



**INDIAN INSTITUTE OF TECHNOLOGY MADRAS**  
**Chennai 600 036**

Telephone: (044) 2257 4824  
E-mail: rajeshnair@iitm.ac.in



Prof. Rajesh R Nair  
Project Coordinator

Ref: OEC/2020/RNAIR/WEST BENGAL  
Dated: 16.07.2020

Limited Tender No: OEC/2020/RNAIR/WEST BENGAL

**Due Date: 30.07.2020, 5:00pm**

**Pre-Bid meeting: - Not required.**

**Bid opening meeting on Due Date: 31.07.2020, 4:00pm**

Dear Sir/Madam,

On behalf of the Indian Institute of Technology Madras, offers are invited for the work of **“Seismotectonic measurements/analysis and analysis essentially consist of Seismic Hazard Analysis, Ground Response Analysis and Liquefaction Potential Evaluation of the site of about 200 Acres in West Bengal”** conforming to the specifications given in (Annexure-I).

**Terms and Conditions of Limited Tender**

- 1. Preparation of Bids:** - The Limited tenders should be submitted under **one bid system** (i.e.) Technical-cum-Financial bid.
- 2. Delivery of the tender:** - The tender shall be sent to the below-mentioned addresses either by post or by courier (duly sealed and super scribed on the envelope with the reference No and due date) so as to reach the following address before the due date and time specified in our Schedule:

**The Senior Manager,  
Project Purchase,  
IC & SR Building, 2nd floor,  
I.I.T. Madras,  
Chennai – 600 036**

**Contact Details for Bid submission: 044 2257 9798**

- 3. Price:** - The price should be quoted in net per unit (after breakup) and must include all packing and delivery charges to **Department of Ocean Engineering**.
  - a. The offer/bid should be exclusive of taxes and duties. The percentage of tax & duties should be clearly indicated separately. IIT Madras is eligible for concessional GST and relevant certificate will be issued.
  - b. In case of import supply, the price should be quoted without custom duty. IIT Madras is exempted from levy of IGST on Imports and eligible for concessional custom duty (not exceeding 5%) and the price should be quoted on EX-WORKS and CIP (stating the Cost, Insurance, Freight separately) and indicating the mode of shipment.
- 4. Terms of Delivery:** - The item should be supplied to our Departments as per Purchase Order. In case of import supply, the item should be delivered at the cost of the supplier to our Institution. The Installation/Commissioning should be completed as specified in our important conditions.

5. **Catalogue:** Original catalogue (not any photocopy) of the quoted model duly signed must accompany the quotation in the Technical-cum-financial bid
6. **Late offer:** - The offers received after the due date and time will not be considered
7. **Payment:** - Payment will be made on successfully completing all the work listed in the seismotectonic analysis based on desired quality  
Preliminary report, Draft report and Final report (20, 50 and 30 percent respectively)
8. **Advance Payment:** - No advance payment is generally admissible. In case of specific percentage of advance payment is required, the Vendor has to submit a Bank Guarantee from a Nationalized Bank of India equal to the amount of advance payment.
9. **Time of completion : Within 2 months**  
**Start of the work will be the date of providing cross hole seismic data and other input data for the analysis.**
10. **Warranty/Guarantee:** - Desired Quality standards.
11. **Validity:** Validity of Quotation not less than 60 days from the due date of tender
12. **Bid Opening:** The bid will be opened on **31.07.2020, 4:00 pm** at the Department of Ocean Engineering, IIT Madras.
13. **Accept /Reject:** IIT Madras reserves the full right to accept / reject any tender at stage without assigning any reason.
14. **Settlement of Disputes:** Any legal disputes arising out of any breach of contract pertaining to this tender shall be settled in the court of competent jurisdiction located within the city of Chennai in Tamil Nadu.
15. **Risk Purchase Clause:** - In the event of failure of supply of the item/equipment within the stipulated delivery schedule, the purchaser has all the right to purchase the item/equipment from other sources on the total risk of the supplier under risk purchase clause.
16. **Unsolicited offers:** “This notice is being published **for information only** and is not an open invitation to quote in this limited tender. Participation in this tender is by invitation only and is limited to the selected registered suppliers. Unsolicited offers are liable to be ignored. However, suppliers who desire to participate in such tenders in future may apply for registration as per procedure.” The Website for Registration of vendors is <http://web.iitm.ac.in/supplier/> and the mail address for queries is “ [workflow@rt.iitm.ac.in](mailto:workflow@rt.iitm.ac.in) “.

Yours sincerely,

**Prof. Rajesh R Nair,**  
**Department of Ocean Engineering**  
**IIT Madras**  
**Chennai - 600 036**

## ANNEXURE – I

Seismotectonic measurements/analysis and analysis essentially consist of Seismic Hazard Analysis, Ground Response Analysis and Liquefaction Potential Evaluation of the site of about 200 Acres in West Bengal.

Seismotectonic measurements/analysis of any region is one of the approaches to mitigate against the earthquake hazards. Indian seismic zoning map (IS 1893) has been revised time to time with the addition of new knowledge and appropriate parameters. In the present National Seismic Code (IS:1893-2016), the whole country is divided in four seismic zones with the response spectra considering various soil/rock type. However this does not able to pick variations due to local site conditions. In such situations, role of local site effects at regional level becomes very crucial which highlights the need for a comprehensive seismic study of the region. In general, seismotectonic analysis consists of the following steps. Note that crosshole seismic data, preliminary geotechnical data and GPR based site characterization and micro tremor will be provided for the analysis

1. Compilation of earthquake database for the region
2. Homogenization of earthquake magnitude
3. Identification of main shocks and declustering
4. Development of seismotectonic map for the region
5. Seismic source models – Linear sources, Point sources, and Gridded seismicity model
6. Appropriate Ground motion prediction equations (Region-specific and NGA East)
7. Deterministic seismic hazard assessment-Estimation of hazard
8. Probabilistic Seismic Hazard Assessment (For 2% and 10% probability of exceedance in 50 years)
9. Contour map of Spectral acceleration at 0.2s and 1s for the entire region at 1m by 1m interval.
10. Site characterization
11. Ground response analysis and estimation of the surface level accelerations
12. Development of response spectra: Spectral acceleration for periods from 0 to 2.5s
13. Interpretation and integration of data using geotechnical, ground probing radar and microtremor measurements and discussions on the same

Soil liquefaction occurs when a saturated or partially saturated soil substantially loses strength and stiffness in response to an applied stress during an earthquake. This phenomenon happens when the pore pressure in soil equals/exceeds its shear strength. Susceptibility of soil to liquefaction is to be estimated by finding the ratio of Cyclic Resistance Ratio (CRR) to Cyclic Stress Ratio (CSR). The CSR is estimated by using the PGA at surface level and effective unit weight, whereas the CRR is estimated using insitu sounding SPT or CPT or Shear wave velocity profiles. If this ratio is less than one, then the soil is said to be susceptible to liquefaction.