

### **Structural Design Information**

To facilitate processing of structural submissions, plans and calculations should be clearly presented and organized as outlined below.

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#### **Structural Plans**

2. Structural plans should be properly indexed and each drawing should bear a drawing title and drawing number.
3. The first drawing of the set should contain general specification notes on :
  - (a) concrete materials, including cement, aggregates and pulverized fuel ash (if used);
  - (b) reinforcement and other structural materials;
  - (c) grade and characteristic strength of structural materials;
  - (d) concrete covers, corrosion protections and fire resistance requirements; and
  - (e) workmanship and other particulars of method of construction.
4. There should be adequate structural drawings consisting of floor plans, sections and elevations where appropriate showing layout, dimensions, levels and identification of all structural frames and members.
5. Notes on designed imposed loads (including allowance for partitions, screeds, dynamic effects and the like) should be given on the corresponding floor plans. Where there are different designed imposed loads for different parts of the floor, the variations should be illustrated diagrammatically.
6. In alteration and addition submissions, reinforcement details of the structural members in the existing building affected by the alteration and addition works should be shown on drawings. These reinforcement details should be extracted from the original approved plans.

## **General Building Plans**

7. The information on designed imposed loads specified in paragraph 5 above should also be given on the general building plans.

## **Structural Calculations**

8. Structural calculations should be grouped into two parts, each to be properly indexed. The first part should contain essential information on the structural design of the building as given in paragraph 9 below, and is to be retained in the Buildings Department (BD) for record. The second part should contain relevant details of analysis and design calculations of the structural elements as outlined in paragraphs 10 to 12 below.

9. The first part of the structural calculations should contain the following:

- (a) a synopsis of the structural design giving --
  - (i) a general description of the foundation and structural system and the basic anatomy of stability by which the applied loads are transferred to the ground; and
  - (ii) design method, assumptions, codes used and limitations of stresses and deformation;
- (b) essential information on the computerized calculations including --
  - (i) the name, version, developer's name/identification, BD reference number and validity period of the computer program used;
  - (ii) the scope of application of the program which is accepted by the BD and a list of the limitations in application;
  - (iii) assumptions made and justifications on parameters used in the computer model e.g. material properties, boundary conditions etc.;
  - (iv) input data with computer-generated graphics or hand sketch showing the framing & layout of the structure, nodes & elements, joint fixity etc.;

- (v) summary of salient output results e.g. the design envelopes of moment, shear, displacement of the most critical cases for the design and check of the applied forces against the output overall reaction; and
  - (vi) the interpretation and application of the computer output in the design;
- (c) essential information on the design to resist wind load, including--
- (i) a general description of the wind-resisting system and mathematical modelling;
  - (ii) diagrams illustrating the location and identification of all structural frames and members in the wind-resisting system;
  - (iii) a summary of sectional properties of wind-resisting elements;
  - (iv) a summary of wind loads applied to the building and the distribution of the wind forces on individual frames at each floor level;
  - (v) principal reactions (moments, shear forces and axial forces) in the wind-resisting elements; and
  - (vi) a summary of equilibrium check on applied lateral forces and calculated reactions of vertical structural members at foundation and other critical levels where there is a major change in structural configuration;
- (d) essential information on the design to resist dead and imposed loads, including --
- (i) the design data on dead and imposed loads (including allowance for partitions, screeds, dynamic effects and the like); and
  - (ii) a summary of principal reactions (moments, shear forces and axial forces) in vertical structural members at foundation and all floor levels;

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- (e) details of the design of major transfer members where the failure of which would induce cumulative instability; and
- (f) details of the design of cantilevered canopies, balconies and major structural appendages.

10. The second part of the structural calculations (namely Part II structural calculations) usually involves presentation of detailed analysis and design of individual structural elements computed by BD's pre-accepted programs in bulk volume of computer printout. Part II structural calculations will be returned to the authorized person (AP) / registered structural engineer (RSE) after processing of the structural proposal. This would inevitably involve a large amount of resources in the preparation and handling of the calculations.

11. To promote green environment and facilitate effective preparation and processing of structural submission, the BD would encourage a paperless submission of Part II structural calculations in CD/DVD format as an alternative to the conventional paper format. In this connection, the BD will accept submission of Part II structural calculations in the form of a non-rewriteable CD-ROM in ISO 9660 format (i.e. CD format) or non-rewriteable DVD-ROM in ISO/IEC 13346:1995 format (i.e. DVD format) with the project information, i.e. BD reference, Submission Title, Name of RSE and Disk Number, given on the cover. The RSE should sign on the cover of each CD/DVD submitted and the electronic files contained in it should:-

- (a) be in the Adobe Portable Document Format (PDF), and each separated page of the documents should not be larger than A3 size;
- (b) have a clear index listing the content and purpose of each document file in the CD/DVD;
- (c) support searching of text contained in the document; and
- (d) have resolution not less than 300 dpi for any image contained in the document.

12. The submitted CD/DVD is not replaceable and will not be returned to the AP/RSE. Any supplementary design calculations and/or information in Part II category for the purpose of substantiating the structural proposal submitted should be presented in the same format and submitted in a supplementary CD/DVD for retention by the BD.

### **Documents Submitted**

13. Appendix A is a list of documents and plans required to be included in the structural submission. This list is not exhaustive and more information may be required for individual consideration.



( HUI Siu-wai )  
Building Authority

Ref.: BD GP/BREG/A/12

This PNAP is previously known as PNAP 121

First issue July 1986

Last revision September 2002

This revision July 2016 (AD/NB2) - Paras. 1, 4, 8 & Appendix A revised and Paras.  
10 to 12 added

### Check List on Documents for Inclusion in Structural Submissions

#### PART 1 - GENERAL INFORMATION

BD Ref. No.: \_\_\_\_\_ Address of Site: \_\_\_\_\_ Lot No.: \_\_\_\_\_

Authorized Person: \_\_\_\_\_ Registered Structural Engineer: \_\_\_\_\_

Type of Submission (tick as appropriate):

New Building ☐; Alteration & Addition Works ☐

First submission ☐; Resubmission upon refusal ☐; Revision/Amendment ☐

Type of Works (circle or state type):

Foundations --

Ground Investigation; Driven Piles; Small Diameter Bored Piles (not exceeding 750mm); Large Diameter Bored Piles (over 750mm); Barrettes; Spread Footings; Rafts; Pile Caps; Others \_\_\_\_\_

Earth-retaining, Excavation and Lateral Support Works --

Retaining Walls; Sheet Piling; Piled Walls; Panelled Diaphragm Walls; Lateral Support Details; Other Shoring System \_\_\_\_\_

Underground Structures --

Basement; Others \_\_\_\_\_

Superstructures --

Main Structure; Curtain Walls; Others \_\_\_\_\_

#### PART 2 - DOCUMENTS SUBMITTED (tick as appropriate)

	Yes	N/A
Plans (2 signed sets for BA approval)		
Design Calculations (Part I, No. of Vol. )		
(Part II, No. of Vol. / CD / DVD Rom)		
Ground/Site Investigation Report (2 sets)		
Appraisal Report on Adjacent Buildings		
Geotechnical Report		
Form BA 4 (Appointment of AP/RSE)		
Form BA 5 (Application for approval)		
Form BA 6 (Stability Certificate)		
Form BA 16 (Application for exemption/modification)		
Form BA 17 (Temporary building)		
Payment of Fees (for structural alteration & addition works)		



### PART 3 - ADDITIONAL PLANS FOR REFERRAL

Does proposal involve or affect the following?	Yes	No	If yes please indicate the number of additional set(s) of plans for referral to each of the relevant organization
Schedule Area No. 1, 2 or 4			Geotechnical Engineering Office
Schedule Area No. 3 or MTR Protection Area			Mass Transit Railway Corporation
Schedule Area No. 5			(a) Geotechnical Engineering Office; and (b) Drainage Services Department
Slopes/Retaining Structures/Deep excavation/disused tunnel			Geotechnical Engineering Office
Culvert, nullah, stream course			(a) Geotechnical Engineering Office; and (b) Drainage Services Department
Proposed MTR routes			Railway Division, Highways Department
Chek Lap Kok Airport			(a) Civil Aviation Department; and (b) Civil Engineering and Development Department
Structures to be erected in, over, under or upon street			(a) Lands Department; and (b) Highways Department
Highway Structures			Highways Department
Sea walls, adjacent to sea front			Port Works Division, Civil Engineering and Development Department
Reclamation, piers			(a) Marine Department; and (b) Port Works Division, Civil Engineering and Development Department
Public drainage			Drainage Services Department
Water mains			Water Supplies Department
Total no. of sets of additional plans for referral:			

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signed (AP/RSE, Name in full)

(Rev. 7/ 2016)