Request for Expression of Interest (EOI)

Subject: Request for Expression of Interest (EOI) from Institutions of National Importance for conducting Large Size Triaxial Shear test for Pumped Storage Projects.

1. **Preamble :**

The **Central Electricity Authority (CEA)** is a statutory organization functioning under the **Ministry of Power, Government of India**. It plays a pivotal role in the development and regulation of the electricity sector in India. Established under the provisions of the **Electricity (Supply) Act, 1948**, and now governed by the **Electricity Act, 2003**, the CEA serves as the apex technical authority in the power sector. The CEA is responsible for planning, policy formulation, and technical evaluation to ensure the efficient and sustainable development of the electricity sector. Its major functions include **Advisory Role, Electricity Planning, Regulation and Standards, Data Collection and Analysis, Monitoring and Evaluation and Research and Development.**

As per Section 8 (1) of the Electricity Act, 2003, any generating company intending to set up a hydro generating station shall prepare and submit to the Central Electricity Authority for its concurrence, a scheme estimated to involve a capital expenditure exceeding such sum (presently, ₹2500/- Crores), as may be fixed by the Central Government, from time to time, by notification for

a. Projects included in NEP and confirm to capacity and Type.
b. Site has been allocated through the transparent process of bidding in accordance with the guidelines issued by Central Government.

OR

Rs.1000/- crore for any other scheme not covered under (a) & (b).

Presently, the Detailed Project Reports (DPRs) for Pumped Storage Projects (PSPs) are prepared through consultation procedure with the appraising agencies like CEA, CWC, GSI and CSMRS. There are currently 47 no. of PSPs with aggregate capacity of about 62 GW under Survey and Investigation for preparation of DPR and many more proposals are likely to come in the coming future considering the country’s large potential of about 183 GW comprising of around 164 PSPs.

As per CEA projections, Pumped Storage Projects with an aggregate capacity of 50760 MW have been envisaged for providing benefits by the year 2031-32 including 7970 MW of PSP under construction.

It is worth mentioning that embankment dams have become increasingly preferred by developers in pumped storage projects (PSPs) due to their cost-effectiveness and efficient utilization of excavated materials. PSPs typically

require extensive excavation for tunnels, reservoirs, and underground caverns. The excavated material, if suitable, can be repurposed as fill material for the construction of embankment dams. This reuse reduces the need to transport or dispose of excavated material offsite, lowering handling and logistics costs. It also minimizes the procurement of additional materials such as rockfill or earthfill, further reducing project expenses.

2. **Objective**

The design of embankment requires shear strength parameters, such as cohesion and the angle of internal friction, which are derived from large-scale triaxial tests. These parameters are crucial for optimizing embankment structures in terms of design, safety, and cost-efficiency.

Large-scale triaxial tests assess the strength and deformation characteristics of rockfill materials under simulated in-situ conditions, crucial for understanding the anisotropy and heterogeneity of these materials. They also help calibrate numerical models for stress distribution, deformation, and failure mechanisms in geotechnical design.

Currently, due to limited capacity of Central Soil and Materials Research Station (CSMRS), New Delhi to conduct Large scale Triaxial Test, delays are observed in carrying out the test, which is vital for the approval of Detailed Project Reports (DPRs) of PSPs. To address this, the CEA plans to set up large-scale triaxial testing facilities in Institutes of National Importance (INIs) to expeditiously carry out the test, resulting in expeditious appraisal of DPRs of PSP.

These institutes will be responsible for conducting tests promptly and delivering results directly to developers (with a copy to CEA), aiming to Fast Track geotechnical data generation to expedite DPR appraisal and approval by CWC or any other appraising agency.

3. **Scope**

i. **Sample Collection and Preparation**: Collect and Prepare rockfill or rock samples as per standards.
ii. **Testing Setup**: Ensure the testing setup adheres to IS codes and standards, using calibrated equipment.
iii. **Data Recording**: Collect and document real-time data, including stress-strain behaviour, pore pressure, and deformation characteristics etc.
iv. **Analysis of Results**: Process raw data to derive key geotechnical parameters such as cohesion, friction angle, and elastic modulus.
v. **Quality Assurance**: Implement strict quality control and provide calibration and validation records for the equipment used.
vi. **Final Test Report Submission**: Submit a comprehensive report with test methodology, results, analysis, graphs, and recommendations.

CEA invites expressions of interest from established Institutes of National Importance(hereinafter mentioned as INIs) capable of setting up large-scale triaxial shear testing facility. Interested parties are requested to submit their credentials, technical expertise, and infrastructure details.

Interested Institutes of National Importance (INIs) are requested to submit their Expression of Interest (EoI) to the CEA in the prescribed format enclosed at **Annex-A**.

4. **Financial Assistance for Establishing Facilities for Large-Scale Triaxial Testing**

To address the critical need for large-scale triaxial shear testing facilities and support the development of PSPs, the Ministry of Power, Govt. of India proposes to provide financial assistance upto ₹3.0 (Three) crore to INIs willing to establish their infrastructure for conducting these tests. Financial assistance shall be given in stages. CAPEX above Rs 3.0 Crore and OPEX shall be the responsibility of INIs.

India holds immense potential for PSPs, and the sector shows promising prospects for growth in the future. With ongoing developments and future projects on the horizon, this highlights the long-term demand and potential for institutes to leverage this opportunity.

By establishing state-of-the-art testing facilities, institutes can play a pivotal role in expediting geotechnical assessments, contributing to faster project appraisals, and enhancing their standing in the domain of civil and geotechnical engineering.

This initiative not only addresses the immediate testing needs of PSPs but also positions institutes to cater to future demand of Hydro Projects, ensuring sustainable growth and financial viability of their testing facilities.

5. **Understanding & Familiarization**

To ensure precision in large-scale triaxial testing, agencies must thoroughly understand extant IS codes, standards, and guidelines. These tests are vital for determining geotechnical parameters essential for designing PSPs. Adherence to prescribed standards ensures credible and reproducible results.

Institutes should excel in equipment calibration, operational protocols, and advanced testing techniques, ensuring compliance with standards. Accurate data interpretation and reporting, aligned with IS codes, are critical for parameters like cohesion and internal friction angle. Reports must follow a standardized format for seamless appraisal by authorities. Employing certified personnel with expertise and a robust quality assurance system further enhances test reliability.

INIs may in depth study the requirement of Large scale Triaxial Test apparatus and ensure that requisite facilities in the form of testing apparatus(core cutting machine capable of analyzing rock anisotropy , servo controlled compression testing machine specifying the load limit, confining pressure unit specifying the limit, strain measuring device etc) are essentially included to carry out test on large size samples of 76 mm .

By maintaining strict compliance with standards and best practices, institutes can ensure efficient testing, supporting the timely review and approval of PSP DPRs.

INIs shall have to get NABL accreditation within a period of 6 months after establishment of facility. Extension up to 6 months may be considered by CEA on the merit of the case.

6. **Deliverables**

The test conducting agency or institute is expected to deliver the following outputs during and after large-scale triaxial tests:

1. **Test Plan and Schedule**:
   - A detailed methodology, equipment specification, and timeline for the tests.
   - Regular progress updates to ensure transparency.
2. **Interim Reports**:
   - Preliminary findings or interim reports to enable discussions with stakeholders or authorities.
3. **Final Test Report**:
   - Comprehensive results, including geotechnical parameters like cohesion and friction angle.
   - Stress-strain curves, failure envelopes, and analysis as per IS standards.
   - Conclusions and actionable recommendations.
4. **Supporting Documentation**:
   - Equipment calibration certificates.
   - Quality control measures implemented during testing.
   - Visual records (photos/videos) of the setup, sample preparation, and procedures.

7. **Milestone/Time schedule**

The intent is to complete the process within 60 days. Any delay on account of Institute resulting in overall delay beyond the complete process of 60 days will attract reduction of 1% of fee (charged by INIs) for delay of one week or part thereof.

8. **Procedure of application :**

Accordingly, applications are invited from reputed Institutes of National Importance. The willing INIs may email their applications **latest by 28.02.2025** to:-

Shri Balwan Kumar, Director (HPP&I)
Room No. 721 (N), CEA, Sewa Bhawan, RK Puram,
New Delhi-110066
Email: cea-hppi@gov.in
Contact: 01126732748

9. **PREFERENCE OF EMPANELMENT**

A total of 47 PSPs are currently at the survey and investigation stage, with the majority located in Andhra Pradesh (14), Maharashtra (10), Uttar Pradesh (7), Gujarat (6), and Rajasthan (4). The remaining PSPs are distributed in smaller numbers across Karnataka, Madhya Pradesh, and Odisha.

Preference will be given to institutes that are located within the same state/nearby state as the PSPs they aim to serve. This approach ensures that the transportation of testing materials, which can be both time-consuming and logistically challenging, is minimized. By involving INIs near the PSP rich states, the overall efficiency of the testing process is improved, and project timelines can be expedited. This localized focus will not only reduce delays but also enhance coordination between developers and testing facilities, ultimately facilitating smoother project execution.

10. **FEE**

The institute's fees for conducting large scale triaxial shear tests shall be reasonable broadly based on additional CAPEX (if any) and the operational expenditures including faculty/staff.

11. **WHO CAN PARTICIPATE**

Institutes of National Importance with adequate experienced manpower may participate.

12. **PROCEDURE FOR EMPANELMENT**

a. A circular/advertisement shall be uploaded on the website of the CEA (https://cea.nic.in) inviting applications from willing Institutes of National Importance for engagement as consultants.
b. CEA shall first shortlist the applications on the basis of the criteria decided by it. Thereafter, the CEA may hold an interaction with the authorized representatives of Institute, if required.

13. **CONFIDENTIALITY OF DATA AND DOCUMENTS**

The intellectual property rights (IPR) of the data collected as well as deliverables produced shall not be utilized or published or disclosed or part with, to a third party(except the developer as mentioned under para(2) Objective), any part of the data or statistics or proceedings or information collected for the purpose of his assignment or during the course of assignment without the express written consent of the CEA. The Institutions shall be bound to hand over the entire set of records of assignment to the CEA before the expiry of the contract and before the final payment is released by the Department.

14. **CONFLICT OF INTEREST**

The Institutions empanelled by the CEA shall in no case represent or give opinion or advice to any other person in any matter which is adverse to the interest of the CEA nor will it indulge in any activity outside the terms of the contractual assignment.

15. **TERMINATION OF ENGAGEMENT**

The CEA reserves the right to terminate the engagement forthwith in following conditions:

i. The Institute/Agency is unable to address the assigned work.
ii. Quality of the work is not found to the satisfaction of the CEA.
iii. The Institute/Agency fails in timely achievement of the milestones as decided by the CEA.
iv. The Institute/Agency is found not acting in line with " Integrity Pact"

Note: The CEA reserves the right to terminate the engagement, by serving thirty (60) days' written notice on the Institutions. Termination shall be affected on the day right after the completion of thirty (60) days of delivery of such notice.

Annex-A

PROFORMA

Application for appointment of Institutions of National Importance for conducting Large Size Triaxial Shear test for Pumped Storage Projects

1	Name of Institute in full (Block Letters)	
2	Complete Address with Pin Code	
3	Date of incorporation (status (Govt.) Private/Autonomous)	
4	**Nodal Person** Name : Designation:	
5	Telephone/Mobile No. of 2 contact persons, first being Nodal Officer, second being alternate E-mail IDs	
6	**Organizational Details** Year of Establishment: Status (Government/Private/Autonomous): Recognition/Affiliation/Accreditation with National Importance: Details of Infrastructure and Facilities Available:	
7	**Experience in Large Hydro/PSP Projects** Number of Hydro/PSP Projects Appraised during last 10 years: Areas of Expertise (Hydel Civil Design, Dam Design, HM design, Geological aspect, Rock Mechanics, etc.): Details of Hydro/PSP Projects Evaluated:	
8	**Competence in Relevant Areas** Testing facility of Rock Mechanics Tests already in place and details of	

	tests conducted in last 5 years Land(in sq meter) available for establishment of new Lab, already available building if any	
9	**<u>Additional Information</u>** Relevant Certifications/Accreditations: Previous Collaboration with Government/PSUs:	

Note: Additional information, if any, in support of suitability for the said engagement. Attach separate sheets, if necessary.

Date :

Name & Signature of the Authorized officer