C-14: Analysis of seismically induced failure in steep slopes of weekly cemented sand

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Most spectacular seismically induced landslides occur generally in weakly cemented soil. Cemented soils are characterized by their ability to stand in very steep natural and man-made slopes. Slopes in these soils can be subdivided according to their slope angle into moderately steep, in the 30° to 60° range and very steep from 60° to near vertical. In the very steep slopes, failures appear to be initiated by tensile splitting along essentially vertical tension cracks or joints in the upper part of the slopes, followed either by toppling of individual blocks or by shearing in the lower portions of the slopes. Failure of the moderately steep slopes tend to be initiated by shear failure, subparallel to the slope face.

Three specific slopes, the Seacliff State Beach site, the Centerville Beach site and the Daily City site located along the Pacific coast of the U.S. were analysed

to obtain the stress distribution within the slopes under static and dynamic loading. These slopes with different slope angles and heights, mainly composed of weakly cemented sands, have a history of seismically induced failures. Failure zones in these slopes were found by comparing the computed stresses to the strength of the material. These failure zones were confirmed using the observed behaviour of the slopes in the field.

The shear failure zones obtained compare well with the actual behaviour and the tensile failure depends very much on the site specific tensile strength of the material.

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