Load test set-up for analysis of subgrade

Name of Equipment/ Assembly	Load test set-up for analysis of subgrade
Related Standards to be accorded	AASHTO T-324
Features/Capabilities /Specifications	The assembly shall consist of the following: • **Wheel-Tracking Machine**—An electrically powered machine capable of moving a 200 mm diameter, 50 mm wide steel wheel over a test specimen. The load on the wheel is 700 ± 5 N. The wheel reciprocates over the specimen, with the position varying sinusoidally over time. The wheel makes 52 ± 2 passes across the specimen per minute. The maximum speed of the wheel, reached at the midpoint of the specimen, is approximately 0.3 m/s. Total tread path of 500 mm with an effective tread path of 300 mm per pass. • **Wheel type and size**- 200 mm diameter, 50 mm wide harden steel wheel with and without rubber layer • **Wheel Pass Counter**—A non-contacting solenoid that counts each wheel pass over the specimen. The signal from this counter is coupled to the wheel impression measurement, allowing for the rut depth to be expressed as a function of the wheel passes. • **Test Boxes:** Test boxes with internal dimensions as (i) 0.5 meters (Length) × 0.18 meters (Width) × 0.6 meters (Height) and (ii) 0.5 meters (Length) × 0.18 meters (Width) × 0.1meters (Height). Three boxes of each size mentioned dimension are required. • **Sample height**- The instrument should be capable of performing experiment under variable sample heights ranging from 100 mm to 600 mm thickness. • **Temperature Control System**—A system capable of controlling the temperature over a range of 10 to 70°C within ±1.0°C accuracy, with a mechanical circulating system stabilizing the temperature within the specimen tank. • **Hydraulic or mechanical lifter to move and slide the sample**. • **Impression Measurement System**—A linear variable differential transducer (LVDT) device capable of measuring the depth of the impression (rut) of the wheel at the center ± 0.1 mm and along the length of the wheel's path over with a rut depth range of 0 to 50 mm, within 0.15 mm. The system shall measure the rut depth along the wheel, at end of every few passes (the number of passes be defined at the start of test in the range 100 to 1000). (5 LVDTs, one on the wheel) • **Slab Specimen Mounting System**—A stainless steel tray that is mounted rigidly to the machine. The mounting system must restrict shifting of the specimen to within 0.5 mm (0.02 in.) during testing. • **Linear Kneading Compactor**—A hydraulic-powered unit that uses a series of vertically aligned steel plates to compact molded asphalt mixtures into flat, rectangular slabs of predetermined thickness and density. • Mini Vibratory soil compactor • **Control Panel:** HMI-PLC based control panel for comprehensive system management. • Rut depth shall be expressed as a function of the wheel passes in the display. • **Data logging:** A fully automatic data recording system that saves data at specified time intervals onto a USB drive. Additionally, the system offers the capability to view and log data through an IoT interface. • **System Operation:** The system is fully automatic and controlled via a touchscreen-based HMI. It can also be operated remotely using Ethernet and Wi-Fi on devices such as PCs, tablets, and mobile phones. • The complete system, including the test section, is divided into several parts for easier handling and installation in the lab • **Computer system along with the following** o Desktop/laptop computer with Intel i7 or equivalent processor, 2 TB SSD, 16 GB RAM, compatible motherboard. With a monitor, keyboard and mouse. With a 2-year warranty.

	○ Compatible software for analysis ○ Configurable controlling unit system for DAQ ○ Printing kiosk ○ UPS to provide a supply for about 15 minutes time. • **Power Supply** requirements shall be mentioned clearly. • Demonstration for the assembly of the system and training for software shall be provided at our place.
Experimental and Research Capabilities	The Set-up shall possess capabilities as follows 1. **Pavement Rutting and Deformation analysis** ○ Load simulation ○ Rutting measurement 2. **Effect of Temperature Variation on Pavement Deformation** ○ Study under varying temperature conditions **3. Asphalt and Pavement Material Performance** ○ Assessment of asphalt mixtures, bituminous materials and subgrade layers for rutting performance ○ Comparison of performance of modified asphalt with standard mixes ○ Study of the impact of compaction levels on rutting susceptibility **4. Moisture Sensitivity and Water Damage** ○ Testing of water conditioned samples **5. Pavement Layer Interaction and Structural Integrity** ○ Multi-layer testing under repeated loading ○ Study of shear deformation and layer delamination due to traffic loading **6. Laboratory and field validation** ○ Correlation with filed data ○ Validation of pavement design models **7. Study on geosynthetic modified pavement** ○ Evaluation of rutting on pavement model modified with geotextiles • **Experiment Possibilities of wheel rut tester** ○ Rutting Resistance Evaluation. ○ Performance Comparison of Asphalt Mixes ○ Effect of Environmental and Structural Factors
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	• 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 maker 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 devises shall not be less than one year. • Technical manual and Standard Operating Procedure document shall be provided.