BUILDINGS DEPARTMENT

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10 January 2013

Mr. Benjamin SUN Chi-bun
c/o Benaim (China) Limited
25th Floor, SUP Tower
75 - 83 King's Road
North Point,
Hong Kong

Dear Sir,

**Application for Prior Acceptance of Computer Program**
**WALLAP (Version 5.04)(Modified C580 Approach)**

I refer to the captioned application made under your letters and document dated 22 June 2010, 28 February 2011, 9 October 2012 and 3 January 2013.

2. Based on your assessment of the computer program, I hereby grant my prior acceptance of its use in submissions made under the Buildings Ordinance for the validity periods listed below and subject to the conditions stipulated in paragraphs 3 to 7.

| Program Title | BD Reference Number | Valid Until |
|---|---|---|
| WALLAP (Version 5.04) (Modified C580 Approach) | G0170 | 9 January 2016 |

3. The above acceptance is subjected to the following restriction:

(a) The stability analysis: wedge stability and FOS calculation is excluded,
(b) Single pile analysis is excluded, and
(c) The acceptance is subjected to the conditions given in the attached document - Notes on the use of WALLAP.

4. The validity period and the BD reference number given in paragraph 2, together with all information required in the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers ADM-6, should be given in a statement included in the submissions made under the Buildings Ordinance.

5. The prior acceptance places emphasis on the competence of the users of the program, i.e. the registered geotechnical engineers making the submissions under the Buildings Ordinance, for the proper use of the computer program. The users of the program should ensure that the program is applicable and the program assumptions are valid for the individual cases, all the program limitations and restrictions are observed, any modelling required in the use of the program is correctly configured, and the computer results are appropriately audited or verified.

/6. ...

6. The prior acceptance is given with respect to the version of the computer program as submitted. Should any changes be proposed or made to the above computer program, a fresh application with details of the amendment should be submitted to me for consideration, and before my prior acceptance on the use of the revised program is given, they should not be used in any submission made under the Buildings Ordinance.

7. Please note that the prior acceptance on the use of the above computer program by this department is given on the understanding that neither the name of this department nor the content of this letter would be used or quoted in any form of advertisement, brochure or publication of the material.

Yours sincerely,

(SM LEUNG)
Chief Officer/Technical Services
for Assistant Director/New Buildings 2
Buildings Department

c.c. SED/R/13 (IV)
GCI 2/D15/1, GEO

# NOTE ON THE USE OF WALLAP (VERSION 5.04) FOR THE LIMIT STATE PARTIAL FACTOR METHOD (MODIFIED C580 APPROACH)

Based on the findings of the validation exercise and back analysis of past case histories of excavation and lateral support works, users are reminded of the following:

## 1. HORIZONTAL EARTH PRESSURE COEFFICIENTS

1.1 Users are reminded that the active and passive earth pressure coefficients (Ka and Kp) values applied in WALLAP are the horizontal components. When opting for the manual input for Ka and Kp, users should use Figures 18 and 19 of Geoguide 1 to obtain the earth pressure coefficients. When opting for the WALLAP calculated values, WALLAP will compute the horizontal earth pressure coefficients based on the method given in the manual (WALLAP User's Guide Section 6.7).

1.2 Users should note that the Partial Factors for materials and loads and the design ground parameters should be based on Geoguide 1.

## 2. MODEL OPTIONS

2.1 The validation of WALLAP has been carried out for 2-D FE analysis model only.

2.2 The validation of WALLAP has been carried out by setting the 'non-linear modulus parameter (L)' to zero to model constant soil stiffness with horizontal distance from the wall. Users can consider setting this parameter to a value equal to the wall depth or a suitable value considered appropriate in accordance with the WALLAP manual recommendations in practice.

## 3. FINITE ELEMENT LENGTH OF WALL

3.1 Users should note that the Finite Element (FE) Length parameter of the wall under "Wall / Pile" definition is pre-set by the Program automatically based on the actual length of wall, which however can be changed manually. It should be noted that a longer "FE length" may reduce the accuracy of analysis results, therefore it is recommended that the manually set length should not deviate from the "recommended length" by too much.

3.2 In the case of computer analysis convergence failure, the user should check the problem geometry as well as other possible reasons. Convergence failure due to geometry sometimes could be resolved by a minor adjustment of the "FE Length" parameter.

## ADVISORY NOTE ON THE USE OF WALLAP (VERSION 5.04) FOR THE LIMIT STATE PARTIAL FACTOR METHOD (MODIFIED C580 APPROACH)

## 4. SENSITIVITY OF RESULTS TO WALL EMBEDMENT DEPTH

4.1 Users should carry out sensitivity checks of the wall behaviour with respect to wall embedment depth. The wall behaviour in terms of stability is normally represented by computed structural forces (bending moments/shear forces/strut loads) in the ULS analysis however the maximum wall deflection is also an important parameter defining the state of the wall. The critical wall embedment depth is usually defined as the depth at which there is a rapid change in structural forces or rapid increase in wall deflection corresponding to a small reduction in the embedment depth. The sensitivity analysis on the above basis is considered to be an important step in selecting a suitable wall embedment depth to achieve an economical design of retaining wall that is sufficiently safe and robust.