



Earthworks without additional water in arid environments

Egis has introduced an innovative practice to reduce the burden that wetting of earthwork fill materials places on water resources. The method allows use of materials from the site and improves landscape integration while saving on water. Transport costs are also reduced and energy saved.

A PROJECT APPROPRIATE TO ITS CONTEXT

Water resources are a major consideration for this type of project, therefore the innovation lies in reusing normally unusable dry materials as fill. This solution designed specially for arid environments focuses on two strategic objectives: making use of dry materials

from the site (water content 2-3%) to limit impacts on the landscape and material transport resulting from multiple borrow and stockpiling areas, whilst also avoiding wetting, thereby saving water resources. This is a major challenge for such projects.

This method is a sustainable alternative appropriate to the local context

- > Allows recovery of materials (reuse).
- > Takes account of the importance of the water resource in areas with high water deficits and provides a solution that preserves this resource.
- > Reduces the energy impact and greenhouse gas (GHG) emissions.
- > Provides significant economic savings.



The method

The process is based on the reuse of fine dry materials – normally very difficult – without wetting.

Fine materials from excavations (schists, limestone, mica schists, etc.) are reused as core fill, with finishing layers of coarse grained materials providing stability and preventing the risk of erosion.

Changes are necessary to the design cross sectional, such as gentler embankment side slopes for better stability and sealing of the central reservation to minimise the risk of infiltration of water into the body of the fill.

After construction, the behaviour and evolution of the fill material remained under surveillance during rainy periods: no significant change was observed.



>> Thematic Fact Sheet

Sustainable Development

The example of Morocco

THE SKHOUR RHAMNA-MARRAKECH MOTORWAY WORK SITE

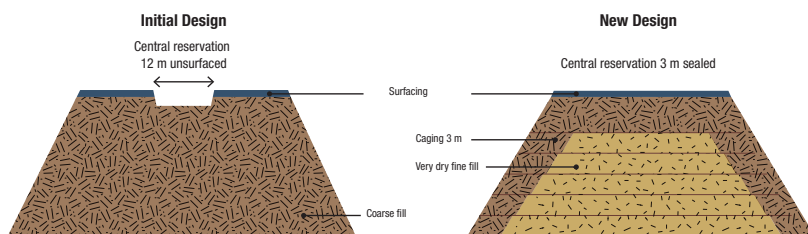
Morocco is in an arid region where the availability of water has to be taken into account when designing and implementing projects. Under the authority of its Client *Autoroutes du Maroc* (ADM), the driving force behind the development of this major project, Egis, in its role as the Engineering Consultant, working with a Moroccan public laboratory, LPEE, solved the problem of the deficit of materials and construction in an arid environment.

Putting the method into practice over approximately 40 km of the 83 km of the project, during the earthworks undertaken from the summer of 2005 to the end of 2006, saved water resources, reduced the borrow and waste material quantities by allowed the recovery of normally non-reusable materials as fill. The method was applied over heights of 3 to 10 metres and up to 18 metres in one particular case.

Use of water was restricted to regular wetting of site roads to keep down dust to protect the health of personnel and local residents. Even so, the quantities used were well below those planned for the initial design.

The benefits

- > All compaction is performed without water for embankments over 3 m high
 - Saving of 700,000 m³ of water.
- > Savings from less transport of materials and conditions of use (initial solution)
 - 3.4 million m³ of borrow material
 - 3 million m³ of waste material
- > Reduction of impact on the landscape due to lower quantities of waste material
- > Deadlines met thanks to reduced transport times
- > Lower GHG emissions and fuel consumption
- > Improved safety on transport routes



www.egis-group.com

Egis

15, avenue du Centre - CS 20538 Guyancourt
78286 Saint-Quentin-en-Yvelines Cedex - France

Tel. +33 1 39 41 40 00

Contact: sustainable-development.egis@egis.fr - www.egis.fr/action

EGIS - S.A. RCS Versailles 702027376 - SIE15_EI10 - FH - Fiche 12 - January 2016

© iStock © Egis