DESIGN OF RETAINING WALLS
IN SEISMIC AREAS
by

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SYNOPSIS

Experimental investigations of a theoretical procedure to determine the
state of limiting equilibrium at rear face of retaining walls for seismic
actions.

ABSTRACT

A method for determining the lateral pressure on a retaining structure
in seismic situations was developed for dry materials (1); it was based on
the assumption that the wall yields sufficiently to produce the state of li
miting equilibrium; it is found that shear stresses acting on the top and
bottom of typical element induced by the upward propagation of seismic wa-
ves is determined from equilibrium conditions; also the pressure acting on
the element of area passing through an internal point and parallel to top
bounding surface is determined by only writing equilibrium equations and
this pressure is found to be unaffected from the state of stress, as long
as the limiting equilibrium is reached. In a such limiting equilibrium sta
te the normal and tangential components of the equivalent pressure acting
on the rear face of the wall are easily evalueted.

Model tests shows reasonable agreement with pressures computed in that
a way.

The tests have been conducted using a 23x35x35 inches box having a mo
ving wall and containing dry sand.

The shear stresses actually developed by horizontal seismic motion are
here obtained by a system of body forces induced via appropriate box motion.
An important conclusion of this approach is that present static amplification
formulas (Mononobe) give the right answer for the total pressure; but they
don't specify the distribution of lateral pressure with depth.Some Building
Codes states that the dynamic pressure increment is applied at height of
2/3 H above base of wall. We find this is wrong: point of application was
about 0.33 H above the base of wall. In the same way we have found the Kapi
la passive pressure is incorrect; (the actual dynamic pressure decrement is
greater than Kapila).

Remarke that the theoretical procedure is able to evaluate the force
acting on a wall also for cohesive soils.

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       ni in c.a. Corso Perfezionamento Anno 1976 Vol.13 - Politecnico Mi
       lano.