

Electrified roads at the 2025 Osaka-Kansai World Expo utilizing cement composite materials

- Application of High-Performance Fiber Reinforced Cementitious Composite for EV Infrastructure -

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This paper describes the method to install power transmission coils for DWPT in the road at the 2025 Osaka-Kansai World Expo. Power transmission coils were encased in concrete to protect against wheel load. The precast concrete was embedded in the road after the concrete hardened. The concrete covering the power transmission coils is HPFRCC, because to make the concrete cover thickness as thin as possible.

HPFRCC (High-Performance Fiber Reinforced Cementitious Composite) is a non-magnetic and ductile material developed to protect the power transmission coils embedded in roads for DWPT. HPFRCC that was used at the 2025 Osaka-Kansai World Expo makes reduce CO₂ emissions by more than 50% because of some cement replacement to blast furnace slag. Experimental results show that the compressive and tensile properties of this HPFRCC are same compared with ordinal one.

The power transmission coil can be protected from repeated wheel loads by HPFRCC covering. However, if the compressive stiffness of power transmission coil is low, HPFRCC will not only deform significantly but will also break. The hollow space inside the coil was potted to reduce compressive deformation of coil. The Young's modulus of the potting material inside the power transmission coil was predicted by analysis to protect wheel load even though 25mm thickness of HPFRCC.

The design details for encasing the transmission coils for the DWPT in concrete were determined based on these considerations.

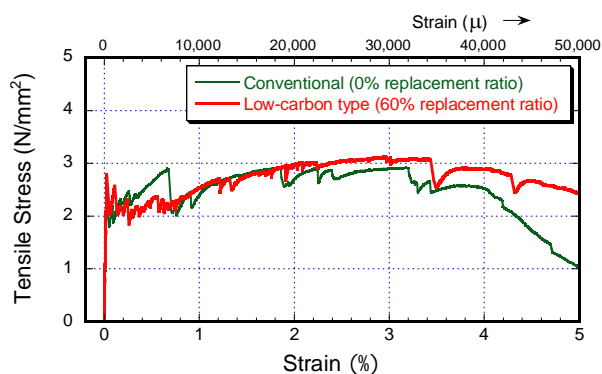


Fig.1 Relationship between Tensile stress and strain of HPFRCC

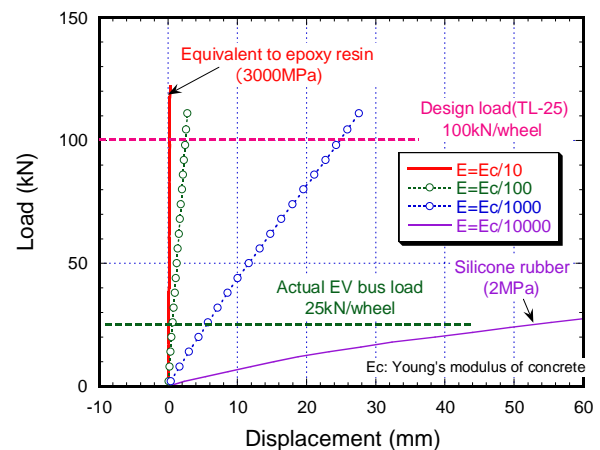


Fig.2 Analytical result of wheel load and displacement relationship at top surface of the precast concrete

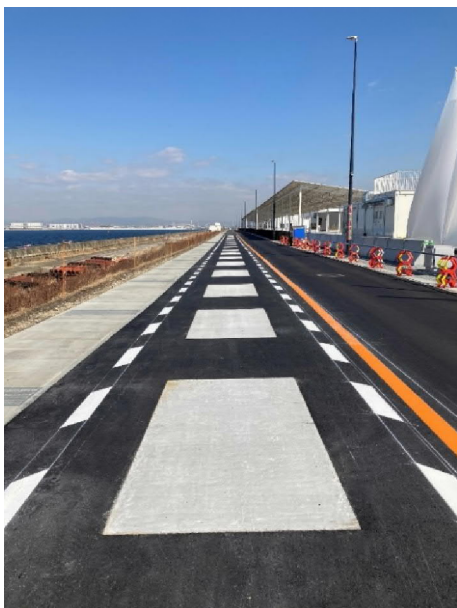


Photo.1 Precast concrete including power transfer coils



Photo.2 Pouring HPFRCC on power transfer coils