Summary of Decisions of the Structural Engineering Committee
SEC 08/2011 held on 13.07.2011

(a) Case 08/2011

Issue: Use of glass fiber reinforced polymer bars as reinforcement for the concrete diaphragm wall at boring positions of TBM

Recommendation: That the use of glass fiber reinforced polymer (GFRP) bars (25 mm and 40 mm in diameter) as reinforcement for the temporary diaphragm wall at boring positions of Tunnel Boring Machine (TBM) be accepted.

Decision: Members endorsed the recommendation subject to the following conditions:-

(a) Suitable measures are to be taken to monitor/control the heat of hydration generated during the concreting process in order to ensure the strength and rigidity of GFRP bars will not be adversely affected.

(b) The handling stress induced in the GFRP bars when the reinforcement cage of the diaphragm wall is being lifted and transported from the fixing yard shall not adversely affect the structural integrity of the GFRP bars.

(c) The GFRP bars shall be manufactured to the proper shape, fabricated and well protected to avoid loss of strength and durability.

(d) Qualified site supervision, including the storage and fabrication of the GFRP bars and the construction of the associated foundation works should be provided by the Registered Structural Engineer and Registered Specialist Contractor.

(e) Since GFRP bars possess a low modulus of elasticity, GFRP reinforced panels would deform more easily than the other panels reinforced with normal steel reinforcing bars. Therefore, its deflection and effect on soil movement caused by such deformation should be investigated at the affected section.

(f) The recommendation of ACI 440 in shear resistance design should be strictly adhered to. Particular attention should be drawn to the reduction in tensile strength of GFRP stirrups at bends as well as the shear strength allowed for GFRP reinforced concrete.