Test set-up to evaluate in-situ engineering properties of Reinforced soil

Name of Equipment/ Assembly	Test set-up to evaluate in-situ engineering properties of Reinforced soil
Related Standards to be accorded	
Need of Equipment/ Assembly	Shaking table is widely used in geotechnical earthquake engineering to simulate seismic loading and study the dynamic response of soil and structures. It is essential for studying the effects of earthquakes on soil behaviour, particularly for liquefaction and slope stability**.** Shaking tables play a crucial role in geotechnical engineering by providing realistic earthquake simulations for safer infrastructure. They help in understanding soil behaviour , improving designs, and reducing seismic risks in construction project
Features/Capabilities /Specifications	The assembly shall consist of the following: • **Unidirectional Shaking Table** with a payload capacity of 1.5 tonnes to house a sample of 1 m × 1 m, with a rigid platform having threaded holes at 100 mm centre to centre distance. The table shall have following properties: o Maximum displacement amplitude: ± 20 mm to ± 25 mm o Frequency range: 0 – 100 Hz o Acceleration range: 0.1 g to 2.5 g o Velocity range: 0 – 1.2 m/s o Programmable shaking to a given acceleration time record. • **Laminar Soil box** with the size of 700 mm × 700 mm and 700 mm height consisting of 15-20 horizontal laminae frames, placed on each other inside the skeleton supported by linear bearings in such a way that the linear movement, of ± 5 mm, is allowed in the shaking direction. Arrangements for measuring pore pressure shall be made at each alternative laminate frame on both sides perpendicular to shaking directions. • **Top Plates:** Two plates having sizes of (1) 650 mm × 200 mm and (2) 650 mm × 650 mm to provide a surcharge load on the soil with a magnitude of 25 kPa. • **Sensors and Transducers** System shall be capable of providing record as under Dynamic loading condition. All the sensors/transducers shall have a calibration certificate and calibration contract for two years after completion of validity of first calibration. o **Accelerometer (06 Nos.):** Piezoresistive accelerometer with a measurement range of 0.1 to 10 g, Frequency range 0.1 Hz – 5 Hz o **Displacement Transducer:** 100 mm capacity with 0.001 mm resolution. (04 Nos.) o **Strain Gauge:** 10 nos. of 350 Ohm resistance o **Pore pressure transducer**: 2.5 MPa (Load accuracy: ± 1% of the indicated pressure value) - 04 no. o Vibrating wires for all the sensors with sufficient length. • **16-channel Data acquisition (DAQ)** system with an extension upto 30 channels of National Instruments (NI) o Multiple input facility required for accelerometer, pressure sensor, LVDT and Strain Gauges o With 18-bit resolution and capacity of 10000 sample/sec, • **Computer system a**long with the following o Desktop/laptop computer with Intel i7 or equivalent processor, 2 TB SSD, 8 GB RAM, compatible motherboard. With a monitor, keyboard and mouse. With a 2-year warranty. o Compatible software for analysis

	○ Configurable controlling unit system for DAQ ○ Multifunction Laser Printer • **Power Supply** requirements shall be mentioned clearly. • Demonstration for the assembly of the system and training for software shall be provided at our place. • UPS (Uninterrupted Power Supply) system with 2-hour continuous power backup capacity to run the electronic system of the equipment
Experimental and Research Capabilities	The Set-up shall possess capabilities as follows 1. Liquefaction Studies: • Liquefaction occurs when saturated soil loses strength due to cyclic loading (e.g., during an earthquake). • Shaking tables simulate earthquake motions, allowing engineers to observe real-time soil behaviour. • Helps in validating numerical models and improving mitigation techniques (e.g., ground densification, drainage systems). 2. Slope Stability Analysis: • Earthquake-induced shaking can trigger landslides and slope failures. • A shaking table can replicate seismic loading and evaluate slope responses, including: ○ Deformation and failure patterns ○ Effectiveness of reinforcements (e.g., retaining walls, geotextiles) ○ Performance of drainage systems to prevent pore pressure buildup 3. Performance of Retaining Walls and Embankments • Tests the stability of retaining walls under dynamic loading. • Assesses the effectiveness of reinforced soil walls and mechanically stabilized earth (MSE) walls. 4. Soil-Structure Interaction: • Helps assess the behaviour of retaining walls, foundations, and embankments under seismic conditions. • Determines failure mechanisms and improvement techniques for seismic-resistant designs. 5. Development of Seismic Hazard Mitigation Strategies: • Aids in designing liquefaction-resistant foundations and slope stabilization techniques. • Supports research on ground improvement methods like vibro-compaction, stone columns, and deep soil mixing.
Make	• Clear mention Make in the bid
Electrical Supply Requirement	• Electricity supply requirements (voltage and phase) shall be clearly mentioned • Mention in case of Requirement of UPS (Uninterrupted Power Supply) with capacity
Size and weight	• Detachable/ Assemblable Units: The equipment shall be dismantlable as placed in the • available infrastructure, The maximum dimensions of the door are given below. • The dimension of any unit/ part of the apparatus shall not exceed 2.7 meters (L) x 1.5 • meters (W) x 1.9 meters (H). • Mention area required for positioning of equipment. • Mention total weight of the equipment. • Mention specific requirement of foundation/pedestal for resting the equipment, if any. • Mentioned need of vibration isolated, if needed

Water and air supply requirements	• Mention the requirement to supply of compressed air, if any. • Mention the requirement and arrangement of water supply, if any.
Compatibility of parts	• In case of accessories from make differing to the make of equipment, compatibility shall be checked and certified by the bidder.
Calibration Certificates, technical manual and SOP	• The calibration certificates shall be provided with equipment and accessories. • Validity of calibration certificate for all devices shall not be less than one year. • Technical manual and Standard Operating Procedure documents shall be provided.