Summary of Decisions of the Structural Engineering Committee
SEC 3/2005 held on 26.4.2005

(a) Case 4/2005

Issue : Proposed rational design approach for the design of barette piles founded on soil.

Recommendations :

(1) That the proposed rational design method for the design of barrette piles using shaft grouted friction and end bearing on soil be accepted.

(2) That the following maximum values be accepted for the design parameters:
   (a) The ultimate shaft grouted friction in alluvium shall not exceed 6 x SPT "N" value, with a limit of 200 kPa.
   (b) The ultimate shaft grouted friction in Completely Decomposed Rhyolite (CDR)/Residual Soil (RS)/Diamict Deposit (DD) shall not exceed 2.4 x SPT "N" value, with a limit of 140 kPa.
   (c) The ultimate end bearing for CDR/RS/DD shall not exceed 10 x SPT "N" value, with a limit of 2000 kPa.
   (d) The allowable load for combined shaft grouted friction and end bearing of barrette piles, shall be defined as not exceeding the summation of the maximum ultimate values as given in item 2(a), 2(b) and 2(c) above divided by a factor not less than 2.0.

(3) That the modification to Building (Construction) Regulation 26(5)(a) to permit the spacing between centres of the barrette piles to be less than the minimum requirement of one pile perimeter (i.e. 7.2m) but subject to a clear pile spacing of not less than 2 m be granted.

(4) That the following proposed acceptance criteria for loading tests of the barrette piles be accepted:
   (a) Maximum settlement (*at head of pile*)< PL/AE + D/50
   (Where P = 2 x design working load, L = pile length, A = cross sectional area of pile, E = Young's Modulus of pile, D = diameter of pile or equivalent diameter for non-circular barrette pile)
   (b) Residual settlement < D/50 (mm)
   (c) Under working load condition, maximum settlement should not exceed 20 mm

Decision : Noting the background information and the rational approach used, members endorsed the recommendations subject to the following :

(a) Qualified site supervision of the quality of the foundation works

including the shaft grouting operation should be provided by the Registered Structural Engineer and the Registered Specialist Contractor, as specified in Practice Note for Authorized Persons and Registered Structrual Engineers 242.

(b) A comprehensive settlement assessment report on the possible total and differential movement of the building structures and their effects on the durability and serviceability of all structural and non-structural building elements, taking into account of the group effects and soil-structure interaction etc shall be submitted upon completion of piling works. The limitation of the angular distortion and deflection of the building structures shall not be greater than that which can be tolerated by the building, building works, structure or street supported by the foundation.

(c) A proposal for monitoring the settlement of the foundation during construction of the sub-structure and superstructure works is to be submitted to Building Authority (BA) at an appropriate stage for agreement.

(d) A performance review report on the settlement behaviour of the building structure shall be submitted to BA for consideration prior to the application of Occupation Pemit.

(e) Proof loading test to minimum 1% of piles and core-drilling test to minimum 5% of piles are required to ascertain the performance of the constructed working piles.

(b) Case 5/2005

Issue : A new pile type consisting of precast prestressed spun concrete pile with steel H pile or steel cage base socketted into rock.

Recommendation :

(1) the design principle be accepted subject to verification by full scale loading test of three trial piles.

(2) the new pile types be accepted as recognized pile types subject to the verification on the constructability and satisfactory performance of the trial piles.

Decision : Noting the background information provided, members endorsed the recommendations subject to the following conditions :

(1) Specification of pile
The pile is to be an assembly of 500x100/125 thick precast prestressed spun concrete pile (*of concrete grade strength not less than 78.5 MPa*) with or without reinforced steel bars joined to a grade 50B/55C (BS 4360:1986) steel H section or steel cage base.

(2) Structural capacity
The vertical structural capacity of a single pile should not exceed 5104 kN (compression) and 2600 kN (tension).

(3) Foundation Capacity
The foundation capacity of the pile should be determined by the application of recognized foundation engineering principles taking into account the ultimate bearing capacity with an adequate factor of safety and the estimation of settlement, based on the characteristics of the ground and the pile element.

(4) Quality Control
The piles shall be manufactured in accordance with the proposed quality control scheme.

(5) Qualified Supervision
Qualified site supervision of the quality of the foundation works including the fabrication, installation and load testing should be provided by the Registered Structural Engineer and Registered Specialist Contractor, as specified in Practice Note for Authorized Persons and Registered Structural Engineers 242.

(6) Trial piles
3 nos. of trial piles shall be carried out by imposition of test load equal to 2 times the allowable pile capacity in accordance with the Code of Practice for Foundations.

(c) Case 6/2005

Issue : Proposed use of 63.5mm diameter high strength threadbar in minipiles socketted into rock.

Recommendations : That the use of 63.5 mm diameter high strength (grade 555/700) threadbars as reinforcement bars without bends in the mini-piles socketted into rock at this site be approved.

Decisions : Noting the background information provided and having due regard to the transient nature of the tensile load acting on the mini-piles, members endorsed the recommendation for the use of the proposed high strength threadbar at this site subject to the following conditions:-

(i) The design of mini-piles shall be in accordance with Building (Construction) Regulations and Code of Practice for Foundations.

(ii) Two numbers of trial piles shall be carried out to verify the tensile capacity of the proposed minipile system in connection with the specified allowable residual extension as given below :

Maximum numbers of coupler in each reinforcement bars per pile, n	Maximum allowable residual extension (mm)
n = 4	4.90
n = 5	5.13
n = 6	5.35
n = 7	5.58
n = 8	5.80
n = 9	6.03
n =10	6.25
n =11	6.48
n =12	6.70

(iii) The maximum numbers of couplers shall not be more than 12 nos. in each high strength threadbar.

(iv) The nominal diameter of the high strength (grade 555/700) threadbars shall be 63.5 mm, the guaranteed yield strength shall be 520 MPa, the ultimate tensile strength shall be 690 MPa and the minimum elongation shall be 10%.

(v) The mechanical couplers shall be staggered so that not more than half of the total number of high strength (grade 555/700) threadbars shall be spliced at any cross section.

(vi) No welding shall be carried out to the high strength (grade 555/700) threadbars.

(vii) The tensile capacity of the mechanical couplers and round nut for external anchorage shall be not less than 125% of the high strength (grade 555/700) threadbars.

(viii) Mill certificates and test reports of the high strength (grade 555/700) threadbars, mechanical couplers shall be submitted to the Building Authority for record.

(ix) Material testings on the high strength (grade 555/700) threadbars, couplers and round nuts for external anchorage shall satisfy the following requirements :

(a) Rate of testing upon material delivery as stipulated in Table 9 of CS2:1995.

(b) Tension test shall be carried out in accordance with Cl. 6.2 of CS2:1995.

(c) maximum permanent elongation of the coupler at working stress (i.e. 0.24fy in this case, where fy = 520 MPa) shall not exceed 0.15 mm similar to the requirement stipulated in Table 3.0.7 of Chinese Design Code JGJ107-2003.