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For enquires, please contact:

Building Engineering Group (#12-00)

Tel : 1800 3425 222

Online feedback form:

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Dear Sir/Madam

JOINT BCA / ACES / IES CIRCULAR 2025

GUIDELINES FOR USE OF DRAINAGE BLANKET BENEATH BASE SLAB

Objective

This circular aim to provide guidelines for the use of drainage blanket beneath base slab as part of foundation and/ or base slab design. The guidelines also provide some of the possible measures to mitigate the risks associated with the usage of drainage blanket for building works.

Background

2 Drainage blanket is used to relief water pressure beneath base slab at non-tower area, where the podium superstructure dead load is inadequate to offset the uplift water pressure, resulting in net tension forces. Conventionally, tension piles are provided to resist the net tension load. By adopting drainage blanket system beneath base slab, the water uplift pressure is reduced. With this, the podium superstructure load becomes larger than the nominal uplift water pressure, and tension piles may no longer be necessary. In addition, the design of the basement slab can also be optimised.

3 Although drainage blanket can provide cost and time savings, there are possible risks involved if it is not executed properly. The risks include:

- i. Build-up of water uplift pressure, and the building could be subject to uplift force, if the monitoring and maintenance of drainage blanket system are not done properly to verify the design assumptions; and/or
- ii. Lowering of ground water level beyond the project boundary line by more than what was calculated during design, if the impact assessment study and field test to ascertain soil permeability were not thorough, which could cause settlement and damage to surrounding buildings.

4 These guidelines aim to mitigate possible risks involved with drainage blanket and incorporate inputs on actionable requirements from the professional institutions. Developers, Qualified Persons ("QPs"), Accredited Checkers ("ACs"), Builders and Site Supervisors must exercise due diligence and

take reasonable steps to adhere to the minimum requirements stipulated in the guidelines in **Annex A** for usage of drainage blanket in the building works.

5 Nothing contained in this circular is meant to replace or negate the need to comply with the provisions of the Building Control Act 1989 and the subsidiary building regulations in all aspects. QPs are to note that they have duties under the Building Control Act, amongst others, to take all reasonable steps and exercise due diligence to ensure that building works are designed in accordance with the provisions of the Building Control Act and the subsidiary building regulations.

6 We would appreciate if you could disseminate the contents of this circular to your members. Please contact us at Tel 1800-3425222 or through the online feedback form (<https://www.bca.gov.sg/feedbackform/>) should you need any clarification. Thank you.

Yours faithfully



Er. Dr. POH TEOH YAW
DIRECTOR, GED
BUILDING AND CONSTRUCTION AUTHORITY
For COMMISSIONER OF BUILDING CONTROL



ER. CHAN EWE JIN
PRESIDENT
INSTITUTION OF ENGINEERS
SINGAPORE (IES)



ER. CHUCK KHO
PRESIDENT
ASSOCIATION OF CONSULTING
ENGINEERS SINGAPORE (ACES)

ANNEX A

Requirements for Drainage Blanket Design

- i. A qualified person appointed to prepare the plans of building works (“**Design QP**”) is to submit the drainage blanket plan as part of the foundation plan in a single plan submission.
- ii. Design QP is to provide detailed impact assessment study on the impact of surrounding buildings and demonstrate that there is negligible impact beyond project site boundary during the design life of the building. Sensitivity study including consideration of worst-case scenario such as higher permeability of soil layers than expected should be included.
- iii. Design QP to include the following note in the approved plan: “Drainage blanket system beneath base slab has been designed and assessed to have negligible impact beyond project site boundary”.
- iv. The drainage blanket system is suitable for site and the surrounding area consisting of hard ground with low permeable soils. Design QP is to carry out adequate and comprehensive site investigation including field tests to verify this, including in-situ permeability test and pumping tests. Design QP is to indicate the location and number of in-situ permeability tests and pumping tests in the plan.
- v. Design QP shall provide necessary measures to address the risk of pipe choking during the design lifetime of the building, including the following:
 - a. Provide dimpled sheet drainage system with additional redundancy for water flow (see Figure 1: Example of dimpled sheet drainage system); or
 - b. If using conventional way of relying on subsoil pipes for drainage blanket, Design QP shall provide design checks for uplift forces for accidental load case when drainage blanket fails. For case without tension piles, the structural design of the base slab shall be designed for accidental load. Refer to SS EN 1997-1 and NA to SS EN 1997-1 for checking of accidental load case.
- vi. Design QP shall indicate in the plan additional sump pits as contingency measures to be constructed if the drainage blanket does not perform as per design. This includes pre-selected locations and details of sump pits within the basement to relieve the water pressure during building service life.
- vii. Design QP is to specify adequate instruments to monitor water pressure beneath the basement slab and the surrounding groundwater level during construction to verify the design assumptions. The monitoring shall start upon completion of basement slab and shall be maintained till the project has obtained Temporary Occupation Permit (TOP) or longer until steady state water level is being achieved to ensure that there is no excessive lowering of groundwater level.

- viii. Design QP is to specify on plan necessary maintenance regime for the drainage blanket system though out the design lifetime of the building.
- ix. Builder is to provide operation & maintenance manual of the drainage blanket system to the Developer upon TOP. The manual is to include inspection and maintenance regime for the drainage blanket system including the pumps, sump pits and sub-soil pipes etc.
- x. Developer is to provide undertaking letter that they are committed to maintain the drainage blanket system and transfer and hand over the commitment to MCST. The undertaking letter to be submitted together with plan submission.

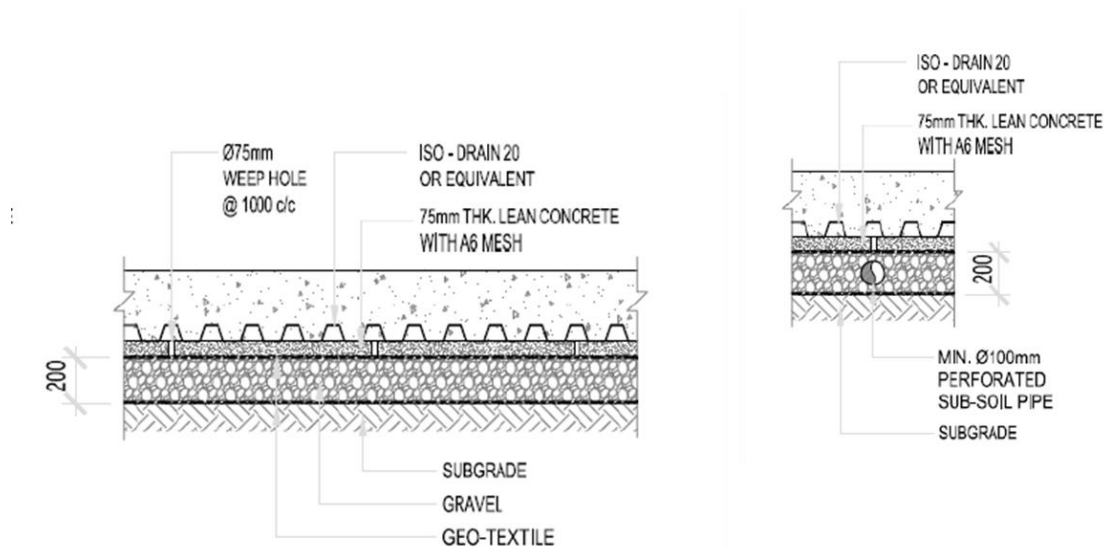


Figure 1: Example of dimpled sheet drainage system

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