F A C U L T Y O F E N G I N E E R I N G

DEPARTMENT OF CIVIL ENGINEERING

An Analysis of Retaining Walls

by

V.I.W. HEMACHANDRA , B.Sc. (Eng).

A dissertation submitted in partial fulfilment for the degree of M.Sc. in Soil Mechanics and Foundation Engineering by Examination and Dissertation.

University of Ceylon June 1973

302452

AN ANALYSIS OF RETAINING WALLS

SYNOPSIS

In this dissertation, one part is devoted to a detailed study of Gravity Retaining Walls, and another part is devoted to a comparative study of the economic aspect of the following types of walls, using assumed soil and wall parameters;

(a) Gravity Retaining Wall,

(b) Cantilever Retaining Wall, and

(c) Counterfort Retaining Wall.

For convenience, the same backfill soil parameters have been used for four different types of foundation soil conditions.

A brief review of the parameters used in earth pressure analysis and the types of common retaining walls is given in the first few pages.A review of the Classical Theories for earth pressure computation is presented and discussed. Out of these theories, Coulomb's Wedge Theory is used to compute the earth pressure against Gravity Retaining Walls ; whereas Rankine's Theory is used for the Cantilever and the Counterfort Walls.

In the first part of the analysis, the effects of the following parameters on Gravity retaining walls are discussed;

(a) angle of internal friction of soil,

(b) cohesion of soil,

(c) adhesion between soil and wall,

(d) angle of wall friction,

(e) bulk density of backfill soil, and

(f) slope angle of backfill.

The factors of safety against overturning, sliding and bearing for the Gravity wall are computed and presented in tables and illustrated by graphs.

In the second part of the analysis, the costs of Gravity, Cantilever and Counterfort walls are computed and analysed for similar backfill and foundation soil conditions. Tables and graphs are presented to illustrate the relative costs of these three walls for a height range from 6 ft. to 40 ft. The variation of the factors of safety against overturning, sliding and bearing are also illustrated for the same height range for the three walls considered.

Further, the relative costs of steel between the Cantilever and the Counterfort walls for a height range from 6 ft. to 60 ft. are also presented as additional information to the reader.

The entire analysis was done on the University IBM 1130 Digital Computer using Fortran IV language. Four computer programs were written for the analysis, and are presented in the dissertation.

V.I.W.HEMACHANDRA