successful Bidder, if such Bidder fails within the specified time limit to:
    i. furnish the acceptance of letter of award; or
    ii. fails to submit Contract Performance Guarantee/Security.

### 7.1.5 Return of Bid Security:

OPGC will return the Bid Security as per following as applicable:

i. The Bid Security of the Successful Bidder to whom a Contract is awarded, will be returned after the said Bidder provides the Contract Performance Security and the same is accepted by the OPGC after due verification in accordance with the OPGC's procedure in force from time to time. Bid Security must be extended to cover such period as may be required till submission of the Performance Security.
ii. Bid Security of all unsuccessful Bidders will be returned at the earliest within thirty (30) days after declaration of Successful Bidder.
iii. The Bid Security for the Bidders, who do not meet the Qualification Requirement, shall be returned at the earliest within thirty (30) days of the declaration of the Qualified Bidders.

## 7.2 CONTRACT PERFORMANCE SECURITY

In the event of contract award, the Successful Bidder shall be required to submit Contract Performance Security (in the form of BG/e-BG/DD or online payment through NEFT/RTGS) within 10 days from the date of issuance of LOA with an amount equivalent to 5% of the Contract Price specified and, in the form, prescribed in Appendix-C to Annexure- C.

## 8.0 EXEMPTIONS

MSMEs are eligible to get the benefit of exemption from payment of Bid Processing/Tender Fee & Bid Security, provided the participating Bidders are registered as MSME for providing the Services as per Section 3.0 of this RFP and they should be registered as MSME Vendors under NSIC/Udyam/DIC.

## 9.0 BIDDING SCHEDULE

| Particulars | Tender Timeline |
|---|---|
| Date of Issuance of NIT | **10th November 2026** |
| Pre-Bid Meeting (virtual mode) | **26th November 2026** |
| Last date of Submission of Techno Commercial Proposal & Price Proposal (Proposal Submission End Date) | **2nd December 2026** by 14:30 Hrs. (IST) |
| Techno-Commercial Proposal Opening Date | **2nd December 2026** at 16:30 Hrs. (IST) |
| Last date of submission of original Hardcopy documents of Tender fee & Bid security/EMD (Cut-off Date) | **2nd December 2026** at 16:30 Hrs. (IST) |
| Price Proposal Opening Date (Indicative) | **10th December 2026** |

## 10.0 GENERAL GUIDELINES FOR THE BIDDERS

### 10.1 Site Visit and Inspection prior to Proposal Submission:

Before Submission of the Proposals, Bidder must visit OPGC Corporate office, site and its surroundings to assess and satisfy themselves about the local conditions such as access roads to the site, water and power supply, applicable / details of taxes, duties, royalties and levies, minimum wages, labour and other related laws, environmental and safety laws, acts and regulations and any other relevant information, as required by them. The Bidder may obtain all necessary information as to risk, contingencies and other circumstances, which may influence or affect their Proposal. Bidder shall be deemed to have considered local conditions and information and to have satisfied himself in all respects before quoting his rates and terms and no claim whatsoever in this regard shall be entertained by the Owner at a later date.

The Bidder shall complete the site visit and satisfy itself with various information requirements and site conditions. Bidders shall become familiar with the Site and the surrounding areas, the scope of the service, commercial terms & conditions and other information set forth in the RFP, and make a complete and careful examination to determine the nature and extent of the difficulties and hazards associated with the performance of the Services.

### 10.2 Language

The submissions prepared by the Bidders, and all correspondence and documents relating thereto, shall be in the English language. English shall be the binding and controlling language for all matters relating to the meaning or interpretation of the RFP and submissions.

### 10.3 Corrections and Erasures

No erasures or over writings shall be permissible. Bidders shall clearly indicate changes using strike through and rewrite any required minor changes with clear approval signified by initials of the person(s) signing the submissions. All alterations, omissions, additions, changes or any other amendments made in the submissions shall be initialed by the person(s) signing the submissions.

### 10.4 Submission Ownership

Without affecting any intellectual property rights, which may exist in a response to this RFP document, all responses submitted will become the property of the OPGC and OPGC will be under no obligation of returning the same. Without limiting this section, the OPGC reserves the right to copy and reproduce responses for the purposes of evaluation, clarification, negotiation and anything else related to these purposes.

### 10.5 Submission cost

The Bidder shall bear all costs and expenses associated with the preparation and submission of its proposal and OPGC shall under no circumstances be responsible or liable for any such costs.

### 10.6 Proposal Validity Period

All Proposals, not rejected for any other reason, shall remain valid for a period of ***Sixty Days (60) from the Proposal Submission Date*** or any extension thereof. Each Proposal shall indicate that it is a firm and irrevocable offer. Non-adherence to this requirement will be a ground for declaring the Proposal as non-responsive. In case of the Bidder revoking or withdrawing/ cancelling his Proposal, varying any term in regard thereof during the validity period of the RFP without the written consent of Owner, the Proposal submitted shall be liable for rejection.

### 10.7 Extension of Submission Date

OPGC may, at its sole discretion, decide to extend the Proposal Submission Date. In such a case, all rights of OPGC previously subject to the Submission Date will thereafter be subject to the new Submission Date.

### 10.8 Details and Signature of Bidder

The Proposal shall be signed and stamped on each page. The Proposal shall be signed by an authorized representative and a power of attorney/authorization in its name shall accompany the Proposal.

### 10.9 ETHICS, COMPLIANCE, CONFIDENTIALITY AND BANNING

Bidders are expected to observe the highest standard of ethics and not to indulge in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice. OPGC reserves a right to carry out the relevant due diligence on the Bidder and seek information if required.

For the purposes of this provision, the terms set forth below as follows:

**"corrupt practice"** means the offering, giving, receiving, or soliciting of anything of value to influence the action in the procurement process;

**"fraudulent practice"** means a misrepresentation of facts in order to influence a procurement process to the detriment of the OPGC and includes collusive practices among Bidders (prior to

or after Proposal submission) designed to establish Proposal prices at artificial, non-competitive levels and to deprive the OPGC of the benefits of competition;

**"coercive practice"** means impairing or harming or threatening to impair or harm directly or indirectly, any person or property to influence any person's participation or action in the bidding process;

**"undesirable practice"** means (i) establishing contact with any person connected with or employed or engaged by the OPGC with the objective of canvassing, lobbying or in any manner influencing or attempting to influence the bidding process; or (i) having a conflict of interest as stated in Section 10.11; and

**"restrictive practice"** means forming a cartel or arriving at any understanding or arrangement among Bidders with the objective of restricting or manipulating a full and fair competition in the bidding process.

***OPGC will reject the Proposals of a Bidder if OPGC determines that the Bidder has engaged in any*** corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice during this Bidding Process. Further, OPGC will declare a Bidder ineligible, either indefinitely or for a stated period of time if at any time it determines that the Bidder has engaged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice in this Bidding Process.

Banning: OPGC has the Banning Policy as stated in its website at www.opgc.co.in and Appendix-D to Annexure-C of the draft Key Commercial Terms stated in this RFP. Bidder/Contractor/Agency may be debarred from business dealings on account of any of the grounds and following the procedures as detailed in the said Policy. Bidders shall certify their compliance with the Banning Policy. Bidder further confirms that if at any point, the declarations given are found to be incorrect, OPGC shall have the full right to reject the bid/terminate the contract and take any action as per applicable laws for breach of bid/contract including forfeiture of Bid & Performance Security.

### 10.10 Disqualification of Bidders

Any entity which has been barred by the Central, State or other Government in India, or any entity controlled by it, or in the jurisdiction of the Bidder barred from participating in any project of the nature of the facility, and the bar subsists as on date of the issue of RFP, shall not be eligible to submit a Proposal.

A Bidder, should in the last 3 (Three) years, not have failed to perform on any Contract, as evidenced by imposition of a penalty by an arbitral or judicial authority or a judicial pronouncement or arbitration award against the Bidder, or have been expelled from any contract, or have had any contract terminated for breach of such Bidder. The Bidder not in compliance with this clause shall be disqualified outright.

### 10.11 Conflict of Interest

Bidders shall state in their Proposal any circumstances, arrangements, understandings or relationship that constitute or may reasonably be considered to constitute, an actual or potential conflict of interest with Bidder's obligations under this RFP or under any contract which may be negotiated or executed between the Bidder and OPGC. The Bidder and their employees, agents, advisers and any other person associated with the Bidder must not place themselves in a position which may, or does, give rise to a conflict of interest (or a potential conflict of interest) between the interests of OPGC or any other interests during the bidding process.

### 10.12 Confidentiality

Information relating to examination, evaluation and recommendation for selection of Successful Bidder shall not be disclosed to any person who is not officially concerned with the process or is not a retained professional advisor advising OPGC in relation to, or matters arising out of, or concerning the bidding process. The parties will treat all information, issued by OPGC or submitted by Bidder as part of the Proposal, in confidence and will require all those who have access to such material to treat the same in confidence. The parties may not divulge any such information unless it is on a need basis and it is directed to do so by any statutory entity that has the power under law to require its disclosure or is to enforce or assert any right or privilege of the statutory entity and/or OPGC or as may be required by law or in connection with any legal process. In the event, parties are required to divulge any information, it will make best endeavors to maintain confidentiality of the information held by it and divulge only that information which is required to.

### 10.13 False or Misleading Claims

If the bidder conceals any material information or makes a wrong statement or misrepresents facts or makes a misleading statement, in any manner whatsoever, in order to create circumstances for the acceptance of the submissions, OPGC may in its absolute discretion exclude or reject any submissions that in the reasonable opinion only of OPGC contains any false or misleading claims or statements. OPGC has no liability to any person for excluding or rejecting any such submissions.

### 10.14 Right to accept or reject Any or All Proposal or to Annul the Bidding Process

OPGC reserves the right to accept or reject any submissions OR to annul the bidding process and reject all Bids at any time prior to Contract award OR to not award the Contract to the Successful Bidder or not award the Contract at all, without assigning any reasons thereof and for such decisions, OPGC shall not entertain any claim whatsoever on this account. No Bidder shall have any claim on OPGC for cost or otherwise in case its Proposal is rejected or the bidding process is annulled. Decision of OPGC will be final and binding on all the Bidders in this regard

### 10.15 Governing Law

The Governing Law of this RFP shall be the substantive law of the Land in India. In the event of any dispute, claim or controversy arising out of this RFP, both the OPGC and the Bidder shall try to resolve it amicably. In the event no amicable solution could be achieved, the same shall settled through Legal proceedings. For any proceedings arising out of or concerning or connected with such dispute, appropriate Courts at Bhubaneswar/Honourable High Court of Orissa shall have exclusive jurisdiction.

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**APPENDIX-A**

## SCOPE OF WORK ("SERVICE")

**A.** The scope of work (Services) covers to carryout the followings but not limited to,
(i) Conduct Geotechnical Investigation Study,
(ii) Laboratory Testing and
(iii) Topographic survey
(iv) Submission of Final study report for Ash Pond & Ash Pipeline corridor of OPGC Stage-III

Geotechnical Investigation: Field investigation across the 270-Acre area involving a tentative provision of 80 (eighty) boreholes, field testing (SPT, field permeability, plate load tests, etc.), and sampling as per relevant IS codes CEA, and CPCB guidelines. The scope also included 5 nos. of bore holes in the water body (approx. 400 mtr) for ash pipeline corridor.

Laboratory Testing: Comprehensive testing of soil and rock samples for index properties, shear strength (UU/CU/CD triaxial), consolidation, permeability, compaction (Proctor), chemical analysis, and liner compatibility.

Topographic Survey: Detailed contour and topographic survey using Total Station/DGPS, establishing benchmarks, identifying natural drainage patterns, and generating CAD/GIS compatible maps.

Submission of Final study report: Submission of detailed Geotechnical & Topographic Survey Reports including bore logs, sub-surface stratigraphy, groundwater observations, embankment slope recommendations, and foundation treatment measures.

**B. Deliverables:**
Agency shall submit the deliverables as per the following schedule during the Assignment:

| Sl. | Milestone | Schedule from LOA |
|---|---|---|
| 1. | **Site Mobilisation and Setting Out:** Mobilisation of required drilling rigs, drilling/field investigation equipment, survey instruments, manpower and other resources at site; establishment of field facilities; setting out of borehole locations and recording of coordinates/elevations of all borehole locations. | 10 days |
| 2. | **Completion of First 50% Boreholes:** Completion of 50% boreholes, including drilling, sampling, SPT/other specified field tests, groundwater observations and preparation of complete borehole logs, along with submission of field investigation records. | 40 days |
| 3. | **Completion of Balance Boreholes and Topographic Survey:** Completion of remaining 50% boreholes, including all specified field tests/sampling, and completion of the topographic survey of the entire 270-acre ash pond area and identified ash slurry piping corridor, including preparation of required survey drawings/data. | 60 days |
| 4. | **Laboratory Testing and Draft Reports:** Completion of laboratory testing of all specified soil/rock samples; submission of laboratory test results; preparation and submission of Draft Geotechnical Investigation Report and Draft Topographical Survey Report, including borehole logs, geological/geotechnical interpretation, groundwater observations, soil/rock | 75 days |

| | | |
|---|---|---|
| | parameters, survey drawings, contours, coordinates and other specified deliverables. | |
| **5.** | **Final Reports and Complete Deliverables:**<br>Submission of the Final Geotechnical Investigation Report and Final Topographical Survey Report, incorporating all comments/observations of OPGC, together with all final drawings, borehole logs, laboratory test reports, survey data, coordinates, levels, digital files and other contractually required deliverables. | 90 days |

**Delay in submission of Deliverables:**

For delay in submission of the Final Geotechnical Investigation Report and Final Topographical Survey Report beyond the stipulated completion period of 90 days from the date of LOA, the Consultant/Agency shall be liable to pay Liquidated Damages @ **1% of the Contract Value per week** or part thereof of delay, subject to a maximum of 5% of the Contract Value.

**C.** The detailed Technical Specification for Geotechnical Investigation is attached as **Annexure-1 to Appendix-A of ITB.**

**APPENDIX-B**

## OPGC CONTACT DETAILS & BANK INFORMATION

### A. CONTACT DETAILS:

For any clarification, Bidders may contact GM- SCM (Corporate Contracts) at the following address.

| | | |
|---|---|---|
| **Postal Address** | : | **GM – SCM (Corporate Contracts)**<br>Odisha Power Generation Corporation Limited<br>Zone-A, 7th Floor, Fortune Towers,<br>Chandrasekharpur, Bhubaneswar- 751023,<br>Odisha, India |
| **Landline** | : | +91-674–2303765/66 |
| **Ph. (Corporate contracts)** | : | +91-9778901001 |
| **Email** | : | contracts.corp@opgc.co.in |
| **Website** | : | www.opgc.co.in |

### B. BANK DETAILS FOR PAYMENT OF TENDER FEE/ BID SECURITY

| | | |
|---|---|---|
| **OPGC BANK ACCOUNT NUMBER** | : | 380801010035993 |
| **BANK IFSC CODE** | : | UBIN0538086 |
| **BANK DETAILS** | : | UNION BANK OF INDIA- MAIN BRANCH,<br>BHUBANESWAR, ODISHA, INDIA- 751009 |
| **OPGC PAN NUMBER** | : | AAACO4759R |
| **OPGC GSTIN NUMBER** | : | 21AAACO4759R1ZZ |
| **OPGC CIN** | : | U40104OR1984SGC001429 |

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# TECHNO-COMMERCIAL PROPOSAL
## FORMS AND FORMATS

**APPENDIX-1**

# BID SECURITY FORMATS

(This Bid Security is to be submitted by the Bidder along with the covering letter)

**Letter No.:** **Date:**

**GM – SCM (Corporate Contracts)**
Odisha Power Generation Corporation Limited
Zone-A, 7th Floor, Fortune Towers
Chandrasekharpur, Bhubaneswar
Odisha- 751023

**Subject: Techno Commercial Proposal for Selection of Agency for conducting Topographic Survey and Geotechnical investigation for Ash Pond & Ash Pipeline corridor of OPGC Stage-III Project- Bid Security**.

Dear Sir,

Enclosed is the Bid Security in the form of Online payment/DD/FDR/Bank Guarantee (BG/e-BG)/Insurance Surety Bond (ISB) bearing No. _____dated _____ issued by _____ Bank/Insurer, _____ Branch for amount of **INR 1,67,000/-** (INR One Lakhs Sixty Seven Thousands only) payable at Bhubaneswar, as per provisions of Request For Proposal (RFP) issued by OPGC for selection of Agency for conducting Topographic Survey and Geotechnical investigation for Ash Pond & Ash Pipeline corridor of OPGC Stage-III Project.

**MSME Certificate Details:**

**SIGNATURES**
For and on behalf of: [Bidder's Name]

(Signature of the Authorised Signatory): ----------

Name of the Person: ----------
Designation: ----------

**Enclosures:** Online payment/DD/FDR/Bank Guarantee(BG/e-BG)/Insurance Surety Bond (ISB)/MSME Certificate as above.

## FORMAT OF BANK GUARANTEE TOWARDS BID SECURITY/EMD

Guarantee No. [*Insert*]

**BY THIS BID SECURITY** dated the [*insert*] day of [*insert*], [*insert*].

**To,**
**Odisha Power Generation Corporation Limited**
Zone-A, 7th Floor, Fortune Towers, Chandrasekharpur
Bhubaneswar, Odisha, INDIA, PIN-751023

Dear Sirs,
In accordance with NIT/Invitation for Bids under your Bid Document No. _____, M/s _____ having its Registered/Head Office at _____ (hereafter called the 'Bidder') wish to participate in the said bid for _____ [Name of Contract/Work/Package] _____.

As an irrevocable Bank Guarantee (BG) against Bid Security for an amount of _____ (*) _____ valid for _____ days from _____ (**) _____ is required to be submitted by the Bidder as a condition precedent for participation in the said bid which amount is liable to be forfeited on the happening of any contingencies mentioned in the Bidding Documents.

We, the _____[Name & address of the Bank]_____ having our Head Office at _____(#)_____ guarantee and undertake to pay immediately on demand by _____[Name of the Employer/Owner]_____ (hereafter called the 'Employer'/'Owner') the amount of _____(*)_____ without any reservation, protest, demand, demur and recourse. Any such demand made by the 'Employer' shall be conclusive and binding on us irrespective of any dispute or difference raised by the Bidder and/or any right/remedy available to the Bidder in terms thereof.

This Guarantee shall be unconditional as well as irrevocable and shall remain valid up to _____(@) _____. If any further extension of this Guarantee is required, the same shall be extended to such required period (not exceeding one year) on receiving instructions from M/s _____ *[Bidder's Name]* _____ on whose behalf this Guarantee is issued.

In witness whereof the Bank, through its authorised officer, has set its hand and stamp on this _____ day of _____ 20 _____ at _____.

(Signature)…….

(Name) …….

(Designation with Bank Stamp)
…….

Authorised Vide
Power of Attorney No.....
Date.....

**NOTE:**

1. (*) The amount shall be as specified in the RFP/Bid Data Sheets.
   (**) This shall be the date of opening of Techno-Commercial bids.
   (#) Complete mailing address of the Head Office of the Bank to be given.
   (@) This date shall be ninety (90) days beyond the end of proposal validity period.
2. The Bank Guarantee shall be from a Bank as per provisions of RFP.
3. The BG should be on Non-Judicial Stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the State(s) where the BG is submitted or is to be acted upon or the rate prevailing in the State where the BG is executed, whichever is higher. The Stamp Paper/e-stamp paper shall be purchased in the name of Bidder/Bank issuing the guarantee.
4. While getting the Bank Guarantee issued, Bidders are required to ensure compliance to the points mentioned in RFP.

| **This Bank Guarantee should be confirmed through SFMS by the issuing Bank and the details are as follows:** | | |
|---|---|---|
| **OPGC Bank Account Number** | **:** | 380805010000063 |
| **Name of the Beneficiary** | **:** | Odisha Power Generation Corporation Limited |
| **Bank Details** | **:** | Union Bank of India- Mid Corporate Branch, Bhubaneswar, Odisha-751007, India |
| **Bank IFSC code** | **:** | UBIN0578827 |

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## FORMAT OF INSURANCE SURETY BOND TOWARDS BID SECURITY/EMD

(To be stamped in accordance with Stamp Act of India)

Insurance Surety Bond No. .....
Date.....

**To,**
**Odisha Power Generation Corporation Limited**
Zone-A, 7th Floor, Fortune Towers, Chandrasekharpur
Bhubaneswar, Odisha, INDIA, PIN-751023

Dear Sirs,

In accordance with NIT/Invitation for Bids under your Bid Document No. _____, M/s _____ having its Registered/Head Office at _____ (hereafter called the 'Bidder') wish to participate in the said bid for _____ [Name of Contract/Work/Package] _____.

As an irrevocable Insurance Surety Bond against Bid Security for an amount of _____ (*) _____ valid for _____ days from _____ (**) _____ is required to be submitted by the Bidder as a condition precedent for participation in the said bid which amount is liable to be forfeited on the happening of any contingencies mentioned in the Bidding Documents.

We, the _____[Name & address of the Insurer]_____ having our Head Office at _____(#)_____ guarantee and undertake to pay immediately on demand by _____[Name of the Employer/Owner]_____ (hereafter called the 'Employer'/'Owner') the amount of _____(*)_____ without any reservation, protest, demand, demur and recourse. Any such demand made by the 'Employer' shall be conclusive and binding on us irrespective of any dispute or difference raised by the Bidder and/or any right/remedy available to the Bidder in terms thereof.

This Insurance Surety Bond shall be unconditional as well as irrevocable and shall remain valid up to _____(@) _____. If any further extension of this Insurance Surety Bond is required, the same shall be extended to such required period (not exceeding one year) on receiving instructions from M/s _____ *[Bidder's Name]* _____ on whose behalf this Insurance Surety Bond is issued.

In witness whereof the Insurer, through its authorised officer, has set its hand and stamp on this _____ day of _____ 20 _____ at _____.

(Signature) .....

(Name) .....

(Designation with Insurer Stamp) .....

Authorised Vide
Power of Attorney No.....
Date.....

**NOTE:**

1. (*) The amount shall be as specified in the RFP/Bid Data Sheets.
   (**) This shall be the date of opening of Techno-Commercial bids.
   (#) Complete mailing address of the Head Office of the Insurer to be given.
   (@) This date shall be ninety (90) days beyond the end of proposal validity period.

2. The Insurance Surety Bond shall be from an Insurer as per guidelines issued by Insurance Regulatory and Development Authority of India (IRDAI) as amended from time to time.

3. The Employer shall be the Creditor, the Bidder shall be the principal debtor, and the Insurance company/Insurer shall be the Surety in respect of the Insurance Surety Bond to be issued by the Insurer.

4. The Insurance Surety Bond should be on non-judicial stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the state(s) where the Insurance Surety Bond is submitted or is to be acted upon or the rate prevailing in State where the Insurance Surety Bond is executed, whichever is higher. The Stamp Paper/e-stamp paper shall be purchased in the name of Bidder/Insurer issuing the Insurance Surety Bond.

5. While getting the Insurance Surety Bond issued, Bidders are required to ensure compliance to the points mentioned in RFP.

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**APPENDIX-2**

## COVERING LETTER

*[On Bidder's Letterhead]*

Date:

**To,**
**GM- SCM (Corporate Contracts)**
Odisha Power Generation Corporation Limited
7th Floor, Zone-A, Fortune Towers, Chandrasekharpur
Bhubaneswar-751023, Odisha.

Dear Sir,

**Sub: Techno Commercial Proposal and Price Proposal for Selection of Agency for conducting Topographic Survey and Geotechnical investigation for Ash Pond & Ash Pipeline corridor of OPGC Stage-III Project.**

Please find attached herein our Techno Commercial Proposal (together with all attachments thereto duly completed, the 'Techno Commercial Proposal') and our Price Proposal (together with all attachments thereto duly completed, the 'Price Proposal') in response to Request for Proposal (RFP).

We hereby confirm the followings:

**A. DECLARATION AND AUTHORISATIONS**

1. The Techno Commercial Proposal and Price Proposals are being submitted by ***[Bidder - Organization name]*** in accordance with the conditions stipulated in the RFP vide NIT dated 10th November 2026 and following amendments there to, issued by OPGC receipt of which is hereby acknowledged.

   Number _____ Dated _____
   Number _____ Dated _____

2. ***[*Bidder - *Organization name]*** have examined in detail, have understood, and abide by all terms and conditions stipulated in the RFP issued by OPGC. Bidder acknowledges OPGC's right to accept or reject any Proposal OR to annul the bidding process and reject all Bids at any time prior to contract award OR to not award the Contract to the Successful Bidder or not award the Contract at all, without assigning any reasons thereof and without any liability to Bidder for any cost or risk on account of the same.

3. The information contained in the proposal is complete and accurate in all material respects. ***[Bidder- Organization name]***, undertakes to notify the OPGC promptly upon Bidder becoming aware of any material fact which tends to render Bidder's proposal misleading or inaccurate. ***[Bidder- Organization name]*** confirms its Qualification Requirement as per clause 4.0 of ITB ***[Bidder- Organization name]***, acknowledges and agrees that any material misrepresentation made in connection with Bidder's proposal might result in its invalidation and Bidder's disqualification from the bidding process.

4. ***[Bidder – Organization name]*** has necessary legal right to submit the Proposals in connection with this RFP. A duly certified true and complete copy of the legal rights is attached hereto as Appendix-3 to Annexure-A, ITB.

5. ***[Bidder- Organization name]*** undertakes that it shall perform Scope of Work without compromising on OPGC's interests and shall avoid any such conflict of interest in its dealings while performing Scope of Work for OPGC's as per the provisions of the Contract in case the (Bidder- Organization name) enters into the Contract with OPGC at a later date.

6. ***[Bidder- Organization name]*** designates Mr./Ms. _____as Bidder's representative and in the absence of Mr./Ms. _____ as above, designates Mr./Ms. _____, who is authorized to perform all tasks including, but not limited to providing information, responding to enquiries, entering into Bid commitment etc. on behalf of the Bidder, in respect of the RFP. ***[Bidder – Organization name]*** has enclosed its Power of Attorney, and/or Board Resolution in favor of Authorized Representatives mentioned above hereto as Appendix-3 to Annexure-A, ITB. (provide designation, contact address, phone no. fax no. etc. in Annexure-1 of Appendix-2 for the above designated persons)

7. ***[Bidder- Organization name]*** hereby confirms that it has perused the Key Commercial Terms in detail and agrees to abide by the same as provided, if Bidder is appointed as Agency.

*8.* ***[Bidder-Organization name]*** hereby undertakes that it has submitted a **NO DEVIATION** Proposal. Bidder also confirms that it has not taken any deviation with respect to RFP, draft Contract document and Technical Specifications in its submitted Proposal. Bidder also confirms that it has not taken any deviations anywhere in the submitted Price Proposal, if any deviation found anywhere in the Techno-commercial Proposal and Price Proposal the whole submitted Proposal shall be rejected and OPGC shall disqualify our Proposal in line with the term of the RFP.

9. ***[Bidder- Organization name]*** hereby confirms that it has not been banned, blacklisted or debarred by the Government of Odisha, Government of India or any of their Public Sector Undertakings as on Proposal Submission Date or any extension thereof failing which shall be disqualified automatically in this tender.

10. ***[Bidder-Organization name]*** confirms that it is not banned under OPGC Banning Policy as stated in its website www.opgc.co.in and Appendix-D to Annexure-C of the draft Key Commercial Terms stated in this RFP. Bidder further confirms that if at any point, the declarations given are found to be incorrect, OPGC shall have the full right to reject the bid/terminate the contract and take any action as per applicable laws for breach of bid/contract including forfeiture of Bid & Performance Security.

11. ***[Bidder-Organization name]*** confirms that the bidder complies with the latest notification(s), orders and circulars issued by the Government of India regarding the guidelines for eligibility of bidders from a country sharing a land border with India.

12. ***[Bidder-Organization name]*** confirms that bidder has not under liquidation and shall not have been declared insolvent under the Insolvency and Bankruptcy Code, 2016.

13. ***[Bidder-Organization name]*** confirms that the bidder complies & submitted the Tender Fee, Bid Security and appropriate MSME for the services to get the exemptions if any as specified in the clause no. 5.3 of the RFP within the Cut-off Date & Time, and failing which our proposal shall be declared as non-responsive and shall be rejected as well.

14. ***[Bidder-Organization name]*** acknowledges and agrees that OPGC has the right not to qualify any bidder on grounds of national interest, security or public policy.

**B. BID VALIDITY**

15. ***[Bidder- Organization name]*** confirms that the Techno Commercial Proposal and the Price Proposal submitted is valid for a period of Sixty (60) days from the Proposal Submission Date or any extension thereof.

**C. SIGNATURE**

| | |
|---|---|
| For and on behalf of | : ---------- |
| (Signature of the Authorized Signatory) | : ---------- |
| Name of the Person | : ---------- |
| Designation | : ---------- |

**Annexure-1 to APPENDIX-2**

## ORGANIZATION DETAILS & AUTHORIZED REPRESENTATIVE

| **Bidder's Details** | |
|---|---|
| Name of the Bidder | *[Bidder to provide details]* |
| Date of Incorporation | *[Bidder to provide details & attach supporting documents]* |
| Registered Address: | *[Bidder to provide details]* |
| Communication Address:<br>(if, different from the registered address) | *[Bidder to provide details]* |
| PAN Number | *[Bidder to provide details & attach supporting documents]* |
| GSTIN registration certificate | *[Bidder to provide details & attach supporting documents]* |
| EPFO Establishment Code & Name | *[Bidder to provide details & attach supporting documents]* |
| Employee State Insurance Corporation (ESIC) Employer Code | *[Bidder to provide details & attach supporting documents]* |
| **Details of Bidder's Authorized Persons (stated in Appendix–2: Covering Letter)** | |
| (1) Name & Designation | |
| Telephone Number/ Fax Number | |
| Mobile Number | |
| Email Address | |
| Authorization | |
| (2) Name & Designation | |
| Telephone Number/ Fax Number | |
| Mobile Number | |
| Email Address | |
| Authorization | |
| **Bidder's Bank Details** | |
| Bank Account Number: | |
| Bank name in full: | |
| Bank Branch & Address | |
| IFSC Code: | |

**Note:**

i. Bidder shall submit Authorization Documents / Power of Attorney in the name of its Authorized Signatory signing the Techno Commercial Proposal and Price Proposal. Authorized Signatory shall also be authorized to perform all tasks including, but not limited to providing information, responding to enquiries, entering into Bid commitment etc. on behalf of the Bidder, in respect of this RFP.

ii. Bidder shall provide their bank details in the above format and shall submit cancelled cheque/duly filled Bank mandate for refund of Bid Security/EMD amount if any.

**Signature and Stamp of Bidder**

**Annexure-2 to APPENDIX-2**

## CHECKLIST

| Sl | Document | ATTACHED |
|---|---|---|
| 1 | Legal Rights | Yes/No |
| 2 | Technical Specification and Other terms of RFP<br>If not complied, | Complied / Not Complied<br>Yes/No |
| 3 | Bid Security Submitted<br>Amount,<br>Issuing bank/insurer,<br>BG/ DD/ FDR/ NEFT/RTGS/ISB Number<br>Validity | (Yes/No)<br>_____<br>_____<br>_____<br>_____ |
| 4 | Compliance with Section 4.0<br>Documents Submitted<br>Meeting Qualification Requirements under Section 4.0 | (Yes/No)<br>(Yes/No)<br>_____ |
| 5 | Validity of Techno-Commercial and Price Proposal | Up to ____/___/____ |
| 6 | Compliance due diligence questionnaire | (Yes/No) |

**Signature and Stamp of Bidder**

**APPENDIX-3**

## LEGAL RIGHTS TO SUBMIT THE PROPOSALS

### A. AUTHORIZATION DOCUMENTS OF BIDDER

The following documents in respect of true and complete copy of the necessary legal rights to submit the Proposals duly executed and delivered by the Bidder are attached.

| Sl | Particulars |
|---|---|
| 1 | Authorization to submit Proposal – Certified True Copy of the Board Resolution for Authorization / Authorization Letter for submission of Techno Commercial Proposal & Price Proposal. |
| 2 | Power of Attorney in favour of the Authorized Representatives (Signatories) for submission of Techno Commercial Proposal, Price Proposal and doing all acts required in relation to the Bidding process leading to execution of the Contract |
| 3 | Memorandum and Articles of Association along with Certificate of Incorporation/ Copy of registration as per applicable Act of Government of India. |

**Note**: All copies of the original documents shall be duly certified by notary.

**Signature and Stamp of Bidder**

**APPENDIX-4**

## FORMAT FOR SUBMISSION OF TECHNO-COMMERCIAL INFORMATION

### INFORMATION TO BE SUBMITTED AS PART OF TECHNO-COMMERCIAL PROPOSAL

We, **(Bidder – Organization Name)**, confirm that we meet the qualifying requirements specified in RFP. We confirm that we meet the qualifying requirements specified under Section 4.0 of RFP. Accordingly, we are providing the following information supporting the qualification requirements.

**A. DETAILS RELATED TO EXPERIENCE:**

Bidder shall have successfully completed *Similar Services during the preceding seven (7) years reckoned from the original scheduled date of techno-commercial bid opening, to be provided in the following format.

(*) "Similar Services" shall mean geotechnical investigation in soil in any project, involving the below activities:

- Boring and drilling in soil and rock, sampling and preparation of bore logs/core logs;
- Laboratory testing of soil, rock and groundwater samples
- Interpretation of investigation data and preparation of factual and interpretive reports.
- The Bidder shall have completed at least one assignment involving topographic survey using Total Station and/or survey-grade DGPS/GNSS.

a) List of projects done as Agency for conducting Geotech Study along with details of scope of services provided in the following format.

| Sl | Client Name & details of contact person | Scope of Services Provided | Contract Start Date | Date of completion of work | Order Value (in INR) | Experience Certificate from Owner [Yes/No] |
|---|---|---|---|---|---|---|
| 1. | | | | | | [Document attached] |
| 2. | | | | | | [_____] |
| 3. | | | | | | [_____] |
| 4. | | | | | | |

b) Description of any current engagement and/or business of the Bidder.

c) The experience list shall include only works executed by Bidder himself as an Agency which shall include entire work for digitized route/corridor surveys and detailed reports.

d) The Bidder shall ensure that all the information, facts & figures, data provided in the bid are accurate and correct. OPGC reserves the right to confirm / verify any data or information through their own sources.

**Note:**

1. Interested Bidders to indicate the project owner's name, contact person and its address along with the name.
2. Bidders shall enclose copy of work orders and completion certificates from clients (Government bodies/PSU/Private organization sector) in India.

**B. DETAILS OF IN-HOUSE RESOURCES**

Bidder shall have the following personnel on its regular payroll for at least one year as on the original scheduled date of techno-commercial bid opening.

Bidder to furnish the list of in-house professionals to meet the above requirements as per the following format.

| Sl | Name & Designation | Educational Qualifications | Work experience in the area of geotechnical investigation (No. of Years) | Sills of the personnel | Date of joining the Bidder's Organisation |
|---|---|---|---|---|---|
| **List of Qualified Geotechnical Engineer with degree in Geotechnical Engineering (at-least 5 years' experience)** | | | | | |
| 1 | | | | | |
| 2 | | | | | |
| | | | | | |
| **List of Qualified Engineering Geologist with degree in Geology/Engineering Geology or Civil engineer with experience in geotechnical engineering with degree (at-least 2 years' experience).** | | | | | |
| 1 | | | | | |
| 2 | | | | | |
| | | | | | |

**C. DETAILS OF EQUIPMENTS AND LABORATORY CAPABILITY**

The Bidder should own the following equipment / test setup / facility:

- Rotary boring rigs - One (1) Nos.
- Electrical Resistivity Test setup - One (1) No.
- Laboratory set up equipped for testing the physical, engineering and chemical properties of soil and rock.

List of the modern survey equipment of the Bidder.

| Sl. | Equipment Details |
|---|---|
| **1.** | |
| **2.** | |
| **3.** | |
| **4.** | |

**D. ANY ADDITIONAL INPUTS WITH RESPECT TO THE PROPOSAL.**

**E. AGENCY'S BROCHURE, IF ANY.**

**F. ANY OTHER INFORMATION RELATED TO PROJECT EXPERIENCE.**

G. Bidder shall submit duly signed and stamped due diligence questionnaire as per Appendix-6 of Annexure-A to ITB, along with the Techno Commercial Proposal Submissions.

**Signature and Stamp of Bidder**

**APPENDIX-5**

## DETAILS OF FINANCIAL QUALIFICATION

*[On the Bidder's Letter Head]*

**A. Financial Information of the Bidder with following details:**

Average Annual Turnover, Net Worth and Profit After Tax for the preceding three (3) Financial Years as on Proposal Submission End Date.

*(In INR Lakhs)*

| Sl | Particulars | FY 2023-24 | FY 2024-25 | FY 2025-26 | Average |
|---|---|---|---|---|---|
| 1. | Annual Turnover | | | | |
| 2. | Net Worth | | | | |
| 3. | Paid up Share Capital | | | | |
| 4. | Profit After Tax | | | | |
| 5. | Audited Financial Statement | *[Attached]* | *[Attached]* | *[Attached]* | |

**NB**:

i. Bidder to submit Audited Balance Sheets of last 3 Financial Years to be attached.

ii. The Net Worth of the Bidder shall be positive in the immediately preceding completed financial year.

**Signature & stamp of the Bidder**

***Note:***

1. *Net worth means the sum total of the paid-up share capital and free reserves. Free reserve means all reserves credited out of the profits and share premium account but does not include reserves credited out of the revaluation of the assets, write back of depreciation provision and amalgamation. Further, any debit balance of Profit and Loss account and miscellaneous expenses to the extent not adjusted or written off, if any, shall be reduced from reserves and surplus.*
2. *Other income shall not be considered for arriving at annual turnover.*
3. *The audited financial statements FY 2023-24, FY 2024-25 & FY 2025-26, stating the above financial figure shall be submitted duly **verified and stamped by CA** in their letter head.*

***Duly Verified the above financial figures by CA:** [CA Firm Name]
**Signature of the CA:**
**Stamp of the CA:**

***CA Certification [CA letter Head] to above financial statement is attached to this Appendix-5.**

**APPENDIX-6**

## COMPLIANCE DUE DILIGENCE QUESTIONNAIRE

**1. Company Name**:

**2. Address:**

**3. Telephone**: **Facsimile**:

**4. Business form**:

Sole Proprietor Corporation

Partnership LLC/LLP

Other:

**State/Country where incorporated or chartered**:

**5. Will subcontractors be used to fulfill this contract?** Yes No

**If Yes, please identify and give their location (city, state, and/or country):**

**6. Owners/Principals (Ownership percentages must total 100%. If publicly traded, all shareholders holding 5% or more must be listed individually.) Please provide full, legal names and location (city, state, and/or country).**

| Name | % ownership | Location |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

**7. Members of the Board of Directors. Please provide full, legal names and location (city, state, and/or country):**

| Name | Location |
|---|---|
| | |
| | |
| | |
| | |

**8. Officers (or persons holding equivalent position). Please provide full, legal names and location (city, state, and/or country):**

| Position | Name | Location |
|---|---|---|
| President/CEO | | |
| Chief Financial Officer | | |

| | | |
|---|---|---|
| Chief Operating Officer | | |
| Managing Director | | |
| Sales/Marketing Director | | |
| Other | | |

**9. Other employees who will work on the project or transaction. Please provide full, legal names, position, and location (city, state, and/or country):**

| Name | Position | Location |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

**10. List all parent companies—up to and including the ultimate parent —and their location (city, state, and/or country).**

| Name | Location |
|---|---|
| | |
| | |
| | |
| | |

**11. List (or attach a list of) all subsidiaries and other Affiliated Companies and their location (city, state, and/or country)**:

| Name | Location |
|---|---|
| | |
| | |
| | |

**12. Business (Company) References; when possible these should be companies for whom you have performed the same or similar work. Please also provide a contact name and contact information.**

Business: Phone:
Name: E-mail:

Business: Phone:
Name: E-mail:

Business: Phone:
Name: E-mail:

Business: Phone:
Name: E-mail:

Business: Phone:
Name: E-mail:

**13. Background information**: Years in business: _____

Description of business: _____

**14**. I**s any owner, controlling shareholder, director, officer, employee or agent of your Company a family member[1] of any OPGC employee**? **If yes, please provide details.**

Yes No

**15. Is any family member of any owner, controlling shareholder, director, officer, senior management-level employee or agent of your Company**:

(i) an officer or employee of a government, department (whether executive, legislative, judicial or administrative), agency, or instrumentality thereof, including a regional governmental body;
(ii) an officer or employee of a government-owned or controlled entity;
(iii) an officer or employee of a public international organization;
(iv) a person acting in an official capacity for or on behalf of such government, department, agency, instrumentality, or public international organization;
(v) a candidate for political or government office or appointee for such office; or
(vi) an officer or employee of a political party?

Yes No

If yes, provide details:

[1] **Family member** means a parent, spouse, child, sibling or in-law.

**16. Is any owner, controlling shareholder, director, officer, senior management-level employee or agent of your Company**:

(i) an officer or employee of a government, department (whether executive, legislative, judicial or administrative), agency, or instrumentality thereof, including a regional governmental body;
(ii) an officer or employee of a government-owned or controlled entity;
(iii) an officer or employee of a public international organization;
(iv) a person acting in an official capacity for or on behalf of such government, department, agency, instrumentality, or public international organization;
(v) a candidate for political or government office or appointee for such office; or
(vi) an officer or employee of a political party?

Yes No

If yes, provide details:

**17. To the best of your knowledge, has your Company ever been**

(i) formally charged or under any formal investigation by a competent governmental authority for any financial crime, including but not limited to fraud, bribery, corruption, money laundering or terrorism financing;
(ii) convicted by a competent judicial authority for any financial crime; or
(iii) the subject of any blocking, seizure or forfeiture order or judgment based on any alleged violation of any money laundering or terrorism laws or for violating any anti-money laundering or anti-terrorism laws?

Yes No

If yes, provide details:

**18. To the best of your knowledge, has your Company ever engaged in a transaction that involves:**

(i) the receipt, transfer, transportation, retention, use, structuring, diverting, or hiding the proceeds of any criminal activity whatsoever, including drug trafficking, fraud and bribery of a public official;

(ii) engaging or becoming involved in, financing, or supporting or giving aid or comfort to any terrorist person, activity or organization; or

(iii) a Designated Person?

Yes No

If yes, provide details:

**19. Does your company have a compliance program or code of conduct? (If Yes, please provide OPGC a copy of such code of conduct or compliance program.)**

Yes No

**20. Does the code of conduct or compliance program apply to all employees who will work on this transaction with OPGC?**

Yes No

**CERTIFICATION, AUTHORIZATION AND RELEASE**

I hereby certify that the answers provided herein are true and correct. By completing and signing this Questionnaire for myself, and if applicable as an agent of my employer, I hereby, authorize OPGC, its subsidiaries and affiliates, or its agents to investigate and verify the information contained in this Questionnaire. A facsimile of this document shall be considered as valid as an original.

Signature:
Name:
Title:
Company:
Date:

**ANNEXURE-B TO ITB**

# FORMAT FOR [UN-PRICED] PRICE PROPOSAL

**ANNEXURE-B**

# FORMAT FOR [UN-PRICED] PRICE PROPOSAL

**[BIDDER SHALL SUBMIT THIS UN-PRICED FORMAT IN THE ANNEXURE-B UNDER TECHNO-COMMERCIAL PROPOSAL FORMAT. THE TECHNO-COMMERCIAL PROPOSAL SHOULD NOT CONTAIN ANY PRICE CONTENT ENTRY IN ANY MANNER. IF THE TECHNO-COMMERCIAL PROPOSAL IS FOUND TO CONTAIN ANY PRICE CONTENT, SUCH PROPOSAL SHALL BE LIABLE FOR REJECTION.**

**BIDDER'S PRICE BID QUOTED IN THE TENDERS ODISHA E-PROCUREMENT PORTAL (PRICE BID BOQ EXCEL FILE) SHALL BE CONSIDERED FOR EVALUATION.]**

**Note: "Bidder shall not Quote any Price component in this format. Bidder to provide the rate of GST & SAC code only (highlighted in BLUE colour) in this format.**

**1. FEES:**

The Lumpsum Fee for the Scope of Services specified at Appendix-A of this RFP shall be as follows.

***(All Prices in INR)***

| Sl | Description of Items | All-inclusive Price (in INR) Including GST. | SAC Code | GST Rate (in %) |
|---|---|---|---|---|
| A. | Lumpsum Fee for conducting Topographic Survey and Geotechnical investigation for Ash Pond & Ash Pipeline corridor of OPGC Stage-III Project as per the Scope of Services detailed at Appendix-A of ITB. | ***" Bidder shall not Quote any Price component here."*** | [____] | [____] |

**Note:**

a. The Fee/Price indicated above are firm and shall remain fixed for performing Services during the engagement which is inclusive of all & including GST. Bidder shall provide the rate of GST applicable on above items.

b. Exception and Deviation in the terms specified in the RFP document, Scope of work and Price Proposal Format shall lead to rejection of the proposal.

c. Price Proposals complying the RFP conditions, scope and specification shall only be considered for the evaluation.

**Signature and Stamp of Bidder**

**~*~**

**ANNEXURE-C TO ITB**

# DRAFT KEY COMMERCIAL TERMS

**ANNEXURE-C**

OPGC, at its sole discretion, shall appoint Successful Bidder as Agency and issue Letter of Award (LOA). The key commercial terms of the engagement are provided herein.

# KEY COMMERCIAL TERMS

## 1.0 SCOPE OF SERVICES

(a) The Agency shall provide services which is placed as Appendix _____ enclosed herewith ("Services"). The Agency shall commence the Services upon receipt and acceptance of this LOA.

(b) The Agency shall ensure that the Service is performed within the ambit of applicable policies, laws, rules and guidelines in force as amended from time to time.

(c) Mr. _____ or any other person as may be notified by OPGC in writing, shall be OPGC's Representative ("Engineer-In-Charge" or "EIC") for this LOA. EIC, on behalf of OPGC, will liaison with Agency on all matters / activities relating to this LOA and make arrangements as appropriate to enable the interaction between Agency and OPGC's personnel.

(d) This engagement shall be led by Mr. _____ (Engagement Manager) on behalf of the Agency. The Services shall be performed by the Team identified under scope of services Appendix____ for ensuring high quality work and timely completion of the Service. In the event of the Agency wishes to change the Engagement Manager or any of the Team members identified, OPGC shall be duly informed and consent shall be taken by the Agency. OPGC will have the right to prematurely terminate this LOA in case of any change in the Engagement Manager or any member of the Team without OPGC's consent. The Engagement Manager shall be responsible for monitoring the progress of the Service and notification to OPGC of any potential issues in Service as soon as the Agency becomes aware of or ought to be aware of the same.

## 2.0 FEES/SERVICE CHARGES AND PAYMENT TERMS & CONDITIONS

(a) OPGC will pay the total Contract Value of INR XXXX including GST@ ___% to the Agency for the scope of Services Specified in Appendix ____ enclosed herewith.

(b) Following Milestones are identified for payment against completion of associate services. The Total Contract Price stated in Sl. 2 (a) shall be payable against achievement of milestones as follows. Any variation in Contract Price due to Quantity variation shall be adjusted in the corresponding next Milestone Payment.

| Sl. | Payment Milestone | Schedule from LOA | Milestone Payment Percentage (%) |
|---|---|---|---|
| 1. | **Site Mobilisation and Setting Out:** Mobilisation of required drilling rigs, drilling/field investigation equipment, survey instruments, manpower and other resources at site; establishment of field facilities; setting out of borehole locations and recording of coordinates/elevations of all borehole locations, on submission of BG of equivalent amount as per the BG format stated in Appendix-B to Annexure-C. | 10 days | 10% of Contract Price |
| 2. | **Completion of First 50% Boreholes:** Completion of 50% boreholes, including drilling, sampling, SPT/other specified field tests, | 40 days | 25% of Contract Price |

| | | | |
|---|---|---|---|
| | groundwater observations and preparation of complete borehole logs, along with submission of field investigation records. | | |
| **3.** | **Completion of Balance Boreholes and Topographic Survey:** Completion of remaining 50% boreholes, including all specified field tests/sampling, and completion of the topographic survey of the entire 270-acre ash pond area and identified ash slurry piping corridor, including preparation of required survey drawings/data. | 60 days | 25% of Contract Price |
| **4.** | **Laboratory Testing and Draft Reports:** Completion of laboratory testing of all specified soil/rock samples; submission of laboratory test results; preparation and submission of Draft Geotechnical Investigation Report and Draft Topographical Survey Report, including borehole logs, geological/geotechnical interpretation, groundwater observations, soil/rock parameters, survey drawings, contours, coordinates and other specified deliverables. | 75 days | 20% of Contract Price |
| **5.** | **Final Reports and Complete Deliverables:** Submission of the Final Geotechnical Investigation Report and Final Topographical Survey Report, incorporating all comments/observations of OPGC, together with all final drawings, borehole logs, laboratory test reports, survey data, coordinates, levels, digital files and other contractually required deliverables. | 90 days | 20% of Contract Price |

**NOTE:**
**For Milestones 2 and 3:**
Payment against the borehole-related milestones shall be released only after verification by OPGC/its authorised representative of the completed boreholes and receipt of the corresponding borehole logs, field test records, sample details and coordinates/elevations.

Payment shall be released upon submission of complete Draft Reports and all supporting laboratory, field investigation and survey deliverables in accordance

**For Milestone 4:**
Payment shall be released upon submission of complete Draft Reports and all supporting laboratory, field investigation and survey deliverables in accordance with the Scope of Work

(c) As soon as a specific milestone is certified by Owner Representative to have been completed, Agency shall raise the invoice for the payment.
(d) Payment after statutory deductions and other deductions like taxes as applicable, duties, penalties, security deposit, advance payment etc. shall be released after due certification of the bills by the Engineer-in-Charge (EIC) within seven (7) working days from the date of submission of GST invoice and other supporting documents correctly in all respect.
(e) The rates/fees/Contract Value indicated above shall be firm and shall remain fixed for performing Services during the engagement.
(f) Fee mentioned above are inclusive of all taxes, duties, levies, cess etc. and including applicable GST. GST shall be paid against GST invoice.

(g) Out-of-Pocket Expenses related to travel, boarding and lodging etc. will not be paid/reimbursed.
(h) The Agency shall seek any revision in the fee to be paid and schedule under this LOA if there is any material change in the Scope of Services.
(i) OPGC reserves the right to materially change the Scope of Services under this LOA at a later date within the term of the LOA. If there is a material change in Services, then there will be a revision of Fee to be paid to the Agency based on mutual agreement.
(j) No advance payment will be made in any case. No interest charges will be paid in case of delay in payment under any circumstances.
(k) The Agency shall not transfer or assign or sub Contract the LOA or any part thereof or any benefit or interest therein or there under without the written consent of OPGC.
(l) Representative of OPGC reserve the right to inspect the Salary Register maintained by you and to be present during the salary disbursement to the personnel employed by you.
(m) DDO, Odisha Power Generation Corporation Limited- Corporate Office, Zone A, 7th Floor, Fortune Towers, Bhubaneswar shall be the paying officer for the Services provided for this LOA.

## 3.0 TERMS & TERMINATION

(a) This LOA shall be effective from date of signing of this LOA ("Effective Date") and shall remain valid for a period of **Six (6)** months from the Effective Date. Thereafter, this LOA may be extended by mutual agreement in writing. Notwithstanding the foregoing, this LOA may be terminated by OPGC, without cause, upon not less than seven (7) days prior written notice to the Agency.
(b) Termination shall be effective upon receipt of notice of termination which shall be 48 hours after the dispatch of notice by OPGC or upon the date of termination specified in the termination notice, as applicable. Upon any such termination, Agency shall be paid fees payable for services performed till then in accordance with the provisions of this LOA.
(c) In case of non-performance/breach of the LOA by the Agency, the LOA shall be terminated with 30 (thirty) days written notice. In the event the Agency fails to rectify/remedy the non-performance/breach to the satisfaction of OPGC within the said 30 days' notice, the LOA shall stand terminated and OPGC shall have the right to assign the balance Services to any other party at the Agency's sole cost and risk subject to the limitations of this LOA. Any additional costs incurred by OPGC for such completion of the balance Services, shall be recovered from the security or any dues of this agreement or any other Contract undertaken by the Agency in OPGC.

## 4.0 LIQUIDATED DAMAGE

For delay in submission of the Final Geotechnical Investigation Report and Final Topographical Survey Report beyond the stipulated completion period of 90 days from the date of LOA, the Consultant/Agency shall be liable to pay Liquidated Damages @ **1% of the Contract Value per week** or part thereof of delay, subject to a maximum of 5% of the Contract Value.

## 5.0 CONFIDENTIAL INFORMATION; PUBLICITY

(a) "Confidential Information" includes any information related to the services being rendered by the Agency to OPGC or information furnished by OPGC to the Agency for carrying out the study under this LOA. Agency agrees to restrict disclosure of the Confidential Information to those persons involved with performing the services for OPGC on a "need to know" basis. The Agency and any persons involved in performing Services for OPGC on the Agency's behalf (hereinafter referred to as "Receiving Party"):
    i. shall maintain the confidentiality of the Confidential Information;
    ii. shall not disclose such Confidential Information to any third party without the written approval of OPGC; and

iii. shall only use such Confidential Information for purposes of performing the work under this LOA.

(b) Each party agrees to keep confidential the existence and terms of this LOA for a period of Five (5) years upon expiry of this LOA. Agency agrees to maintain the confidentiality of Confidential Information at all times, except where disclosure is required to be made to the statutory authorities, and further agrees that each person involved in performing Services for OPGC on Agency's behalf shall be made aware of and shall agree in writing to the confidentiality obligations contained in this LOA. No press releases or other publicity regarding this LOA may be issued without OPGC's prior written consent. Upon termination of this LOA or at OPGC's request (whichever occurs first), Confidential Information transmitted in record-bearing media or other tangible form including electronic form, and any copies accessible, shall be either returned to OPGC or destroyed with such destruction certified in writing.

## 6.0 CONTRACT PERFORMANCE SECURITY

Within ten (10) working days of the Effective date, the Agency shall submit the Performance Security, in the form of online payment through (NEFT/RTGS) in favour of OPGC to its bank account details as mentioned in the Appendix-B to ITB or Account payee Demand Draft (DD) in favour of OPGC payable at any Commercial Bank, Bhubaneswar or an unconditional, irrevocable, payable on demand Bank Guarantee (BG/e-BG) as per the format specified in Appendix-C to Annexure-C of an amount equivalent to 5% of the Contract Price. The Performance Security shall remain valid upto ninety (90) days beyond the completion of contract period, with additional 90 days claim period after validity period and shall be payable at the branch of the issuing bank in Bhubaneswar. The Performance Security shall be extended by the Agency in case of extension of the Contract. The Performance Security shall be released within 30 days of the demobilization of all the personnel & equipments from OPGC after due clearance from the OPGC for the performance of Services and recovery of any damages or claims not settled by the Agency.

## 7.0 REPRESENTATIONS AND WARRANTIES

(a) Agency warrants that all services will be performed by qualified personnel in a professional manner. If any services are not in compliance with acceptable standards and is brought to Agency's attention within one year from completion of the services, then Agency agrees to re-perform the services at its own cost and expense. Agency warrants that all services will be in compliance with all applicable central, state and local laws, orders, rules and regulations. Agency shall have no liability for defects in the services attributable to its reliance upon or use of data, design criteria, drawings, specifications, or other information furnished by OPGC.

(b) Agency warrants that it shall not place itself in a position which may, or does give rise to a conflict of interest (or a potential conflict of interest) between the interests of the Agency with that of the Owner as related to the services.

(c) Agency shall at any point in time be able to justify the authenticity and reliability of any of the assumptions, figures, sources used in preparing the report and arriving at the conclusion.

(d) Agency represents and warrants to OPGC that, in performance of its obligations as contained herein, the Agency will employ or engage such appropriate personnel and shall alone be responsible for any and all obligations towards such Agency Personnel, as specified under any law or as may be determined by any Court or other appropriate forum. The obligations and representations contained in this LOA are Agency's sole warranty and guarantee obligations and OPGC's exclusive remedy in respect of quality of the Services. OPGC's failure to (a) properly operate and maintain OPGC's facilities or (b) allow Agency to

promptly make such tests and perform such remedial services as it may deem appropriate on receipt of written request from the Agency, shall relieve Agency of its guarantee relative to such improper operation and maintenance or the subject of such tests or services.

(e) Agency agrees to indemnify and hold OPGC and its affiliates, principals, associates, their respective officers, directors, employees and/or agents, harmless from and against all, loss, liabilities, obligations, damages, costs, judgment, lien, suit, dues, cause of action, proceedings, order, demand, liability or actions, and all expenses incidental to the defense of any such claim, proceedings or action, based upon or arising out of this LOA, if and to the extent of Agency's gross negligence or willful misconduct for bodily injury and property damage, which shall be limited to the extent of Fee payable to the Agency under this LOA. The indemnity in this Section shall be in addition to, and not in lieu of, all other legal rights and remedies under this LOA that OPGC may have and shall survive expiry or termination of this LOA."

## 8.0 SAFETY, HEALTH AND ENVIRONMENT

a) Agency and its team shall abide by all safety rules of OPGC and obtain safety induction training from OPGC Safety Officer before entering the plant premises, if any visit to OPGC site. Any violation in the safety rules shall attract penalty as per OPGC Safety Rules.

b) Agency must strictly follow the Safety, Health & Environment guidelines for OPGC Contractors as per OPGC EHS rules.

## 9.0 OWNERSHIP DOCUMENTS AND COPYRIGHT

a) Title to drawings, design, plans, specifications, reports and other documents specifically prepared by Agency as part of the Services under this LOA will remain with OPGC. Agency grants to OPGC an irrevocable, perpetual, non-exclusive, royalty-free, and fully assignable (without need of Agency consent) right to use and reproduce any or all drawings, designs, plans, specifications and similar materials specifically prepared as part of the Services and other design documentation necessary or useful for the purpose of constructing, operating, maintaining, rebuilding, or modifying the facility (the "Specification Rights").

b) As and when required or upon termination of the LOA, the aforesaid documents including indigenous make reproducible shall be handed over to the OPGC.

## 10.0 RECORDS

Agency agrees to furnish to OPGC such information in respect to the services covered by this LOA at such times and as often as OPGC may reasonably request. At reasonable times and on reasonable notice to Agency, OPGC may examine, inspect and copy Agency's files, records, books and documents, which specifically pertain to the subject matter of this LOA. Agency shall not be required to keep records of or provide access to those of its costs expressed as fixed rates, a lump sum, or of costs which are expressed in terms of percentage of other costs.

## 11.0 INDEPENDENT CONTRACTOR

Agency is an independent commercial contractor to OPGC. This LOA does not create any agency, joint venture or partnership between Agency and OPGC. Agency shall not impose or create any obligation or liability of any kind, express or implied, or make any commercial contracts, promises, representations or warranties on behalf of or in the name of OPGC, or to enter into any obligation binding upon OPGC. Agency agrees to indemnify, defend and hold OPGC harmless from and against any cost, expenses or any other liability whatsoever arising from Agency's failure to comply with any obligations under selections.

## 12.0 COMPLIANCE WITH LAWS AND REGULATIONS

a) Agency shall at all times conduct its efforts hereunder in strict accordance with all applicable laws and regulations and with the highest commercial standards. Agency shall effect or

secure and maintain at its own cost all necessary governmental permits, licenses, approvals and registrations required in connection with the execution or performance of this LOA. Agency shall not engage in any practice or activity with respect to any of the services and assistance rendered by Agency under this LOA which is prohibited or in violation of any applicable central, state or local law in the Territory, or which in the opinion of legal counsel to OPGC is illegal or in violation of any applicable central, state or local law in the Territory. Agency agrees with the policy as stated in this Clause, and further agrees that failure by Agency or any persons under its responsibility including but not limited to its directors, officers, employees and agents to comply with any provision of this Clause shall constitute just and sufficient cause for immediate termination of this LOA and thereupon Agency shall have no claims whatsoever against OPGC.

b) Agency shall comply fully with the applicable anti-corruption, anti-money laundering, anti-terrorism and economic sanction and anti-boycott laws of India.

c) In performing its obligations under this LOA, the Agency and its officers, directors, employees, agents and representatives agree that they have not, and will not:

i. directly or indirectly, offer, give, make, promise, pay or authorize the payment of any money, gift, or anything of value to any person that is an officer or employee of OPGC or any government, or an officer or employee of any department, agency or instrumentality thereof, or of any public international organization, or any person acting in an official capacity on behalf of such government, department, agency or instrumentality thereof, or any candidate for or appointee to a political or government office, or to any political party; or

ii. receive, transfer, retain, use or hide the proceeds of any criminal activity whatsoever, or employ or otherwise conduct business with a “designated person”, namely a person or entity that appears on any list issued by the Reserve Bank of India or international organizations such as the United Nations as being involved in money laundering, terrorism, or drug trafficking, or as having violated economic or arms embargoes.

d) In the event Agency becomes aware or obtains knowledge of any violations of (b) and (c) above, Agency shall promptly report to OPGC any such violation. Any violation of these provisions shall be sufficient cause for OPGC, acting in good faith, to declare the LOA, in whole or in part, null and void, in which case Agency shall forfeit any claim to additional payments due under this LOA, other than payments for services previously rendered under this LOA, in addition to being liable for any damages or remedies available under applicable law.

## 13.0 MISCELLANEOUS

(a) No revision or modification of this LOA shall be effective unless it is in writing and signed by authorized signatory of both the parties.

(b) Any license, permits and clearances from Statutory Authority or any other Government bodies required to carry out the scope of work shall be under Agency’s scope.

(c) Agency to ensure Insurance of its deployed manpower and Plant & Machineries at site during the period of engagement.

(d) Agency shall purchase and maintain insurance as it will protect Agency from the losses or claims set forth below which may arise out of or result from Agency's performance or obligations to perform under the LOA, whether such performance is by Agency or by anyone directly or indirectly employed by Agency, or by anyone for whose acts Agency may be liable:

a. Claims under professional liability;
b. Claims under workers' compensation;
c. Claims for damages for bodily injury, occupational sickness or disease, or death of Agency's employee;
d. Claims for damages insured by personal injury liability coverage; and
e. Claims for damages for injury to or destruction of tangible property.

(e) Insurance: During the Contract period, all insurance shall be taken by the contractor and related expenses shall be borne by the Agency. The Owner shall not incur any financial loss.

In case of any loss or damage or pilferage or theft or fire accident or combination of the said incidents etc. under the coverage of insurance, the Contractor shall lodge the claim as per rules of insurance. Any FIR required to be lodged to local Police Station shall be the responsibility of the Contractor.

The Agency shall arrange for providing insurance coverage to its workmen under Workmen's Compensation Act or similar Rules and Acts as applicable during execution of work for covering risk against any mishap to its workmen. The Contractor shall also undertake a Third-Party Insurance. The Owner shall not be responsible for any such loss or mishap.

(f) Tools & Tackles: The Contractor shall provide technically suitable tools and tackles, equipment, Machineries etc. conforming to relevant BIS safety and technical standards for proper execution of work. The Owner, in no way, shall be responsible for supply of any tools and tackles, equipment, Machineries etc. for execution of the work.

(g) Construction Water and Power: The responsibility of arrangement for construction water and power is in the scope of Contractor for execution of the job.

(h) Safety Measures: Agency shall have to provide necessary and adequate safety measures including personal protective equipment and precautions to avoid any accident, which may cause damage to any equipment/ material or injury to workmen. The Owner shall not be responsible for any such accidents.

(i) Hazardous Material: Any hazardous material used during work at site or used as part of the work has to be taken back by the Contractor for recycling or dumping purpose after its operating/ working life, so that it may not affect the environment or any living being. The Contractor shall comply with the State Pollution Board regulation.

(j) Stoppage of Work: OPGC shall not be responsible and not liable to pay any compensation due to stoppage of work as a reaction from local public due to any undue action on the part of the Contractor causing annoyance to local people.

(k) Responsibility of the Contractor: Agency shall provide guarantee and be entirely responsible for the execution of the Contract in accordance with this tender including but not limited to its specification, schedules, and annexure.

(l) The Agency shall comply with all applicable laws, by laws, rules, and regulations and shall procure and maintain their validity all necessary Municipal, Panchayat and Government permits & licenses etc. at its own cost.

(m) The failure to insist upon the strict performance of any provision of this LOA or to exercise any right granted under this LOA, shall not be deemed to be a waiver or relinquishment of the future performance of any such provision or the future exercise of such right, but the obligation of Agency and OPGC with respect to such future performance shall continue in full force and effect. Waiver, in order to be effective against a party shall be in writing signed by such party or its duly authorized representative.

(n) Each party signing this LOA represents that it has all necessary rights and authority to enter into this LOA and to bind the parties as provided.

(o) In no event shall either party be liable for special, incidental or consequential damages (including without limitation loss of use, time or data, inconvenience, commercial loss, lost of profits or savings, loss of opportunity; loss of goodwill; cost of substitute facilities, goods or services; cost of capital; cost of replacement power; governmental and regulatory sanctions; and claims of customers for such damages) to the full extent such may be disclaimed by law. OPGC's and Agency's total liability under this LOA, whether for breach of Contract, warranty, negligence, strict liability in tort or otherwise is limited to the total amount paid by OPGC to the Agency under this LOA.

(p) No person who is not a party to this LOA (whether or not such person shall be named, referred to, or otherwise identified, or form part of a class of persons so named, referred to or identified, in this LOA) shall have any right whatsoever to enforce this LOA or any of its terms.

(q) This LOA together with any documents referred to in it, supersedes any and all oral and written agreements, drafts, undertakings, representations, warranties and understandings heretofore made relating to the subject matter hereof and constitutes the entire LOA and understanding of the Parties relating to the subject matter hereof. It is expressly agreed that this LOA shall supersede all previous discussions and meetings held and correspondence exchanged between the Parties in respect of this LOA and any decisions arrived at therein in the past and before coming into force of this LOA shall have no relevance with reference to this LOA and no reference of such discussions or meetings or past correspondence shall be entertained either by OPGC or Agency for interpreting this LOA or its implementation.

(r) Agency acknowledges and agrees that no grant under any of OPGC's Intellectual Property rights is given or intended, including any license (implied or otherwise), under this LOA. Rights to intellectual property developed, utilized, or modified in the performance of the services shall remain the property of Agency. Agency hereby grants to OPGC an irrevocable, non-exclusive, royalty-free license to utilize its proprietary property provided to OPGC as part of the services. Further the Agency hereby warrants that it shall not violate any third party intellectual property rights during the performance of this LOA. In the event of any breach/claims/dispute/proceedings initiated by any third party regarding violation of Intellectual Property Rights, the Agency shall be solely liable for any such breach/claims/dispute/proceedings. Nothing contained in this Section shall be construed as limiting or depriving the Agency to forfeit its rights to use its basic knowledge and skills to design or carry out other projects or work for itself or others whether or not such other projects or work are similar to the work to be performed pursuant to this LOA. However, the Agency may use copies of drawings, designs, documents and engineering and other data furnished or to be furnished by the Agency only with the previous written permission of OPGC. All documents, including drawing, specifications, and computer software prepared by Agency pursuant to this LOA are instruments of service in respect to the Scope of Services. They are not intended to be modified or represented to be suitable for re-use on extensions of the Project or any other project.

(s) Without OPGC's prior written approval, Agency shall not assign, subcontract or transfer to third parties any of Agency's obligations under this LOA. In the event of any assignment as

per terms of this LOA, the Agency shall continue to be solely liable to OPGC for any of the act/omission of any of its sub-contractors.

## 14.0 BANNING OF BUSINESS

OPGC has the Banning Policy as stated in its website at www.opgc.co.in and Appendix-D to Annexure-C of the draft Key Commercial Terms stated in this RFP. Agency may be debarred from business dealings on account of any of the grounds and following the procedures as detailed in the said Policy. Agency shall certify their compliance with the Banning Policy. Bidder further confirms that if at any point, the declarations given are found to be incorrect, OPGC shall have the full right to reject the bid/terminate the contract and take any action as per applicable laws for breach of bid/contract including forfeiture of Bid & Performance Security.

## 15.0 GOVERNING LAW

The governing law of this LOA shall be the substantive law of the land in India. Any dispute, claim or controversy arising out of this LOA, both the OPGC and the Bidder shall try to resolve it amicably. In the event no amicable solution is achieved, the same shall be settled through Legal proceedings. For any proceedings arising out of or concerning or connected with such dispute, appropriate Court at Bhubaneswar/Honourable High Court of Orissa shall have exclusive jurisdiction.

## 16.0 FORCE MAJEURE

Any delays in or failure of performance by Owner or Agency, shall not constitute default hereunder if and to the extent such delays or failure of performance are caused by occurrences beyond the control of OPGC or Agency, as the case may be, including, but not limited to, acts of God or the public enemy, expropriation or confiscation of facilities, compliance with any order or request of any government authority not arising out any default of non-compliance of any party, act of war, acts of terrorism, rebellion or sabotage or damage resulting there from, fire, floods, explosion, accidents riots or strikes or other concerted acts of workmen, whether direct or indirect, or any causes, whether or not of the same class or kind as those specifically named, which are not within the control of Owner or Agency respectively, and which by the exercise of reasonable diligence, Owner or Agency are unable to prevent. However, on the happening of such unforeseen event, written notice of such event shall be given by the affected Party to the other within five (5) days from the date of occurrence thereof. If the performance in whole or part of any obligation under this LOA is delayed by reason of any such eventuality for a period exceeding two (2) months, the parties shall meet and review in good faith the desirability and conditions of terminating or continuing with this LOA. If the effect of any events specified in this clause lasts for a continuous period of less than 3 (three) days, such events shall not be construed to be Force Majeure Event.

## 17.0 NOTICES

All notices, demands, requests or other communications that are given by one party to the other party under this LOA shall be in writing and sent in a manner that confirms delivery, addressed as follows:

If to OPGC, the address is:

***Odisha Power Generation Corporation Ltd.,***
*Zone-A, 7th Floor, Fortune Tower,*
*Chandrasekharpur,*
*Bhubaneswar – 751023, Odisha, India*

If to Agency, the address is:

_____

_____

_____

Each party may designate by notice in writing a new address to which any future notices relating to this LOA may be delivered. Documents delivered by hand shall be deemed to have been received upon delivery; documents delivered by courier shall be deemed to have been received upon receipt, or at the time as delivery is refused by the addressee upon presentation.

~*~

## Appendix-A to Annexure-C

## SCOPE OF SERVICE

*[to be inserted in line with the Scope of the Service stated in the Appendix-A to ITB of RFP]*

**Appendix-B to Annexure-C**

## SITE MOBILISATION AND SETTING OUT SECURITY - BANK GUARANTEE FORMAT

(To be stamped in accordance with Stamp Act if any, of the Country of the Issuing Bank)

Bank Guarantee No. .....
Date.....

**To:**
**Odisha Power Generation Corporation Limited**
Zone-A, 7th Floor, Fortune Towers, Chandrasekharpur
Bhubaneswar, Odisha, INDIA, PIN-751023

Dear Sirs,
In consideration of the _____*[Employer's Name]*_____ (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators and assigns) having awarded to M/s _____*[Agency's Name]*_____ with its Registered /Head Office at _____ (hereinafter referred to as the 'Agency', which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns), a Contract by issue of Employer's Award No. _____ dated _____ and the same having been unequivocally accepted by the Agency, resulting into a Contract bearing No _____ dated _____ valued at _____ for _____ and the Agency having agreed to provide an interest-free Advance Payment Guarantee to the Employer of an amount equal to INR _____(*) amount equivalent to "Site Mobilisation and Setting out" as stated in Clause 2(b), Table Sl. no. 1 of Annexure-C.

We, _____*[Name & Address of the Bank]*_____ having its Head Office at _____ (hereinafter referred to as the 'Bank', which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns) do hereby guarantee and undertake to pay the Employer, on demand any and all monies payable by the Agency to the extent of _____(*)_____ as aforesaid at any time up to _____(@)_____ *[days/month/year]* without any demur, reservation, contest, recourse or protest and/or without any reference to the Agency. Any such demand made by the Employer on the Bank shall be conclusive and binding notwithstanding any difference between the Employer and the Agency or any dispute pending before any Court, Tribunal, Arbitrator or any other authority. The Bank undertakes not to revoke this guarantee during its currency without previous consent of the Employer and further agrees that the guarantee herein contained shall be enforceable till ninety (90) days after expiry of its validity.

The Employer shall have the fullest liberty, without affecting in any way the liability of the Bank under this guarantee, from time to time to extend the time for performance of the Contract by the Agency. The Employer shall have the fullest liberty, without affecting this guarantee, to postpone from time to time the exercise of any powers vested in them or of any right which they might have against the Agency, and to exercise the same at any time in any manner, and either to enforce or to forbear to enforce any covenants, contained or implied, in the Contract between the Employer and the Agency or any other course or remedy or security available to the Employer. The Bank shall not be released of its obligations under these presents by any exercise by the Employer of its liberty with reference to the matters aforesaid or any of them or by reason of any other act or forbearance or other acts of omission or commission on the part of the Employer or any other indulgence shown

by the Employer or by any other matter or thing whatsoever which under law would, but for this provision, have the effect of relieving the Bank.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Agency and notwithstanding any security or other guarantee that the Employer may have in relation to the Agency's liabilities.

Notwithstanding anything contained hereinabove our liability under this guarantee is restricted to _____(*)_____ and it shall remain in force up to and including _____(@)_____ and shall be extended from time to time for such period (not exceeding one year), as may be desired by M/s _____*[Agency's Name]*_____ on whose behalf this guarantee has been given.

Dated this _____ day of _____ 20_____ at _____.

(Signature)……..
(Name) …….
(Designation with Bank Stamp)
Authorised Vide
Power of Attorney
No..... Date.....

**Note:**

1. (*) The above security shall be equivalent of the amount of "Site Mobilisation and Setting out" as stated in Clause 2(b), Table Sl. no. 1 of Annexure-C of the RFP.

   (@) This date will be ninety (90) days beyond the contract period as specified in the Contract.

2. The Bank Guarantee shall be from a Bank as per provisions of the RFP.
3. The BG should be on Non-Judicial stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the state(s) where the BG is submitted or is to be acted upon or the rate prevailing in State where the BG is executed, whichever is higher. The Stamp Paper/e-stamp paper shall be purchased in the name of Bidder/Bank issuing the guarantee.
4. The BG should be on Non-Judicial stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the state(s) where the BG is submitted or is to be acted upon or the rate prevailing in State where the BG is executed, whichever is higher. The

| | | |
|---|---|---|
| **This Bank Guarantee should be confirmed through SFMS by the issuing Bank and the details are as follows:** | | |
| **OPGC Bank Account Number** | **:** | 380805010000063 |
| **Name of the Beneficiary** | **:** | Odisha Power Generation Corporation Limited |
| **Bank Details** | **:** | Union Bank of India- Mid Corporate Branch, Bhubaneswar, Odisha-751007, India |
| **Bank IFSC code** | **:** | UBIN0578827 |

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**Appendix-C to Annexure-C**

## PERFORMANCE SECURITY BANK GUARANTEE FORMAT

(To be stamped in accordance with Stamp Act if any, of the Country of the Issuing Bank)

Bank Guarantee No. .....
Date.....

**To:**
**Odisha Power Generation Corporation Limited**
Zone-A, 7th Floor, Fortune Towers, Chandrasekharpur
Bhubaneswar, Odisha, INDIA, PIN-751023

Dear Sirs,
In consideration of the _____*[Employer's Name]*_____ (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators and assigns) having awarded t o M/s _____*[Agency's Name]*_____ with its Registered /Head Office at _____ (hereinafter referred to as the 'Agency', which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns), a Contract by issue of Employer's Award No. _____ dated _____ and the same having been unequivocally accepted by the Agency, resulting into a Contract bearing No _____ dated _____ valued at _____ for _____ and the Agency having agreed to provide a Contract Performance Guarantee for the faithful performance of the entire Contract equivalent to INR _____(*) __% (___ percent) of the said value of the Contract to the Employer.

We, _____*[Name & Address of the Bank]*_____ having its Head Office at _____ (hereinafter referred to as the 'Bank', which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns) do hereby guarantee and undertake to pay the Employer, on demand any and all monies payable by the Agency to the extent of _____(*)_____ as aforesaid at any time up to _____(@)_____ *[days/month/year]* without any demur, reservation, contest, recourse or protest and/or without any reference to the Agency. Any such demand made by the Employer on the Bank shall be conclusive and binding notwithstanding any difference between the Employer and the Agency or any dispute pending before any Court, Tribunal, Arbitrator or any other authority. The Bank undertakes not to revoke this guarantee during its currency without previous consent of the Employer and further agrees that the guarantee herein contained shall be enforceable till ninety (90) days after expiry of its validity.

The Employer shall have the fullest liberty, without affecting in any way the liability of the Bank under this guarantee, from time to time to extend the time for performance of the Contract by the Agency. The Employer shall have the fullest liberty, without affecting this guarantee, to postpone from time to time the exercise of any powers vested in them or of any right which they might have against the Agency, and to exercise the same at any time in any manner, and either to enforce or to forbear to enforce any covenants, contained or implied, in the Contract between the Employer and the Agency or any other course or remedy or security available to the Employer. The Bank shall not be released of its obligations under these presents by any exercise by the Employer of its liberty with reference to the matters aforesaid or any of them or by reason of any other act or forbearance or other acts of omission or commission on the part of the

Employer or any other indulgence shown by the Employer or by any other matter or thing whatsoever which under law would, but for this provision, have the effect of relieving the Bank.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Agency and notwithstanding any security or other guarantee that the Employer may have in relation to the Agency's liabilities.

Notwithstanding anything contained hereinabove our liability under this guarantee is restricted to _____(*)_____ and it shall remain in force up to and including _____(@)_____ and shall be extended from time to time for such period (not exceeding one year), as may be desired by M/s _____*[Agency's Name]*_____ on whose behalf this guarantee has been given.

Dated this _____ day of _____ 20_____ at _____.

(Signature).....
(Name) .....
(Designation with Bank Stamp)

Authorised Vide
Power of Attorney
No.....
Date.....

**Note:**

1. (*) The above security shall be ____% of the Contract Price or as mentioned in RFP.

   (@) This date will be ninety (90) days beyond the contract period as specified in the Contract.

5. The Bank Guarantee shall be from a Bank as per provisions of the RFP.
6. The BG should be on Non-Judicial stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the state(s) where the BG is submitted or is to be acted upon or the rate prevailing in State where the BG is executed, whichever is higher. The Stamp Paper/e-stamp paper shall be purchased in the name of Bidder/Bank issuing the guarantee.
7. The BG should be on Non-Judicial stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the state(s) where the BG is submitted or is to be acted upon or the rate prevailing in State where the BG is executed, whichever is higher. The Stamp Paper/e-stamp paper shall be purchased in the name of Bidder/Bank issuing the guarantee.

| **This Bank Guarantee should be confirmed through SFMS by the issuing Bank and the details are as follows:** | | |
|---|---|---|
| **OPGC Bank Account Number** | : | 380805010000063 |
| **Name of the Beneficiary** | : | Odisha Power Generation Corporation Limited |
| **Bank Details** | : | Union Bank of India- Mid Corporate Branch, Bhubaneswar, Odisha-751007, India |
| **Bank IFSC code** | : | UBIN0578827 |

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**Appendix-D to Annexure-C**

## POLICY FOR BANNING/SUSPENSION/WITHHOLDING

**1.1 Banning of business with a vendor:**

Banning of Business with a vendor shall generally be done in following cases:

a) If the Proprietor or Partner or Director of the Firm/Bidder/Vendor is convicted by a Court of Law, following prosecution under the normal process of Law for an offence involving moral turpitude in relations to business dealings with OPGC.
b) If security considerations including the question of loyalty to the State warrant as per recommendations of Ministry of Home Affairs.
c) If there are adequate basis for believing that the Proprietor or Partner or Director of the Vendor has been guilty of malpractices such as bribery, corruption, cheating, fraud, substitution of tender etc. in dealings with OPGC even if there is no conviction by any Court in India.
d) If the Vendor refuses / fails to pay the Company's dues without adequate cause.
e) If the Vendor is blacklisted by Ministry of Power of the Central Government/ Government of Odisha.
f) If the Vendor is a confirmed repetitive violator of Safety Rules and Norms of the OPGC.
g) If the Vendor resort to unfair means during tendering process or thereafter during execution of Works at OPGC.
h) If the performance of the Vendor does not satisfy OPGC expectations e.g. repetitive quality issues, late deliveries, unsafe behavior of their employees, contractors in the field etc.

Banning of business dealings can be for a period of three (3) year as may be specified. A list of vendors banned for business dealings shall be published on the website of the Company. List shall be categorized as per the reasons of the banning/suspension/withholding.

Particular care shall be taken to see that the same Firm is not permitted to transact business with the Company in the guise of another name or through any of its agents, employees or subsidiaries whatsoever.

**1.2 Procedure for banning of business dealing:**

Sourcing Department on coming to know themselves or on complaint by any other Dept or external agency shall proceed to identify the defaulting party. Subsequent to identification and establishing the case of banning of business, the case shall be referred to a Standing Committee (this Committee shall be set up by MD by nominating senior level representatives from various Departments) consisting members from Finance, Sourcing and User Departments to look in to allegations. The Vendor shall be given a show cause notice for explaining, why it shall not be banned for business dealings on account of the reason specified therein. The show cause notice shall be vetted by legal department. Response to the Notice shall be carefully evaluated and duly considered. Enough opportunity should be given to the vendor to explain their position through written statements and also through oral submissions before the Committee.

After due consideration of facts, evidences and written and oral submission of the vendor, the Committee shall submit their recommendation to ban the business dealings with vendor or otherwise. Recommendation of the Committee, after legal vetting shall be put up to Managing Director through D(O) and D(F) for approval.

The Managing Director shall be the Competent Authority to approve banning of business dealings with vendor

- Banned vendor should be given enough opportunity to represent against the banning order. Committee of Directors shall be appellate authority to look into representation of banned vendor. Decision of appellate authority shall be final.
- Termination of contract shall be guided by termination clause provided in the individual contracts and considering over all interest of OPGC in timely completion of job.
- In case the banned vendor has participated in any tender and price bid has not been opened, their offer will be rejected and price bid will not be opened.
- In case price bid has been opened and banned vendor is L1, the offer will not be rejected.

**1.3 Revocation of Banning Order:**

- A banning order shall ordinarily not be revoked unless;
- The period specified therein, if any, has expired; or
- Appellate authority had revoked banning order.

**1.4 Suspension of business dealings:**

Suspension of business may be ordered, where full enquiry into the allegations is pending, which, if proved, may entail the banning of business dealing with the Vendor. The committee formed to look in to banning of business dealing with vendor shall recommend for suspension of business through D(O) and D(F), which shall be approved by MD. Suspension of Business Dealings shall be for a period of three months extendable maximum to six (6) months and all care must be taken to ensure that the Banning proceedings during this period of suspension and the decision to ban or otherwise is finalised during suspension period. During the period of suspension such party would not be allowed to participate in any of the tendering activity.

**1.5 Withholding of business dealing with Vendor:**

In case where the conduct, which includes any offense or failure to execute a sourcing contract satisfactorily, of the Vendor is not serious enough to merit banning of the business dealing, but at the same time is of such a nature that removing the name of the Vendor from the list of registered Vendor is justified in the interest of the Company, withholding of business with the Vendor shall be done.

Withholding of business with a firm for failure to execute a contract satisfactorily can normally be done for a period not exceeding one year. A standing committee (this committee shall be nominated by D(O) with representation from User, Planning and Finance Department) shall be formed to examine such failures by contractors. The concerned department shall forward the case of such poor performance to the standing committee who shall review the case and recommend for withholding of business through D(O) with approval of MD. No new work order shall be awarded to such vendor. However, any existing work order maybe completed subject to performance of the Vendor.

**1.6 Banning/Suspension/Withholding of Business Dealings:**

An order of banning / suspension / withholding business, passed in respect of banned / suspended/withheld Vendor shall be extended to allied Firms, Affiliates/Subsidiaries etc. In determining this, the following factors shall be taken into consideration:

a) Where the Management is common (same authority);

b) Where majority shareholding in such allied firms is held by the Partners or Directors of the banned / suspended /withheld Vendor;

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OPGC
*Power for Progress*

# ANNEXURE-1 TO APPENDIX-A

# TECHNICAL SPECIFICATION FOR

# TOPOGRAPHIC SURVEY AND GEOTECHNICAL INVESTIGATION FOR ASH POND AND ASH PIPELINE CORRIDOR OF OPGC STAGE-III PROJECT AT ITPS JHARSUGUDA, ODISHA

**BID ID No.: OPGC/CO/GEOTECH ASH POND/10112026**

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## 1.0 INTRODUCTION

The Owner intends to carry out a detailed Geotechnical investigation and Topographic Survey for the 270 acres of area identified for the proposed ash pond and Ash Pipeline corridor. The purpose of the investigation and survey to obtain comprehensive information regarding the existing ground conditions, topography, subsurface stratification and engineering characteristics of soil at the project site. The information shall provide the designer both general and specific, about the substrata profile and relevant soil and rock parameters at site on the basis of which the foundations for Ash disposal area, Pump House, Pipeline Corridors in water body (river/nala/canal etc.) etc. The above list is indicative and not exhaustive. The range of load intensities from various structures is expected to be between 100 kN/m2 and 700 kN/m2.

The geotechnical investigation, including the number, location and depth of boreholes/test pits and the type and frequency of field and laboratory tests, shall therefore be adequate to characterize the subsurface conditions prevailing within the zone of influence of the proposed foundations and associated works.

The Topographical Survey shall cover the entire identified area and pipeline corridor and shall establish existing ground levels, contours, natural drainage features, water bodies, roads, structures, utilities and other permanent or temporary features relevant to planning, design and construction of the proposed facilities.

All field investigations, laboratory testing, interpretation of results and recommendations shall be carried out in accordance with the applicable latest editions/revisions of relevant Indian Standards and other applicable statutory requirements, and the final report shall provide all geotechnical parameters and recommendations required for detailed engineering of the Project.

## 2.0 SCOPE

i. This specification covers the technical requirements for a geotechnical investigation and topographic survey of the ash pond and ash pipeline corridor and submission of a comprehensive geotechnical and topographic survey report. The work shall include mobilization of all necessary equipment, providing necessary engineering supervision and technical personnel, skilled and unskilled labour, etc., as required to carry out the entire field as well as laboratory investigation, analysis and interpretation of data collected and preparation of a Geotechnical and topographic survey report. The entire field as well as laboratory investigation work shall be supervised by a post-graduate in Geotechnical Engineering with at least 5 years of experience in Geotechnical Investigation work. A geologist shall also be deputed at site during investigation whenever rock drilling is undertaken.

ii. The Contractor shall make his own arrangements for locating the coordinates and positions of bore holes, trial pits, dynamic cone penetration tests and other field tests as per the drawings/sketches/co-ordinates supplied to him and for determining the reduced levels (R.L.'s) at these locations with respect to the single bench mark indicated by the Engineer. Two established reference lines will be indicated to him. The Contractor has to provide at the site all the required survey instruments to the satisfaction of the Engineer so that the work can be carried out accurately according to specifications and drawings.

iii. The Contractor shall intimate the Owner, giving reasons, if any additional specific tests he considers necessary to be carried out duly considering local soil conditions before starting of such tests.

iv. All the laboratory test data shall be recorded in the proforma recommended in the Indian Standard Codes and a copy of these shall be sent to the Owner every week during the progress of laboratory testing. Whenever desired during the progress of the work the Owner may be present at the laboratory where the Contractor is arranging for execution of the laboratory tests.

v. The contractor shall interact with the Owner to get acquainted with the different types of structures envisaged and in assessing the load intensities on the foundations for the various structures of the Power project to enable him to calculate the allowable bearing pressure.

vi. After the review of the draft report, the Owner's may call for discussions in order to explain to the Contractor the Owner's observation on the report. Any expenditure on account of redrafting, finalising the report including cost of visits to Owner shall be deemed to have been included in the quoted rates.

vii. The Contractor shall carry out all work covered under this Specification, even if not explicitly mentioned under the Scope. All work shall be executed to the satisfaction of the Engineer.

## 3.0 GENERAL REQUIREMENTS

i. In areas which have already been developed, the Contractor shall take advantage of existing local knowledge, records of trial pits, bore holes, etc., in the vicinity and the type of foundations adopted and behaviour of existing structures, particularly those of similar nature to the ones proposed for this project.

ii. The Contractor shall make use of information gathered from quarries, unlined wells, cuttings from nearby areas, etc. The general topography of the nearby areas will often give some indication about the variation of the soil conditions which are likely to exist.

iii. The Contractor shall gather data regarding the removal of overburden by excavation, erosion or landslides, etc. in the areas. Similarly, data regarding recent fills shall also be studied to determine the characteristics of the fill as well as the original strata.

iv. The water level in streams and water courses, if any, in the neighborhood shall be noted. Reliable information regarding ground water level shall also be gathered from water level in the wells nearby.

v. The Contractor shall make enquiry and verify regarding earlier use of the site which can have important bearing on its suitability for the proposed structures. This is important, particularly in areas where there have been underground works e.g. worked out ballast pits, quarries, old brick fields, mines, mineral workings, etc. The possibility of damage to the structures, sewers, conduits and drainage system by subsidence shall also be investigated.

vi. It is essential that the equipment/instruments are properly calibrated at the commencement of the work so that they represent true values and submit the test reports to Engineer. If the Engineer so desires, the Contractors shall arrange for having the instruments tested in presence of the Engineer at an approved laboratory at his cost and the test reports shall be submitted to the Engineer.

vii. No claim whatsoever shall be entertained for differences between the extent, location, depth, etc. of soil test indicated on the construction drawings and those shown on the tender drawings.

viii. When blasting with explosives is involved, agency/contractor shall arrange statutory clearance and also the portable magazine for storing /carrying the explosives. Only licensee shall handle these explosives.

## 4.0 CODES AND STANDARDS

i. All standards, specifications and codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions.

ii. In case of conflict between this specification and those (IS codes, Standards etc.) referred to herein, the former shall prevail.

iii. All work shall be carried out as per the following Indian Standards and Codes:

| IS Code | Title / Description |
|---|---|
| IS:1080 | Code of Practice for Design and Construction of Simple Spread Foundations |
| IS:1498 | Classification and Identification of Soils for General Engineering Purposes |
| IS:1888 | Method of Load Test on Soils |
| IS:1892 | Code of Practice for Subsurface Investigation for Foundations |
| IS:1904 | Code of Practice for Design and Construction of Foundations in Soils-General Requirements |
| IS:2131 | Method of Standard Penetration Test for Soils |
| IS:2132 | Code of Practice for Thin Walled Tube Sampling of Soils |
| IS:2470 (Part-I) | Code of Practice for Design and Construction of Septic Tanks |
| IS:2720 | Methods of Test for Soils (Relevant Parts) |
| IS:2809 | Glossary of Terms and Symbols Relating to Soil Engineering |
| IS:2810 | Glossary of Terms Relating to Soil Dynamics |
| IS:2911 | Code of Practice for Design and Construction of Pile Foundations (Relevant Parts) |
| IS:2950 (Part-I) | Code of Practice for Design and Construction of Raft Foundations |
| IS:3025 | Methods of Sampling and Testing (Physical and Chemical) for Water Used in Industry |
| IS:3043 | Code of Practice for Earthing |
| IS:4078 | Code of Practice for Indexing and Storage of Drill Cores |
| IS:4434 | Code of Practice for In-situ Vane Shear Test for Soils |
| IS:4453 | Code of Practice for Exploration by Pits, Trenches, Drifts and Shafts |
| IS:4464 | Code of Practice for Presentation of Drilling Information and Core Description of Foundation Investigation |
| IS:4968 (Part-II) | Method for Subsurface Sounding for Soils – Dynamic Method Using Cone and Bentonite Slurry |
| IS:4968 (Part-III) | Method for Subsurface Sounding for Soils – Static Cone Penetration Test |
| IS:5313 | Guide for Core Drilling Observations |
| IS:5529 (Part-I) | Code of Practice for In-situ Permeability Test in Overburden |
| IS:5529 (Part-II) | Code of Practice for In-situ Permeability Test in Bed Rock |
| IS:6065 | Recommendations for Preparation of Geological and Geotechnical Maps for River Valley Projects |
| IS:6403 | Code of Practice for Determination of Allowable Bearing Pressure on Shallow Foundations |
| IS:6926 | Code of Practice for Diamond Core Drilling for Site Investigation for River Valley Projects |
| IS:6935 | Method of Determination of Water Level in a Bore Hole |
| IS:6955 | Code of Practice for Subsurface Exploration for Earth and Rockfill Dams |
| IS:7422 | Symbols and Abbreviations for Use in Geological Maps, Sections and Subsurface Exploratory Logs (Relevant Parts) |
| IS:8009 (Part-I) | Code of Practice for Calculation of Settlement of Foundations Subjected to Symmetrical Vertical Loads – Shallow Foundations |
| IS:8009 (Part-II) | Code of Practice for Calculation of Settlement of Foundations Subjected to Symmetrical Vertical Loads – Deep Foundations |

| IS Code | Title / Description |
|---|---|
| IS:8763 | Guide for Undisturbed Sampling of Sands |
| IS:8764 | Method for Determination of Point Load Strength Index of Rocks |
| IS:9143 | Method for Determination of Unconfined Compressive Strength of Rock Materials |
| IS:9179 | Method for Preparation of Rock Specimens for Laboratory Testing |
| IS:9198 | Compaction Rammer for Soil Testing |
| IS:9214 | Determination of Modulus of Subgrade Reaction in Field |
| IS:9259 | Specification for Liquid Limit Apparatus |
| IS:9640 | Specification for Split Spoon Sampler |
| IS:9669 | Specification for CBR Mould and Its Accessories |
| IS:10050 | Method for Determination of Slake Durability Index of Rocks |
| IS:10060 | Code of Practice for Subsurface Investigations for Power House Sites |
| IS:10074 | Specification for Compaction Mould Assembly for Light and Heavy Compaction |
| IS:10108 | Code of Practice for Sampling by Thin Wall Sampler with Stationary Piston |
| IS:10589 | Equipment for Determination of Subsurface Sounding of Soils |
| IS:10837 | Specification of Moulds for Determination of Relative Density and Its Accessories |
| IS:11229 | Specification for Shear Box Testing of Soils |
| IS:11315 (Part-II) | Description of Discontinuities in Rock Mass – Core Recovery and Rock Quality |
| IS:12070 | Code of Practice for Design and Construction of Shallow Foundations on Rocks |
| IS:13372 (Part-I & II) | Code of Practice for Seismic Testing of Rock Mass |

## 5.0 FIELD INVESTIGATIONS – IN SOIL

### 5.1 BORING

#### 5.1.1 General Requirements

a) Bore holes shall be taken at specified locations to obtain information about the sub-soil profile, its nature and strength and to collect soil samples for strata identification and conducting laboratory tests. The minimum diameter of the bore shall be 150 mm and boring shall be carried out in accordance with the provisions of IS : 1892 as per this specification.

b) All bore holes shall extend upto depths shown on the construction drawings or as directed by the Engineer. If the strata with Standard Penetration Test (SPT) 'N' value greater than 100 with characteristics of rock is met with, prior to the specified depth, the bore hole shall be advanced further by chiselling. Chiselling shall be continued for a maximum depth of 20 cms or upto 2 hours whichever is earlier. During chiselling rock fragments shall be collected. Identification of rock strata shall be on the basis of visual examination of SPT sample and rock fragments. After it is established that rock is met with, borehole shall be advanced further by drilling in rock as specified in Clause 6.1 and core shall be collected. When the bore hole is terminated in soil strata, an additional Standard Penetration Test shall be carried out at the termination depth.

c) Casing pipe shall be used in the bore hole to support its sides when a side fall is suspected to occur inside the bore hole. When casing pipe is used, it shall be ensured that its bottom end is at all times less than 15 cms above the bottom of the bore hole and not below the level at which the test has to be conducted or sampling has to be done. In case of cohesionless soils the advancement of the casing pipe shall be such that it does not disturb the soil to be tested or sampled. The casing shall be advanced by slowly turning the casing pipe and not by driving.

d) In-situ tests shall be conducted or undisturbed samples (UDS) shall be collected in the bore holes at regular intervals and at change of strata or as decided by the Engineer. Representative disturbed samples shall be preserved for conducting various identification tests in the laboratory. Water table in the bore hole shall be carefully recorded and reported. No water/drilling mud shall be added while boring above ground water table. For cohesionless soil below water table, the water level in the bore hole shall at all times be maintained slightly above the water table.

e) The bore hole shall be cleaned using suitable tools up to the depth of testing or sampling, ensuring that there is minimum disturbance of the soil at the bottom of the bore hole. The process of jetting through an open tube sampler shall not be permitted. In cohesive soils, the bore hole may be cleaned using a bailer with a flap valve. Gentle circulation of drilling fluid shall be done when rotary mud circulation boring is adopted.

f) On completion of the bore hole, including the borehole in which special tests are conducted, the Contractor shall backfill all the bore hole as directed by the Engineer.

### 5.1.2 Auger Boring

Auger boring can be adopted in soft to stiff cohesive soils above water table. Augers shall be of helical or post hole type which may be manually or power operated. While boring, care shall be taken to minimise the disturbance to the deposits below the bottom of the bore hole. The cuttings brought up by the auger shall be carefully examined in the field and the description of all the strata shall be duly recorded. No water shall be introduced from the top while conducting Auger boring.

### 5.1.3 Shell and Auger Boring

Shell and Auger boring can be used in all types of soil free from boulders. For cohesionless soil below ground water table, the water level in the bore hole shall always be maintained at or above the ground water level. The use of chisel bit shall be permitted in hard strata with SPT-N value greater than 100. Chisel bits may also be used to extend the bore hole through local obstruction, such as old construction, boulders, etc. All other requirements of Clause 5.1.1 shall apply for this type of boring also.

### 5.1.4 Percussion boring (Chiseling)

This method can be adopted in soil with gravel and boulders when the boring has to be done at a fast rate. This method consists of breaking of the strata by repeated blows from a chisel or drilling bit and bailing out the debris at intervals by adding water into the bore hole. This method is not permitted unless otherwise specified.

### 5.1.5 Rotary Mud Circulation Boring

This method can be used in all types of soil below water table. In this method boring shall be done by rotating the bit fixed at the bottom of the drill rod. Proper care shall be taken to keep firm contact between the bit and the bottom of the bore hole. Bentonite mud shall be used as the drilling fluid to prevent caving in of the bore hole sides. Use of percussion tool shall be permitted in hard clays and dense sandy deposits.

### 5.1.6 Standard Penetration Test

This test shall be conducted in all types of soil deposits met within a bore hole, to find the variation in the soil stratification by correlating with the number of blows required for unit penetration of standard penetrometer. This test shall be conducted at 3.0 m intervals and every change of strata and as per the direction of the Engineer. The starting depth of performing SPT shall be between 1.0 and2.0 M depth below ground level. This depth shall be staggered in alternate boreholes. The depth interval between the top levels of Standard penetration test and next undisturbed sampling shall not be less than 1.0 m. The specifications for the equipment and other accessories, procedure

for conducting the test, presentation of test results and collection of the disturbed soil samples shall conform to IS : 2131.

This test shall be carried out by driving a standard split spoon sampler in the bore hole by means of a 650 N hammer having a free tall of 0.75 m. The sampler shall be driven using the hammer and for 450 mm. While driving the number of blows for every 150 mm penetration and the penetration for every 50 blows shall be recorded. The number of blows for the last 300 mm drive shall be reported as N value. This test shall be discontinued when the blow count is equal to 100 and the penetration shall be recorded. Refusal shall be considered to be met with when the blow count is equal to or greater than 100. At the location where the test is discontinued the penetration and the number of blows shall also be reported. Sufficient quantity of disturbed soil samples shall be collected from the split spoon sampler for identification and laboratory testing. The sample shall be visually classified and recorded at the site and shall be properly preserved and labelled for future identification.

## 5.2 SAMPLING

### 5.2.1 General

a) Sufficient number of soil samples shall be collected for reliable estimation of soil properties. The samples collected shall be either disturbed or undisturbed. Disturbed soil samples shall be collected for field identification and conducting tests such as sieve analysis, index properties, specific gravity, chemical analysis, etc. Undisturbed samples shall be collected to estimate the strength and settlement properties of the soil.

b) All the accessories required for sampling and the method of sampling shall conform to IS: 2132. All the disturbed and undisturbed samples collected in the field shall be classified at the site as per IS : 1498.

c) All the samples shall be identified with date, bore hole or trial pit number, depth of sampling, etc. It is also essential to mark an arrow pointing towards the top surface of the sample. Care shall be taken to keep the undisturbed soil samples and box samples vertically with the arrow directing upwards. The tube samples shall be properly trimmed at both ends and sealed with molten paraffin wax at both ends immediately after extracting the samples from the bore hole and suitably capped on both sides.

d) When the Contractor fails to collect the undisturbed soil sample at a specified depth the reason for the same shall be indicated in the borelog and the bore hole shall be advanced by 0.5 M. Subsequently, for cohesionless soil Standard Penetration Test shall be performed and for very soft cohesive soil field vane shear test shall be performed.

e) Precaution shall be taken to ensure that there shall not be any change in moisture content and disturbance of the soil samples and they shall be placed in a temporary store at the end of the day's work. All the samples shall be kept over a bed of sand, jute bags, saw dust, etc. and covered over on top with similar material. The bed and top cover shall be kept moist till they are properly packed in wooden boxes. The Contractor shall be responsible for packing and transporting of all the samples from site to the laboratory within seven days after sampling with proper protection against loss and damage.

f) All the samples shall be packed in wooden boxes using sand, saw dust etc. all around the samples before transportation to laboratory for testing.

### 5.2.2 Disturbed sample

a) Disturbed soil samples shall be collected in bore holes at regular intervals to provide complete description of soil profile and its variation. Jar samples weighing approximately 10 N shall be collected

in bore holes at 0.5 m intervals starting from a depth of 0.5 m below ground level and at every identifiable change of strata to supplement the boring records. Samples shall be immediately stored in air tight jars or polythene bags and labelled with bore hole number and depth.

b) In elevated areas, if superficial material is available in plenty, then bulk samples from a depth of about 0.5 m below ground level shall be collected to establish all the required properties to use it as a fill material. Disturbed samples weighing about 250 N shall be collected at shallow depths and immediately stored in polythene bags as per IS: 1892. The bags shall be sealed properly and they shall be kept in wooden boxes.

### 5.2.3 Undisturbed Samples

In each bore hole undisturbed sample shall be collected at every change of strata and at regular intervals of 3.0 m and as directed by the engineer. The starting depth of collection of UDS shall be between ground level and 1.0 m below ground level and as decided by the Engineer. The starting depth shall be staggered in alternate boreholes. In cohesive soils collection of UDS shall be preferred in place of SPT. The depth interval between the top level of undisturbed sampling and standard penetration test shall be at least 0.5m. Undisturbed samples shall be 100 mm dia and 450 mm length. Samples shall be collected in such a manner that the structure of the soil and its moisture content do not get altered. The specifications for the accessories required for sampling and the sampling procedure shall conform to IS: 1892 and IS : 2132. Undisturbed sampling in sand shall be done using compressed air technique mentioned in IS : 8763. Thin walled sampler shall be used to collect undisturbed samples by pushing the tube into the soil. The sampling tube shall have a smooth finish on both surfaces and minimum effective length of 450 mm. The area ratio of sampling tubes shall be less than 12.5%. However, in case of very stiff soils, area ratio upto 20% shall be permitted.

#### a) Undisturbed Sampling in cohesive soil

Undisturbed samples in soft to stiff cohesive soils shall be obtained using a thin walled sampler. In order to reduce the wall friction, suitable precautions such as oiling the surfaces shall be taken. The bore hole shall be cleaned and the depth of sampling below the ground level shall be noted. The sampler shall then be attached to the bottom of the boring rods and lowered into the bore hole. The sampler shall be pushed into the clay layer by hand or by jacking and soil sample of specified length shall be collected without disturbing the soil. The distance by which the sampler penetrates into the soil strata shall be checked. Care being taken to ensure that the sampler is not driven too far as this will compress the soil. The sampler shall be rotated to break the core at the bottom of the sampler and then steadily drawn up.

#### b) Undisturbed sampling using Piston sampler

Undisturbed samples in very loose saturated sandy and silty soils and very soft clays shall be obtained by using a piston sampler consisting of a sampling cylinder and piston system. In soft clays and silty clays, with water standing in the casing pipe, piston sampler shall be used to collect undisturbed samples. During this method of sampling expert supervision is called for.

The interior surface of the sampler shall be smooth, clean and corrosion resistant. Its cutting edge and the ring seals shall be inspected for wear and rejected if worn. Check shall be done to ensure that the moving parts of the sampler function freely before the sampler is lowered into the bore hole. While pushing the system into the soil and till the beginning of the sampling operations, the bottom of the piston shall be flush with the cutting edge of the sampler. At the depth of sampling, the piston should be fixed relative to the ground and the sampler cylinder shall be independently pressed down smoothly and continuously into the ground. If an obstruction is met, the sampler shall be withdrawn and another sample taken after the obstruction is removed.

Accurate measurements of the depth of sampling, height of sampler, stroke and length of sample

recovery shall be recorded. After the sampler is pushed to the required depth, both the sampler cylinder and piston system shall be drawn up together ensuring that there shall not be any disturbance to the sample which shall then be protected from changes in moisture content.

**c) Undisturbed sampling in Cohesionless Soils**

Undisturbed samples in cohesionless soils shall be obtained as per the procedure given in IS : 8763. Compressed air sampler shall be used to take samples of cohesionless soil below water table. Precautions shall be taken to clear the bore hole before sampling. Thin walled tube samplers of 60 mm internal diameter shall be used. The height and other dimensions of the sampler shall be recorded before use. Proper care shall be taken to maintain the water level slightly above the ground water table before and during sampling operations. Immediately after the sample is obtained, the ends of the sample shall be waxed and capped to avoid moisture content changes.

### 5.2.4 Relaxation During Sampling

a) The Sampler shall be pushed into the soil and driving of sampler shall be resorted to only when it cannot be pushed into the soil. This shall be done only with the permission of the Engineer and all the details about the same shall be recorded into the bore logs.

b) In clays when N value is above 50, undisturbed samples may be replaced by standard penetration test.

## 5.3 GROUND WATER

**5.3.1** One of the following methods shall be adopted for determining the ground water table in bore holes as per IS : 6935 and as per the instructions of the Engineer.

a) In permeable soils, the water level in the bore hole shall be allowed to stabilize after lowering it adequately by bailing. When the water level inside the bore hole is found to be stable, the depth of water level below ground level shall be measured. Stability of sides and bottom of the bore hole shall be ensured at all times.

**5.3.2** For both permeable and impermeable soils, the following method shall be suitable. The bore hole shall be filled with water and then bailed out to various depths. Observations on the rise or fall of water level shall be made at each depth. The level at which neither a fall nor a rise is observed shall be considered as the water table elevation. This shall be established by three successive readings of water level taken at an interval of two hours. In case any variation in the ground water level is observed in any specific boreholes, then the water level in these bore holes shall be recorded daily during the course of the field investigation. Levels in nearby wells, streams, etc. if any, shall be noted whenever these readings are taken.

**5.3.3** If so called for, observation wells shall be drilled for the purpose of long-term studies of the fluctuation in ground water levels and pressure. Either a Stand pipe or Piezometer shall be installed in selected previously drilled or specially drilled bore holes covering the complete site area. These shall be at specified depths as per the specifications and instructions of the Engineer. Daily water level readings shall be recorded immediately following the installation upto the time of leaving the site. At the end of field work, these installations shall be handed over in satisfactory working condition to the Engineer without disturbing their position so that the owner can continue further observations. It is important to install some Stand pipes and Piezometers prior to the coming monsoon, in order to record the local effects and variations in the ground water level during the period.

**5.3.4** Stand pipes and Piezometers shall consist of 19mm internal diameter rigid unplasticised (UPVC) tubing. All the joints in the tubing shall be made of coupling sleeves. The top of UPVC tubing shall be enclosed in a 75mm diameter galvanized steel pipe of 1.5m length having a galvanised steel screw cap with well-greased threads and the caps shall be tightened such that it would be impossible to loosen by hand. The lower end of the pipe shall have four legs of 6mm thick and 100mm long and welded to have projection of 25mm. The pipe shall be sealed into the ground with cement grout so that it does not rotate. The top end of the pipe shall project about 300 mm above ground level unless otherwise specified by the Engineer.

**5.3.5** The perforated tubing for the porous element shall be surrounded by a response zone of well graded sand from 500 mm below to 150 mm above the lower end of the Stand pipe or Piezometer, and the bore hole above the response zone shall be back filled with natural soil or well graded sand. The latter shall compose of particles that vary in amount according to the size in such a manner that the void space formed by the larger particles can be filled by smaller size particles.

a) Stand pipe: Stand pipes shall be installed to measure the water level in soils with high permeability such as sand and gravel. The stand pipe shall consist of a perforated tubing attached to the bottom of the UPVC tubing. The perforated tube shall be 150 mm long having perforation of diameter not greater than 1 mm.

b) Piezometers: Piezometers shall be installed to measure the pore pressures in soil with medium to low permeability. Piezometers shall consist of a porous filter attached to the bottom of the UPVC tubing. The filter shall be 300 mm length and shall be placed in the bore hole and sealed at top and bottom by grouting. Hydraulic Piezometers with double line to be used to remove the air trapped in the system.

### 5.3.6 Sub-soil Water Samples

a) Sub-soil water samples shall be collected for carrying out chemical analysis. Representative samples of ground water shall be collected when it is first encountered in bore holes before the addition of water to aid boring or drilling. Water samples shall not be collected when bentonite slurry or mud has been used for drilling operations. If water has been added for drilling purpose or if ground water has been diluted by surface rain water, then the bore hole shall be dewatered and water allowed to rise from which the sample may be taken.

b) The sampling apparatus shall be such that the water at the desired depth can be collected directly without any disturbance and any change in the concentration of the constituents like dissolved gases, etc. Undue agitation shall be avoided. An ordinary suction pump with its suction end inserted upto the required depth in the bore hole shall be used for this purpose.

c) The sample shall be collected in a clean vessel and allowed to settle so that the supernatural liquid can be poured into a clean well rinsed glass or polythene bottle. Sufficient quantity and number of samples shall be collected to carry out the chemical analysis and sent to a laboratory in airtight bottles with proper labelling. Chemical analysis of water samples shall include determination of pH value; turbidity; sulphate, carbonate, nitrate and chloride; presence of organic matter and suspended solids.

d) In some cases constituents may be mixed and analysed later as specified in the specific test methods. Chemical preservatives may be added to the sample for cases as specifield in the test method/IS codes. This shall only be done if analysis cannot be conducted within an hour of collection and shall have the prior written permission and approval of the Engineer.

### 5.3.7 In-situ Permeability Test

In-situ permeability test shall be conducted to determine the water percolation capacity of overburden soil. This test shall be performed inside the bore hole/trial pit at specified depths or in each layer or as per the directions of the Engineer. The type of test shall be either pump-in or pump-out test depending on the subsoil and ground water conditions. Pump-in test shall be conducted whether ground water in bore hole exists or not. Pump-out test shall be conducted to obtain data for dewatering purposes when ground water is met in the bore hole. The specifications for the equipments required for the test and the procedure of testing shall be in accordance with IS : 5529, Part-I. When it is required to carry out the permeability test for a particular section of the soil strata above the ground water table, bentonite slurry shall not be used while boring.

### 5.3.8 Pump-in Test

Pump-in test shall be conducted in the bore hole/trial pit by allowing water to percolate into the soil. Choice of the method of testing shall depend on the soil permeability and prevailing ground water level. Only clear water shall be used for conducting the test. Before conducting the test, the bore hole shall be cleaned as specified in Clause 5.1.1(e). Water shall be allowed to percolate through the test section for sufficient period of time to saturate the soil before starting the observation.

a) **Constant Head Method (in bore hole)**

This test shall be conducted in bore holes where soil has a high permeability. Water shall be allowed into the bore hole through a metering system ensuring gravity flow at constant head so as to maintain a steady water level in the bore hole. A reference mark shall be made at a convenient level which can be easily seen in the casing pipe to note down the fluctuations of water level. The fluctuations shall be counteracted by varying the quantity of water flowing into the bore hole. The elevation of water shall be observed at every 5 minute interval. When three consecutive readings show constant value, the necessary observations such as flow rate, elevation of water surface above test depth, diameter of casing pipe, etc. shall be made and recorded as per the proforma recommended in IS : 5529, Part-I, Appendix-A.

b) **Falling Head Method (in bore hole)**

This method shall be adopted for soils of low permeability and which can stand without casing. The test section shall be sealed by the bottom of the bore hole and a packer at the top of the test section. If the test has to be conducted at an intermediate section of a prebored hole then, double packers shall be used. Access to the test section through the packer shall be by means of a pipe which shall extend to above the ground level. Water shall be filled into the pipe upto the level marked just below the top of the pipe and water allowed to drain into the test section. The water level in the pipe shall be recorded at regular intervals as mentioned in IS: 5529, Part-I, Appendix-B. The test shall be repeated till constant records of water level are achieved.

c) **Percolation Test (in trial pit)**

Percolation test shall be conducted in the trial pit in areas where water/effluent is stored/discharged in ground level tanks. The loss of water due to percolation into the soil shall be estimated by the soil absorption capacity. This test shall be conducted in trial pits as per the procedure given in IS : 2470-Part-I, Appendix-A.

### 5.3.9 Pump-out Test

This test shall be carried out to determine accurate values of permeability of soil below water table. This test shall be conducted by continuous pumping out water from a well so as to maintain a steady water level at the desired depth in the well. The fluctuations in water level shall be counteracted by varying the quantity of water pumped out of the well. The specifications for the equipment and accessories required for performing the test, test procedure, field observations and reporting of

results shall conform to IS : 5529, Part-I. The well shall be 400 mm dia perforated G.I./M.S. pipe to be installed in the well of 250 mm dia and observation pipes of 50 mm dia shall be installed at regular intervals along three radial lines extending from the well at 120 degrees to each other. Length of these pipes shall depend upon the ground level, estimated lowering of ground water table and the distance from the well.

Sufficient number of observation pipes shall be installed along each of the radial lines so as to assess the zones of influence due to dewatering. Draw down depth in the well as specified in the drawings.

### 5.3.10 Trial pit

Trial pits shall be of minimum 2m x 2m size at the bottom so as to permit easy access for visual examination of walls of the pit and to facilitate sampling and insitu testing operations. Pits shall be upto 4.0m depth in all types of soils or at least 1.0m into rock or as per the directions of the engineer. Precautions shall be taken to ensure the stability of pit walls including provision of shoring, if necessary, as per IS: 4453. Precautions shall be taken to prevent surface water draining into the pit. Arrangements shall be made for dewatering if the pit is extended below water table. Trial pits shall be kept dry and a ladder shall be provided for easy access to the bottom of the pit. In-situ tests shall be conducted and undisturbed samples shall be collected immediately on reaching the specified depth so as to avoid substantial changes in moisture content of the subsoil. Arrangements shall be made for barriers, protective measures and lighting necessary for the period the pits remain open.

The contractor shall ascertain for himself the nature of materials to be excavated and the difficulties, if any, likely to be encountered in executing this work. Wherever ground water table is met with during excavation, the contractor shall make suitable dewatering arrangement to maintain dry working conditions by maintaining the water table below the bottom of the excavation level.

**5.3.11** A note on the visual examination of soil and rock strata shall be prepared. This should include the nature, colour, consistency and visual classification of the soil, thickness of soil strata, thickness of expansive soil, ground water table, if any, etc.

**5.3.12** Undisturbed samples shall be collected at 1.0, 2.0, 3.0 m depth and at the termination depth in all the pits.

a) Chunk Samples

In cohesive soils, weathered rock undisturbed samples of regular shapes shall be collected. The samples shall be cut and trimmed to a suitable size (0.3 x 0.3 x 0.3 m). A square area (0.35 x 0.35m) shall be marked at the centre of the levelled surface at the bottom of the pit. Without disturbing the soil inside the marked area, the soil around this marking shall be carefully removed upto a depth of 0.35 m. The four vertical faces of the soil block protruding at the centre shall be trimmed slowly so that its size reduces to 0.3m x 0.3m. Wax paper cut to suitable size shall be wrapped uniformly and covered with two layers of thin cloth over all the 5 exposed surfaces of the soil block and sealed properly using molten wax. A firmly constructed wooden box of size 0.35 x 0.35 x 0.35m (internal dimensions) with the top and bottom open shall be placed around the soil block and held such that its top edge protrudes just above the surface of the block. The space between the soil block and the box shall be filled uniformly and tightly with moist saw dust. The top surface shall also be covered with saw dust before nailing the wooden lid to cover the box firmly taking care that the soil block is not disturbed. The area of contact between the bottom portion of the block and the ground shall be reduced slowly by removing soil in small quantities using small rods, so that the block can be separated from the ground slowly without disturbance. After inverting the wooden box along with soil block, the bottom portion shall be trimmed and covered with wax paper, cloth and sealed with molten wax. A wooden lid shall be nailed to the box after providing proper saw dust cushion below it. An arrow mark shall be made on the vertical face of the wooden box to indicate the top surface

of the sample along with the coordinates, date and depth of sampling.

b) Tube Samples

Undisturbed tube samples may also be obtained by means of a 100 mm diameter sampling tube with a cutting edge. The sampler shall be slightly oiled or greased inside and outside to reduce friction. The sampler shall be pushed into the soil and while doing so, soil around the tube shall be carefully removed. In case it is not possible to push the sample, it may be driven by light blows from a "monkey".

**5.3.13** After the completion of the test, sampling and visual examination, the pit shall be suitably backfilled as directed by the Engineer. Unless otherwise specified, excavated soil shall be used for this purpose.

**5.3.14** In case it is not possible to collect undisturbed samples in the trial pit, in-situ density of soil shall be determined by the sand replacement method. The specifications, equipment, accessories required for the test and test procedure shall be as per IS : 2720, Part-XXVIII. No separate payment shall be made for this test.

### 5.4 Static Cone Penetration Test

Static cone penetration test shall be conducted to know the soil stratification and to estimate the various physical and engineering soil properties. The cone penetrometer shall be advanced by pushing and the static force required for unit penetration shall be determined. The test shall be conducted using a 200 KN capacity mechanically operated equipment upto the specified depth or refusal whichever is earlier. For this test, 'refusal' means meeting a very hard strata which cannot be penetrated at the rate of at least 0.3cm/sec even when the equipment is loaded to its full capacity. The specifications for the equipment and accessories required for performing the test procedure, field observations and reporting of results shall conform to IS : 4968, Part-III. At the ground level, pre-boring upto 0.5m depth shall be permitted if the overlying strata is hard. No extra payment shall be made for boring. Continuous record of the penetration resistance shall be maintained. On completion of the test, the results shall be reported in an approved proforma as in IS : 4968, Part-III, Appendix-A.

### 5.5 Dynamic Cone Penetration Test

Dynamic cone penetration test shall be conducted using bentonite slurry by driving a standard size cone attached to the bottom of a string of drill rods. The test shall be conducted upto the specified depth or refusal whichever is earlier. Refusal shall be considered when the blow count exceeds 150 for 300 mm penetration. The specification for the equipment and accessories required for performing this test, procedure, field observations and reporting of results shall conform to IS : 4968, Part-II. The driving system shall comprise of a 650 N weight having a free fall of 0.75 m. The cone shall be 65 mm diameter provided with vents for continuous flow of bentonite slurry through the cone and rods in order to avoid friction between the rods and soil. On completion of the test, the results shall be presented as a continuous record of the number of blows required for every 300 mm penetration of the cone into the soil in a suitable chart supplemented by a graphical plot of blow count for 300 mm. penetration vs depth.

### 5.6 Vane Shear Test

Field vane shear test shall be performed inside the bore hole to determine the shear strength of cohesive soils, especially of soft and sensitive clays, which are highly susceptible to sampling disturbance. This test shall be conducted by advancing a four winged vane of suitable size ( 75 mm or 100 mm diameter as per the soil condition) into the soil upto the desired depth and measuring the torque required to rotate the vane. The specification for the equipments and accessories required for conducting the test, the test procedure and field observations shall correspond to IS : 4434. Test

may also be conducted by direct penetration from ground surface. If the cuttings at the test depth in the bore hole show any presence of gravel, sand, shells, decomposed wood, etc., which are likely to influence the test results substantially, the test at that particular depth may be omitted with the permission of the Engineer. However, the test shall be conducted at a depth where these obstructions cease to occur. On completion of the test the results shall be reported in an approved proforma as specified in IS : 4434, Appendix-A.

### 5.7 Plate Load Test

a) Plate load test shall be conducted to determine the bearing capacity and load/settlement characteristics of soil / rock at shallow depth by loading a plane and level steel plate kept at the desired depth and measuring the settlement under different loads, until a desired settlement takes place or failure occurs. The specifications for the equipment and accessories required for conducting the test, the test procedure, field observations and reporting of results shall conform to IS : 1888. The location and depth of the test shall be as given in the drawing or as indicated by the Engineer. Undisturbed tube samples as specified in Clause 5.6.3(b) shall be collected at 1.0 m and 2.5 m depths from the natural ground level for carrying out laboratory tests.

b) The size of the pit shall not be less than five times the plate size and shall be taken upto the specified depth. All provisions regarding excavation and visual examination of pit under Clauses 5.6.1 and 5.6.2 shall apply here also.

c) If the ground water table is at a depth higher than the specified test depth, the ground water table shall be lowered and maintained at the test depth for the entire duration of the test. Dewatering shall be at the cost of the Contractor.

d) Unless otherwise specified the reaction method of loading shall be adopted. Settlement shall be recorded from dial gages placed at four diametrically opposite ends of the test plate. The test plate shall be 600 x 600 mm size and atleast 25 mm thick. The bottom of the pit shall be levelled before placing the plate in position for conducting the test.

e) A seating load of 7 kN/m2 shall be applied and after the dial gauge readings are stabilized, the load shall be released and the initial readings of the dial gauges recorded after they indicate constant reading. The load shall be increased in stages. These stages shall be 20,40,70,100, 150, 200, 250, 300, 400, 500, 600 and 800 kN/m2 or as directed by the Engineer, Under each loading, record of Time vs Settlement shall be kept as specified in IS: 1888.

In case of cohesive soils each load increment shall be maintained until the settlement is less than 0.02 mm/min or 6 hours whichever is later. Dial gauge readings for settlement shall generally be taken at 1, 2.25, 4, 6.25, 9, 16, 25, 60,
90 and 120 minutes from the start of each stage of loading. Thereafter the readings shall be taken at hourly interval upto a further 4 hours and at two hours interval thereafter for another 6 hours.

Other than cohesive soils, each stage of loading shall be maintained for a minimum duration of one hour or till the settlement rate reduces to 0.02 mm/min. whichever is later. No extrapolation of settlement rate from periods less than one hour shall be permitted. The final loading shall be maintained for 24 hours. During unloading reading of dial gauge reading shall be recorded for each stage of unloading.

f) Loading shall be carried out in stages as specified above till one of the following conditions occurs.

i. Failure of the soil under the plate i.e. the settlement of the plate at constant load becomes progressive and reaches a value of 40 mm or more.

ii. Load intensity of 800 kN/m2 is reached without failure of the soil.

g) Backfilling of the pit shall be carried out as per the directions of the Engineer. Unless otherwise specified the excavated soil shall be used for this purpose.

### 5.8 Cyclic Plate Load Test

This test shall be carried out to determine the dynamic soil properties required for the analysis of foundation subjected to dyanmic loads. This test shall be conducted on similar lines as the ordinary plate load test. In additions, unloading shall also be done before such stage of loading. Test set up, load increment, maximum load intensity, recording of field data, etc., shall be as per Clause 5.10.

After each stage of loading, the load shall be removed in a minimum of two stages and as directed by the Engineer. After each stage of reduction of load, dial gauge readings and settlements shall be taken for atleast one hour until the readings stabilize. Thereafter the next loading stage shall commence. Analysis of test data shall be reported as per IS : 5249.

### 5.9 Field California Bearing Ratio Test

This test shall be carried out to obtain the properties of soil required for the construction of roads. The equipment and accessories required for carrying out the test procedure, recording of observations and presentation of results shall conform to IS : 2720 part XXXI. The test locations and depth shall be as specified in the drawings or as directed by the Engineer.

### 5.10 Electrical Resistivity Test

This test shall be conducted to determine the Electrical resistivity of soil required for designing safety grounding system for the entire power plant area. The specifications for the equipment and other accessories required for performing electrical resistivity test, the test procedure, and reporting of field observations shall conforms to IS : 3043. The test shall be conducted using Wanner's four electrode method as specified in IS : 1892, Appendix-B2. Unless otherwise specified, at each test location, the test shall be conducted along two perpendicular lines parallel to the coordinate axes. On each line a minimum of 8 to 10 readings shall be taken by changing the spacing of the electrodes from an initial small value of 0.5 m upto a distance of 10.0 m.

### 5.11 Seismic Refraction Test

a) This test shall be carried out to establish the rock and soil profiles of varying density. The dynamic shear modulus of the soils shall also be obtained from the results of this test. The specification for the equipment and other accessories, procedure for carrying out the test, recording and analysis of results and their presentation shall conform to IS : 1892.

b) This test shall be carried out by inducing shock waves into the soil, at ground level or at a certain depth below by striking a plate, placed on the ground surface with a hammer or by exploding small charges in the soil. The shock waves shall be picked up through geophones placed on the ground surface at regular intervals in line with the plate along a straight line. The time elapsed before the waves reach the geophones shall be recorded to an accuracy of one milli second or better.

c) The distance between the shock point and the geo-phones shall be increased to cover a wider area. Alternatively, multiple geo-phones shall be used simultaneously using multiple channel seismograph to record the arrival time and intensity of the waves reaching the geophones. The spacing of the geo-phones shall be 5 m. As the distance between the geophones and the shocks producing point are increased, the time lapse for the waves passing through different underlying strata and reaching the geophone shall be recorded. The wave forms shall be recorded for each test using multi-channel seismograph.

d) The test shall be conducted along traverses in two orthogonal directions as per the drawing or the instructions of the Engineer. During testing, proper care shall be taken to avoid disturbance caused due to the movement of vehicles or other working operations around the test location. The type of wave (compression or shear) shall be analyzed properly using the data recorded during the test.

### 5.12 Cross hole shear test

This test shall be carried out generally in accordance with IS: 13372-1992 to establish the dynamic elastic properties of soil and rock.

In cross-hole shear test, the seismic waves should be generated inside one bore hole (shot hole) and seismic waves are to be picked up in two adjacent receiver bore holes. The number and spacing of the boreholes shall be determined by the nature of the project so as to obtain good results. The boreholes shall be uncased in the portion carrying the geophones. However, it should be kept filled with water or drilling mud in order to ensure perfect contact between the borehole wall and the geophone. In case of cased hole preferably a low velocity material such as a high impact PVC should be used for casing and it is essential that it should be well grouted behind in order to make an intimate contact with wall material. The charge shall be installed within the borehole at depth as specified and the waves shall be picked up from the geophones installed at required depths in receiver boreholes. Knowing the travel time from shot-hole to receiver hole, and corresponding distance, the velocity of the waves is determined which enables to estimate dynamic elastic modulus, shear modulus and Poisson's ratio.

In each receiver borehole, multiple geophones shall be provided at 3.0m interval to cover the depth and various strata as specified and intensity of the waves shall be recorded by multiple channel seismograph.

### 5.13 Pressure meter Test

**5.13.1** This test shall be conducted in bore holes at desired depth, to obtain the in-situ stress strain characteristics and strength parameters of soil/rock layer by measuring the deformation of the probe at different pressures of the volume meter. The size of the borehole shall be compatible to the size of the pressure meter probe. The location and depth of the test shall be as given in the drawing or as per the directions of the Engineer.

**5.13.2** All precautions shall be taken to ensure a smooth bore hole of required diameter with minimum disturbance to the surrounding soil. In soft, loose and sensitive soils, the bore hole shall be predrilled deeper than the testing depth far enough so that the cuttings settling at the bottom of the bore hole shall not interfere with the test.

**5.13.3** The equipment shall be calibrated for pressure losses (membrane correction/air calibration) and volume or radius changes (line calibration/thick wall rigid steel cylinder test) before starting of test and at regular intervals as per the manufacturer's specification.

**5.13.4** Maximum value of pressure correction shall not be more than 50% of limit pressure. The total volume losses in the system shall not exceed 0.5% of the static probe volume per 100 kPa. Volume correction may be neglected in soil if it is less than 0.1 % of probe volume per 100 kPa.

**5.13.5** The test shall be performed by expanding a cylindrical probe to obtain a pressure vs volume curve as specified in IS : 1892. The probe may be of Ax, Bx or Nx size. However, the size of the borehole shall be compatible to the size of the pressure meter probe. Hose pipe connecting the probe with the surface unit shall be of flexible tubing of single or coaxial type. The equipment should be able to reach a maximum pressure of 5000 kPa for testing in soil and 8000 kPa for testing in rock. The accuracy of measuring device shall be such that a change 0.2% of static probe volume or 0.1% of probe radius is measurable as specified in IS: 1892.

**5.13.6** The probe shall be lowered down to the required depth as soon as the boring is completed so as to limit the expansion of soil due to release of stresses. The probe shall be held by a clamping device ensuring that it is not located at the interface of two different soil/rock layers.

**5.13.7** The pressure shall be increased in atleast 20 equal stages as directed by the Engineer. At each stage the pressure shall be maintained for a period of atleast 60 secs. and volume reading shall be taken for 7 to 14 minutes. The volume of water sent into the probe during this period shall be measured upto an accuracy of 0.01 cu.cm. In case the water level in the volumeter drops rapidly, it is necessary to close the volumeter valve quickly so that the reservoir does not empty and allow air or gas into the tubing.

**5.13.8** The test shall be carried out in stages till one of the following conditions occurs:

a) The volume of the probe is doubled
b) Ultimate failure of soil/rock occurs
c) Load intensity of 5000 kPa for soil and 8000 kPa for rock is reached without failure.

**5.13.9** If the shape of the uncorrected pressure vs. volume curve drastically varies from the ideal test curve, the test shall be repeated at no extra cost to the owner at a different depth as decided by the Engineer.

**5.13.10** On completion of the test all the results specified in Clauses 8.2(l) and 8.2(m) shall be reported.

## 6.0 FIELD INVESTIGATION - ROCK

### 6.1 Rock Drilling

#### 6.1.1 General Requirements

Drilling in rock shall be done at specified location or as per the directions of the Engineer. Before commencing drilling, it shall be proved that characteristics of rock has been met with as mentioned in clause 5.1.1 (b). The starting depth of drilling in rock, as mentioned in clause 5.1.1 (b) shall be certified by the Engineer. The portion drilled in rock shall be backfilled with cement and sand (1:3) grout. The drilling information shall be recorded in pro-forma prescribed in IS 5313, Appendix-A.

#### 6.1.2 Equipment

a) Core drilling shall be done by rotary motion using diamond bit. The feed or thrust to the drilling bit shall be actuated by hydraulic type. The equipment or set up shall be capable of recovering 75% of the drilled volume. The rotary core drilling equipment and procedure for drilling shall conform to IS :

6926. The equipment shall be provided with necessary facilities to regulate the spindle speed, bit pressure and water pressure during core drilling to get good core recovery.

b) Drilling shall be carried out with NX size diamond tipped drill bits or impregnated diamond bit depending on the type of rock encountered. Double tube swivel core barrel of Type B conforming to IS : 6926 shall be used to ensure good core recovery and to pick up cores from all layers of rock. Suitable core catchers shall be used to ensure continuous and good core recovery.

### 6.1.3 Procedure

a) The drilling fluid shall be clean water. Circulation of the drilling fluid shall be started before the core barrel reaches the bottom of the hole to prevent cuttings or sludge from entering the core barrel at the start of coring. Drilling fluid shall be circulated continuously down the hollow rods and the sludge conveying the rock cuttings to the surface shall be collected.

b) When drilling through soft/weathered/fractured rock water circulation must be reduced so as to avoid shattering/breaking the core.

c) The rotational speed of the bit (spindle speed) the amount of downward pressure applied on the bit (bit pressure) and water pressure shall be suitably adjusted and properly monitored so that the core is collected with least disturbance and avoid shearing of the Core from its base. Bit speed, bit pressure, water pressure for the type of bit for various rocks type shall be as given in Appendix A of IS : 6926.

d) No drilling run shall exceed 0.75 m in length. This can be increased to

e) 1.5 m provided the core recovery is observed more than 80% in two successive 0.75 m drill runs and on approval from Engineer. If the core recovery is less than 20% then SPT shall be performed before commencing the next drill run as specified in Clause 6.1.7.

f) If at any time a blocking of the bit or grinding of the core is indicated, the core barrel shall be immediately withdrawn from the bore hole regardless of the length of drill run completed.

### 6.1.4 Observations

a) The colour of return water at regular intervals, the depth at which any change of colour of return water is observed, the depth of occurrence and amount of flow of hot water, if encountered, shall be recorded.

b) The depths through which a uniform rate of penetration was maintained, the depth at which marked change in rate of penetration or sudden fall of drill rod occurs, the depth at which any blockage of drill bit causing core loss, if any, shall be recorded.

c) Any heavy vibration or torque noticed during drilling should be recorded together with the depth of occurrence.

d) Special conditions like the depth at which grouting was done during drilling, presence of artesian conditions, loss of drilling fluid, observation of gas discharge with return water etc., shall also be observed and recorded.

e) During drilling operation, observation on return water, rate of penetration etc. shall be recorded on a pro-forma as given in IS : 5313, Appendix-A.

### 6.1.5 Core Samples

a) Core samples shall be extracted by the application of a continuous pressure at one end of the core

with the barrel held horizontally without vibration. Friable cores shall be extracted from the barrel directly into a suitable sized half round plastic channel section. Care shall be taken to maintain the direction of extrusion of sample same as that while coring to avoid stress reversal.

b) Immediately after withdrawal from the core barrel, the cores shall be placed in a tray and transferred into boxes specially prepared for the purpose. The boxes shall be made from seasoned timber or any other durable material and shall be indexed on top of the lid as per IS : 4078. The cores shall be numbered serially and arranged in the boxes in a sequential order. The description of the core samples shall be recorded as per IS : 4464. Where no core is recovered, it shall be recorded as specified in the continuous record of core recovery and RQD to be mentioned in the core log as per IS : 11315 Part-II.

c) The basic information for the description of rocks shall cover a) degree of weathering b) discontinuity spacing c) strength d) colour e) grain size

d) structural condition, the mineralogy of the grains and cementing material g) rock name special features like major joint planes's features/laminations, faults, etc. shall also be indicated.

### 6.1.6 Permeability Test

Permeability test shall be conducted in bedrock inside the drilled hole by pumping in water under pressure to determine the percolation capacity of the rock strata. This test shall be conducted in encased and ungrouted sections of the drill hole and the use of bentonite slurry drilling is strictly prohibited. Clear and clean water shall be used for the purpose of both drilling and testing. The equipments required and the procedure to be followed for conducting the test shall conform to IS : 5529, Part-II. The length of the test section shall be either 1.5m or 3.0m as per field conditions and the directions of the Engineer. The levels of water table, if any, in the drill hole shall be recorded and the drill hole shall be cleaned before starting the test. Depending upon the depth of the test section, single packer or double packer method shall be adopted. Care shall be taken to see that all joints and connections are watertight during the test.

a) Single Packer Method:

This method shall be adopted when the bottom elevation of the test section is the same as the bottom of the drill hole and where it is considered necessary to know the permeability value during drilling itself. This test shall be useful where the full length of the hole cannot stand encased or ungrouted. The packer shall be fixed at the top level of test section such that only the test section lies below the packer. Water shall then be pumped through a pipe into the test section under a required pressure and maintaining it till a constant quantity of water intake is observed. The amount of water percolating through the hole shall be recorded at every 5 minutes intervals. The test shall be repeated by increasing the pressure at regular intervals upto a pressure limit as specified in IS : 5529, Part-II. The details and observations during the test shall be suitably recorded in a proforma recommended in IS : 5529, Part-II, Appendix-B.

b) Double Packer Method:

This method shall be used when the permeability of an isolated section inside a drill hole is to be determined. Packers shall be fixed both at the top and bottom of the test section such that their spacing is exactly equal to the length of the test section. The test shall then be conducted as specified in Clause 6.1.6(a), with applicable modifications.

### 6.1.7 Standard Penetration Test

The relevant hardness of rocks shall be tested in boreholes and after every drill run of 0.75 m in rock if core recovery is observed less than 20% or as directed by Engineer. The test equipment and

arrangement shall be conforming to IS : 2131. An initial seating of the blows shall be given and the number of blows for each 7.5 cm penetration to a total penetration of 45 cm shall be recorded. Penetration shall be recorded (to mm) for every 50 blows and test shall be stopped at total of 100 blows.

### 6.1.8 Plate Load test

The test shall be conducted as described under Clause 5.10 for soil subject to the following changes.

The test plate on the surface of the rock shall be of size 45 cm x 45 cm and at least 25 mm thick. The maximum load shall be 2500 kN per sq.m applied in stages for 25, 50, 100, 150, 200, 300, 400, 600, 800, 1000, 1500, 2000 and 2500 kN per sq.m under each load the time vs settlement shall be recorded and plotted.

### 6.1.9 Pressure meter test

This test shall be conducted as described under Clause 5.15 for soil, subject to the following changes. The test shall be carried out till one for the following condition occurs:

a) The volume of the probe is doubled
b) Ultimate failure of rock
c) Load intensity of 8000 kN/m2 is reached without failure.

## 7.0 LABORATORY TESTING

### 7.1 Essential Requirements

a) All laboratory tests shall be conducted in an approved laboratory using approved apparatus complying with the requirements and specification of Indian Standrads or other approved standards for this class of work. It shall be checked that the apparatus are in good working condition before starting the laboratory tests. Calibration of all the instruments and their accessories shall be done carefully and precisely.

b) Depending on the type of sub strata encountered, appropriate laboratory tests shall be conducted on soil and rock samples collected in the field. Laboratory tests shall be scheduled and performed by qualified and experienced personnel who are thoroughly conversant with the work. Tests indicated in the schedule of items shall be performed on soil, water and rock samples as per relevant IS Codes indicated in Clause 4.0. One copy of all the laboratory test data records shall be submitted to the Owner progressively every week. Laboratory tests shall be carried out concurrently with field investigation since initial laboratory test results could be useful in planning the later part of field work. A schedule of laboratory tests shall be established by the Contractor and the same shall be submitted and got approved by the Engineer before starting of laboratory tests.

c) All samples, whether undisturbed or disturbed, shall be extracted, prepared and examined by competent personnel, properly trained and experienced in soil sampling, examination, testing and in using the apparatus as per the specified standards.

d) Undisturbed soil samples retained in liners or seamless tube samplers shall be taken out without causing any disturbance to the samples using suitably designed extruder just prior to actual testing. If the extruder is horizontal, proper support shall be provided to prevent the sample from breaking. For screw type extrudes, the pushing head shall be free from the screw shaft so that no torque is applied to the soil sample in contact with the pushing head. For soft clay samples, the sample from tube shall be cut by means of a high speed hacksaw to specified test length and placed over the mould before pushing the sample into it with a suitable piston.

e) While extracting a sample from a liner or tube, care shall be taken to see that its direction of

movement is the same as that during sampling to avoid stress reversal.

f) On all undisturbed soil samples tested for bulk density, water content, grain size distribution, liquid limit and plastic limit tests shall also be performed.

g) On all rock samples tested for unconfined compression test, bulk density, water absorption, point load index tests shall also be performed.

## 7.2 Tests

Tests as indicated in this specification and as called for by the Engineer shall be conducted. These tests shall include the following:

a) Tests on Undisturbed and Disturbed Samples
- Visual and Engineering Classification
- Sieve Analysis and Hydrometer Analysis
- Liquid, Plastic, and Shrinkage limits
- Specific Gravity
- Chemical Analysis
- Swell pressure and Free Swell index determination
- Proctor Compaction test
- California Bearing Ratio

b) Test on Undisturbed Samples
- Bulk Density and Moisture Content
- Relative Density (for sand)
- Unconfined Compression Test
- Box Shear Test (in case of cohesionless and c- soil)
- Triaxial Shear Tests: (depending on the type of soil and field conditions on undisturbed or remoulded samples)
  i) Unconsolidated undrained.
  ii) Consolidated Undrained Test with the Measurement of Pore Water Pressure.
  iii) Consolidated Drained.
- Consolidation test.
- Laboratory Permeability Test

c) Test on Rock Samples
- Visual classification
- Water Absorption, Porosity and Density
- Specific gravity
- Hardness
- Slake durability
- Unconfined compression test (both saturated and at insitu water content)
- Point load strength index
- Deformability test (both saturated and dry samples).

d) Chemical Analysis of Subsoil and Ground Water

## 7.3 Salient Test Requirements

a) Remolded soil specimen, whenever desired, shall be fully reworked at field density and moisture content. For conducting CBR test and triaxial test for dyke/road material the sample shall be re-moulded to 95% of standard proctor density.

b) Triaxial shear test shall be conducted on undisturbed soil samples, saturated by the application of

back pressure. Only if the water table is at sufficient depth such that chances of its rising to the base of the footing are meagre or nil, the triaxial tests shall be performed on specimens at natural moisture content. Each test shall be carried out on a set of three test specimens from one sample at cell pressures equals to 100, 200 and 300 kN/Sq.m or as required depending on the soil conditions.

c) Effective stress triaxial shear test could be either consolidated drained or consolidated undrained with pore water pressure measurement. The test shall be conducted at cell pressures of 100, 200 and 300 kN/Sq.m ensuring complete consolidation at each stage.

d) Direct shear test shall be conducted on undisturbed soil samples. The three normal vertical stresses for each test shall be 100, 200 and 300 kN/Sq.m or as required as per the soil conditions.

e) Consolidation test shall have loading stages of 10, 25, 50, 75, 100, 200, 400 and 800 kN/Sq.m. Rebound curve shall be recorded for all the samples by unloading the specimen at the in-situ stress of the specimen. Additional rebound curves shall also be recorded whenever desired by the Engineer.

f) Chemical analysis of sub-soil shall include determination of pH value; carbonate, sulphate (both SO3 and SO4), chloride and nitrate contents; organic matter, chemicals salinity and any other chemicals harmful to the foundation material. The contents in soil shall be indicated as percentage (%).

g) Chemical analysis of sub-soil water sample shall include the determination of the properties such as colour, odour, turbidity, pH value and Specific conductivity, both at 25 deg. C and chemical contents such as Carbonates, Sulfates (both SO3 and SO4), Chlorides, Nitrates, Organic matter and any other chemical harmful to the foundation material. The contents such as Sulphates, etc. shall be indicated as ppm by weight.

h) The lab CBR test shall be performed on undisturbed and remoulded sample for soaked and unsoaked condition.

i) The lab permeability test shall be performed on undisturbed and remoulded (blended with bentonite) samples as approved by the engineer. The percentage of bentonite shall be varied to achieve permeability less than 1x10-7 cm/sec.

## 8.0 REPORT

### 8.1 General

a) On completion of all the field and laboratory work, the Contractor shall submit a draft report containing Geological information of the region, procedure adopted for investigation, field observations, summarised test data, statistical average parameters for each identified layer. The report shall include detailed borelogs, subsoil sections, field test results, laboratory observations and test results both in tabular as well as graphical form, practical and theoretical considerations for the interpretation of test results, the supporting calculations/ documents for the conclusions drawn, etc. Initially, the Contractor shall submit three copies of the report in draft form for the Owner's review. The abstract of the sub-soil stratification of the project shall also be included in the report.

b) The Contractor's qualified Geotechnical engineer shall visit the Owner's Office for a detailed discussion on the draft report based on the comments of the Owner. Before submission of draft report, the Contractor's qualified Geotechnical Engineer shall give the presentation on the site investigation work completed, contents of draft report, discussion on soil strata/foundation system etc. at Owner's Office. During the discussions, it shall be decided as to the modifications that need to be done in the draft report. Thereafter the Contractor shall incorporate in the report the agreed modifications as suggested by the Owner and submit the revised draft report for Owner's approval. Upon Owner's approval, the final report shall be submitted in digital form. The approved report shall also be submitted on three computer compatible compact discs (CDs).

c) The detailed final report based on field observations, in - situ and laboratory tests shall encompass theoretical as well as practical considerations to arrive at foundations of different types of structures envisaged in the area under investigation. The Contractor shall acquaint himself about the type of structures, foundation loads and other information required from the Engineer.

## 8.2 Data to be furnished

The report shall also include but not be limited to the following:

a) A plot plan showing the locations and reduced levels of all field tests e.g. bore holes, trial pits, static cone penetration tests, dynamic cone penetration tests, plate load tests, etc., properly drawn to scale and dimensioned with reference to the established grid lines.

b) Geological information of the area such as geomorphology, geological structure, lighology, stratigraphy and tectonics faults, seismicity of the region and site, core recovery and rock quality designation, etc.

c) Past observations and historical data, if available, for the area or for other areas with similar soil profile with similar structures in the surrounding areas.

d) A true cross section of all individual boreholes and trial pits with reduced levels and coordinates showing the classification and thickness of individual stratum, position of ground water table, various in-situ tests conducted and samples collected at different depths and the rock stratum, if met with. All soil profiles shall be presented using any latest software package.

e) A set of longitudinal and transverse soil/rock profiles vertical scale 1:200, horizontal scale 1:2000 connecting various bore holes in order to give a clear picture of the various of the subsoil strata as per IS: 6065.

f) Water level contours and Rock level contours shall be presented in any latest software package.

g) Plot of Standard Penetration Test (N values both uncorrected and corrected) with depth for identified areas.

h) Results of all laboratory tests shall be summarised (i) for each soil and rock sample in formats approved by the Engineer and (ii) in a consolidated table presenting the layer-wise soil and rock properties. All relevant charts, tables, graphs, figures, supporting calculations, conclusions and photographs of representative rock cores and trial pits shall be furnished.

i) For all triaxial shear tests, stress v/s strain diagrams as well as Mohr's circle envelopes shall be furnished. If back pressure is applied for saturation, the magnitude of the same shall be indicated. The value of modulus of elasticity, E shall be furnished for all tests along with relevant calculations.

j) For all consolidation test, the following curves shall be furnished:

k) e vs log P (with Preconsolidation pressure marked on the curve) e vs P and compression vs log t or compression vs square root of t (depending upon the shape of the plot for proper determination of coefficient of consolidation). The point showing the initial condition (eo, Po) of the soil shall be marked on the curves.

l) Values of compression index, coefficient of volume compressibility shall be furnished. The procedure adopted for calculating the compression index from the field curve and settlement of soil strata shall be clearly specified. The time required for 50% and 90% primary consolidation along with secondary settlement, if significant, shall also be calculated.

m) Pressure meter tests, the following shall be furnished:

Calibration Record including:

Description of membrane and sheath on probes, Dimensions of thick walled cylinder, Length of flexible tubing, Calibration curves, Temperature.

Drilling Record including:

Borehole number, Method of making borehole, log of soil type and condition, Depth of water in borehole, weather and temperature.

Test Record:

Type of test, Date and time, Depth of Center Point of probe, Volume readings at 30 and 60 second elapsed time and corresponding pressure readings. Notes on any deviation from standard test procedure.

Field Pressure meter, creep and air calibration curves indicating $P_o$, $P_f$ and $P_l$. Corrected pressure meter and creep curves indicating $P_0$, $P_f$, $P_l$, along with calculation for the corrections.

n) Values of cohesion, angle of internal friction, pressure meter modulus, shear modulus and coefficient of sub-grade reaction along with sample calculation. Calculation for allowable bearing pressures and corresponding total settlements, for shallow foundations specified in Clause 8.3(b) and load capacity calculation of piles in various modes.

## 8.3 Analysis and Discussion of Results

The following shall be furnished in the report.

a) Analysis of results, comparison of field and laboratory data, discussion of results, statistical average of soil parameters, viz. engineering and physical, for each identified layer.

b) For shallow foundations necessary information shall be provided to arrive at the following:

i) Net safe allowable bearing pressure for isolated square footings and continuous strip footings of sizes 1.0 to 5.0m at different founding depths of 1.0 to 5.0m, below ground level considering both shear failure and settlement criteria.
ii) Net safe allowable bearing pressure for raft foundations of widths greater than 6 m at 2.0, 3.0, 4.0 and 5.0m depth below ground level considering both shear failure and settlement criteria.
iii) Modulus of subgrade reaction, modulus of elasticity from plate load test results along with time settlement curves and load settlement curve in both natural and log-log graph.

c) For piling necessary information shall be provided to arrive at the following:

i) Type of pile.

ii) Suitable founding strata for the pile.

iii) Estimated length of pile for 500 kN (400 mm dia), 750 kN (450 mm dia), 1000 kN (500 mm dia) 1400 kN (600 mm dia), 2500 kN (760 mm dia) and 4500 kN (1070 mm dia) capacities along with relevant sample calculation.

iv) Magnitude of negative skin friction, if any.

d) Coefficient of permeability of various sub soil and rock strata based on in-situ permeability tests.
e) Cone resistance, frictional resistance, total resistance and settlement analysis for different sizes of foundation as specified in Clause 8.3(b)(i) based on static cone penetration test.
f) Electrical resistivity of sub-soil based on electrical resistance tests including electrode spacing vs commutative resistivity curve.
g) Dynamic soil properties such as dynamic shear modulus, Poisson's ratio based on cross-hole shear and seismic refraction test data.
h) Suitability of the soil for construction of roads and pavements, their stable slopes for shallow and deep excavations, active and passive earth pressures at rest and modulus of elasticity as a function of depths for use in the design of underground structures.
i) Suitability of locally available soils at site for filling and back filling purposes.
j) If expansive soil is met with removal/retainment of the same under the structures/roads etc. shall be given. In the latter case, detailed specifications of any special treatment required including specifications for materials to be used, construction method, equipment to be deployed, etc. shall be furnished.
k) Chemical nature of soil and ground water with due regard to potential deleterious effects on concrete, steel and other building materials, etc. shall be dealt in detail.
l) Susceptibility of sub soil strata to liquefaction, if any, in the event of an earthquake.
m) Any other information of special significance like dewatering schemes, etc.
n) Additional soil investigation beyond the scope of the present work if the Contractor considers such investigation is necessary.

## 9.0 RATES AND MEASUREMENTS

The clauses below shall apply for item rate contracts only. They shall not be applicable to turn key and lumpsum contracts, except for work beyond the scope of such contracts.

### 9.1 Rates

a) The item of work in the Schedule of Quantities describes the work very briefly. The various items of the Schedule of Quantities shall be read in conjunction with the corresponding sections in the technical specifications including amendments and additions, if any. For each item in the Schedule of Quantities the bidder's rates shall include for the activities covered in the description of the items as well as for all necessary operations in details described in this technical specification.
b) No claims shall be entertained if the details shown on the released for construction drawings differ in any way (e. g. location and depth for tests, number of tests, etc.) from shown on the tender drawings, if any.
c) The unit rates quoted shall include minor details which are obviously and fairly intended, and which may not have been included in these documents but are essential for the satisfactory completion of the work.
d) The bidders quoted rates shall be inclusive of providing all plant equipments, men, materials, skilled and unskilled labour; making observations, mobilisation of men and materials, establishing the ground level and coordinates at location of each bore hole, test pit, etc., by carrying levels from one established bench mark and distances from one set of grid lines furnished by the Owner. Also, no extra payments shall be made for conducting the Standard Penetration Test; Collecting, packing, transporting of all samples and cores; recording of all results and submitting them in approved formats.
e) The quoted rates for pits/plate load test shall be inclusive of shoring / strutting, dewatering and backfilling.
f) Rates quoted for pump out test shall be inclusive of boring of well of
g) 400 mm dia, providing and installation of perforated GI pipe and observation pipes etc. for draw down depth as specified in the drawings, and as per specification.
h) Rates quoted for conducting cross hole shear test shall be inclusive of boring providing PVC pipes,

preparation of bore including shot hole and receiver holes, providing geo-phones, measurement through seismograph, etc. upto the depth specified and as per specification.

i) The quoted rates for drilling in rock shall satisfy the requirements of Clauses 5.1.1(b) and 6.1.

j) The rates quoted by the bidder for laboratory tests shall include preparation of sample, performing tests, recording and analysis of data and submission of one set of the above information to Owner's Office, every week after completion of tests.

### 9.2 Measurements

a) All measurement shall be in Sl units.

b) Length shall be measured in meters (m) correct to two places of decimals. Areas shall be worked out in square meters (Sq.m.) and volume in cubic meters (Cu.m), rounded off to two decimals.

c) Certain tests have to be conducted in bore holes, trial pits, etc. Such bore holes, trial pits, etc., shall be measured only once and not again just because tests are conducted therein.

d) The depth of penetration due to SPT at the bottom of bore hole shall not be considered for the measurement of bore hole depth.

e) Measurement for the item of pump out test shall be done in numbers.

f) Pits shall be measured in Cu.m. The lateral dimension for measurement purposes shall be the least of the following :

   i. actual excavation outline

   ii. 0.3 m on all sides beyond the pit size of 2 m x 2m for depths upto 1.0 below existing grade and 1.0 m on all sides beyond the pit size of 2 m x 2 m at the bottom for depth more than 1.0 m below existing grade.

For measurement purposes the sides shall be considered vertical with the lateral dimension indicated above. Northing extra would be payable for slope etc. irrespective of whatever is provided.

g) Pre-boring done for carrying out Static Cone Penetration Test shall not be measured.

h) Coring in rock with a diamond bit shall be measured in metres (m), correct to two decimal places, for the actual cored length satisfying the requirements of Clauses 5.1.1(b) and 6.1.

## 10.0 Service Specification

| Sl. No. | Service Text | Service Long Text |
|---|---|---|
| **Geotechnical Investigation** | | |
| **1.** | Mobilization & demobilization | Mobilisation of necessary equipment, men and materials to the project site for carrying out the geotechnical investigation and demobilization of the same after completion of all the field works etc. all complete as per specification, drawing and as directed by the engineer. |
| **2.** | 150mm boreholes on ground upto 25m depth | Making 150 mm nominal diameter boreholes at various locations in all types of soil/ash including laterite using suitable approved method of boring including chiseling, cleaning, providing casing pipe as required or as directed; performing Standard Penetration Test at every 3.0 m interval and at change of strata; collection of water samples and disturbed soil samples, observation such as ground water, etc., collection of undisturbed soil samples at every 3.0 m interval and at change of strata; transportation of all the collected samples to the laboratory and back filling of boreholes on completion of the same, complete as per specification and instructions of the Engineer, for depths below natural ground level as given below: From natural ground level to 25.0 m depth. |
| **3.** | 150mm boreholes in water upto 25m depth | Making 150 mm nominal diameter boreholes at various locations in all types of soil/ash including laterite using suitable approved method of boring including chiseling, cleaning, providing casing pipe as required |

| Sl. No. | Service Text | Service Long Text |
|---|---|---|
| | | or as directed; performing Standard Penetration Test at every 3.0 m interval and at change of strata; collection of water samples and disturbed soil samples, observation such as ground water, etc., collection of undisturbed soil samples at every 3.0 m interval and at change of strata; transportation of all the collected samples to the laboratory and back filling of boreholes on completion of the same, complete as per specification and instructions of the Engineer, for depths below natural ground level as given below: In water body (river/nala/canal etc.) upto water depth of 6 m using staged/fixed platform. From bed level to 25.0 m depth. |
| **4.** | Trial pits upto 4m deep in soil/1m in rock | Excavating trial pits at various locations of size specified by Engineer upto 4.0 m depth in all types of soils/ash and 1.0m depth in weathered rock which can be excavated with pick axe/crow bar, including sheeting or shoring the sides for stability, dewatering and maintaining the pit dry at all times, handling, transporting and stacking of excavated material upto a lead of at least 50.0 m, collecting disturbed/undisturbed samples at 1.0 m intervals and conducting in-situ density tests at every 1.0 m interval and at final depth, collecting water samples and transporting all soil and water samples to the laboratory, backfilling of the pit as per the directions of the Engineer, complete as per specification. |
| **5.** | Field permeability test by constant head | Conducting field permeability test at various locations in bore holes or pits at various depths including providing packers as required, etc. as per specification and directions of the Engineer. The cost of boreholes and trial pits, including maintaining them dry and backfilling, shall be paid separately under Item Nos. 2 or 3 and Item No. 4, as applicable. a) Pump in test in borehole by constant head or falling head method. |
| **6.** | Field permeability test by percolation | Conducting field permeability test at various locations in bore holes or pits at various depths including providing packers as required, etc. as per specification and directions of the Engineer. The cost of boreholes and trial pits, including maintaining them dry and backfilling, shall be paid separately under Item Nos. 2 or 3 and Item No. 4, as applicable. b) Percolation test in trial pit. |
| **7.** | Electrical resistivity tests | Conducting Electrical resistivity tests at various locations all complete as per specification and directions of the Engineer. |
| **8.** | Core drilling in rock on ground | Core drilling in rock using rotary drill and double tube core barrel with diamond bit including collection of core samples, performing SPT at locations where core recovery is less than 20%, maintaining continuous record of core recovery/RQD, keeping the cores in wooden core boxes, transporting to laboratory, back filling on completion of the same, all complete as per specification and instructions of the Engineer. On Ground. |
| **9.** | Core drilling in rock in water | Core drilling in rock using rotary drill and double tube core barrel with diamond bit including collection of core samples, performing SPT at locations where core recovery is less than 20%, maintaining continuous record of core recovery/RQD, keeping the cores in wooden core boxes, transporting to laboratory, back filling on completion of the same, all complete as per specification and instructions of the Engineer. In water body (river/nala/canal etc.) upto water depth of 6 m using staged/fixed platform. |

| Sl. No. | Service Text | Service Long Text |
|---|---|---|
| **10.** | Field permeability rock Single packer | Conducting field Permeability test in rock in drill holes at various depths all complete as per specification and directions of the Engineer. The cost of boring through soil/ash and core drilling in rock shall be paid separately under Item Nos. 2 or 3 and Item Nos. 8 or 9, as applicable. Single Packer Method. |
| **11.** | Lab test- Soil/Ash Sample | Conducting various laboratory tests on soil/ash samples at an approved laboratory including preparation of soil samples to determine the following properties of soil, all complete as per specification.<br><br>a) Bulk Density and Moisture Content<br>b) Sieve Analysis<br>c) Hydrometer Analysis<br>d) Liquid Limit and Plastic Limit<br>e) Shrinkage Limit<br>f) Specific gravity<br>g) Standard proctor compaction test<br>h) Swell Pressure<br>i) Free Swell Index<br>j) Unconfined Compressive Strength<br>k) Direct Shear Test<br>l) Triaxial Shear Test<br>m) Unconsolidated Undrained Test<br>n) One-Dimensional consolidation test<br>o) Chemical Analysis<br>p) Laboratory Permeability Test<br><br>i. UDS<br>ii. 2% Bentonite blended sample<br>iii. 4% Bentonite blended sample<br>iv. 6% Bentonite blended sample |
| **12.** | Chemical tests on water | Conducting chemical tests on water samples to determine the Carbonate, Sulphate, chloride, and Nitrate contents, pH value, turbidity, organic matter and any other chemicals harmful to foundation material, all complete as per specification. |
| **13.** | Lab test – rock Sample | Conducting laboratory tests on rock samples including preparation of the samples to determine the following properties, all complete as per specification.<br><br>a) Moisture content, porosity & Density<br>b) Specific gravity<br>c) Hardness<br>d) Soundness<br>e) Slake Durability index<br>f) Unconfined compression test (both at saturated and in-situ water content<br>g) Point load strength index |
| **14.** | Report preparation & submission | Submission of the geotechnical investigation report as per Clause 8.0 and as per the requirement and direction of EIC. |
| **Topographical Survey** | | |
| **1.** | Mobilization & | Mobilisation of necessary equipment, men and materials to the |

| Sl. No. | Service Text | Service Long Text |
|---|---|---|
| | demobilization | project site for carrying out the survey work and demobilization of the same after completion of all the field works etc. all complete as per specification, drawing and as directed by the engineer. |
| **2.** | Fixing Control Station | Determination of exact Latitude and Longitude of selected ground control point using Differential Global Positioning System (DGPS) within the area to be surveyed. |
| **3.** | Carrying out the Topographical Survey | Carrying out the Topographical Survey and allied works of the Ash Pond and route for pipeline from plant boundary to ash pond as shown in the Technical Specification including taking spot levels at interval of 10 m to develop contour lines at 0.5 m intervals, preparation of survey maps indicating grid lines, etc., all complete as per the specification and direction of Engineer-In-Charge. |
| **4.** | Construction of BM Pillars | Construction of PCC (M20 Grade), reference pillars of size 200 mm × 200 mm × 750 mm, projecting 250 mm above ground with 50 mm square × 6 mm thick MS plate (with suitable anchor and painted with anticorrosive paint) at top of pillar with marking of coordinates and reduced levels, including all labour and materials, associated earthwork etc., all complete as per the specifications and as per the direction of Engineer-In-Charge. |
| **5.** | Submission of Drawing/Report | Preparation and submission of draft drawing in soft copies and final drawing in hard copies and soft copies on Digital Compact Disk/Pen Drive after the approval of draft report including all field records, calculations etc., all complete as per specification. Final drawing shall be submitted after incorporating comments on the draft drawing. |
| **6.** | Clearing Jungle | Clearing the area of deep wild vegetation, jungle, forestation etc. as required for survey, work including labour, tools, plants, sickles etc. complete and as directed by E.I.C. |