

AustStab Technical Note

No. 6 September 2013

Dams

Stabilisation techniques have been, and can be, used extensively in dam construction and maintenance.

Types

Dams are an essential part of many different types of infrastructure in Australia. Earth dams are used for town water storage, sewerage and waste management, mine infrastructure and other assorted uses.

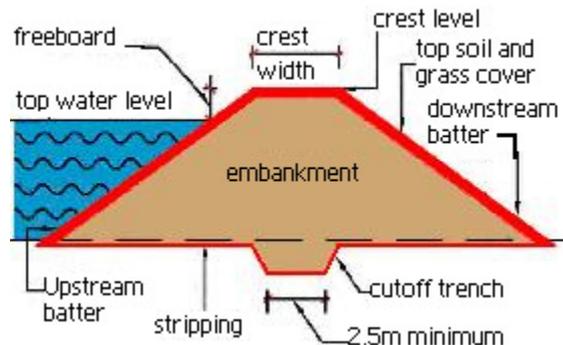


Figure: Cross-section of a typical dam (O'Connor & Yiasoumi, 2009)

Technical

Earth dams, by their nature, can be constructed from varying insitu materials. Stabilisation techniques can be used to improve the impermeability of available earth or soil materials used in the dams. As with all uses of stabilisation, it is essential to do appropriate testing to determine the most appropriate binder type and percentage to be used to obtain the best results.

The actual testing regime to be used is dependent on the types of materials available and the specific use and requirements of the particular dam in question. However, capillary rise testing is usually incorporated in the investigative testing.

Generally, for materials that are more granular in nature, a cementitious type of binder would, more likely, lead to optimum results.

Since clay materials naturally provide a relatively significant level of impermeability, clayey materials are predominately used in earth dam construction.

Use of Lime

Lime has proven to be the most successful binder in improving the natural impermeability properties of clay materials used in dam linings.

With the addition of small percentages of lime, there is actually an initial increase in the permeability, due to an increase in pore volume due to flocculation with the cations exchange with the introduced Ca cations. With increased lime contents consistent for strength gains, there is a decrease in permeability due to the pozzolanic reactions between the introduced Ca and the pozzolans (Aluminates and Silicates) in the clays. The optimum percentages

for strength gain and hence reduced permeability can be determined using Lime Demand testing.

Please refer to the AustStab, Lime Tech Note for more information on the use of lime with clays.

Some forms of Gypsum, although less effective than lime, may also be used as a source of CA in the stabilisation of clay materials for dam construction and maintenance.

Construction

Since most earth dams involve the use of clayey materials, the improvement of these materials using stabilisation generally requires insitu stabilisation methods. The use of pugmill stabilisation is generally prohibited since clay materials do not flow easily through pugmills.

Generally, when using insitu stabilisation procedures the base of the dam is able to be stabilised in place. However, since the slopes of the sides of dams may cause problems in the operations of the stabilising equipment, the usual practice is to stabilise the material for the sides in flat pads adjacent to the site. The stabilised material is then either picked up with scrapers or pushed to the required slopes and then compacted in place.

References

AustStab. (2008). *Lime Stabilisation Practice*. Sydney: AustStab.

Little, D. (1995). *Handbook for Stabilization of Pavement Subgrades and Base Courses with Lime*. Texas: The Lime Association of Texas.

O'Connor, J., & Yiasoumi, B. (2009, October). Primefact 781. *Building a farm dam*. Richmond, NSW, Australia: NSW Government Industry and Investment.

The Association is a non-profit organisation sponsored by organisations involved in the stabilisation and road recycling industry in Australia whose purpose is to provide information on the use and practice of pavement stabilisation. This Technical Note document is distributed by the Association for that purpose. Since the information provided is intended for general guidance only and in no way replaces the services of professionals on particular projects, no legal liability can be accepted by the Association for its use.

For more information about the Association, please write to the CEO, AustStab, PO Box 738, Cherrybrook NSW 2126 or visit the web site

www.auststab.com.au
