Griffith UNIVERSITY

LECTURE SERIES AND WORKSHOPS ON GEOTECHNICAL ENGINEERING IN PRACTICE

Vertical Drainage Execution Aspects

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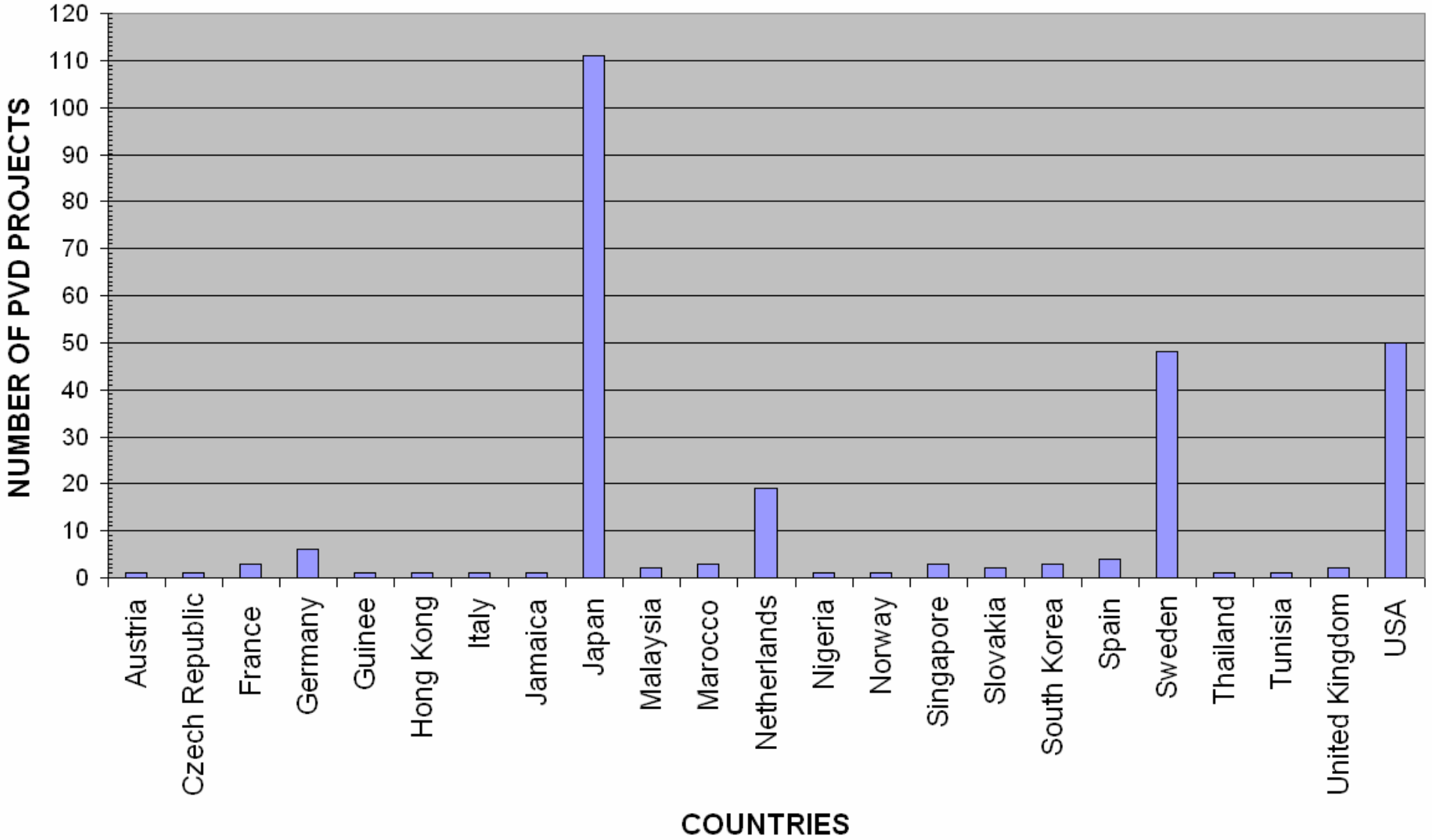
Sweden

Use of PVD Method

- In Japan, the total length of installed band drains is in excess of 37 million m. The average length of installed drains on these projects is in excess of 20 m.
- During the same period, almost 50 band drain projects have been carried out in Sweden, with a total drain length of 11 million m.
- In the North America, more than 50 projects have been reported, followed by the Netherlands with about 20 projects.

Survey of International PVD Projects



EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

FINAL DRAFT
prEN 15237

October 2006

ICS 93.020

English Version

Execution of special geotechnical works - Vertical drainage

Exécution des travaux géotechniques spéciaux - Drains verticaux

Ausführung von besonderen geotechnischen Arbeiten (Spezialtiefbau) - Vertikaldränierung

This draft European Standard is submitted to CEN members for formal vote. It has been drawn up by the Technical Committee CEN/TC 288.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. prEN 15237:2006: E

European Standard
Vertical Drainage: prEN 15237

Scope

This European Standard establishes general principles for the execution, testing, supervision and monitoring of vertical drain projects.

The Standard includes the application of prefabricated vertical drains and sand drains and deals with requirements to be placed on design, drain material, installation methods and loading (static, vacuum, groundwater lowering).

This Standard applies to the improvement of low-permeability, highly compressible soils by vertical drainage and preloading.

Vertical drainage is used both on land and in marine constructions

- (pre-)consolidation and reduction of post-construction settlements;
- speeding up the consolidation process by decreasing the path lengths for pore water dissipation;
- increase of stability (by increasing effective stresses in the soil);
- groundwater lowering;
- mitigation of liquefaction effects.

Execution of vertical drainage

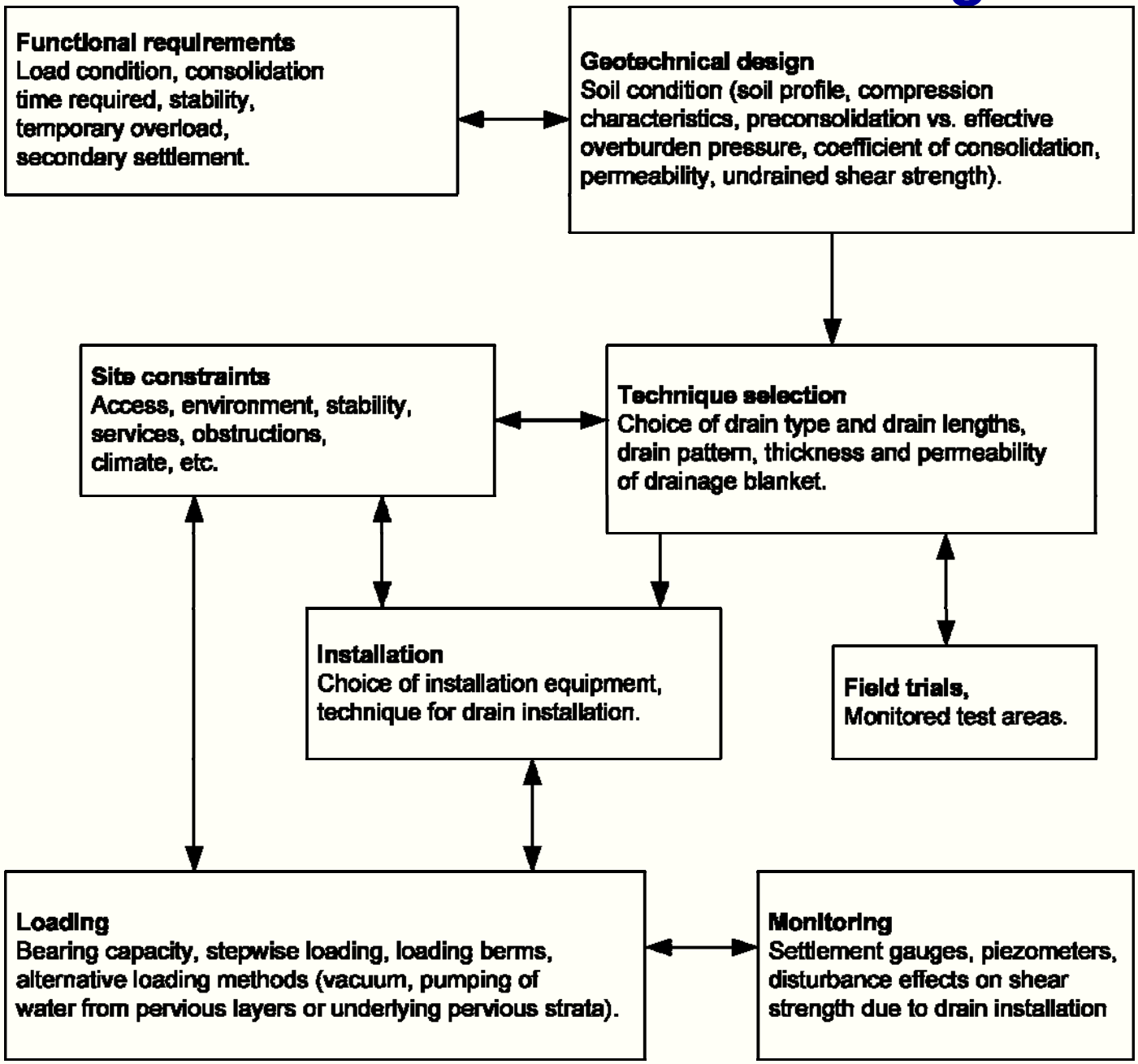
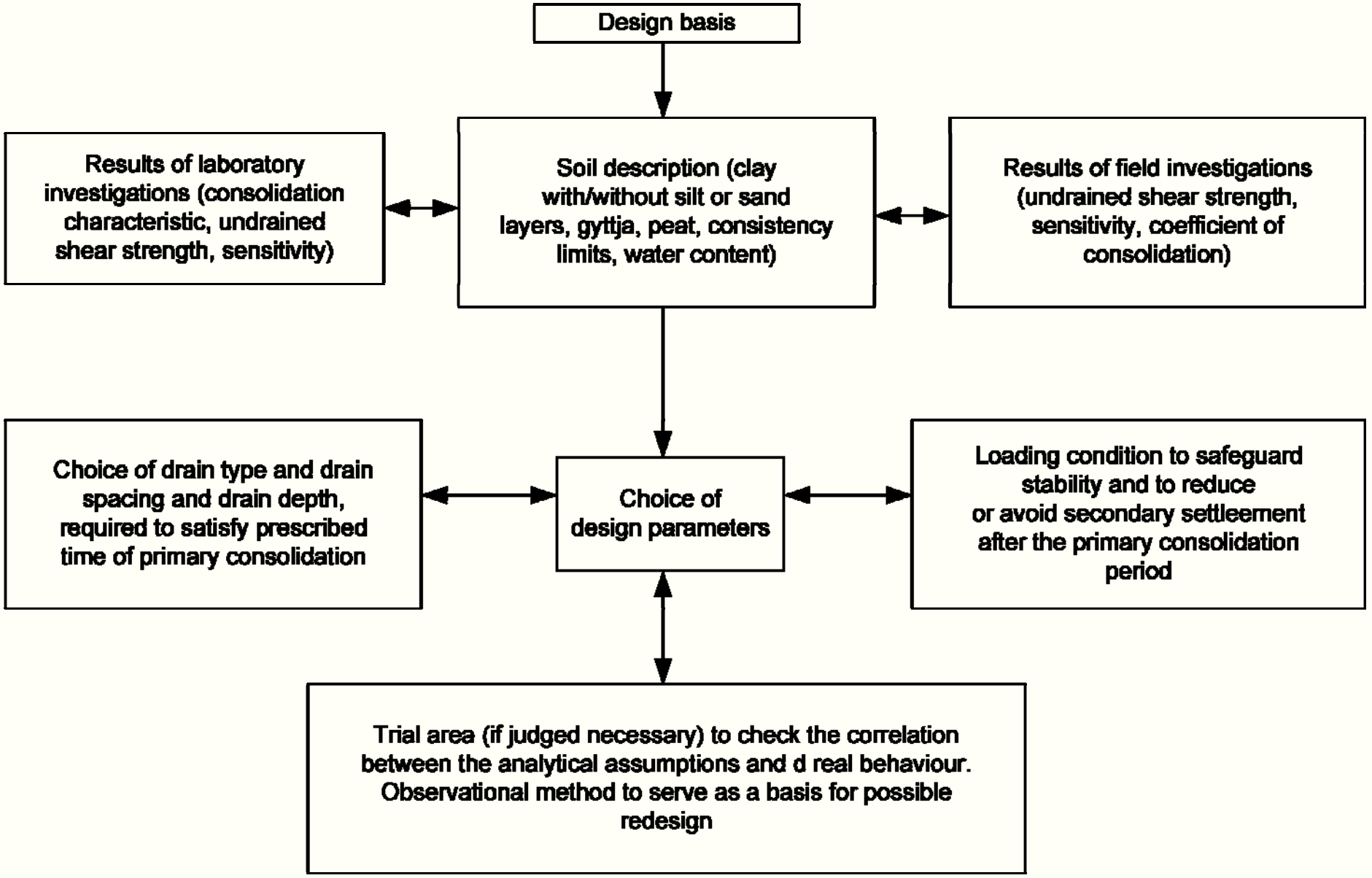
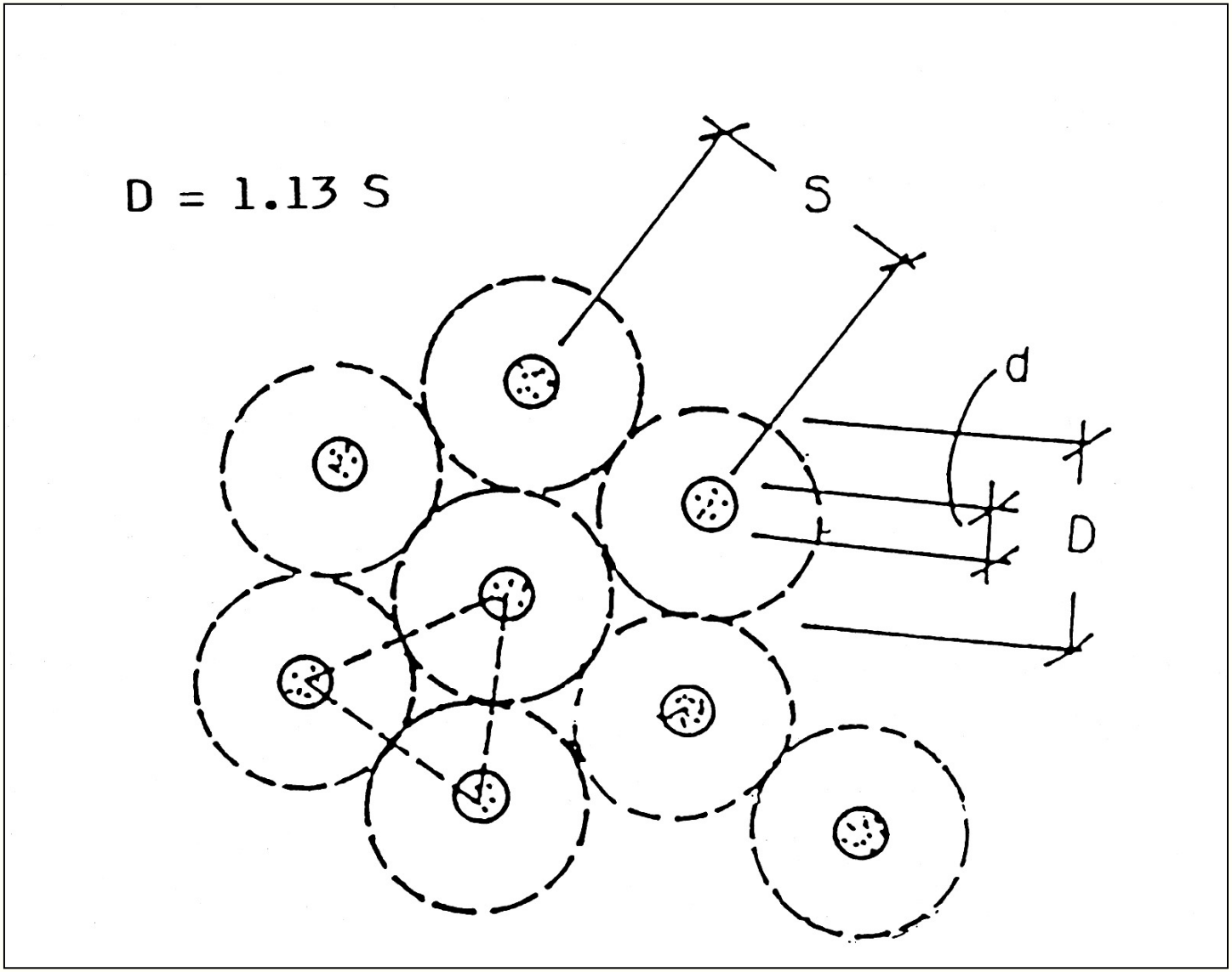
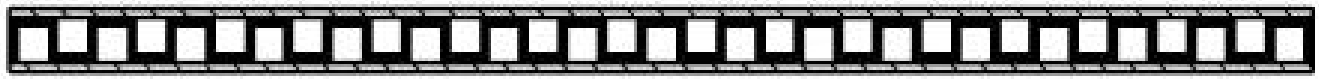


Chart of Design Process

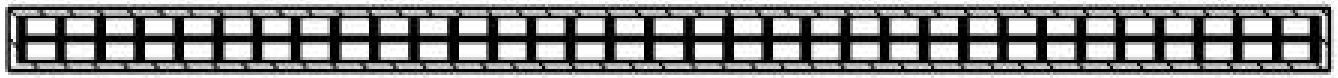


Vertical Drains

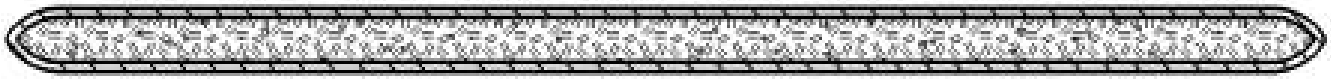




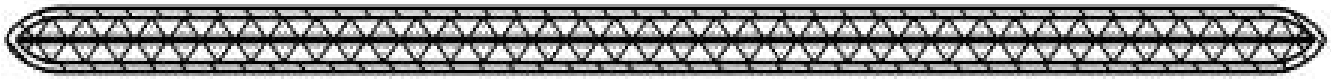
a) Channel-shaped core with glued filter



b) Channel-shaped core with wrapped filter

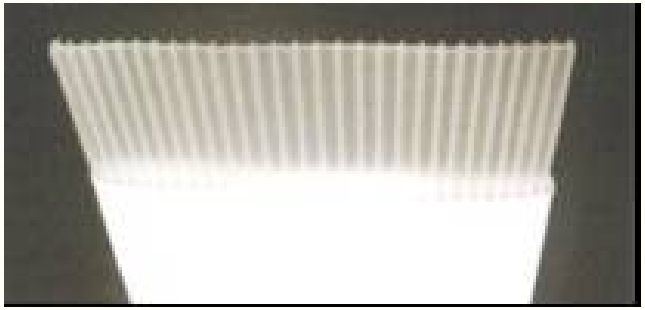


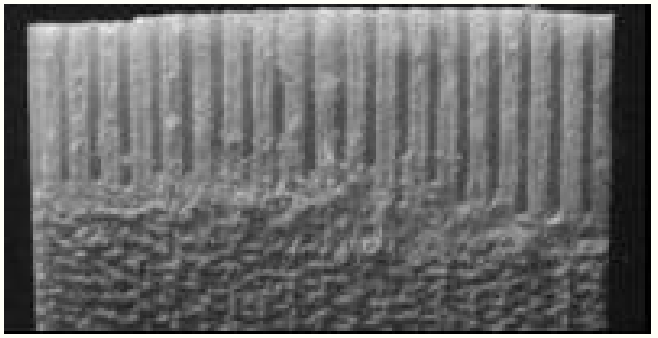
c) Geo-mat with edge-sealed filter

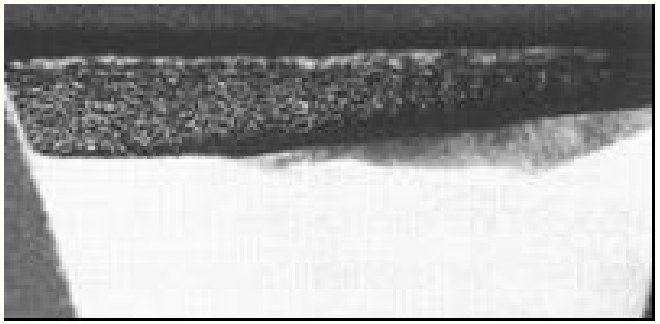


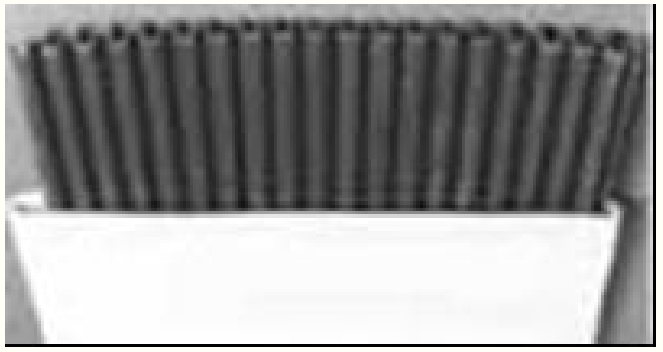
d) Cusp-shaped core with wrapped filter

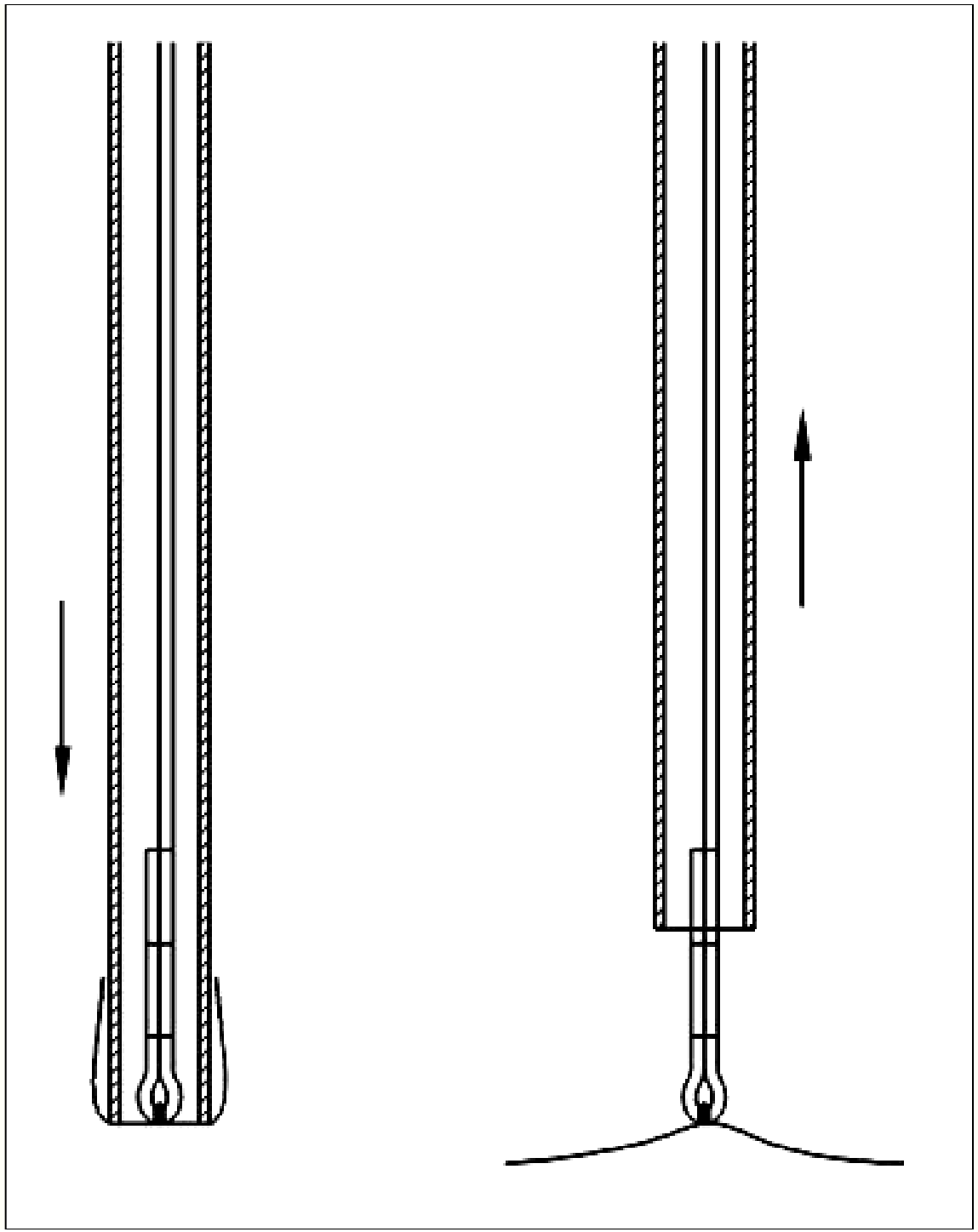
Drain Types



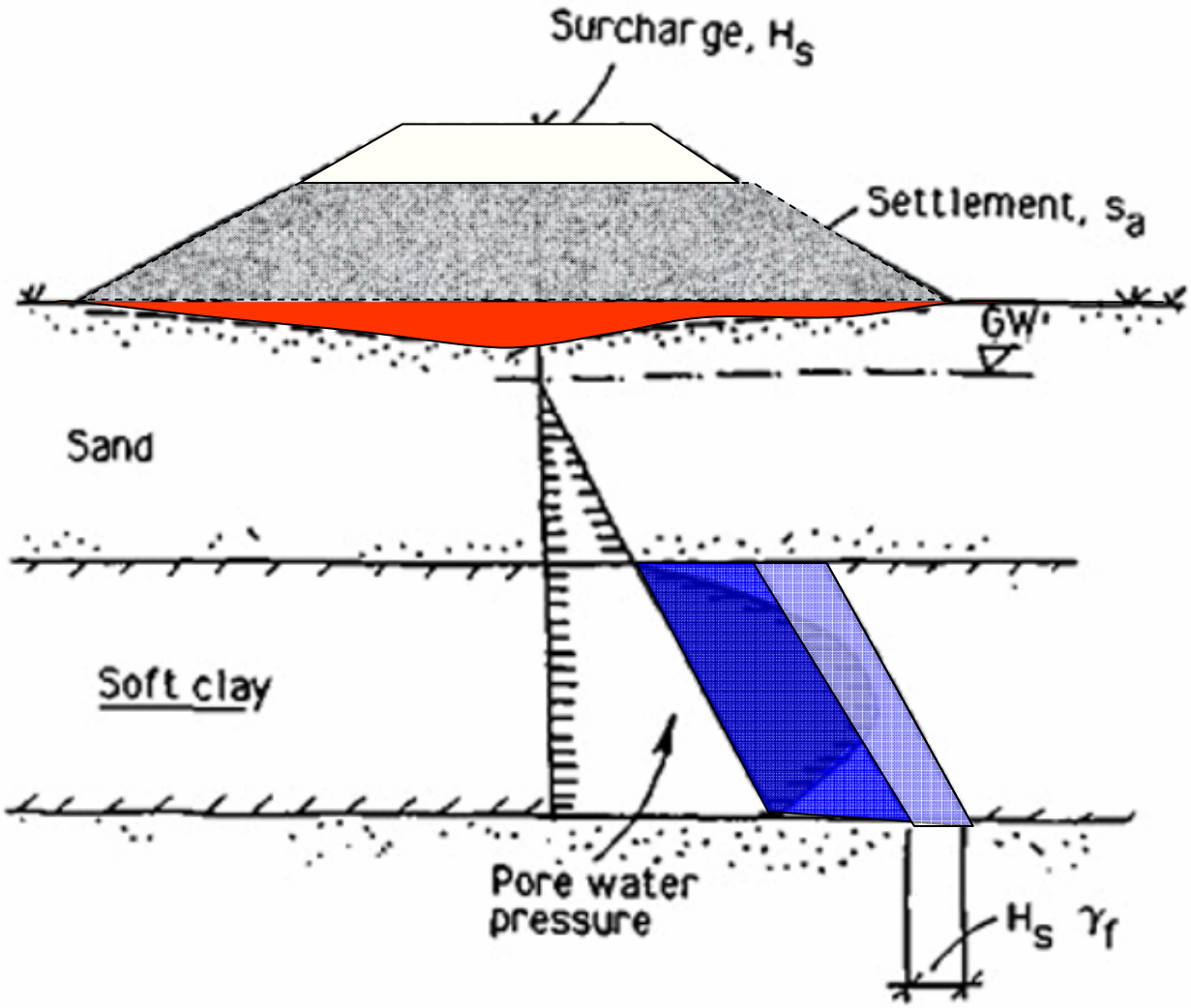




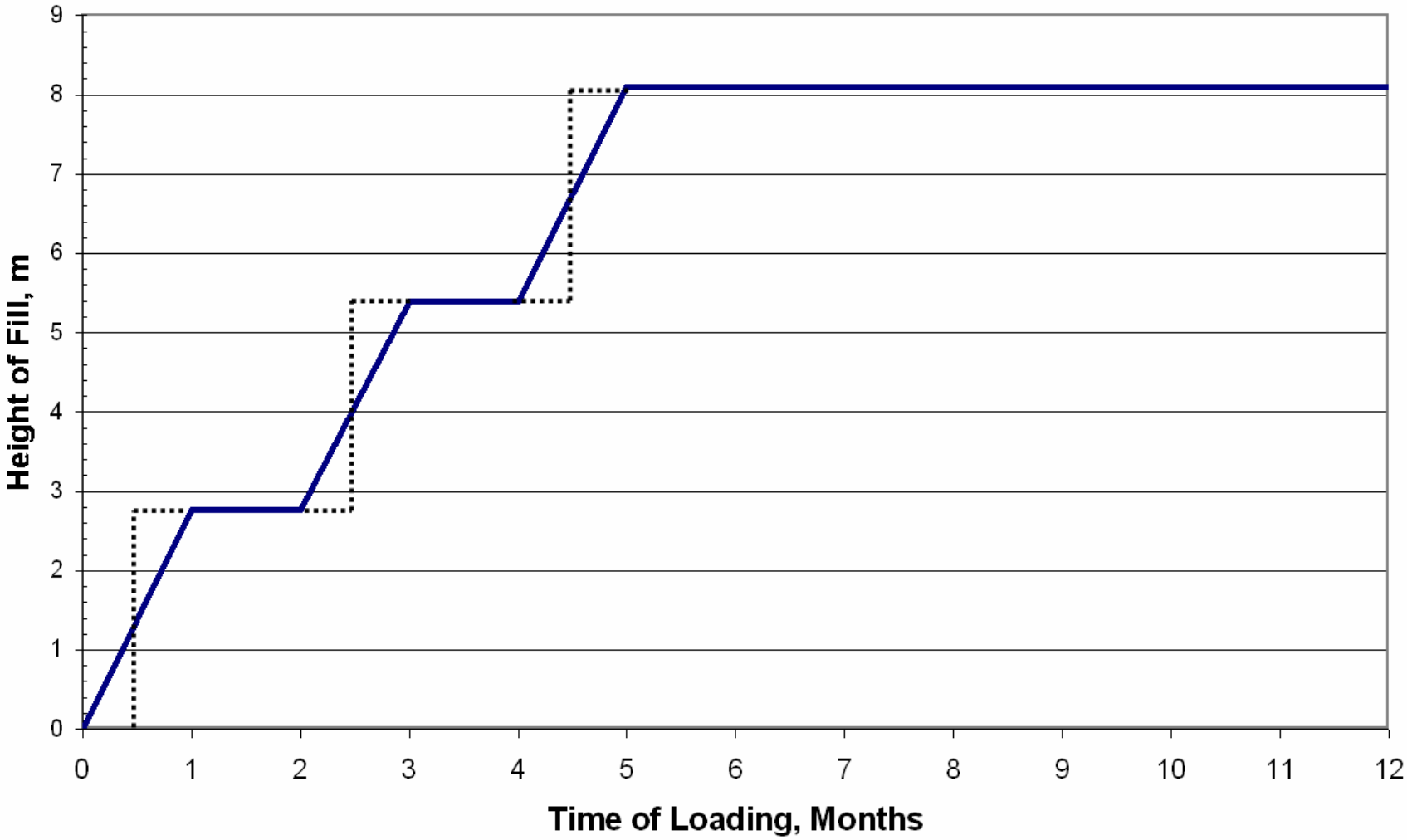




Preloading

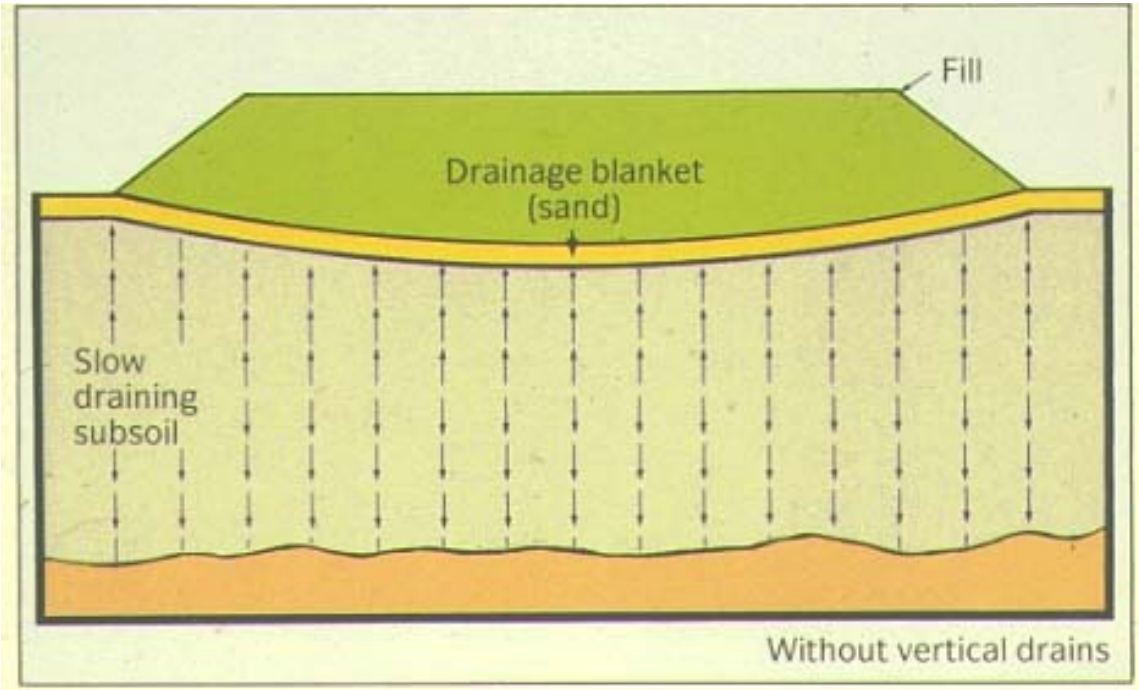

Surcharge, H_s
Settlement, s_a
GW
Sand
Soft clay
Pore water pressure
H_s γ_f

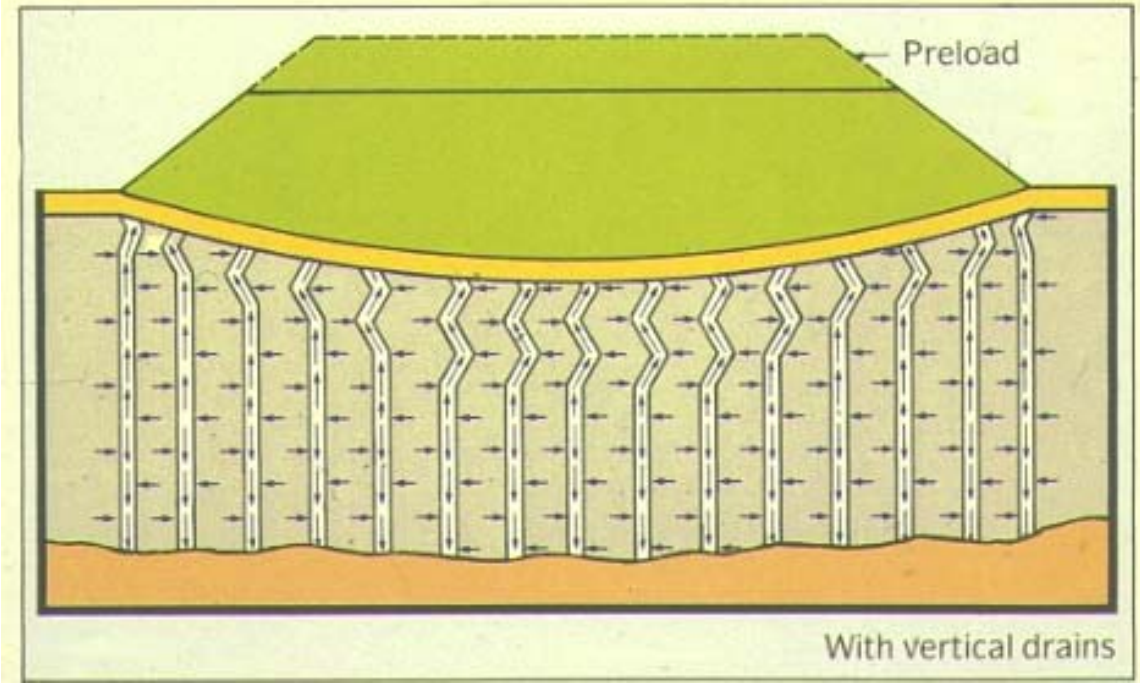
Surcharging Method – Stp-loading



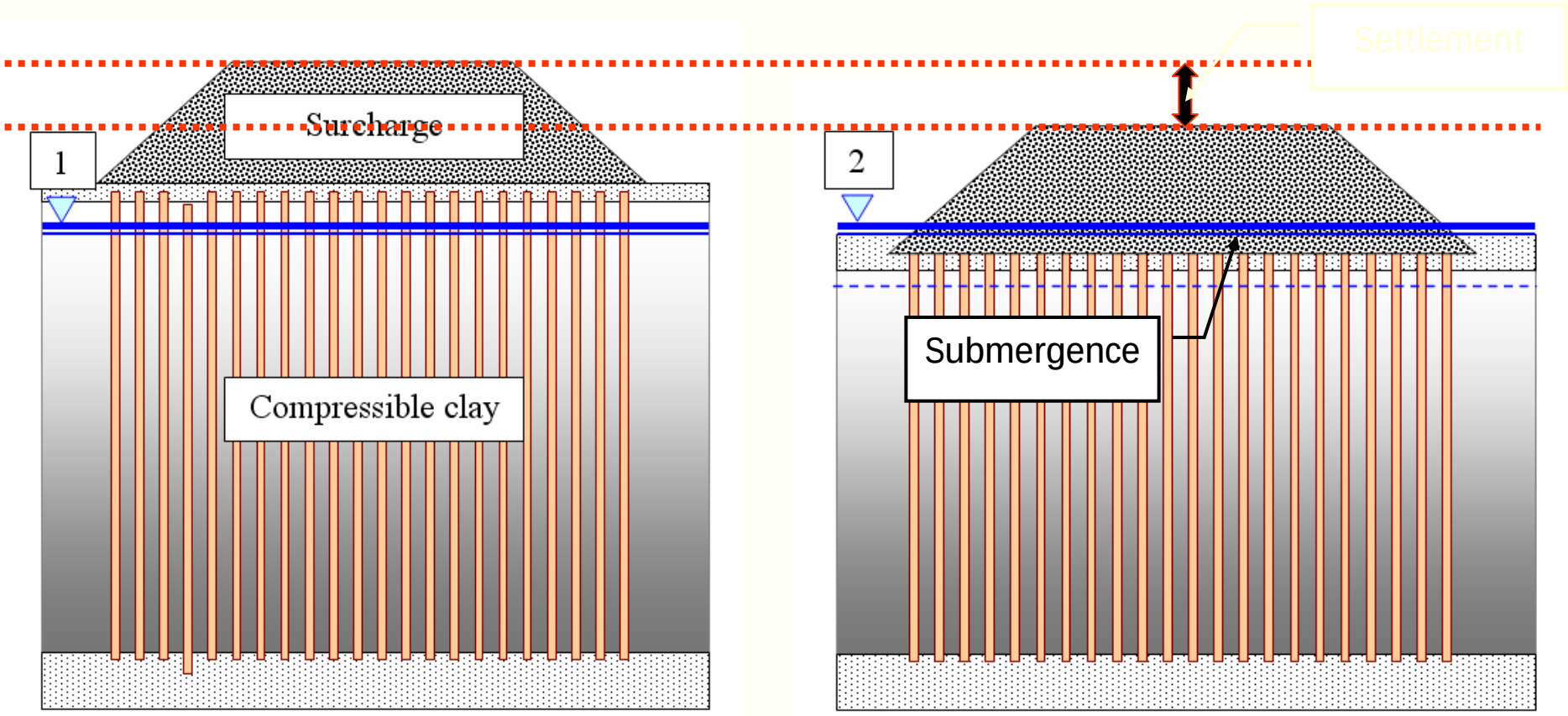
Factors Affecting Drains

- Equivalent Drain Diameter
- Influence of one-dimensional consolidation
- Smear Effect
- Well Resistance
- Insufficient Depth of Installation
- Kinkig (buckling) of drain

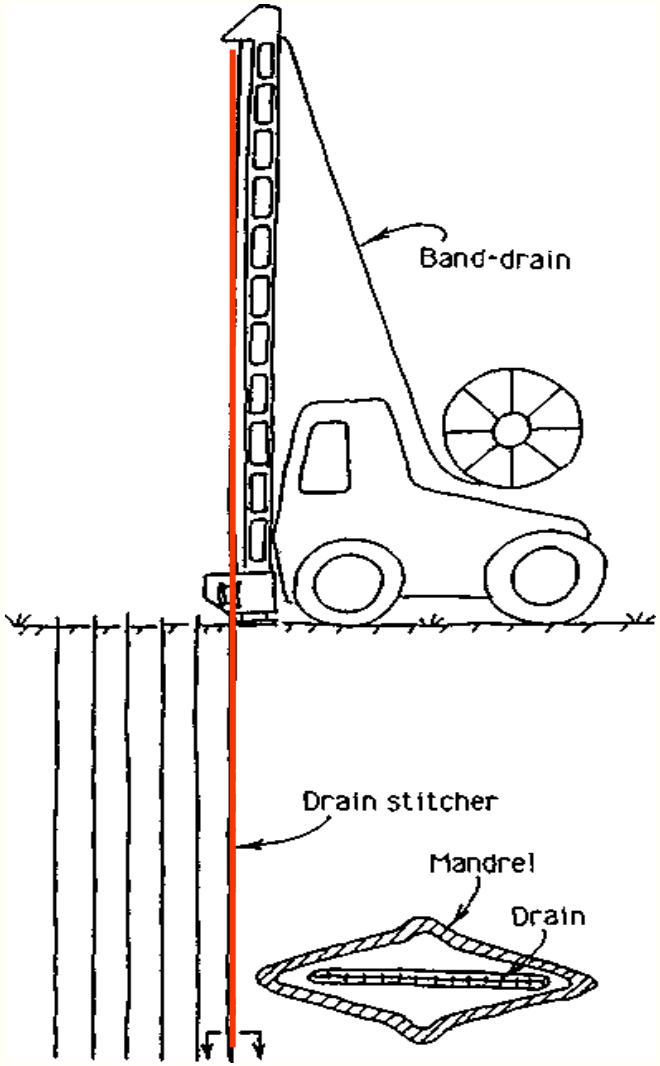

Fill
Drainage blanket
(sand)
Slow
draining
subsoil
Without vertical drains


Preload
With vertical drains

Drainage and Effect of Submergence



Vertical Drainage by PVD

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Band Drain (PVD) Installation

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