



Newsletter

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THE AVENUE

JUNE 2026



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Message



I would like to express my sincere appreciation to the KHRI team for their dedicated efforts in maintaining and up keeping the test scope under NABL accreditation. Their commitment to upholding high standards of quality assurance and enhancing the institute's service capabilities is truly commendable.

I also acknowledge the significant role of the Centre of Excellence – KHRI in proactively identifying and resolving challenges encountered during project implementation, thereby contributing to the efficient execution of Public Works Department projects.

KHRI's continued focus on innovation, quality, and service excellence is making a valuable contribution to Highway sector. I extend my best wishes to the institute and am confident that it will continue to achieve greater milestones in the years ahead.

I extend my heartfelt congratulations and best wishes to the editorial team on the publication of Volume 8, Issue 1 of the KHRI Newsletter. The newsletter is an excellent platform for sharing technical knowledge, research outcomes, innovations, and institutional achievements. I am confident that it will continue to promote knowledge sharing and strengthen collaboration within the sector.

Sri. P K BASHEER
MINISTER FOR PUBLIC WORKS DEPARTMENT



Message



Kerala Highway Research Institute (KHRI) has played a key role in advancing the Centre of Excellence (CoE) in the Kerala Road Sector since its inception in 2021. Through innovation, applied research, and technical expertise, CoE–KHRI has effectively addressed numerous field-level challenges and provided valuable technical support to the Public Works Department and other government agencies in the field of civil engineering.

The achievements of the institute reflect the dedication and expertise of its team.

I extend my sincere appreciation to the entire KHRI team and wish CoE–KHRI continued success in expanding its contributions and strengthening its presence at the national level.

The newsletter is a commendable initiative that highlights the institute's technical contributions, research activities, and achievements. I wish the publication continued success and wider reach in the years ahead.

Smt. ADEELA ABDULLA, IAS
SPECIAL SECRETARY FOR PUBLIC WORKS DEPARTMENT



Message



KHRI's advanced laboratory facilities and modern testing equipment provide essential material testing and quality assurance services to the Public Works Department and other government agencies. The institute also serves as a valuable research hub for engineering students and researchers undertaking academic and thesis work.

Through its induction training programmes, technical visits, and knowledge-sharing initiatives, KHRI helps enhance the skills of students, professionals, and government officials. Its collaborations with premier institutions such as IITs, IISc, and NITs facilitate the transfer of emerging technologies and expert solutions to complex engineering challenges, thereby supporting the effective implementation of Public Works Department projects.

My best wishes to the editorial team on bringing out Volume 8, Issue 1 of the KHRI Newsletter. The publication is a valuable medium for sharing technical expertise, research findings, and institutional achievements. I am certain that it will continue to benefit professionals, researchers, and students.

Smt. SUJA RANI T S
CHIEF ENGINEER (DESIGN), PWD

Words of Editor-in-Chief

The Centre of Excellence -Kerala Highway Research Institute (CoE - KHRI) under Kerala Public Works Department, located in Kariyavattom, Thiruvananthapuram, has been a cornerstone of public infrastructure development of the state of kerala for over 53 years. This institute has concentrated its efforts on applied research, pilot projects, training, capacity building, material testing and quality improvements in construction. CoE - KHRI collaborates with leading National institutions like IITs and NITs, conduct research and pilot studies to introduce cutting-edge technology to the Public Works Department. Vision of this institute is to gather best global practices & adapt them to the needs of our state and disseminate the information.



The eighth volume of the newsletter showcasing the comprehensive overview of activities of this institute from December 2025 is presented with sincere gratitude to Sri. P.K.Basheer (Hon'ble. Minister for Public Works), Smt. Adeela Abdulla, IAS(Special Secretary - Public Works Department), Smt. Suja Rani T.S (Chief Engineer, PWD Design) and the KHRI Team.

KHRI has various wings which work together to provide unique outcomes to various issues across Kerala:

- Concrete & Structures Division
- Soil Mechanics & Foundation Division
- Traffic Engineering Division
- Innovative Design Unit
- Flexible Pavement Division

Over 20 problem-solving activities directly assisting the field engineers and laboratory testing of around 1,500 samples for the past 6 months, demonstrate the commitment to continuous operational improvement in the projects, including training to students and research fellows.

CoE KHRI is committed to a culture of excellence and innovation, leveraging every challenge as an opportunity to scale new heights.

Smt. SHEMA S BABU
JOINT DIRECTOR, COE- KHRI

HIGHLIGHTS

- 1 Achievements
- 2 Pilot Projects
- 3 Problem Solving
- 4 Workshops/
Collaborative Learning
- 5 Miscellaneous



Contribution to National Standards: Role of KHRI in refining IS 19008:2023

The Kerala Highway Research Institute (KHRI) made a significant contribution to national standardization activities through its technical intervention in IS 19008:2023 – Determination of Binder Content in Bituminous Paving Mixtures. During NABL compliance review, the Flexible Pavement Division of KHRI identified a correction in the calculation procedure under the Solvent Extraction Method and submitted a technical comment to the Bureau of Indian Standards (BIS) in October 2024.

The comment was deliberated by the BIS Sectional Committee PCD 06 and subsequently examined by a Working Group comprising experts from IIT Roorkee, Border Roads Organisation, Dilip Buildcon Limited, BIS, and KHRI. The Working Group approved recommendation of KHRI and proposed amendment of the standard. Following the statutory circulation process and approval by the Sectional Committee, Amendment No. 1 to IS 19008:2023 incorporating KHRI's recommendation was published by BIS in March 2026.

This achievement highlights the active participation of this institute in the formulation and improvement of national standards and its commitment to enhancing the accuracy, consistency, and reliability of bituminous mixture testing practices in India.

भारतीय मानक
Indian Standard

IS 19008 : 2023

बिटुमिनस फ्रेश मिश्रण में बिटुमेन सामग्री
का निर्धारण

Determination of Bitumen Content
in Bituminous Paving Mixtures

ICS 91.100.50, 93.080.20

BIS 2023



भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बाहदुर शाह जफर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

February 2023

Price Group 6

IS 19008 : 2023
Amended based on
comments
from KHRI

AMENDMENT NO. 1 MARCH 2026

TO

IS 19008 : 2023 DETERMINATION OF BITUMEN CONTENT IN
BITUMINOUS PAVING MIXTURES

(Page 4, clause 4.5) — Substitute the following for the existing:

$$\text{'Bitumen content, percent} = \left[\frac{(W_1 - W_2) - (W_3 + W_4)}{W_1 - W_2} \right] \times 100$$

where

W_1 = mass, in g, of test portion taken;

W_2 = mass, in g, of water in the test portion;

W_3 = mass, in g, of the extracted aggregate; and

W_4 = mass, in g, of the mineral matter in the total volume of extract.'

(PCD 06)

Price Group 1
Publication: BIS, New Delhi

1

Amendment of IS 19008 :2023 based on comments from KHRI



Technical paper presentation in the symposium Held at IIT palakkad - Performance Evaluation of Stone Matrix Asphalt Wearing Coat on Bridges – A Case Study from Kerala

By Aravind Anil Kumar, Assistant Director, FP Division; Shemy S Babu, Joint Director, KHRI; Sheeja Rani K S, Deputy Director, FP Division; and Sreenadh N D, First Grade Overseer, FP Division



KHRI conducted a forensic study on premature distresses observed on two bridges along NH-966B in Ernakulam district, where Stone Matrix Asphalt (SMA) was used as a wearing coat for the first time in Kerala. The findings of the study were presented in a technical paper titled “Performance Evaluation of Stone Matrix Asphalt Wearing Coat on Bridges – A Case Study from Kerala” at the symposium SATVA 2026 held at IIT Palakkad on 6 June 2026.

The study evaluated the field performance of SMA wearing coats under Kerala’s tropical climate, high humidity, and heavy traffic conditions. It highlighted key challenges associated with the application of specialized bituminous mixes on concrete bridge decks and emphasized the importance of appropriate design, construction practices, and quality control measures. The presentation of the paper at SATVA 2026 demonstrates KHRI’s commitment to research-driven evaluation of road and bridge infrastructure and provides valuable technical inputs for improving the design, construction, and maintenance of bridge wearing coats in Kerala.



Technical paper presented at SATVA 2026, IIT Palakkad on 6th June 2026.



Effectiveness of Dynamic Warning Systems: A Pilot Study on Drivers' Sensitivity Based on Surrogate Safety Analysis

The Traffic Engineering Division of KHRI, in collaboration with IIT Palakkad, is undertaking a pilot study to evaluate the effectiveness of Dynamic Warning Systems in enhancing driver awareness and improving road safety. Conventional static warning signs often lose their effectiveness over time as drivers become familiar with them. Dynamic warning systems, on the other hand, provide real-time and attention-grabbing messages that can potentially influence driver behaviour more effectively.

The study compares driver responses under three different scenarios:

- (i) without any warning messages,
- (ii) with conventional static warning signs,
- (iii) with dynamic Variable Message Sign (VMS) warnings.

The objective is to assess whether dynamic warnings can generate greater driver attention and encourage safer driving practices, particularly at locations prone to traffic conflicts and accidents.

Using Surrogate Safety Analysis, the study evaluates vehicle interactions, speed variations, and traffic conflict indicators to understand the impact of different warning systems on driver behaviour. The first two scenarios have been successfully completed, while the implementation and evaluation of dynamic VMS warning messages are currently in progress.



Study on Pongumoodu Junction for Assessing Potential Traffic Congestion Following the Completion of Sreekaryam Flyover

To assess and manage potential traffic congestion from the upcoming Sreekaryam Flyover, the Traffic Engineering Division of the Kerala Highway Research Institute (KHRI) and IIT Palakkad are studying traffic patterns at Pongumoodu, Chavadimukku, and Ulloor junctions.

While the flyover will improve flow along the main corridor, it could shift traffic distribution and create bottlenecks at these adjacent intersections.

To analyze these impacts, KHRI has procured VISSIM (derived from the German Verkehr In Städten – Simulation, meaning "Traffic in Cities Simulation"), a microscopic traffic simulation software that models individual vehicle movements and driver behavior. Extensive traffic data collection is underway to calibrate the simulation models, map future hotspots, and evaluate targeted traffic management and infrastructure improvements for the entire corridor.



Study on Sustainable Controlled Low Strength Material (CLSM)

A research study on Controlled Low Strength Material (CLSM) is being carried out at the Soil Mechanics and Foundation Engineering Laboratory of KHRI. CLSM, also known as flowable fill, is a self-compacting and self-levelling cementitious backfill material that can be placed without mechanical compaction. As per (American Concrete Institute) ACI guidelines, CLSM typically possesses a 28-day compressive strength below 8.3 MPa, while strengths below 2.1 MPa are generally preferred for utility trench applications to ensure future re-excavatability.

The study aims to develop sustainable CLSM mixes using locally available materials and industrial by-products. Three representative soil types from Kerala were selected as base materials, while quarry waste generated from M-sand production and recycled concrete waste were incorporated as sustainable aggregate substitutes. Ordinary Portland Cement (OPC 53 Grade) was used as the binding agent in limited quantities to produce environmentally friendly



CLSM samples being tested for their durability

and cost-effective CLSM mixes. The laboratory investigation included flowability testing as per ASTM D6103, bleeding evaluation as per ASTM C940, unconfined compressive strength (UCS) testing in accordance with ASTM D4832, and durability assessment through wet-dry cycling based on ASTM D559. The water content of each mix was optimized to achieve a target flow spread of approximately 250 mm while maintaining bleeding within acceptable limits for field applications.

The results demonstrated that CLSM mixtures containing higher proportions of quarry waste and recycled concrete waste exhibited superior performance in terms of strength development and durability. The best-performing mixes made with the laterite soil achieved 28-day UCS values in the range of approximately 0.4–0.6 MPa, which falls well within the recommended strength range for trench backfilling applications. Durability testing further showed that these mixes retained more than 80% of their original strength after repeated wet-dry cycles, indicating excellent resistance to environmental exposure.

The study confirms that high-quality CLSM can be produced using locally available soils and construction waste materials while satisfying the strength, flowability, and durability requirements for utility trench restoration. The developed mixes have significant potential for use as backfill material around pipelines, conduits, and underground utilities, offering a sustainable alternative to conventional compacted fills. The ongoing phase of the project includes completion of testing on CLSM made with clayey soil, analysis of tests on CLSM made with sandy soil and field-scale evaluation of selected CLSM mixes under actual traffic loading conditions.

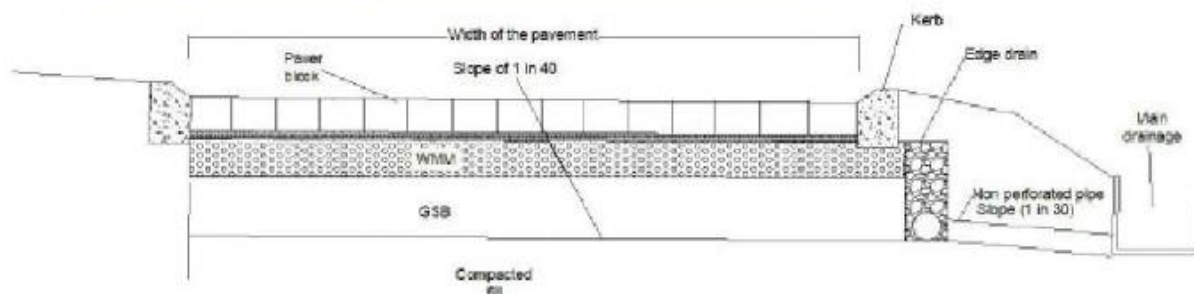


Ground improvement solutions

1) Front yard of Venjaramood fire and rescue station, Thiruvananthapuram

The project involved providing geotechnical recommendations for the front yard and pavement area of the Fire and Rescue Station at Venjaramood. The site, which was developed over a filled quarry area, was found to have weak saturated subsoil conditions, shallow groundwater levels, and severe waterlogging issues during monsoon seasons, making it unsuitable for supporting the regular movement of heavy fire engines. Based on detailed site inspections and field observations, a comprehensive pavement and drainage system was proposed.

The existing yard soil will be excavated to a depth of 600 mm, after which the exposed formation will be compacted in accordance with MoRTH guidelines. A 300 mm thick layer of compacted borrow soil will then be placed over the prepared formation to create an improved subgrade, with the finished surface provided with a 1 in 40 (2.5%) longitudinal slope towards the drainage outlet to facilitate efficient subsurface drainage followed by a 300 mm thick Granular Sub-Base (GSB) layer. A non woven geotextile layer shall be placed both above and below the GSB layer to provide separation, filtration, drainage, and capillary cut-off. The pavement surface will comprise a 250 mm thick Wet Mix Macadam (WMM) layer, a geotextile separator, 30 mm thick bedding sand, and 100 mm thick M40 interlocking concrete paver blocks with sand-filled joints and proper edge restraints. French drains, edge drains, and pervious drainage arrangements to ensure long-term pavement stability, prevention of water stagnation, and safe disposal of infiltrated water under challenging ground conditions.

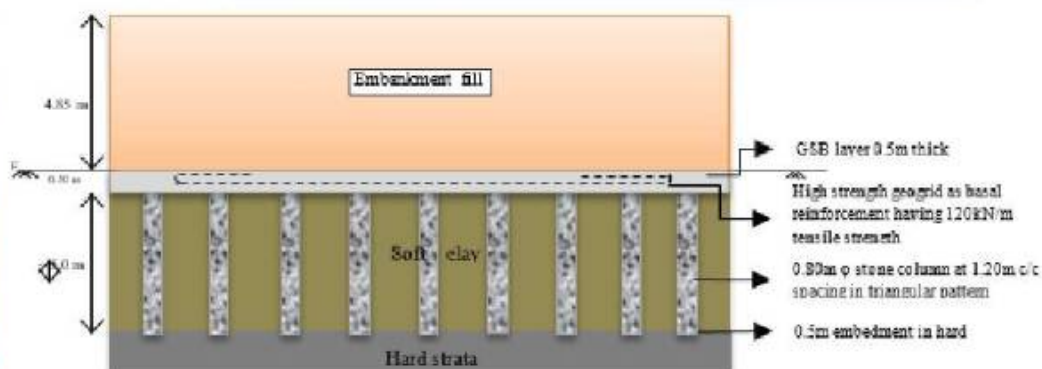


Cross-section of the ground improvement scheme at Venjaramood

2) Embankment design for Korankadavu bridge approach road, Ernakulam



Location of paddy field through which Korankadavu Bridge approach alignment passes.



Ground improvement scheme proposed at Korankadavu approach road



This project involved proposing suitable ground improvement measures for the remaining approach road of the Korankadavu Bridge, which passes through weak paddy field deposits near the Muvattupuzha River. Detailed geotechnical investigations and laboratory testing revealed highly compressible soft clay layers with significant settlement potential. To improve the bearing capacity and stability of the embankment, RCC retaining wall, and box culvert foundations, stone column ground improvement with granular sub-base (GSB) and geogrid reinforcement was recommended.

3) Sand compaction pile for foundation of buildings at Konchiravila UPS, Thiruvananthapuram and Changanassery police station, Kottayam



Sand compaction pile for foundation of Changanassery police station, Kottayam



Sand compaction pile for foundation of Konchiravila UPS

Ground improvement using sand compaction piles was recommended for the proposed buildings at Konchiravila UPS and Changanassery Police Station, where weak subsoil conditions and loose sand deposits made conventional shallow foundations unsuitable. Sand Compaction Pile is a ground improvement technique used to densify loose or weak soils by installing compacted granular columns. In this method, the treatment area is laid out in a predetermined grid, and a steel casing pipe with a disposable concrete plug is driven to the required depth using a mechanical hammer. As the casing is gradually withdrawn in stages, a granular mixture of coarse aggregate and sand is introduced and compacted in lifts to form a dense column. The installation of these compacted granular piles increases the density and stiffness of the surrounding soil through lateral displacement and compaction, thereby improving its bearing capacity and reducing settlement. The effectiveness of the treatment is verified through post-improvement Standard Penetration Tests (SPT) and field density tests to ensure that the desired soil improvement has been achieved.

For the Konchiravila UPS building, a raft foundation supported on sand compaction pile-improved ground was proposed to achieve the required safe bearing capacity at a reduced founding depth, along with detailed construction and quality control guidelines for installation and verification of the improvement works. Similarly, for the Changanassery Police Station project, allowable safe bearing capacities corresponding to different footing sizes were finalized for foundations resting on ground improved with sand compaction piles and compacted GSB layers.

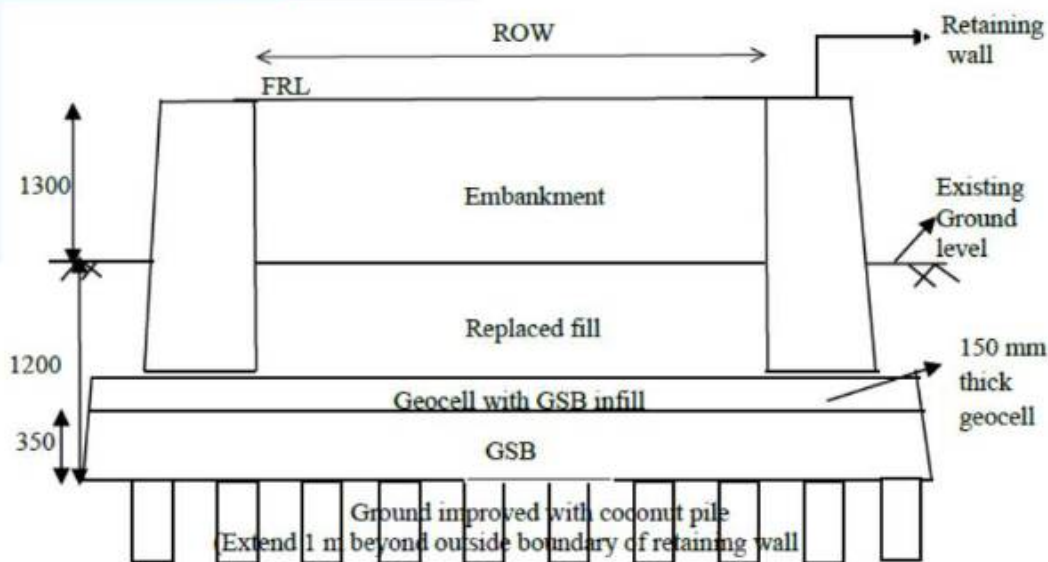


4) Embankment design for Moolakkadavu bridge approach road, Kottayam



Moolakkadavu Bridge

Design solution was proposed for an approach embankment stretch through the extremely weak strata at the Moolekkadavu Bridge. Detailed analysis of borehole data revealed the presence of highly compressible soft clay deposits with natural water content exceeding the liquid limit extending to considerable depths, with large predicted long-term settlements. To improve embankment stability, a staged construction methodology incorporating coconut pile reinforcement, GSB layers, geocell reinforcement, engineered fill, and geocomposite drainage layers was proposed. The need for settlement monitoring and adoption of flexible pavement systems due to unavoidable residual settlement in the soft ground area was proposed.



Cross-section of the embankment at moolakkadavu

5) Roads in the waterlogged areas at Pullu-Manakkodi and Kannankattukadavu, Kollam



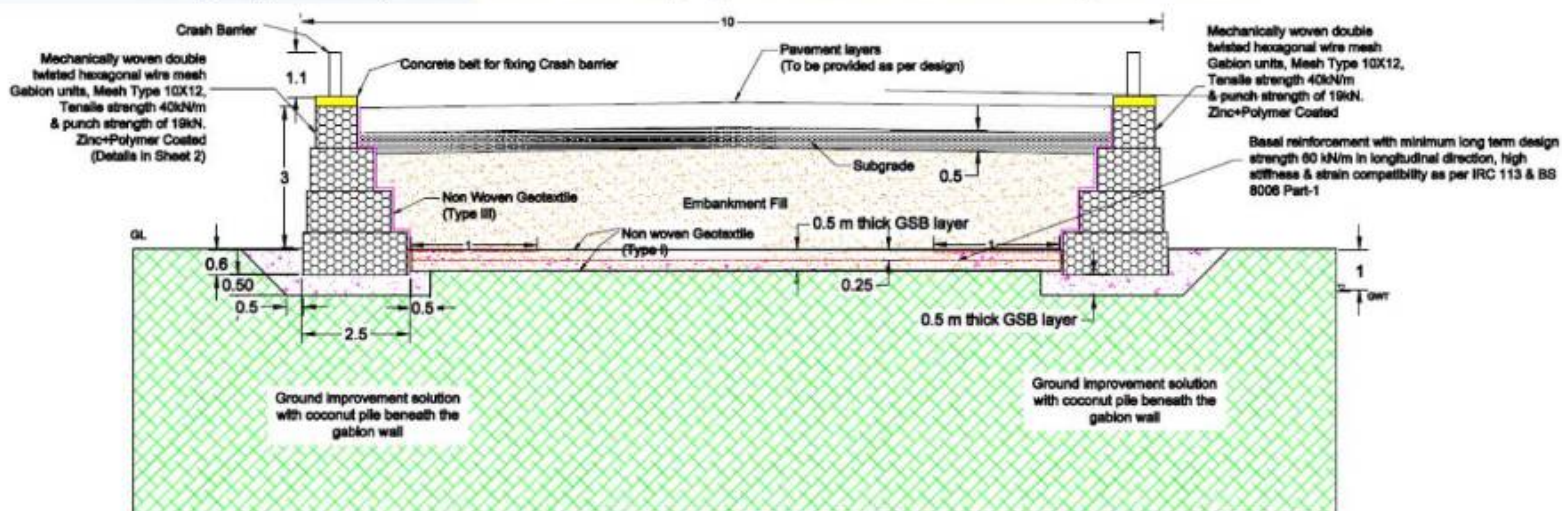
Kannankattukadavu, Kollam



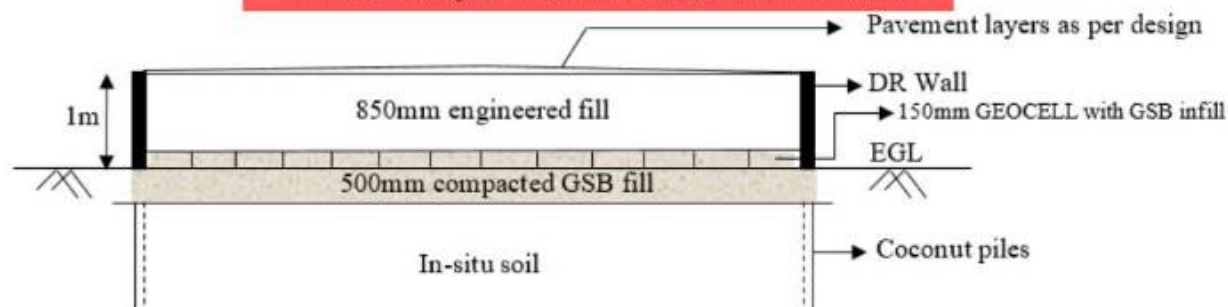
Waterlogged Pullu-Manakkodi road



Ground improvement solutions were developed for the flood-affected Pullu-Manakkodi Road and the Kannakattukadavu Bridge approach road, both of which pass through weak and waterlogged soil conditions. Detailed geotechnical evaluations indicated the presence of soft clay deposits and poor subgrade stability, necessitating specialized embankment improvement measures. The proposed solutions included the use of compacted geocell reinforced GSB, coconut pile support, engineered embankment fill, gabion retaining walls, and prefabricated drainage composites to improve bearing capacity, reduce settlement, and enhance long-term stability of the embankments. Proper drainage and erosion protection measures were also incorporated to ensure safe and durable performance of the road and bridge approach systems under challenging environmental and loading conditions.



Cross-section of the embankment at Kannakattukadavu



Schematic sketch for embankment construction with ground improvement

Condition assessment of Structures

1) Obstetrics and Gynecology (O&G) Block in Kottayam Medical College.

The O&G Block is a five-storeyed (G+4) RCC framed structure completed in 2010, as per the records available with the field office.

During the site inspection, defects such as column cracks, seepage and dampness, vegetation and fungal growth, and surface deterioration were observed.

As an immediate measure, directions have been issued to conduct a detailed audit of the internal plumbing and drainage systems to identify and rectify active leakages and prevent further structural deterioration.



2) Out Patient (OP) Block and O&G Block in Kottayam Medical College

The subject building is a 155 m × 15 m RCC framed structure (G+2) constructed in 1969. Considering its age of approximately 57 years and the very high daily occupancy, the building shows significant signs of deterioration and structural distress.

During the site inspection, the following defects were observed:

- Concrete spalling in structural members
- Distress in fin walls
- Cracks in RCC columns
- Corrosion of reinforcement with exposed steel bars
- Spalling and deterioration in brick masonry

The combined effect of aging, continuous heavy usage, and the observed structural distress particularly the longitudinal cracks in columns and exposed reinforcement in beams indicates the need for a detailed structural stability assessment of the building.

To assess the present condition, strength, and durability of the structural components, it is proposed to carry out a structural stability audit using suitable Non-Destructive Tests (NDT) and partially destructive tests. The detailed testing and evaluation will be carried out in due course.



3) St Johns Britto Church, Sakthikulangara, Kollam

Based on the preliminary inspection, an estimate has been submitted to the client for carrying out the necessary tests to assess the condition of the foundation, concrete quality, corrosion of reinforcement, and in-situ concrete strength.



4) Kerala State Co-operative Agricultural and Rural Development Bank (KSCARD) Bank Building, Thiruvananthapuram

The structure is a 53 year old, G + 4 storeyed RCC framed structure. Cover meter test, core extraction, and carbonation test have been conducted. The remaining tests will be carried out shortly after the necessary arrangements are made by the officials of Kerala State Co-operative Agricultural and Rural Development Bank.



Locating rebars using cover meter



Extraction of concrete core specimen from column



Carbonation test on extracted concrete core specimen



5) GST Building Kollam

The GST Building located at Kollam is a 15-year-old G+3 storeyed RCC framed structure. During the site inspection, defects such as diagonal cracks on walls, moisture retention on the soffit of slabs, and damage to paint and plaster on exposed slab soffits were observed. Directions were issued to submit documents including the Soil Investigation Report, Foundation Details, and Detailed Structural Drawings to facilitate further assessment and to determine the additional tests required for evaluating the structural issues.



6) Secretariat Employees Association Office, Auditorium and Dining Hall

The building is a two-storeyed structure comprising RCC beams and slabs with masonry columns. The Secretariat Employees Association Office and Dining Hall are located on the first floor, while the auditorium is situated at the roof level with the roof slab covered by a truss system.

During the site inspection, spalling of concrete and exposed reinforcement were observed on the soffit of the stair slab and beams.



Carbonation test on extracted core specimens

Detailed investigations comprising Non-Destructive Tests (NDT), including the Rebound Hammer Test and Half-Cell Potential Test, along with the partially destructive Core Extraction Test, were carried out to assess the condition of the structural members.

Based on the findings of the investigation, a detailed report containing recommendations for rectification and remedial measures has been submitted.



7) Pathanamthitta Mini Civil Station

The Pathanamthitta Mini Civil Station building is a 40 year old, five-storeyed RCC framed structure. In general, spalling of concrete from slabs, columns, and beams was observed at multiple locations in the building, primarily attributable to improper maintenance and prolonged exposure to moisture. Moisture retention and vegetation growth were also noticed on the roof slab, sunshades, and exterior walls, indicating inadequate drainage and waterproofing provisions. Signs of reinforcement corrosion, such as exposed steel and rust staining, were observed in certain areas.

Detailed investigations comprising Non-Destructive Tests (NDT) such as the Rebound Hammer Test, Ultrasonic Pulse Velocity (UPV) Test, Carbonation Test, and Half-Cell Potential Test, along with the partially destructive Core Extraction Test, were carried out, and the report has been submitted.



*Extraction of concrete core specimen from
RCC Wall*



Extraction of concrete core specimen from Beam



Extraction of concrete core specimen from Roof Slab



Extraction of concrete core specimen from Roof Slab



Surface Resistivity Test at Stair Column



Half Cell Potential Test

June 2026

CoE-KHRI



Carbonation test on concrete cores



Representative samples

Fractured cores

June 2026

CoE-KHRI



8) Structural glazing at government secretariat building - annex II, Thiruvananthapuram

A glass panel fixed at the exterior beam projection on the 6th floor of the Govt. Secretariat Annex II Building failed and fell from the structure. Following the incident, Kerala Highway Research Institute was requested to assess the safety of the façade system and the possibility of similar failures.

Considering the potential risk due to wind loads, thermal cycling, and material fatigue, it was recommended to carry out continuous monitoring of the façade system and conduct specialized testing of glass panels, sealants, and fixing arrangements to identify the exact cause of failure and assess the structural adequacy of the system.

Innovative Designs

- 1) Roof truss for mini civil station Erattupetta, Kottayam district.
- 2) Roof truss for Library block in Government College Chokli, Thalassery, Kannur district.
- 3) Roof truss for the Building of Pampavalley Farmer Producer Company at Mannady Adoor, Pathanamthitta district.
- 4) Roof truss for for the Training aid at Fire and Rescue Service Academy, Viyyur Thrissur district.
- 5) Auditorium for Govt. Collge, Chittur, Palakkad district.
- 6) Structural design of Municipal Ground, Perumbavoor, Ernakulam district.
- 7) Roof Truss for Ponnara Sreedhar Memorial Auditorium, Kattakkada, Thiruvananthapuram district.
- 8) Construction of Indoor Stadium at Government Brennen College, Thalassery, Kannur district.
- 9) Retaining wall for Niravilpuzha road, Wayanad district.
- 10) Truss for Community health centre at Santhivila, Thiruvananthauram district.
- 11) Design of Retaining wall at Ch: 4/800 to 5/100 of Pariyaram Vettippuram Road, Pathanamthitta district.
- 12) Design of Roof Truss of new building for Coastal Police Headquarters building at Kochi, Wellington Island, Ernakulam district.
- 13) Repair proposal of distressed Thiruvegappura bridge in Malappuram district.
- 14) Horizontal Extension for Thrissur Medical College.
- 15) Truss work for installation of Lighting arrangement for Goshree bridge in Ernakulam district.
- 16) Mango Park at Kuttiyattoor in Kannur district.
- 17) Design of Cultural Convention Centre at Vadakkencherry, Palakkad district.
- 18) Construction of Administrative Block for ITI Women (Phase 1 – Design of steel roof truss) Kazhakootam, Thiruvananthapuram district .
- 19) Construction of women friendly aminity centre Amalanagar Thrissur distict.
- 20) Multipurpose Hall at Govt.Nursing college , Thrissur-Composite Work -Detailed Truss Design.
- 21) Design of indoor stadium in Kamakshi grama panchayath in Idukki district.
- 22)Foundation, recommendation of Wadakkanchery cultural convention centre phase I in Thrissur district.
- 23) KSRTC - Building Ernakulam district.
- 24) KSRTC - Building Thrissur district.
- 25) KSRTC - Kollam district.
- 26) KSRTC - Bus terminal Irinjalakuda Thrissur district.
- 27) KSRTC - Building Chengannur, Alappuzha district.
- 28) KSRTC - Bus Terminal Kayamkulam, Alappuzha district.

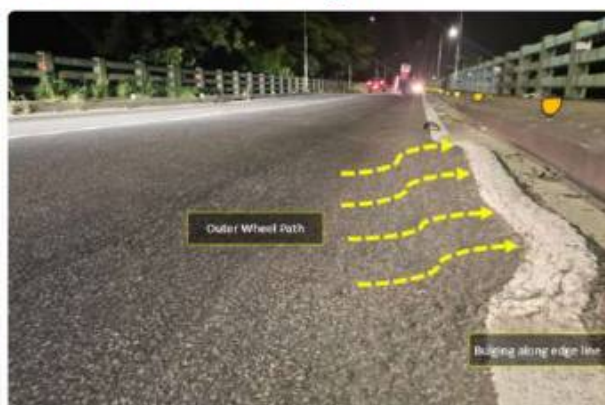


Pavement Investigations

1) Premature Distress in SMA Wearing Coat on NH 966B Bridges



Shoving along the outer wheel path in RHS lane in Alexander Parambithara Bridge



Shoving observed a RHS Ch 5/501.5 in Kundanoor Thevara Bridge



Sample collection by KHRI team using core cutting machine



Sample collection using core cutting machine

The Flexible Pavement Division of KHRI conducted a detailed investigation of the Stone Matrix Asphalt (SMA) wearing course on the Kundanoor–Thevara Bridge and Alexander Parambithara Bridge along NH 966B. The study was undertaken following directions from the Chief Engineer, PWD-NH, to assess premature pavement distresses observed on the bridge deck surfaces.

Field inspections and laboratory testing of 25 bituminous core samples revealed surface distresses such as rutting, shoving, bulging, and asphalt flushing, particularly along wheel paths subjected to heavy commercial traffic. Analysis indicated that the distress was likely caused by the combined effects of a comparatively softer binder, finer aggregate gradation, heavy traffic loading, and temperature-induced stresses.

The study highlighted the importance of appropriate binder selection, aggregate gradation control, field compaction, and performance-based quality assurance for SMA applications on bridge decks and heavily trafficked corridors.



2) Wearing coat failure of Irumpanam Road Over Bridge

The Flexible Pavement Division of KHRI conducted a detailed investigation of the Irumpanam Road Over Bridge along the Airport–Seaport Road in Ernakulam to identify the causes of recurring potholes and pavement distresses on the bridge wearing coat. The study, undertaken at the request of the Chief Engineer, Bridges, revealed extensive pavement distress, including ravelling, alligator cracking, bleeding, delamination, and recurring potholes, particularly in the heavily trafficked lane towards Kakkanad.

The investigation identified inadequate drainage as a major contributing factor, with clogged drainage outlets, accumulation of debris along the carriageway edges, and loss of proper cross slope due to repeated maintenance works leading to water stagnation and seepage into the pavement layers.

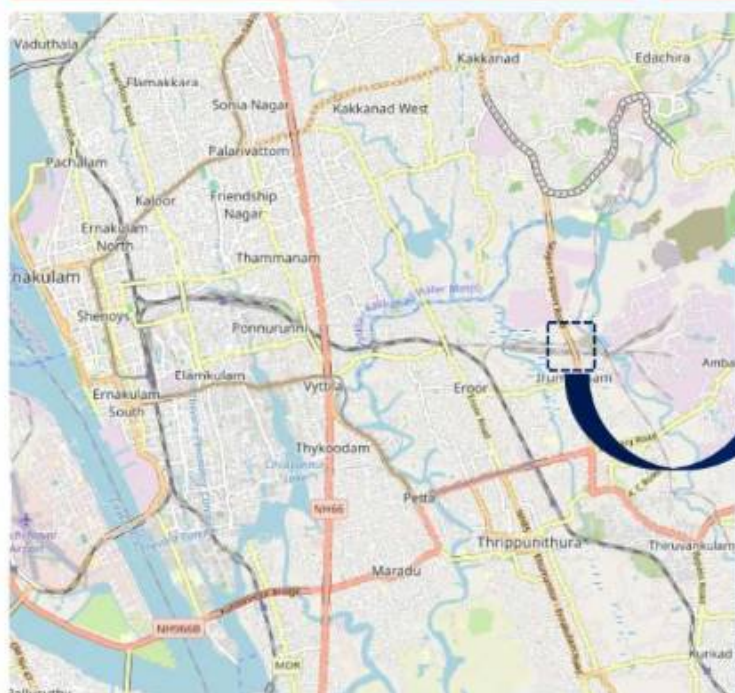
Based on the findings, KHRI recommended removal of the existing distressed bituminous layers through cold milling before laying a new wearing coat in accordance with MoRTH specifications and other restoration measures .



Location of drainage outlets in the RoB portion constructed by Indian Railway



Drain outlets are clogged in the section above the railway crossing



High traffic along LHS lane of Irumpanam bridge



3) Structural evaluation study for MC Road stretch from Kottayam to Angamally



Trial pit survey locations done by PWD, RIQCL, Ernakulam

KHRI conducted a scientific assessment of the proposed 30 mm Bituminous Concrete (BC) overlay for the OPBRC project on the MC Road corridor from Aida Junction, Kottayam to Angamally. Based on KHRI's recommendation, a Falling Weight Deflectometer (FWD) survey and other investigations as per IRC 115:2014 were carried out to evaluate the structural condition of the pavement.

Analysis of the FWD data, pavement crust details, and traffic information revealed that the proposed 30 mm overlay was inadequate to ensure the required structural performance and service life of the pavement. The study indicated significantly higher overlay thickness requirements for both 5-year and 10-year design periods across various road sections. Based on these findings, KHRI provided section-wise recommendations of the overlay thickness.



Technical Session on Drone Technology for Central Armed Police Forces at Indian Institute of Space Science and Technology - ISRO



Mr. Arun R Nath, Technical Expert at the Kerala Highway Research Institute (KHRI), delivered a technical lecture on Drone Technology and UAV-based Surveying for officers of the Central Armed Police Forces, including BSF, CISF, SSB and allied units, at the Department of Earth and Space Sciences, Indian Institute of Space Science and Technology, Thiruvananthapuram. The session was conducted as part of a specialized training programme on UAV image acquisition and analytics, where the complete drone surveying workflow was presented, covering mission planning, sensor integration, flight operations, and photogrammetric processing for generating orthomosaics, digital elevation models, and three-dimensional representations of terrain and infrastructure.

The lecture further highlighted the role of RTK/PPK-enabled positioning for achieving

centimetre-level accuracy, the application of thermal and advanced sensors for inspection and monitoring, and the integration of drone-derived outputs with GIS platforms to support analysis and informed decision-making. Practical insights from KHRI's experience in infrastructure mapping and condition assessment were shared, and the interactive session facilitated meaningful technical exchange, emphasizing the growing importance of UAV technology in rapid mapping, infrastructure monitoring, disaster response, and situational awareness.

The participation of KHRI in such capacity-building initiatives reflects the institute's continued commitment to advancing geospatial technologies and promoting knowledge dissemination across multidisciplinary domains.



GIS and Drone Survey Workshop at College of Engineering Trivandrum (CET) TERRAX 2026



Mr Arun R Nath, Technical Expert, Kerala Highway Research Institute (KHRI) successfully conducted a full-day workshop on “Geographic Information System (GIS) and Drone Survey” on 28th February 2026 as part of TERRAX 2026 organised by the IGS CET Student Chapter at the College of Engineering Trivandrum (CET). The workshop

focused on practical and application-oriented learning in modern geospatial technologies relevant to civil engineering and infrastructure development. The sessions covered GIS fundamentals, spatial data handling, drone-based survey techniques, flight planning, safety protocols, and photogrammetric data processing including orthomosaic generation and 3D modelling. A live drone demonstration provided participants with hands-on exposure to UAV operations and their applications in highway and bridge projects. Through such academic engagements, KHRI reiterates its commitment to advancing technical capacity in emerging geospatial technologies and strengthening industry– academia collaboration. The Institute continues to promote innovation, research-driven practices, and practical skill development in



infrastructure engineering, contributing to the preparation of competent professionals equipped to meet future challenges in the sector.





Indian Geotechnical Conference (IGC) 2025, NIT Jalandhar



The Indian Geotechnical Conference (IGC) 2025, held at NIT Jalandhar from 18–20 December 2025, provided an excellent platform for the KHRI staff to gain insights into the latest developments in geotechnical engineering. The conference featured a wide range of technical presentations, with a particular focus on sustainability. The event offered valuable opportunities to interact with professors and researchers from premier institutions, including various IIT's and other leading national institutes. These knowledge-sharing sessions facilitated discussions on emerging trends and innovative methodologies in geotechnical engineering. In addition, interactions with industry professionals, laboratory equipment suppliers, and technology providers helped us understand the latest advancements in testing techniques, instrumentation, and engineering solutions. Overall, the conference served as a useful forum for technical discussions and exchange of ideas with researchers and industry professionals.

Technical Session on Ground Improvement Solutions by Kellar

A technical session on advanced ground improvement solutions was conducted at KHRI by experts from Kellar Ground Engineering India Pvt. Ltd., a leading geotechnical solutions company. The session provided valuable insights into modern ground improvement techniques adopted across India, with a special focus on Deep Soil Mixing (DSM), Stone Columns, and Vibroflotation methods. The experts discussed the design principles,



site implementation challenges, quality control measures, and key technical considerations associated with these techniques. The programme also included an interactive doubt-clearing session, during which participants had the opportunity to discuss practical field issues and design-related queries. The session served as an excellent platform for enhancing knowledge on cutting-edge ground improvement technologies and their applications in infrastructure projects.



Technical Visit to IIT Madras Geotechnical Engineering Division

A team of engineers from KHRI visited the Geotechnical Engineering Division at IIT Madras as part of an academic and technical knowledge-sharing initiative. During the visit, detailed technical discussions were held with faculty members on various geotechnical engineering challenges, with particular emphasis on ground improvement techniques and foundation solutions for extremely soft soil conditions encountered in several parts of Kerala. The interaction provided valuable insights into modern ground improvement technologies and emerging research trends that could be adapted to local site conditions.

The team visited the Soil Mechanics and Geotechnical Engineering Laboratories, where various routine soil testing procedures were demonstrated and explained in detail by the laboratory staff. The visit provided an opportunity to observe the testing methodologies, sample preparation techniques, equipment operation, and interpretation of test results used in geotechnical investigations. The interaction helped strengthen the team's understanding of laboratory practices and their application in solving real-world geotechnical engineering problems.



Consolidation setup



The team also visited several advanced research laboratories, including the Geosynthetics, Rock Mechanics, Geo-environmental, and Geomechanics Laboratories. These facilities are equipped with state-of-the-art testing and analytical equipment such as plate load and pullout testing systems, large direct shear and cyclic triaxial apparatus, a 2000 kN rock compression testing machine, and advanced material characterization tools including TGA, FTIR, XRD, MIP, and Gas Chromatography. The laboratories support research on reinforced soil structures, ground improvement, rock engineering, environmental geotechnology, sustainable construction materials, and the behaviour of geomaterials under complex loading and environmental conditions.

The visit provided valuable exposure to advanced laboratory facilities and ongoing research activities at IIT Madras, while also fostering technical exchange and collaboration opportunities between the two institutions.



Cyclic plate load test setup



Setup for analysis of flow behaviour of granular materials



Cyclic Triaxial Equipment



Relative density test apparatus



Large box direct shear apparatus



POSH Act

The poster is for a POSH Act seminar. It features the Government of Kerala logo and the Centre of Excellence for Kerala Road Sector, Kerala Highway Research Institute. The title 'POSH ACT' is written in English and Malayalam. The date is 09-06-2026. A photo of Adv. Sreela Menon is included, along with her title as State Coordinator of Nirbhaya Cell. The background has a silhouette of a woman and a child.

Government of Kerala
Public Works Department
Centre of Excellence for Kerala Road Sector
Kerala Highway Research Institute

POSH ACT
അവബോധ സെമിനാർ

വിഷയം : തൊഴിലിടങ്ങളിലെ സ്ത്രീ
സുരക്ഷാ നിയമങ്ങളും പരിഹാരങ്ങളും
തീയതി : 09-06-2026

Adv. Sreela Menon
State Coordinator of Nirbhaya Cell
Department of child and women development centre, Poojapura

The POSH act Seminar was conducted on 09-06-2026 at Centre of Excellence in Kerala Road Sector, Kerala Highway Research Institute for providing awareness on Social wellbeing of Women at workplace. The Seminar was moderated by Smt. Shemy S Babu, Joint Director, CoE-KHRI. The key address was handled and guided by Adv. Sreela Menon, State Coordinator of Nirbhaya Cell, Department of Child and Women Development Centre, Poojapura, Thiruvananthapuram. The seminar focused on the joint discussion and knowledge sharing on the POSH act.

The key deliverables of this act are as follows:

- **Applicability:** Covers all public and private sector organizations, educational institutions, hospitals, sports venues, and even unorganized sectors like domestic workers.
- **Definition of Harassment:** Includes unwelcome physical contact, a demand or request for sexual favors, showing pornography, or creating a hostile work environment through unwelcome sexual advances.
- **Redressal Mechanisms:**
 - 1) **Internal Committee (IC):** Mandatory for workplaces with 10 or more employees. Must be Renewed every 3 years.
 - 2) **Local Committee (LC):** Set up at the district level for organizations with fewer than 10 employees or for complaints against the employer.

Complaint and Inquiry Process

- **Filing a Complaint:** Aggrieved women must file a written complaint within 3 months of the incident (which can be extended). The complaint can also be filed online through the government's centralized SHe-Box Portal.
- **Inquiry:** The IC must complete the inquiry within 90 days and submit the report within 10 days of completion.
- **Action:** Disciplinary action or penalties are recommended based on the IC's findings.



Installation of 1500 kN Automatic Universal Testing Machine



The Concrete and Structures Laboratory of Kerala Highway Research Institute has enhanced its testing facilities with the installation of a 1500 kN Automatic Universal Testing Machine (UTM) of Controls make, capable of operating in both strain-controlled and stress-controlled modes.

The machine is capable of conducting tensile, bend, and re-bend tests on steel reinforcement bars, as well as testing prestressing strand wires, nut-bolt assemblies, and other metallic components. Equipped with a high-precision load cell and automated data acquisition system, the UTM ensures accurate and reliable test results.

The facility significantly strengthens the laboratory's material testing capabilities and supports compliance with NABL requirements through improved accuracy, standardization, and traceability in testing procedures.



PTV VISSIM License

Procurement of a PTV VISSIM License, along with a High-End Workstation, for the pilot project titled "Study on Potential Traffic at Chavadimukku, Pongummoodu, and Ulloor Intersections upon Completion of the Sreekaryam Flyover," at a total cost of ₹34,85,391/-.



PTV VISSIM is a microscopic traffic simulation software widely used for modelling and analysing traffic flow and transportation systems. It enables detailed simulation of vehicle movements, intersection operations, traffic signals, queue formation, and roadway performance under existing and future traffic conditions. The software is extensively used in traffic engineering studies, urban transport planning, junction improvement analysis, flyover and corridor studies, and evaluation of traffic management measures. It also provides graphical visualization and performance outputs such as delay, queue length, travel time, and Level of Service (LOS). A two-day training programme on the use of VISSIM software was conducted for the officials of KHRI to enhance their technical capability in traffic simulation and transportation analysis.



California Bearing Ratio (CBR)



The California Bearing Ratio (CBR) test is a vital geotechnical test for evaluating the strength of subgrade soil, especially in the design and construction of flexible pavements. It is one of the most frequently conducted tests in our laboratory and forms the backbone of pavement design and quality assurance.

Our newly purchased automatic CBR machine ensures greater accuracy through automated load application and digital data acquisition, improved efficiency, reducing manual effort and test duration & enhanced reliability on results.

30 kVA UPS



A UPS system with a total capacity of 20 kVA was originally installed at KHRI to provide an uninterrupted power supply to the servers, workstations, and desktop computers. This setup consisted of three separate single-phase UPS units: two 5 kVA units and one 10 kVA unit.

However, the 10 kVA UPS had been out of service for approximately three years due to a major fault. Consequently, the electrical loads originally connected to it were redistributed between the two remaining 5 kVA units. Furthermore, due to aging batteries, these two 5 kVA units became incapable of providing the

required backup time. As a result, UPS power had to be restricted strictly to critical equipment—such as the core servers and primary workstations—while the remaining computers were disconnected from the backup supply. Even if the batteries of the existing units were replaced, the total available capacity would still be limited to 10 kVA because the 10 kVA unit remained non-functional. Additionally, relying on two single-phase UPS units left the system highly susceptible to phase load unbalancing. Considering these critical limitations, discussions were held with the PWD Electrical Section, and it was decided to replace the fragmented setup with a single, unified three-phase UPS system. To accommodate the future expansion of KHRI—including the addition of more computers and workstations—the team decided to upgrade to a new system with a capacity of 30 kVA.

Based on this decision, all necessary electrical work required for the infrastructure upgrade was completed under the supervision of the PWD Attingal Electrical Section. Subsequently, the new 30 kVA Three-Phase UPS system was successfully installed and commissioned at KHRI on June 15, 2026.



Republic day celebration



Centre of Excellence in Kerala Road Sector - Kerala Highway Research Institute (CoE-KHRI) celebrated the 77th National Republic Day on 26th January 2026. Republic Day is celebrated commemorating the adoption of the Constitution of the Republic of India and the country's transition to a republic which came into effect on 26 January 1950.



STAFF NEWS

Retired from KHRI



Anil Kumaran Nair N

DRIVER SR GR

RETIRED ON 30-04-2026



Padma R

JUNIOR SUPERINTENDENT

RETIRED ON 31-05-2026



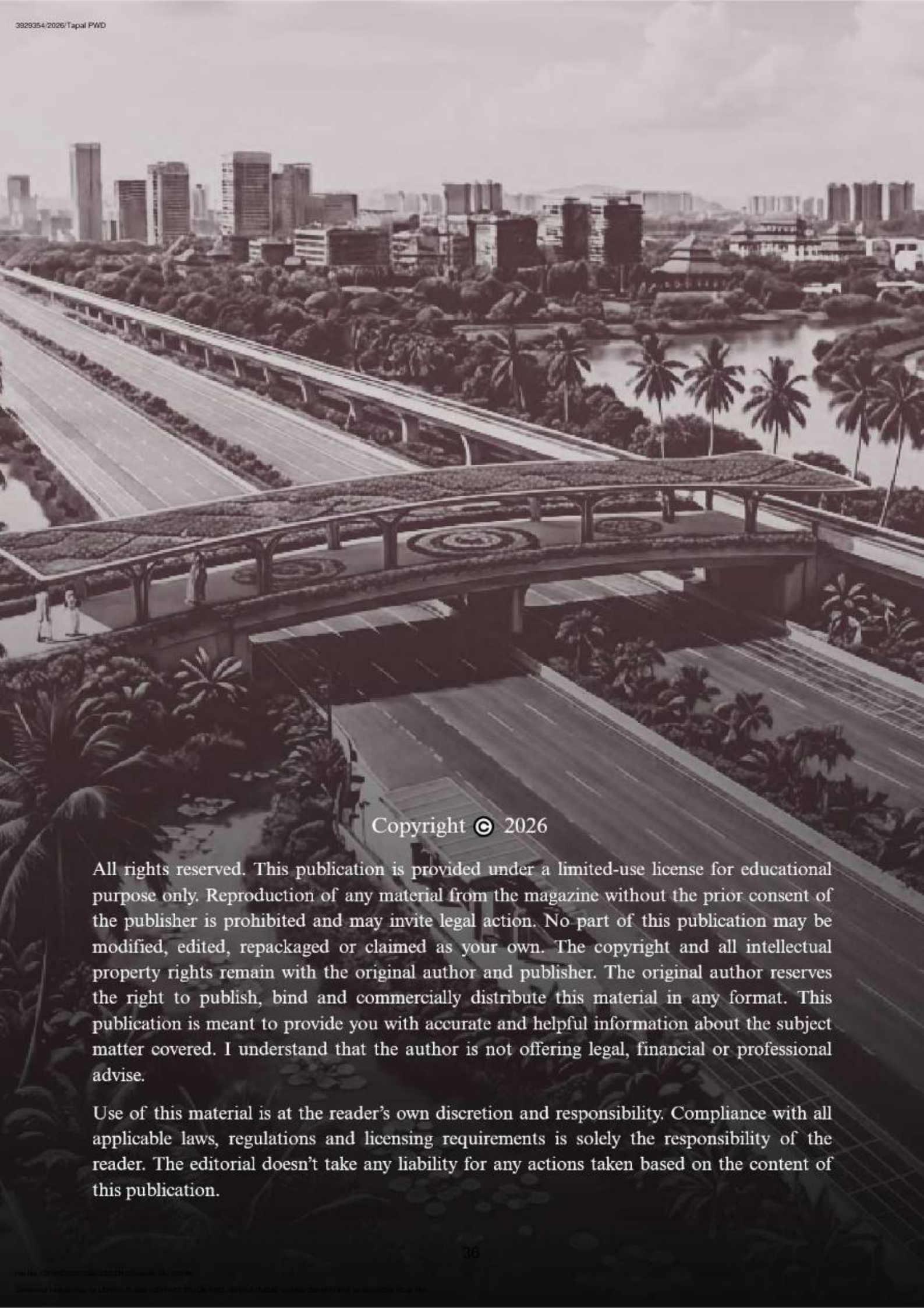
Ushakumari SR

DRAFTMAN (CIVIL) - GRADE I

RETIRED ON 31-05-2026

REVENUE

Based on the Testing and Consultancy works, CoE KHRI had generated a total revenue of Rs. 40,69,454/- during the period from November 2025 to May 2026.



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