Summary of Decisions of the Structural Engineering Committee
SEC 1/2006 held on 29.3.2006

(a) Case 1/2006

Issue:	Proposed use of grade 80D concrete with 25% PFA and total cementitious content of 550 kg/m^3.
Recommendation:	To accept the use of grade 80D concrete for columns and core walls of superstructure subject to the conditions given in the SED Appendix SE-SA1A and PNAP 90 being met and the quality assurance scheme proposed by RSE being implemented.
Decision:	Members were concerned on the fire resistance properties of high strength concrete and pointed out that specialist literature review in this respect should be included in the design brief of the proposal. Noting the background information provided and that previous SEC cases using 80D or above concrete with similar imposed conditions had been endorsed, members endorsed the recommendation subject to the condition that the fire resisting properties of the high strength concrete columns and core walls had been adequately considered. Attachment: 1. SE-SA1A (Issue 11/05) 2. PNAP 90 (Issue Sept 2001)

Ref : BD_____

Address : _____

Appendix_____ to approval dated_____

High Strength Concrete

In giving this approval of plans, I hereby impose the following conditions under item 6 in section 17(1) of the Buildings Ordinance:

(a) Sampling and testing of steel reinforcement should be carried out in accordance with Practice Note for Authorized Persons and Registered Structural Engineers 122 (PNAP122) current at the date of this approval. Testing should be carried out by a laboratory* accredited under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for the particular test concerned. Test results should be reported on a HOKLAS Endorsed Certificate and appended with a statement signed by the Authorized Person/Registered Structural Engineer to confirm that the acceptance criteria appropriate to the type of steel used have been complied with, and should be submitted within 60 days of the delivery of the steel reinforcement to the site.

(b) A quality assurance proposal is to be submitted with sufficient preliminary test results to confirm that reliable and consistent concrete can be produced. This should include a detailed assessment of the concreting materials, the mix design and the quality control procedures of the batching plant. In this respect the designed mean resistance to crushing shall initially exceed the specified resistance to crushing by a margin of not less than 12 MPa.

(c) Adequate facilities are to be provided on site, for sampling the fresh concrete, making, curing and storing the test cubes.

(d) An experienced and competent person is to be provided full time to supervise the whole work so as to ensure compliance with the approved plans.

(e) All concrete arriving onsite shall come from a concrete supplier registered under the Quality Scheme for the Production and Supply of Concrete (QSPSC).

(f) Sampling of fresh concrete, making, curing, storing and compression testing of concrete test cubes should be carried out in accordance with the methods specified in CS 1:1990 by a laboratory* accredited under HOKLAS for the particular test concerned. Both sampling and test results should be reported on a HOKLAS

Endorsed Certificate and submitted within 21 days after sampling and/or testing. The test reports[#] should be appended with a statement signed by the Authorized Person/Registered Structural Engineer to confirm the following:

(i) All concrete used for the construction and concrete cubes covered by the test reports are in accordance with the concrete grades shown in the approved plans.

(ii) Concrete cube sizes, rates of sampling fresh concrete for testing and acceptance criteria for compressive strength set out in Building (Construction) Regulations have been complied with.

(iii) All sampling of fresh concrete, making, curing, storing and compression testing of concrete test cubes have been carried out by a laboratory* accredited under HOKLAS and in accordance with the methods specified in CS1: 1990.

(g) At least one sample of concrete shall be taken from every ready mixed vehicle arriving on site. If concrete is site batched one sample shall be taken from every $10m^3$ of concrete produced.

(h) Insitu core testing on the completed structure shall be carried out. Tests for compressive strength of concrete cores should be carried out in accordance with the method specified in CS1:1990, by a laboratory* accredited under HOKLAS for the particular test concerned. Test results should be reported on a HOKLAS Endorsed Certificate and submitted within 21 days after testing. The test reports should be appended with a statement signed by the Authorized Person/Registered Structural Engineer to confirm the following:

(i) All insitu concrete cores taken from the completed structure are in accordance with the coring proposal submitted to the Building Authority, item k(v).

(ii) The diameter of the concrete cores should preferably be 150mm for 40mm aggregate and 100mm for 20mm aggregate or less, and must not be less than 75mm. The ratio of diameter to the maximum aggregate size should be not less than 3. The length of the test sample cut from the concrete core should be at least 95% of the diameter.

(iii) Concrete cores should not show evidence of segregation of individual materials. Concrete cores should not exhibit honeycombing which means interconnected voids arising from, for example, inadequate compaction or lack of mortar. For any set of cores representing a test location, the estimated insitu cube strength of each core specimen should be at least 75% of the specified grade strength and the average estimated insitu cube strength of the set should be at least 85% of the specified grade strength. In

this respect, the estimated insitu cube strength of each core specimen should be calculated in accordance with CS1: 1990.

(i) Qualified site supervision of the drilling of concrete core samples, by an experienced and competent person, should be provided. The person supervising the drilling of core samples should be independent from the contractor.

(j) Details of any subsequent revision of the mix design are to be submitted.

(k) Consent to commence the work will not be granted until the following documents have been submitted and found satisfactory:

(i) the quality assurance proposal, item (b) and confirmation of the mix proportion to be adopted;

(ii) proposals for the onsite facilities for sampling of fresh concrete and making, curing and storing the test cubes, item (c);

(iii) the name of the laboratory* accredited under HOKLAS, which will carry out the onsite and laboratory sampling and testing work;

(iv) the name and professional details of the person who is to supervise the works on a full time basis (i.e. during site working hours), item (d); and

(v) proposal for insitu core testing of the finished concrete structure, item (h).

* A Directory of Accredited Laboratories in Hong Kong is obtainable from the Hong Kong Accreditation Service (HKAS) Executive, Innovation and Technology Commission.

Up-to-date information on accredited laboratories and their scopes of accreditation are available on the internet at the HKAS website at http://www.info.gov.hk/itc/hkas/.

A laboratory's accreditation for an individual test or calibration may be granted, modified or withdrawn at any time. To ensure that the test that you commission the laboratory to conduct is within its scope of accreditation, please always insist on test results be reported on a HOKLAS Endorsed Certificate.

\# The test reports, when submitted, should be appended with a summary which contains information on locations of concerned structural elements, concrete grades and dates of cast. The summary should also include previous summary information of concrete cube test reports in chronological order.

Pulverised Fuel Ash in Concrete

The technical and environmental benefits of using Pulverised Fuel Ash (PFA) as a partial replacement for Ordinary Portland Cement (OPC) in concrete are well established. However, it is necessary to ensure effective curing; in cold weather, in particular, very early strengths may be lower than equivalent OPC mixes.

2. The use of PFA as a partial cement replacement in concrete is permitted on the following conditions :

(a) PFA as a separate constituent may be used only with OPC and should comply with BS 3892: Part 1:1982, except that the criterion for maximum water requirement may not apply;

(b) Blended cement containing PFA should comply with BS 6588:1985 and have a nominal PFA content not exceeding 25%. PFA should not be used as a partial cement replacement in concrete in addition to blended cement;

(c) The PFA content should not exceed 35% by mass of the cementitious content (OPC plus PFA) of the concrete. It should, however, be noted that 25% PFA replacement is usually only used in normal construction whereas PFA replacement exceeding 25% is for special applications such as marine construction and massive pours which will require expert advice and stringent site control;

(d) The AP/RSE should specify the PFA content and extent of its use in the structural submissions. He should satisfy himself and the registered contractor should make sure that the concrete supplier has adequate quality control measures to ensure that the finished concrete complies with the specifications and statutory requirements in all respects. The AP/RSE shall be informed if deviations have been found; and

(e) When the PFA replacement exceeds 25%, the AP/RSE should also satisfy himself that there will not be any adverse effect on the structure due to removal of formwork, creep and long-term deflection etc.

(C M LEUNG)
Building Authority

Ref. : BD GP/BREG/C/1

First issued : December 1982
Last revision : May 1994
This revision : September 2001 – paragraph 2 amended (AD/NB2)

Index under : PFA
Pulverised Fuel Ash