



TENDER ID : BHU/P&E/05/2024-25/03

DATE:23.05.2024

STATE BANK OF INDIA

Local Head Office
III/1,Pt. J. N. Marg,Bhubaneswar

TENDER ID: BHU/P&E/05/2024-25/03

TENDER DOCUMENT

PROJECT:

**PROPOSED CONSTRUCTION OF STATE BANK OF INDIA OF LEARNING
& DEVELOPMENT (SBILD) AT BURLA, SAMBALPUR DISTRICT**

GEO TECHNICAL INVESTIGATION

On Behalf of STATE BANK OF INDIA

CONSULTANT: Vastukar, Architects & Project Consultants,

Plot.2845, Nageswar Tangi, Bhubaneswar-751002, Odisha

Phone:0674-2435060/9437035988, Email: vastukar_architect@rediffmail.com

PART – A: TECHNICAL BID

TENDER SUBMITTED BY:

NAME : _____

ADDRESS : _____

DATE : _____



STATE BANK OF INDIA

AGM (Premises & Estate)

Local Head Office

III/1,Pt. J. N. Marg, Bhubaneswar

NOTICE INVITING TENDER

State Bank of India, Local Head Office, Bhubaneswar, invites “online E-tenders” from reputed registered Firms/ Proprietary Firms having at least seven years’ experience in field of Geotechnical Investigation works for carrying out geotechnical investigation works at plot located at **SBILD AT Burla, Sambalpur District**. The pre-qualification criteria, scope of the services to be offered, terms and conditions and the detailed format etc. can be downloaded from our website www.sbi.co.in <Link> SBI in the news> Show More>. Last date of submission of complete application form along with all attachments is **<01.06.2024>** up to 3.00 PM. SBI will not be responsible for late receipt of application due to postal delay or any other reason/s. In-complete applications are liable to be rejected summarily. Bank reserves the right to accept or reject any or all applications without assigning any reason there for.

Place: - Bhubaneswar

Assistant General Manager (P&E)



STATE BANK OF INDIA

EXPRESSION OF INTEREST FROM
VENDOR/CONTRACTOR FIRM
FOR

PROVIDING GEOTECHNICAL INVESTIGATION WORK CONSULTANCY SERVICES FOR
CONSTRUCTION OF STATE BANK OF INDIA OF LEARNING & DEVELOPMENT (SBILD AT
BURLA, SAMBALPUR FOR

PLOT AREA ADMEASURING APPROXIMATELY AREA = 2.0 ACRES, PLOT.NO.5822(P),
KHATA NO.845, MZ: BURLA TOWN UNIT.NO.3, SAMBALPUR, ODISHA
THE SHAPES OF THE PLOT SBILD AT BURLA, SAMBALPUR DISTRICT IS AS UNDER



NOTICE INVITING e-TENDER

Date : **23/05/2024**

TENDER ID : BHU/P&E/05/2024-25/03

State Bank of India invites “online e -tenders” from the reputed Vendors for carrying out soil investigation works at plots located at **SBILD AT BURLA, SAMBALPUR DISTRICT, ODISHA**

NOTE :

1. The reputed vendor having minimum Seven years’ experience in this field are only eligible to participate in the bidding process.
2. Intended vendors have to submit **“Online Tender”** with EMD failing Bid which their tenders may not be considered.

The details of tender are as under:

| Sl No. | Particulars | Details |
|--------|--|---|
| 1 | Name of work | GEOTECHNICAL INVESTIGATION WORK FOR CONSTRUCTION OF STATE BANK OF INDIA LEARNING & DEVELOPMENT (SBILD) AT BURLA, SAMBALPUR DISTRICT |
| 2 | Nature of Work | GEOTECHNICAL INVESTIGATION WORK |
| 3 | Time allowed for completion | 15 Days |
| 4 | Earnest Money Deposit | Rs. 9,000.00 (Rupees Nine Thousand Only) By Demand Draft / Pay Order from any Scheduled Bank drawn in favour of “State Bank of India” Payable at Bhubaneswar. |
| 5 | Initial Security Deposit (ISD) | 2% of contract amount (EMD will be returned on receiving ISD). The successful bidder(s) shall be responsible to deposit Initial security deposit @ 2% of the Cumulative Contract Value of the work by way of demand draft in favour of “State Bank of India” Payable at Bhubaneswar within 07 days from the date of receipt of “Letter of Intent” from Architect Firm. |
| 6 | Date of issue of tender documents from the Bank’s / service provider’s website | Tender documents are to be downloaded from the Bank’s website(www.sbi.co.in) <Link> SBI in the news> show more> Geotechnical or SBI e-Tender Portal www.tenderwizard.com/SBIETENDER |
| | (a) Technical Bid | 23/05/2024 to 01/06/2024 Available at www.sbi.co.in portal <link> SBI in the news >Show More |
| | (b) Online Price Bid | From 24/05/2024 to 01/06/2024 (3.00 pm) Available at M/s Antares systems Ltd. our Service Provider’s portal www.tenderwizard.com/SBIETENDER |
| 7 | Last date and time for receipt of written queries for clarification from bidders in Pre-bid meeting. | Up to 3.00 PM on 01/06/2024 |
| 8 | Pre-Bid Meeting | At 3:00 PM on 27/05/2024 at Address mentioned in point no. 12 below. (Only written queries submitted by the bidders till stipulated date and time shall be discussed and clarified in the meeting) |
| 9 | Date of posting of clarifications on the Bidder’s queries. | 27/05/2024 (Clarifications, if any, shall be posted only on the e- tender portal. No individual communication shall be provided to the Bidder). |

| | | |
|----|---|--|
| 10 | Last date & time for submission of Hard copy of Technical Bid along with Original copy of EMD& Online Price Bid. | Up to 03:00 PM on 01/06/2024 Note: It is sole responsibility of the bidder to ensure submission of their EMD in the prescribed form at this office by stipulated date failing which the tender will be rejected summarily without assigning any reason thereof. |
| 11 | Address for submission of EMD and Technical Bid in Hard Copy. | Assistant General Manager (P&E), State Bank of India, SBI, LHO P&E, III/1, Pandit Jawaharlal Nehru Marg, Bhubaneswar-751001. |
| 12 | Date and Time for opening of Technical Bid | 01/06/2024 after 04:00 PM by M/s Antaras Systems Limited |
| 13 | Date and Time for opening of online Price Bid | Date and Time of opening of Price Bids will be informed to the eligible vendors only after scrutiny of the Technical Bids by way of Phone call, SMS, E- Mail Etc. |
| 15 | Validity of offer | 90 days from the date of opening of Price-bid. |
| 17 | Liquidated Damages | 0.50% per week subject to max. 5% of contract amount for delay incompletion of work. |
| 18 | Payment of Bills | <ul style="list-style-type: none"> i. The Vendor shall submit Tax Invoices/Bills along with reports to SBI, LHO, Bhubaneswar, on successful completion of work. ii. The payment shall be made by the Bank online in the bidders account within 30 working days from the date of receipt of the following: <ul style="list-style-type: none"> (a) Tax Invoice/Bill (b) Work completion certificate issued by the Project Architect/Consultant. (c) Soil Investigation Report |
| 19 | Retention Money | 5% of Contract Value/actual cumulative Invoice value at the Bank in the form of Bank Guarantee (BG) issued by any Scheduled Bank, as per format supplied/approved by the SBI. Till such time BG is submitted, the SBI shall be at liberty to retain the equivalent sum from the Bills of the Vendor (which will subsequently be released by the Bank on receipt of BG). BG will be retained with the Bank till the entire project is completed. |
| 20 | Release of Initial Security Deposit | ISD shall be released to the bidders by the BANK on successful completion of work. EMD of unsuccessful bidders will be returned within 30 days after finalization of L1 vendor. |
| 21 | e-Tender Service Provider Contact persons | <p>Service provider: < Enter e-Tender Service Provider Address and Contact Persons Details of Mobile and E-Mails></p> <p>M/s Antaras Systems Limited, Registered Office : # 24 Sudha Complex, 3rd Stage, 4th Block, Bangalore – 560079, Karnataka.Ph.: 080-49352000 / 40482000 Fax: 080-49352034</p> <p>Help Desk: 9073677150/ 9073677151/ 9073677152/033 4604 6611</p> <p><u>Contact Persons:</u> (On working days 9 AM to 6 PM)</p> <p>1. Mr. Kushal Bose Mobile No.: +91 7686913157 e-Mail: kushal.b@antaressystems.com</p> <p>2. Mr. Tousik Ghosh Mobile No.: +91 9674758724 e-Mail: tousik.g@antaressystems.com</p> |

22. Conditional tenders shall be summarily rejected.

23. SBI reserve their rights to accept or reject any or all the tenders, either in part or whole without assigning any reason(s) for doing so and no claim/correspondence shall be entertained in this regard.

24. In case the date of opening of tenders is declared as a holiday, the tenders will be opened on the next working day at the same time.

25. No advance on materials/plant/machinery or mobilization advance shall be paid in any circumstances.

26. In case the date of opening of tenders is declared as a holiday, the tenders will be opened on the next working day at the same time.

27. Bank reserves its rights to accept/reject any/all tender without assigning any reason whatsoever and can increase or decrease the quantities of any item and contractor has to execute the same at the quoted rates.

Yours Faithfully,

Sd/-

For Assistant General Manager (P&E)

**Vastukar
Architects and Project Consultants
2845, Nageswar Tangi, Bhubaneswar-751002**

LETTER OF DECLARATION

To

The Assistant General Manager (P&E)

Premises & Estate Dept, Local Head Office III/1,

Pandit Jawaharlal Nehru Marg, State Bank of India, Bhubaneshwar-751001

Dear Sir,

Having examined the BOQ, specifications, and schedule of quantities relating to the works specified in the NIT for the project and memorandum hereinafter set out and having visited and examined the site of the works specified in the said memorandum and having acquired the requisite information relating thereto as affecting the tender, I/We hereby agreed to execute the works specified in the said memorandum at the rates finally quoted by us through online bidding process and in accordance in all respects with the specifications, design, drawings and instructions in writing referred to in conditions of tender, the Articles of Agreement, Special Conditions, Schedule of Quantities and in all other respects in accordance with such conditions so far as they may be applicable.

MEMORANDUM

| S. N. | Particulars | Brief details |
|-------|---|--|
| 1 | Description of work | Geotechnical Investigation Work for construction of State Bank Of India Learning & Development (SBILD) at Burla, Sambalpur District |
| 2 | Earnest Money | Rs. 9, 000.00 (Rupees Nine Thousand Only) by means of Demand Draft / Pay Order from any Scheduled Bank, drawn in favour of "State Bank of India" Payable at Bhubaneswar. |
| 3 | Percentage, if any, to be deducted from Bills | 5% (Five Percent) of Contract value/Cumulative Invoice Value. |
| 4 | Time allowed for completion of the Work | 15 (Fifteen) days from the date of written order from Architect Firm to commence the work. |

Should this tender be accepted, I/we hereby agree:

- (i) I / We have deposited a sum of **Rs. 9,000.00 (Rupees Nine Thousand Only)** as Earnest Money with the along with our tender. We, here by, also submit our written concurrence to deposit specified sum of Initial Security Deposit within the specified time limit for due fulfillment of contractual revisions.
- (ii) We understand that both EMD and ISD amount deposited by us/to be deposited shall not to bear any interest. Should/We fail to execute the Contract when called upon to do so I / We do hereby agree that this sum (EMD and ISD) shall be forfeited by State Bank of India.
- (iii) To abide by and fulfill the terms and provisions of the said conditions of Contract annexed hereto so far as they may be applicable or in default thereof to forfeit and pay to SBI, the amount mentioned in the said conditions.
- (iv) We understand that as per terms of this tender, the SBI may consider accepting our tender in part or whole or may entrust the work in phases. We, therefore, undertake that we shall not raise any claim / compensation in the eventuality of Bank deciding to curtail/reduce the scope of work of this tender at any stage during the contract period. Further, we also undertake to execute the work entrusted to us in phases on our approved rates and within the stipulated time limit without any extra claim for price escalation.
- (v) We, here by, also undertake that, we will not raise any claim for any escalation in the prices of any of the material during the currency of contract/execution/completion period.

Signature of Vendor with Seal

Name:

Contact details:

TENDER SCHEDULE

| | |
|---|--|
| Availability of Tender document | : 23/05/2024 to 31/05/2024 In Bank's web site |
| Date of Pre-bid meeting & Site Visit | : Site Visit from 23/05/2024 to 31/05/2024 during the period from 10:30 to 16:00 Hrs in consultation with the Project Architect. |
| Date and time for submission of tender | : 01.06.2024 upto 3pm |
| Date and time of opening of Technical Bid | : 01/06/2024 at 4 pm |
| Address for Communication | : Assistant General Manager (P&E), Premises & Estate Dept, Local Head Office III/1, Pandit Jawaharlal Nehru Marg, State Bank of India, Bhubaneswar-751001. |

The complete tender documents can be downloaded from the State Bank of India website i.e www.sbi.co.in under "procurement" news section. Technical bid to be submitted by interested eligible tenderer along with the requisite EMD of **Rs.9,000.00 (Rupees Nine Thousand Only)** in the form of a Demand Draft issued by any Nationalized/Scheduled Bank drawn in favour of "State Bank of India" payable at Kolkata. Tender documents without Earnest Money Deposit (EMD) shall be rejected summarily. SBI reserves the right to increase or decrease the quantum of services to be provided and also reserves the right to reject, cancel or revise or accept any or all the tenders or part of tenders without giving any reasons thereto.

Sd/-

For Assistant General Manager (P&E)

VASTUKAR
Architects & Project Consultants
2845, Nageswar Tangi, Bhubaneswar-751002

GENERAL

State Bank of India (SBI) invites “online E-tenders” from reputed registered firms/Proprietary Firms having at least seven years’ experience in field of soil investigation works for carrying out soil investigation works **SBILD BURLA, SAMBALPUR.**

A. DETAILS OF THE PROPOSED CONSTRUCTION PROJECT/WORK: -

- i) **Name of work** : Construction Of State Bank Of India Of Learning & Development (sbild) & Guest House At Burla, Sambalpur
- ii) **Site Address** : **SBILD Burla, Sambalpur**
- iii) **Estimated Completion period of the project** : 30 Days

IV) Brief description of the projects

The project involves for construction of a multistoried Buildings Including Geo Technical Investigation works required for the Project etc.

B. ELIGIBILITY CRITERIA FOR PRE-QUALIFICATION: -

- (i) Minimum 7 years’ experience as a Vendor/Contractor as on 31.03.2024. The experience should include consultancy services for buildings such as Geotechnical Investigation .
- (ii) The vendor/Contractor should have done Soil investigation, Laboratory testing, generation of report, supervised viz. offered all types of consultancy services as in (i) above in single and/or more building projects, from inception to completion.

Preference will be given to those who have experience in soil investigation and geo- technical survey works for at least two multi storied buildings with a minimum built-uparea of about 1000sq.mt. for each for public sector organization / Bank /reputed national / multinational companies during last 7 years ending on 31.03.2024.

(iii) The vendor/Contractor should have empaneled as a Geo Technical Engineer under Bhubaneswar Development Authority with minimum 7 years experience. – **Review this point**

(iv) The partner / associates / permanent employees of the vendor/Contractor should have a valid registration and license as a Geo Technical Engineer etc. from statutory authorities’. The vendor /Contractor should also have a full-fledged office or ready to establish an office at Bhubaneswar and should have adequate number of qualified engineers and other personnel on the payroll / establishment of the company and should also have tie up arrangements with reputed registered and licensed vendor/Contractor etc.

2. The application forms must be submitted in a prescribed format as laid down in the enclosed Annexures. **Hard Copy of the Technical bid should be submitted in sealed covers named as Technical bid (offline) superscribed with the legend “Tender of Geo Technical Vendor/Contractors for State Bank of India for construction of Bank Learning and Development(SBLD) Building at Burla, Sambalpur District “to:**

Assistant General Manager (P&E),
Premises & Estate Dept,
Local Head Office III/1, Pandit Jawaharlal Nehru Marg,
State Bank of India, Bhubaneswar-751001

3. **The Price bid should be submitted online only as prescribed format given in our Service Provider’s portal www.tenderwizard.com/SBIETENDER.** The last date for submission of both Technical Bid (offline) and Price bid (Online) of completed application form in the prescribed format is **01/06/2024 up to 3.00 pm. Technical bid containing price bid (in hard copy) will be rejected summarily. The Price bid should be submitted in online mode only.**

4. SBI reserves the right to reject any or all the applications without assigning any reason therefore and no correspondence would be entertained in this regard.

5. OTHER CRITERIA: -

Vendor/Contractor firms applying for Tender must fulfill each of the above mentioned and following criteria individually as Vendor/Contractor firm. The applications of the Vendor/Contractor firms not fulfilling the said criteria shall not be considered for short listing.

- a. The Vendor/Contractor/firm should have a valid PAN/TAN of Income Tax Department & GSTN.
- b. The Vendor/Contractor/firm’s average annual turnover (For **Geo Technical** work only) during the last 7 (Seven) years ending 31st March 2024 should be **at least INR 2.60lakhs.**
- c. The Vendor/Contractor firm shall have experience of having successfully completed **Geo Technical** work for building Projects similar to the Bank’s proposed project during last 7 years ending 31 March 2023 with minimum values as any of the following:
1. Three similar Work completed Projects each cost not less than **INR 3.4 Lakhs.** OR

2. Two similar Work completed Projects each cost not less than **INR 4.3 Lakhs**. OR
3. One similar Work completed project costing not less than **INR 6.9 Lakhs**.

Definition of similar Projects: Multistoried Offices, Commercial Complexes, Hospitals, Bank Buildings, Institutional Buildings.

The firm must be registered in appropriate class/category with CPWD / MES /PSU /Nationalized Banks/PWD/Railways/Other Govt. & Semi Govt. Organizations/Construction firms of National or International repute.

5. PRE-QUALIFICATION DOCUMENTS:

- i) Availability: Copy of Press Advertisement , Pre-Qualification Notice ,and Application Form along with all details can be downloaded from Bank's website <http://www.sbi.co.in> under section "Procurement News" from **23/05/2024 to 01/06/2024**.
- ii) Submission date: **Latest by 3.00 PM on 01/06/2024**.
- iii) **Place of submission: (Technical Bid)**

Assistant General Manager(Premises & Estate),
Premises & Estate Dept,
Local Head Office III/1, Pandit Jawaharlal Nehru Marg,
State Bank of India, Bhubaneshwar-751001

6. INSTRUCTION TO VENDOR/CONTRACTOR FIRMS:

- i. Duly completed application Form along with self-attested enclosures/documentary proof as prescribed in the said application form duly signed on each page of Technical Bid(Part – "A") by the authorized signatory should be submitted in one sealed cover subscribed "Technical Bid" must reach the above-mentioned address and "Price Bid" should be submitted only by online. Please subscribe /write on the top of the Technical Bid envelope: "**Tender of Geo Technical Vendor/Contractors for construction of State Bank of India for Bank's Building**".
- ii. Any & all cost/expenditure incurred by the Vendor/Contractor firms in relation to making the application shall be borne by the Vendor/Contractor/firm. No payment by way of compensation or whatsoever shall be made by the Bank.
- iii. The Vendor/Contractor firms should strictly furnish all the information only on the formats furnished/provided/made available . The applications not complying with this requirement are liable to be rejected outright without assigning any reason as the sole discretion of the SBI.
- iv. All corrections and overwriting should be attested & countersigned by the authorized signatory of the Vendor/Contractor firm.
- v. In case Vendor/Contractor firm intends to give additional information for which specified space is not sufficient, he may furnish such information by adding extra sheets by specifying/indicating the same in the appropriate column.
- vi. Applications received after the due date & time, incomplete/partially filled/unsigned applications, applications not accompanied with relevant annexed documents, enclosures, etc. are liable to be rejected summarily without assigning any reason there for at the sole discretion of the Bank.
- vii. Please ensure that the applications, annexed documents, enclosures etc. are signed by the Vendor/Contractor firm's (Authorized Signatory) only and proof of mode of authorization (such as Power of Attorney, Partnership Deed indicating such authorization, resolution, authorization letter etc. as applicable) is enclosed as prescribed in the Application Form.
- viii. Delay in submission of any part arising due to postal or any other irregularities at any stage will not be considered. The bank will not be responsible for any damage in transit in case of postal delivery.
- ix. **Technical bid should contain application forms, formats duly filled with documentary proof, terms and conditions etc. No price/rate should be mentioned anywhere in the technical bid. Technical bids contain rates/price (In hard copy) for the said work should be rejected.**
- x. All the documents should be self-attested, and the Bank will verify with the original at the material time. All the pages of the application form duly filled in, press release, terms & conditions, annexures etc. should be signed by the authorized signatory with seal of the firm.
- xi. **Price bid should contain for the project in prescribed BOQ format item rate wise only. The prescribed item rate wise BOQ format should be downloaded from our web site and to be submitted in online mode only.**

7. OTHER TERMS AND CONDITIONS TO TENDERERS:

Tenderer to Quote for whole scope of work.

The tenderers shall quote their prices with reference to each **Item** and must tender for **whole scope of work** as per attachment to this tender.

Erasures and Alterations

Bids containing erasures and alterations in the tender documents may be rejected. All Prices shall be indicated both in words and figures. Where there is a difference between the prices quoted in words and figures, the prices given in words shall prevail.

Incomplete and late tender

Unsolicited/Incomplete/late tenders or tenders received without desired Earnest Money are liable to rejection without any further reference. Rates should be firm and exclusive of GST etc. as per Tax law in force and SBI will pay GST extra as applicable.

Validity of Tender

The rates quoted by tenderer should be valid for a period of **90 days** from the date of opening of Price Bid for the purpose of placement of LOI/Award of Work.

Earnest Money

SBI shall return Earnest Money, where applicable, to all unsuccessful tenderers after award of job. However, earnest money to successful tenderers shall be returned only after submission of Financial Guarantee for performance.

Earnest Money deposit as stated above shall be submitted in a cover to be enclosed in a Separate Envelope with Technical bid prescribe above on Envelope as "Earnest Money". EMD may be given in the form of demand draft drawn in favour of "**STATE BANK OF INDIA.**" payable at **Bhubaneswar**, drawn on / issued by any Nationalized / Scheduled Bank. The bids received incomplete/late/unsolicited/without EMD shall be considered non-responsive and shall be rejected summarily. Earnest Money Deposit in the Form of Demand Draft for **Rs.9,000/-** drawn in favour of "**State Bank of India**" Payable at **Bhubaneswar**.

No cost payable for preparing tender

The tenderers shall not be entitled to claim any costs, charges, expenses for or incidental to in connection with preparation and submission and subsequent clarification of his tender even if SBI decides to withdraw the invitation to tender or the tender is rejected on any count.

Jurisdiction

Notwithstanding any other court or courts having jurisdiction to decide the questions forming subject matter or a suit any and all actions and proceedings arising out of or relating to this contract (including any arbitration in terms thereof) shall be only in the court of competent civil jurisdiction at Bhubaneswar.

Assignment/Sub-letting

The contractor shall not assign or sub-let any part of the contract without the written consent of Owner.

Inconvenience to others

The contractor shall plan his work in such a way so as not to cause any inconvenience to public, owner and/or other contractors at site. Contractor shall be responsible for the manner and method of execution of work. The work shall be subject to the approval of owner from time to time for the purpose of determination of the question whether the work is being executed in accordance with provisions of contract.

General

In case any clarifications are required, the tenderer shall approach the Owner in writing. The Owner shall provide such clarifications in writing only. All clarifications provided shall be binding on Owner and the tenderer.

The tenderer may visit the site and acquaint himself with the site conditions before quoting.

The tenderer should make himself fully aware and examine the specifications, schedules and drawings etc. before quoting. No claim whatsoever shall be entertained by the owner in this regard.

- a. No tenderer can withdraw his tender or revoke the same within the validity period. If a tenderer withdraws or revokes his tender or revises the tender prices for any Package within the validity period, his earnest money deposit will be forfeited without prejudice to any other right/claim that owner may have against the tenderer.
- b. Tender shall be forwarded under cover of a letter type written on the tenderers letterhead and duly signed, in long hand using ink, by a duly authorized representative of the tenderer.
- c. Wherever it is mentioned "shall be done by contractor or supplied by contract" it shall be deemed to mean shall be done or supplied by contractor at his cost.
- d. At any time prior to the deadline for submission of bids, the owner for any reason, whether at its own initiative or in response to a clarification requested by a prospective bidder, may modify the bidding documents by amendment thereto.
- e. The amendment will be notified in writing or by fax or E-mail to all prospective bidders who have received the bidding documents and will be binding on them.
- f. In order to afford prospective bidders reasonable time in which to take the amendment into account in preparing their bids, the owner may, at their discretion, extend the deadline for the submission of bids.
- g. The owner may, at their discretion, extend the deadline for the submission of bids by amending the bidding documents in accordance with Articles e) to g) above, in which case all rights and obligations of the owner and bidders previously subject to the deadline will thereafter be subject to the deadline as extended.
- h. Effective date of the contract shall be handing over of clear site to the contractor however the LOI (letter of intent) shall be issued for mobilization of the site activity of the contractor.

i.

PRE-QUALIFICATION OF CONSULTANCY FIRM--- FIRM PROFILE

1. Name of the Firm:

2. Address:

3. Name, Telephone Nos. including Mobile of contact person:

4. E-mail ID and address and Fax No.:

5. Constitution of the Firm:

6. Year of Establishment:

7. Name of Partners /Associates:

8. Bio-data of Partners /Associates,

Details may be given in the enclosed format (Annexure – I)

9a. Registration Number of the Firm:

(Copy of valid registration to be enclosed)

9b. Details of GST registration:

(Copy of valid registration to be enclosed)

9c. Amount of SERVICE TAX/GST paid year-wise:

During last 5 financial years ending on 31.03.2024

10. Name and value of major Building:

Construction works completed during the Last 7 years. Details may be given in the Enclosed format (Annexure – II)

11. List of Technical Personnel employed:

12. List of other Personnel employed:

13. List of vendor/Contractors engaged by the Firm:

14. . List of office equipment owned by the company:

15. . Details of Bank account of firm

- i. Account name (exactly as it appears on statement of account)
- ii. Account number
- iii. Name of the Bank with Branch name; branch code & IFSC Code

16. . Latest Income Tax Clearance Certificate to be enclosed:

17. (a) List of registration with other Organizations:

(b) List of completion certificate etc. from the clients for completed/ongoing projects

(c) Certified copies of the letter of intent for award of the work from reputed Govt./ Govt. of undertaking / multinational organizations/ PSUS etc.

18. **It is mandatory to have an office of the firm at Bhubaneswar**, If the firm is not having its office in Bhubaneswar: Please indicate the time by which it is likely to be opened an office at Bhubaneswar with documentary evidence.

| 19 | Turnover of the firm during last 3 years (amount in lacs) | Year ended | | Turnover | |
|----|---|------------|--|----------|--|
| | | 2021-2022 | | | |
| | | 2022-2023 | | | |
| | | 2023-2024 | | | |

Note: 1. please enclose separate sheets for additional information, photographs, and documents.

2. Please enclose all the Annexes with relevant supporting documents duly self-attested.

Date:

Place:

Signature of the Vendor/Contractor with seal

Annexure – I

BIO-DATA OF THE ASSOCIATES

Use separate form for each associate.

1. Name:

With Contact Number & E-mail Id:

2. Associates with the firm since:

3. Date of Birth

4. Professional Qualifications:

5. Professional Experience:

6. Professional Affiliation:

7. Membership in:

8. Details of Published papers in Magazine:

9. Details of cost-effective methods/designs adopted in the projects:

10. Exposure to new materials/Techniques:

11. Details of Features of green buildings provided in the buildings:

12. Details of modern amenities provided in the buildings:

Note: Please enclose all the Annexes with relevant supporting documents duly self-attested.

Signature of the Vendor/Contractor with seal

Date:

Place:

Use separate form for each executive/partner/director

| | | |
|----|---|--|
| 1 | Name | |
| 2 | Designation/position | |
| 3 | Associated with the firm since | |
| 5 | Professional Qualification | |
| 6 | Professional Experience | |
| 7 | Field of expertise | |
| 8 | Contact number | |
| 9 | e-mail Id | |
| 10 | Annexure number of documents evidencing employment with the firm like EPF contribution etc. | |

Signature of the Vendor/Contractor with seal

Date:

Place:

ANNEXURE- II

LIST OF MAJOR BUILDING CONSTRUCTION WORKS COMPLETED DURING THE LAST SEVEN YEARS ENDING AS ON 31.12.2020

| Sl. No. | Name of the Client | Nature of work | Features green building and modern amenities provided | Location of the building/municipal limits | Estimated value | Built up Area in Sq.mt. | Height of the building | Date of start | Period of completion | Actual date of completion | Final value of the project | Reasons for /delay, |
|---------|--------------------|----------------|---|---|-----------------|-------------------------|------------------------|---------------|----------------------|---------------------------|----------------------------|---------------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

Note: Please enclose all the Annexes with relevant supporting documents duly self-attested.

Note:

(a) The credentials issued by the Clients shall be enclosed including letter of award of the work.

(b) The work should have been executed by the firm under the name in which they are submitting the applications.

Signature of the Vendor/Contractor with seal

Date:

Place:

TECHNICAL SPECIFICATION FOR GEOTECHNICAL INVESTIGATION

A. Scope of Work: -

This specification covers complete soil exploration work including carrying out field tests and laboratory tests to evaluate soil parameters and preparation of detailed report including the recommendation regarding the following main items

- The type of foundation system to be used.
- The depth of foundation
- Bearing capacity at the foundation strata with the permissible settlement.
- Pile capacity in case the report recommends piles for Tower Blocks.
- Suitability of the excavated earth in back filling
- Quantitative assessment of chlorides and sulphate contents in the ground water and earth. Recommendations on the use of water for concreting and drinking purposes.
- Modulus of sub-grade reaction for the design of raft foundations.
- Other soil parameters required for design of sub-structure including retaining walls, reinforced earth walls and Basement.
- Requirements for stabilization of earth slopes in open excavation
- Electrical resistivity of soil
- Level of ground water table and its' expected seasonal variation.
- Recommendation for the composition of sub-grade for the internal road design
- Precaution to be taken for excavation
- Dewatering method to be adopted for excavation related to foundation work.

B. GENERAL

The contractor shall perform all work under the purview of this specification along with all incidentals and related work including setting out, slogging, approach to test locations, contractor's office, stores and protection of adjacent buildings, structures of services / facilities. No separate payments shall be made on such accounts. The Tenderers should therefore take into account all such relevant items while quoting his unit rates against the schedule of items.

Work to be provided by the Contractor

The work to be provided by the contractor, unless specified otherwise shall include but not limited to the following:

- a. Furnish necessary plant and equipment, tools and tackles, instruments, necessary power, fuel, water, labor, supervisions by qualified and experienced engineers and supervisors specialized in the type of investigation, transport of materials, men and equipment etc., services, full insurance and all other incidental items as may be necessary for entire and successful completion of the work as per tender terms, drawings, specifications and instruction of the owner/engineer.
- b. Locate in the field and in layout drawing all boreholes and other field investigation items.
- c. Furnish progressively and periodically field bore logs, investigation observations, test results with relevant data and features in triplicate.
- d. Prepare and submit draft (in duplicate) and final (after incorporating comments, if any) sub soil investigation report as per specification, schedule of items and instructions of the owner/his engineer.

Work to be provided by others

No work under this specification will be provided by any agency other than the contractor unless specifically mentioned elsewhere in the contract.

Location and Levels

Location of all boreholes and field test points and levels of the existing ground at such locations shall be established by the contractor at his own cost from two reference grids and one bench mark given by the owner/his engineer and these shall be subsequently plotted in the layout plan, bore logs and other relevant field test data sheets/tables to be incorporated in the report by the contractor.

Making benchmark pillar(s) and reference line pillars (whatever is required for the work) and maintaining them up to the completion of the work shall be the responsibility of the contractor at no extra cost to the owner.

Codes and Standards

The work shall be carried out as per IS Codes to be used for the soil investigation work and preparation of report. In all cases latest revision along with amendments, if any, shall be referred to:

- IS:1490 - Classification and identification of soils for General Engineering purposes.
- IS:1888 - Method of load tests on soils
- IS:1892 - Subsurface investigation for foundation
- IS:1904 - Structural safety of buildings: shallow foundations
- IS:2131 - Method for standard penetration test for soils
- IS:2132 - Code of Practice for thin walled tube sampling of soils
- IS:2720 - Methods of tests for soils
- IS:2809 - Glossary of terms and symbols relating to Soil Engineering.
- IS:3025 - Methods of sampling and testing for water used in industry
- IS:3043 - Code of Practice for earthing
- IS:4078 -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 - Presentation of drilling information and core description in foundation investigation.
- IS:4968 -Dynamic Cone Penetration Test. (Part-II)
- IS:4968 -Static Cone Penetration Test. (Part-III)
- IS:5249 -Method of test for determination of dynamic properties of soil.
- IS:5313 -Guide for core drilling observations
- IS:5529 -In situ permeability tests - tests in over-burden (Part-I)
- IS:5529 -In situ permeability tests - tests in bed rock (Part-II)
- IS:6403 -Determination of allowable bearing pressure on shallow foundations.
- IS:6926 -Diamond core drilling for site investigation for river valley projects.
- IS:6935 -Method of determination of water level in boreholes
- IS:7746 -In situ shear test on rock
- IS:8009 -Calculation of settlement of foundations-

(Part-I) shallow foundations subjected to symmetrical static vertical loads

(Part-II) deep foundations subjected to symmetrical static vertical loading.

IS: 8763 - Guide for undisturbed sampling of sands

IS: 8764 - Method for determination of point load strength index of rocks

IS:9143 -Method for the determination of unconfined compressive strength of rock materials

IS: 9179 - Method of preparation of rock specimen for laboratory testing

IS:9214 -Method of determination of modulus of subgrade reaction (k-value) of soils infield.

IS:9221 -Method for determination of modulus of elasticity and poisson's ratio of rock materials in uniaxial compression.

IS:9259 -Liquid limit apparatus for soils

IS:9640 -Specification for split spoon sampler

IS:10108-Sampling of soils by thin wall samples with stationary piston

IS:10589- Equipment for subsurface sounding of soils

IS:10837- Specification of molds for determination of relative density and its accessories.

IS:11229- Specification for shear box testing of soils

IS:11315-Description of discontinuities in rock mass - core recovery and rock (Part-II) quality.

C. SOIL EXPLORATION

Test Boring

Test Boring through different layers of soil shall be carried out by the contractor at the locations marked in the enclosed Drawing and/or at such other locations as directed by the Engineer in a manner described below.

Various methods of boring as described in IS: 1892 may be adopted. The tenderer shall furnish in his tender the complete details of the equipment and the method he proposes to follow. Minimum diameter of boring shall be 150mm.

During the boring operations if rock strata is not encountered. The boring shall be continued up to 35 m depth for five bore holes up to 30m depth for the remaining boreholes unless stated otherwise by the Engineer. If the present formation level is above the natural ground with filled-up soil, the depth of boring mentioned above shall exclude such filled-up soil.

The contractor shall describe in detail the equipment and method of boring he proposes to use. In the absence of dry boring equipment, wash boring at the discretion of the Engineer may be allowed, but the particular way of cleaning the casing by washing has to be approved by the Engineer. However, if the engineer, at any time, feels that the washing process is disturbing the samples to be taken, he may stop the work and the contractor shall have no claim whatsoever on this score. If the contractor can, however, improve the method to the satisfaction of the Engineer, he may be allowed to resume the wash boring work.

When boring cannot be advanced due to presence of hard material, it should be checked whether there is continuous strata of hard material below before resorting to drilling methods. If only a local boulder is present it should be chopped using suitable chopping bits and the debris removed and normal boring continued.

Ground water level for each hole shall be checked during boring operation and shall be recorded in bore log. Sub-soil water samples shall also be collected from each borehole and recorded. All the boreholes shall be backfilled by the contractor using sand fill as and when directed by the Engineer.

Stabilization of Boreholes

Boreholes shall be stabilized, whenever required, against caving of the sides of the drill hole and heaving of the bottom of the hole, especially in cases where the hole is carried below the ground waterlevel, by use of drive pipe or casing or by means of drilling fluids (water or mixtures of water and colloidal, gel forming thixotropic clays such as bentonite), grouting (in rock) or other suitable methods.

Tube Sampling

For obtaining undisturbed samples in its simplest form, an open drive thin wall tube sampler shall be attached to a rod and shall be lowered to the bottom after completely cleaning the borehole bottom by washing. The samplers to be used should have area ratio less than 13 percent and preferably less than 10 percent. The head should have check valve and ports to permit easy escape of drilling fluid or air from the sample tube as the sample enters it.

Sampling will be accomplished by jacking or driving the tube depending on the type of soil to be sampled. Upon completion of the sampling operation the sampler shall be withdrawn from the borehole and the sample of soil carefully taken out. Approximately one-inch length of soil is to be removed from each end for identification. If there is any surface water on the sample, this shall be wiped off with soaking paper, all sludge of cuttings from advancement of borehole removed and the sample immediately packed in an airtight, close fitting container marked with respective test bore numbers, elevation at which the sample was taken and other relevant information as per IS:1892. The size of soil test samples shall preferably be 65 mm dia x 200 mm high, but not less than 50 mm dia. x 150 mm high.

Representative / disturbed samples shall also be taken in different strata for visual classification, water content, grain size analysis, Atterberg limits, determination of specific gravity and compaction tests.

Record of Boring

Detailed chronological record of drilling and sampling operations shall be maintained in the field log and should be submitted to the owner after completion of boring work at site. The final log showing pertinent subsurface information and results of field and laboratory testing should be submitted with the soil report.

The field log should contain at least the following information:

Reference information like project number, title and location, exploration number and location by coordinates, inclination of the boring and if inclined the bearing or azimuth of the dip of the hole, reference level and datum.

- a) Personnel information – name of drilling contractor, driller and inspecting engineer.
- b) Equipment data – manufacturer’s name and model designation.
- c) Sampling and coring information:
 - i) General: Sample type and number, sampler dimension, depth at start and completion of sampling, length of sample, recovery ratio and complete visual description of each sample in “as retrieved “state.
 - ii) Drive samplers: weight and height of drop of hammer and number of blows for each 150 mm penetration.
 - iii) Push samplers: hydraulic pressure and rate of penetration.
- d) Description of material penetration but not sampled.
- e) Casing information - size, depth at which required, length and depth of bottom of casing weight and height of drop of and number of blows for each 300 mm of penetration for driven casing, and average rotational speed and downward pressure on casing and average rate of penetration for drilled casing.

- f) Seepage pressure test information-depth and duration of test.
- g) Ground water information - depth to water surface recorded daily and continued till water level has stabilized.
- h) Artesian pressure information - depth at which encountered, measured head and lime at which each measurement is made.
- i) Elevation of top and bottom of hole and top of rock.
- j) Date and time of all operations and delays with reasons.
- k) Miscellaneous information to aid interpretation of subsurface conditions.
- l) Additional pertinent information.

The final log shall be a condensation of the field log refined on the basis of field and laboratory tests. The final log should present a clear, concise and accurate picture of subsurface conditions to be utilized by the engineer.

D. PENETRATION TESTS

Penetration tests using various types of equipment as specified shall be conducted to measure the resistance of soil to penetration.

Standard Penetration Test

Standard Penetration Test (SPT) shall be carried out in accordance with IS:2131 at every change in strata or at 1.5m intervals or as directed by the engineer. The contractor shall record the number of blows for each 150 mm penetration of the standard split spoon sampler over a depth of 450 mm. The number of blows for the first 150mm of penetration shall not be considered in evaluating the penetration resistance. Hammer used for driving the sampler rod shall be 65 kg and drops of 750 mm shall be maintained. Records of the test including depth at which driving is initiated and the number of blows for each 150 mm penetration shall be shown in the field log, the final log shall indicate the actual SPT value (sum of number of blows for last 300 mm of penetration) at appropriate depths.

Static Cone Penetration Test

The test shall be carried out at locations as shown on the drawing and / or at such other locations as directed by the overall base diameter of □ Engineer. A steel cone with an apex angle of 60° giving a cross-sectional area of 10 Sq.cm. shall be pushed through soil strata through a distance in accordance with the design of the equipment and cone resistance is noted. Thereafter the cone and the friction jacket with 36 mm OD are pushed together for a distance depending upon the design of the cone and the friction jacket assembly and combined values of cone and friction resistance noted. The procedure shall be repeated up to the desired depth. Rate of penetration shall be 1 cm/sec. unless otherwise instructed by the Engineer. The test shall be carried out up to a depth of 35m.

The driving mechanism shall have a capacity of not less than 10 tones for the mechanically operated equipment. If approved by the Engineer, manually operated equipment may be used for shallow depths (Not greater than 10m) in case of soft clay layer.

The contractor shall get the dial and pressure gauges calibrated by an approved testing laboratory before commencing the actual test and produce the test certificates to the Engineer.

The test shall be carried out in accordance with IS: 4968 (Part-III), latest edition. Cone resistance and frictional resistance shall be separately provided in the report together with a borehole log.

E. GROUND WATER INVESTIGATION

Ground water investigation shall comprise determination of groundwater levels and pressures and permeability of subsurface materials. The effect of tidal variations (if applicable for the site) on ground water level shall also be observed by noting the water level in boreholes during high and low tide periods.

Ground water level observation

The contractor shall make necessary arrangements to prepare the boreholes for ground water observation. Completed boreholes should be capped and a G.I. pipe inserted in order to preserve them for future ground water observation. These observations will be taken by the contractor during the period of investigation work.

F. FIELDTESTS

In situ tests shall be performed as desired by the engineer to measure properties of soil during the field investigation work.

Plate Load Tests on Soils

The plate load tests on soil shall be carried out in the trial pits specified in enclosed Drawing and / or at such other locations as directed by the Engineer. This test is to be carried out at 1.2m below the natural ground level as indicated in the above drawing as directed by the Engineer. The plate sizes to be used shall depend on the nature of the soil, a 45 cm square plate will be used in clayey soil and in sandy soils, three plates of size varying between 30 cm to 75 cm will be used. The test shall be carried out in a manner as to give dependable assessment of bearing capacities of the soils at particular level. The results of the test shall also be used for arriving at the modulus of subgrade reaction and deformation modulus of soil.

The tenderer shall furnish in his tender the complete details of the equipment and method he proposes to follow.

The excavation and side protection during the test and back-filling after the test shall be carried out by the contractor. If 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. The cost of dewatering shall be borne by the contractor.

The contractor will submit, for approval of the Engineer, a detailed arrangement drawing for the tests and satisfy the Engineer about its adequacy in respect of strength and safety and of its being capable of giving accurate data. However, the contractor shall have to modify the arrangement at his own cost if it is ultimately found to be deficient.

The contractor must get the dial and pressure gauges calibrated by an approved testing laboratory before commencing the direct load tests at the site and produce the certificates of the tests to the Engineer. There shall be adequate number of standby gauges available at the site for quick replacement of faulty gauges. The contractor shall bring not less than two dial gauges and one pressure gauge as standby.

In no case settlement observations by means of level and staff shall be accepted.

The tests shall be carried out as described in IS:1888 unless otherwise specifically directed. The application of load may be by gravity or by reaction as detailed out in the above standard.

The test plate shall be pre-loaded with a load of 700 Kg./Sq.m. retained for a reasonable period and then replaced to take out all slacks of the arrangement. All settlement observations shall start

thereafter. Unless the ultimate bearing capacity can be calculated from the available soil data, the contractor shall assess ultimate bearing capacity of the soil under test. Increments of the load shall be of about one fifth of the ultimate bearing capacity. The increments shall continue to an extent that allows locating the 'Yield Value of the Soil' as defined in IS: 1888 or up to practicable limit of testing.

While releasing the loads, the rebounds are to be observed in a similar manner as the settlement observations.

The observations shall be recorded directly in logbooks, proforma of which has to be approved by the Engineer, who shall also be present to check the data. The Engineer shall be notified well in advance of the detailed programme of the test and shall also be informed prior to start of releasing the load so that the total settlement can be checked by him. In addition to carrying out plate load tests, undisturbed / disturbed soil samples shall also be collected at regular intervals during excavation.

The payment shall be lumpsum for each test and shall include all costs inclusive of earthwork in excavation up to 1.20m depth below natural ground level, shoring for side protection, if necessary, and back filling after the test. For the depths over 1.20m extra payments shall be made only for earthwork and shoring, if any. If water table is required to be lowered during the test, necessary diesel operated pumping arrangement will have to be provided by the contractor himself. All expenses in this connection shall be included in his quoted rates.

Test for Measurement of Soil Resistivity

For designing the earthing system for the project, it is necessary to find out the electric resistivity of the soil at some representative locations of the project site.

Soil resistivity is determined in Ohmmeter by using "WENNER'S FOUR ELECTRODE METHOD". The principle of the above method is generally as under:

Four electrodes are driven into the earth along a straight line at equal intervals of 'S'. This distance 'S' can be varied, and different readings taken for electrode spacing S = 5, 10, 15, 20 meters etc. to detect the vertical variations of resistivity at a certain location. A current I is passed through the two outer electrodes and the earth. The voltage difference, V, between the two inner electrodes is measured. The current "I" flowing into the earth produces an electric field proportional to its density and to the resistivity of the soil. The voltage V measured between the inner electrodes is, therefore, proportional to this field. Consequently, the resistivity will be proportional to the ratio of voltage to current.

If the depth of burial of electrodes in the ground is negligible compared to the spacing between the electrodes, then the soil resistivity.

Test for Measurement of Soil Resistivity(contd.)

$$= 2 \times 3.14 \times S.V / I$$

Where, Resistivity of soil in Ohmmeter

S = Spacing between electrodes in meter

V = Voltage difference between two inner electrodes in volts. I = Current flowing through two outer electrodes in amp.

Earth testers normally used for the above purpose comprise the current source and meters in a single instrument and directly read the resistance. Such an instrument is known as four terminal meggar. Using such megger for measurement, above formula becomes

$$= 2 \times 3.14 \times S.R.$$

where R is meggar reading in Ohms.

Depths of burial of electrodes shall not be more than 1/20 or the spacing between the electrodes.

Correction of the test results should be done, if necessary, using the method outlined in IS :3043.

The location and number of the test points are shown in the plant layout. The number shall be increased if the test results obtained in different locations show a significant difference.

G. FIELD DETERMINATION OF CALIFORNIA BEARING RATIO

The test shall be carried out at locations as shown on the drawing or at locations as directed by the engineer. The test shall be carried out at a depth of 500mm or at appropriate depth as per the instruction of the Engineer-in-charge below the finished ground level.

The Contractor shall submit, for approval of the Engineer complete detail of the equipment and the method he proposes to use. However, the contractor shall have to modify the arrangement at his own cost if it is ultimately found to be deficient.

The surface area to be tested shall be exposed, cleaned of all loose and dried material, leveled and then soaked till saturation with a surcharge weight of 15 kg. After soaking is complete, the test surface shall be drained of all free water and allowed to stand for at least 15 minutes before starting further operations.

The test shall be carried out strictly in accordance with the provisions as laid down in IS: 2720 (Part XXXI) latest edition. Surcharge weights of 15 kg. including that of the annular weight of 5 kg. shall be applied before application of load on the penetration piston. Load shall be applied on the penetration piston such that the penetration is approximately 1.25 mm/min. The load readings shall be recorded at penetrations of 0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 7.5, 10.0 and 12.5 mm. The maximum load and penetration shall be recorded if it occurs for a penetration of less than 12.5mm.

After completion of the test, a sample of soil shall be taken from the point of penetration for moisture content determination. In place density shall also be determined. From the plot of load penetration curve, after necessary correction, the bearing ratios shall be calculated for penetrations of 2.5mm and 5mm. If the bearing ratio at 2.5mm penetration is greater than that at 5mm penetration the former shall be taken as the bearing ratio. If bearing ratio at 2.5 mm penetration is less than that at 5mm penetration, the test shall be repeated and if the ratio at 5 mm penetration is consistently greater than that at 2.5mm penetration, the ratio at 5mm penetration shall be taken.

H. LABORATORY TESTS ON SOIL SAMPLES

The contractor shall carry out the tests as listed out in the Schedule of Items, and/or as decided by the Engineer, in laboratory. He shall furnish the name(s) of laboratories where he proposes to have the tests carried out and have them approved by the Engineer.

The owner shall have the right of access to contractor's laboratory and / or any other laboratory where tests have been arranged to be carried out during the progress of this investigation.

Adequate volume of test samples of soil shall have to be collected from site and stored, labeled and transported carefully to the approved laboratory for carrying out the tests. The method and procedure of testing to be followed shall be as per the relevant Indian Standard Codes of Practice. The results of the tests shall be submitted to the Engineer in sextuplicate duly signed by the laboratory-in-charge.

Following laboratory tests shall be carried out.

- a) Bulk density & dry density shall be carried out.
- b) Sieve analysis.
- c) Hydrometer analysis.
- d) Liquid limit & Plastic limit.
- e) Shrinkage limit.
- f) Specific gravity.
- g) Free swell index.
- h) Relative density (for sand).

- i) Unconfined compressive strength.
- j) Direct shear test.
- k) Triaxial shear test
- l) One dimensional consolidated test.
- m) Chemical ratio.

I. REPORT ON SUB-SOIL INVESTIGATION

General

- a) On completion of all the field and laboratory work, the contractor shall submit a formal report containing geological information of the region, procedure adopted for investigation, field observations, summarized test data, conclusion and recommendations. The report shall include detailed bore logs, 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 calculation for the conclusions drawn etc. Initially, the contractor shall submit two (2) copies of the report in draft form for the owner's review.
- b) The contractor's qualified geotechnical engineer shall visit the owner's corporate office for a detailed discussion on the owner's comments on his draft report. 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 his report the agreed modifications and after getting the amended draft report approved, five (5) copies of the detailed final report shall be submitted along with one set of reproducible of the graphs, tables , etc.
- c) The detailed final report based on field observations, in-situ and laboratory tests shall encompass theoretical as well as practical considerations for foundations for different type of structures envisaged in the area under investigations. The contractor shall acquaint himself about the type of structures, foundations loads and other information required from the Engineer.

Data to be Furnished

The report shall include the enlisted items but not be limited to them.

- a) Purpose and scope of investigation
- b) Authorization enabling the contractor to carry out the work at the site.
- c) Project description including proposed facilities and construction materials required for the works.
- d) Description of the site which shall include
 - i) Location of the site and existing facilities
 - ii) Topography of the site
 - iii) Drainage Characteristics
- e) A plot plan showing the locations and reduced levels of all field tests e.g., boreholes, static cone penetration tests, plate load tests etc., properly drawn to scale and dimensioned with reference to the established gridlines.
- f) A true cross section of all individual bore holes with reduced levels and coordinates showing the classification and thickness of individual stratum, position of groundwater table, various in-situ tests conducted, and samples collected at different depths

and the rock stratum, if met with.

- g) A set of longitudinal and transverse profiles connecting various boreholes shall be presented in order to give a clear picture of the site, how soil/rock strata is varying vertically and horizontally.
 - h) Geological Information
 - i) Regional geology - geologic province, topographic position of site, processes of formation of subsurface materials at site.
 - ii) Description of overburden and bear rock at the site (if applicable for the site)
 - iii) Comments on texture and structure of rock, joints, bedding planes, fissures, weathering condition etc. (if applicable for the site.)
 - iv) Effect of geologic features on design.
 - i) Past observations and historical data, if available, for the area or for other areas with similar profile or for similar structures in the nearby area.
 - j) Bore hole and trial pit logs on standard proforma showing the depths, extent of various soil strata etc.
 - k) Plot of SPT (N) value (both uncorrected and corrected) with depth.
 - l) Procedure of investigations employees - field tests and laboratory investigation.
 - m) Results of all laboratory tests summarized (i) for each sample as well as (ii) for each layer along with all the relevant charts, tables, graphs, figures, supporting calculations, conclusions.
 - n) For all triaxial shear tests stress vs. 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.
 - o) For all consolidation tests, the following curves shall be furnished:
 - e vs. log p
 - 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 co-efficient of consolidation).The point showing the initial conditions (e.p) of the soil shall be marked on the curves.
 - p) 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 settlements, if significant, shall also be calculated.
 - q) From the pressure meter test results the value of cohesion, angle of internal friction, pressure meter modulus, shear modulus and coefficient of subgrade reaction shall be furnished along with sample calculation. Calculation for allowable bearing pressures and corresponding total settlements, for shallow foundations mentioned below the capacity calculation of piles in various modes shall also be included.

Recommendations

Recommendations shall be given area wise duly considering the type of soil, structure and foundation in the area. The recommendations shall include but not be limited to the following:

- a) Type of foundations to be adopted for various structures, duly considering the sub soil

characteristics, water table, total settlements permissible for structures and equipment. Minimum depth and width of foundation shall also be recommended. The provision in relevant Indian Standard Codes indicated in Clause 3.04.00 shall be considered.

- b) For shallow foundations, the following shall be indicated with comprehensive supporting calculations:
 - i) Net safe allowable bearing pressure for isolated square and continuous strip footings of different sizes at different founding depths below ground level considering both shear failure and settlement criteria, giving reasons for type of shear failure adopted in the calculation.
 - ii) Net safe allowable bearing pressure for mat foundations at different founding depths below ground level considering both shear failure and settlement criteria.
 - iii) Rate and magnitude of settlement expected of the structure.
 - iv) Modulus of sub grade reaction, modulus of elasticity, deformation modulus from plate load test results along with time-settlement and load- settlement curves for the various footing sizes at different founding levels indicated above. The recommended values shall include the effect of size, shape and depth of foundation.
- c) If piling is envisaged, the following shall be indicated with comprehensive supporting calculations.
 - i) Type of pile and reasons for recommending the same considering soil characteristics.
 - ii) Suitable founding strata for pile.
 - iii) Estimated length and diameter of pile for various values of pile capacities. End bearing and frictional resistance shall be indicated separately. Group action shall be considered as applicable.
 - iv) Magnitude of negative skin friction, if any, to be considered in pile design.
- d) Recommendations on foundations for special structures like tanks, transformers, sub-station structure etc.
- e) Recommendations regarding bases of roads and pavements.

Additional Recommendations

- a) Cone resistance, frictional resistance, total resistance, relation between cone resistance and SPT (N) value and settlement analysis for different footing sizes based on CPT/SPT.
- b) Electricity resistivity of sub-soil based on electrical resistivity tests including electrode spacing vs cumulative resistivity curve.

- c) Coefficient of earth pressure at rest and stress strain modulus of soil.
- d) Recommendations regarding earth pressure as a function of depth below grade as applied to side walls of underground structures. Values of co-efficient of permeability shall be included in the report
- e) Recommendations regarding method and slope of deep excavations.
- f) Recommendations regarding stability of slopes, during excavations Etc.
- g) If expansive soil is met with recommendation on removal or retainment of the same under the structures / roads etc. shall be given, in the latter case detailed specification of any special treatment required including specification for materials to be used, construction method, equipment to be deployed etc. shall be furnished.
- h) Susceptibility of sub soil strata to liquefaction in the event of earthquake and recommendation on remedial measures, if necessary.
- i) Information of special significance like dewatering schemes etc. which may have a bearing on design and construction.
- j) Aggressiveness of percolating water through sub-soil / rock fissures to reinforced concrete foundation / sub-structures and also recommended protective measures, if required.
- k) Recommendation for the type of cement to be used and any treatment to the underground concrete structures based on the chemical composition of soil and sub-soil water.
- l) Recommendations on suitability of the overburden soil as material of construction of earthen embankments and in back filling or excavated pits / trenches.
- m) Recommendations for additional investigation beyond the scope of the present work if the contractor considers it necessary.
- n) Drawings :
 - i) General plan showing location of site, and Aerial geology.
 - ii) Plan showing existing features, proposed facilities, contours and locations of boring and other investigations.
 - iii) Geologic sections and soil profiles.
- o) Appendices :
 - i) Logs of subsurface explorations
 - ii) Field test results
 - iii) Laboratory test results.

TIME SCHEDULE

The time schedule for the total Geotechnical Investigation work shall be furnished by the tenderer. It is expected that the total job shall be completed within the following time schedule:

- (a) Preliminary Report within - 4 weeks
- (b) Final Report within - 2 weeks

