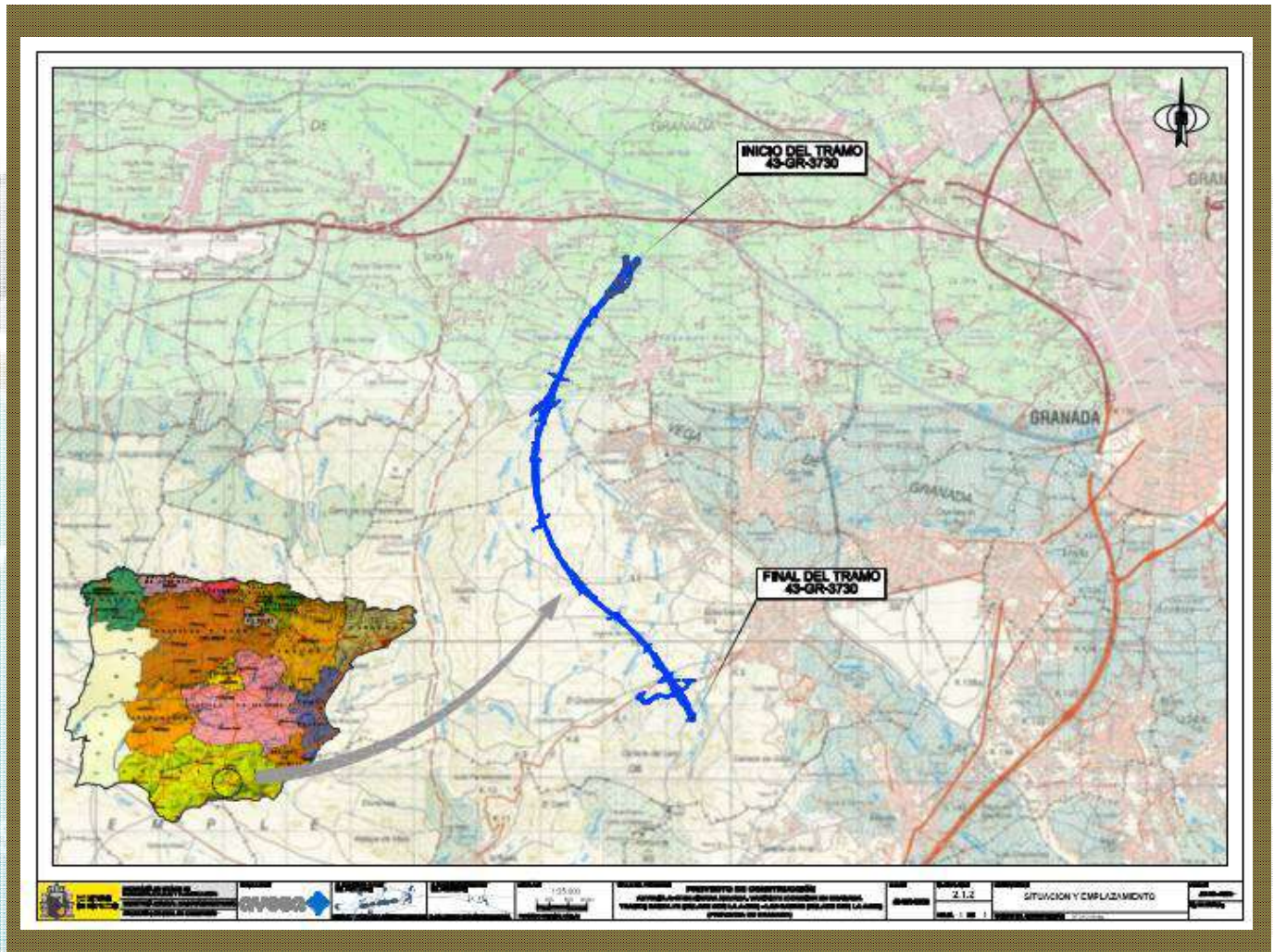
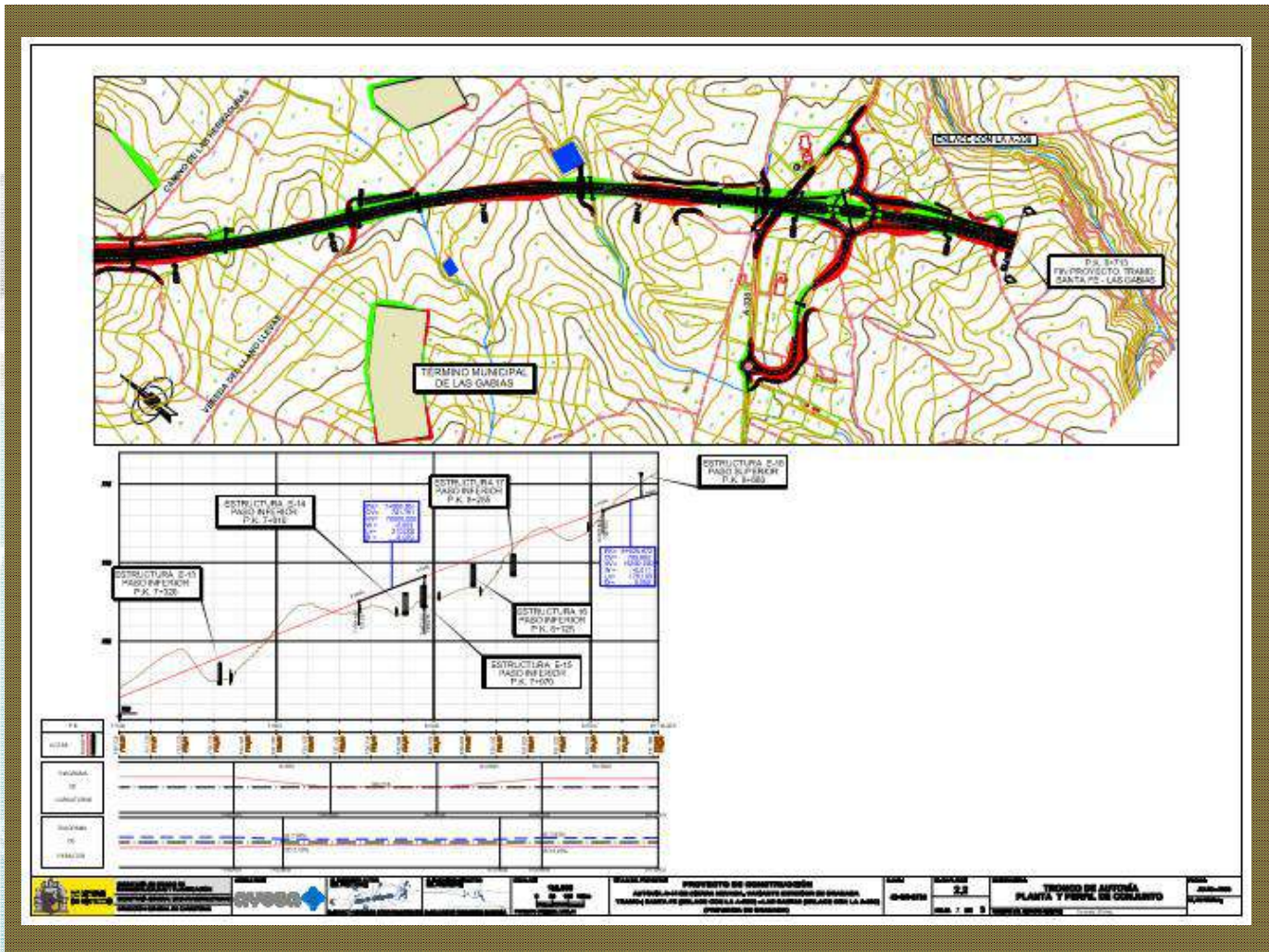
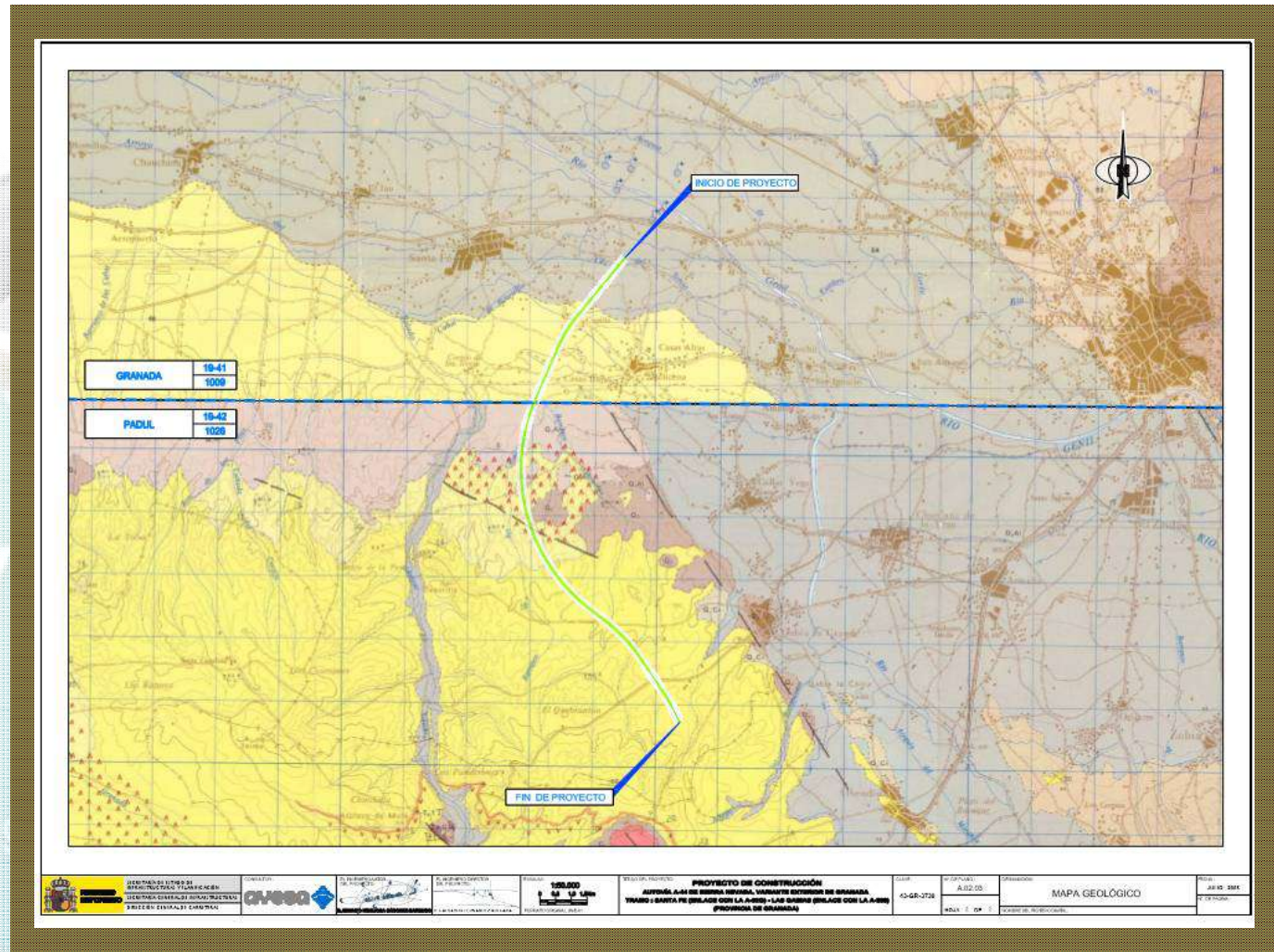


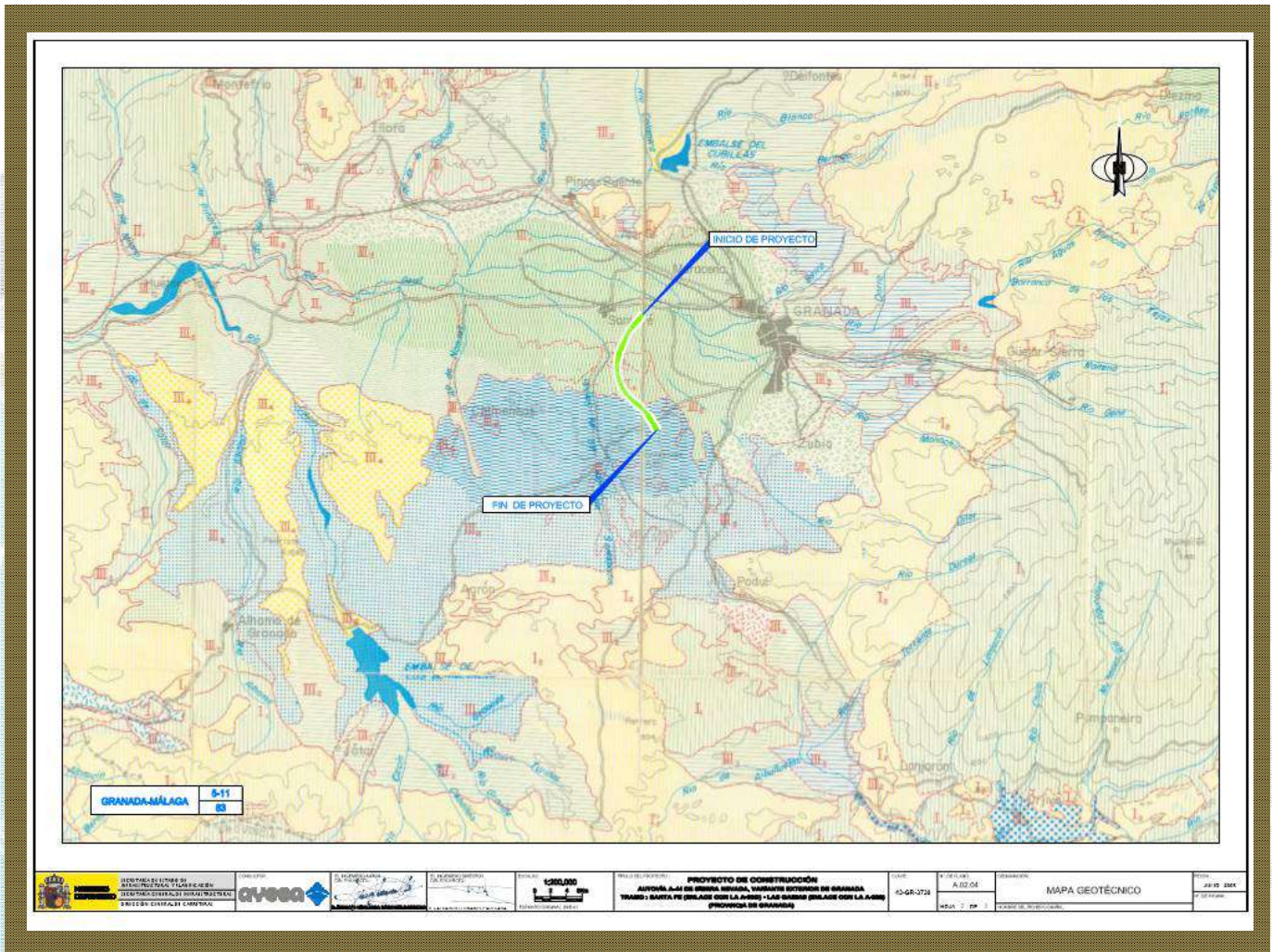
USE OF MARGINAL SOILS IN SOME SPANISH ROAD CONSTRUCTION, HIGHWAY A44, SANTA FÉ-LAS GABIAS

IGNACIO HINOJOSA SÁNCHEZ-BARBUDO
JOSE ANTONIO MOYA ORTIZ





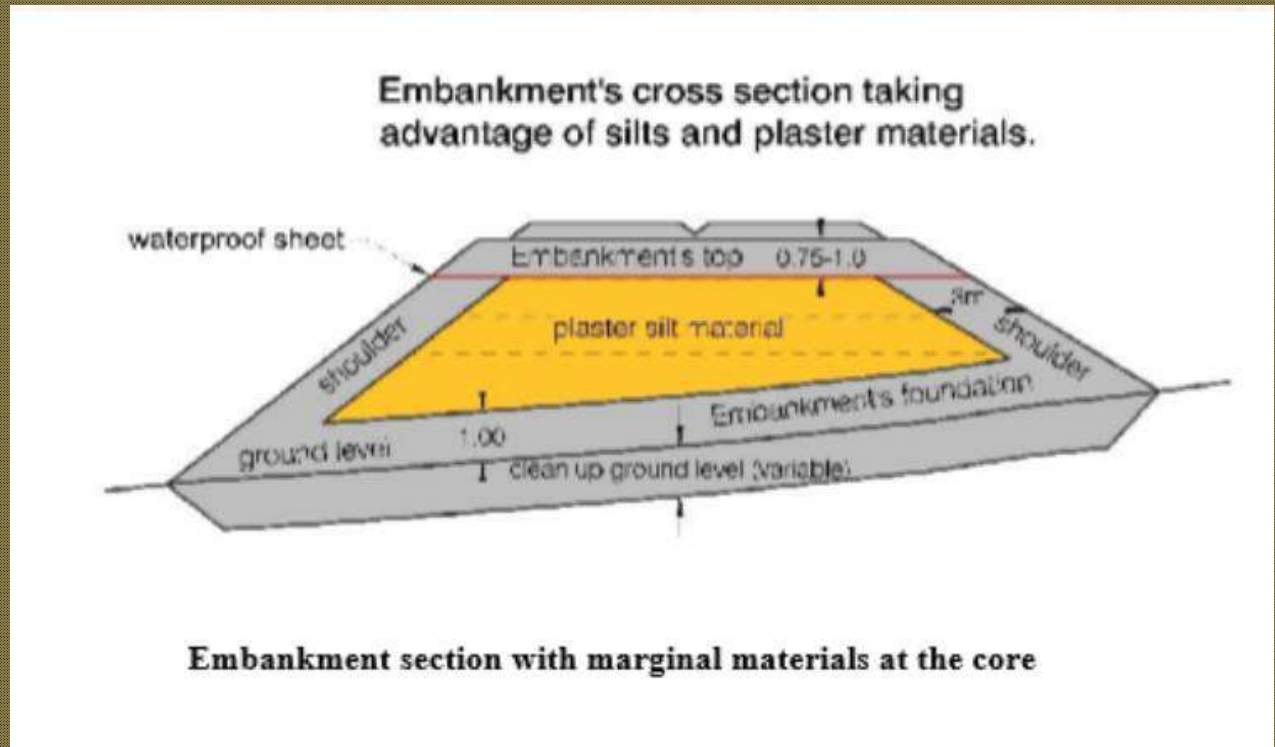


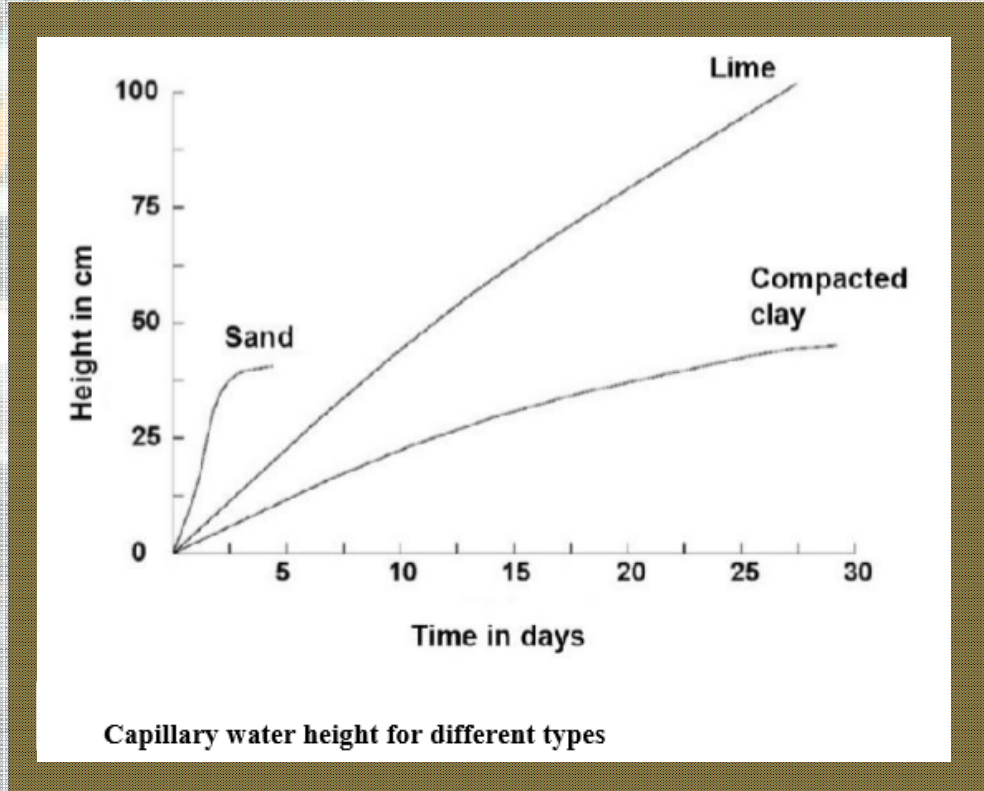
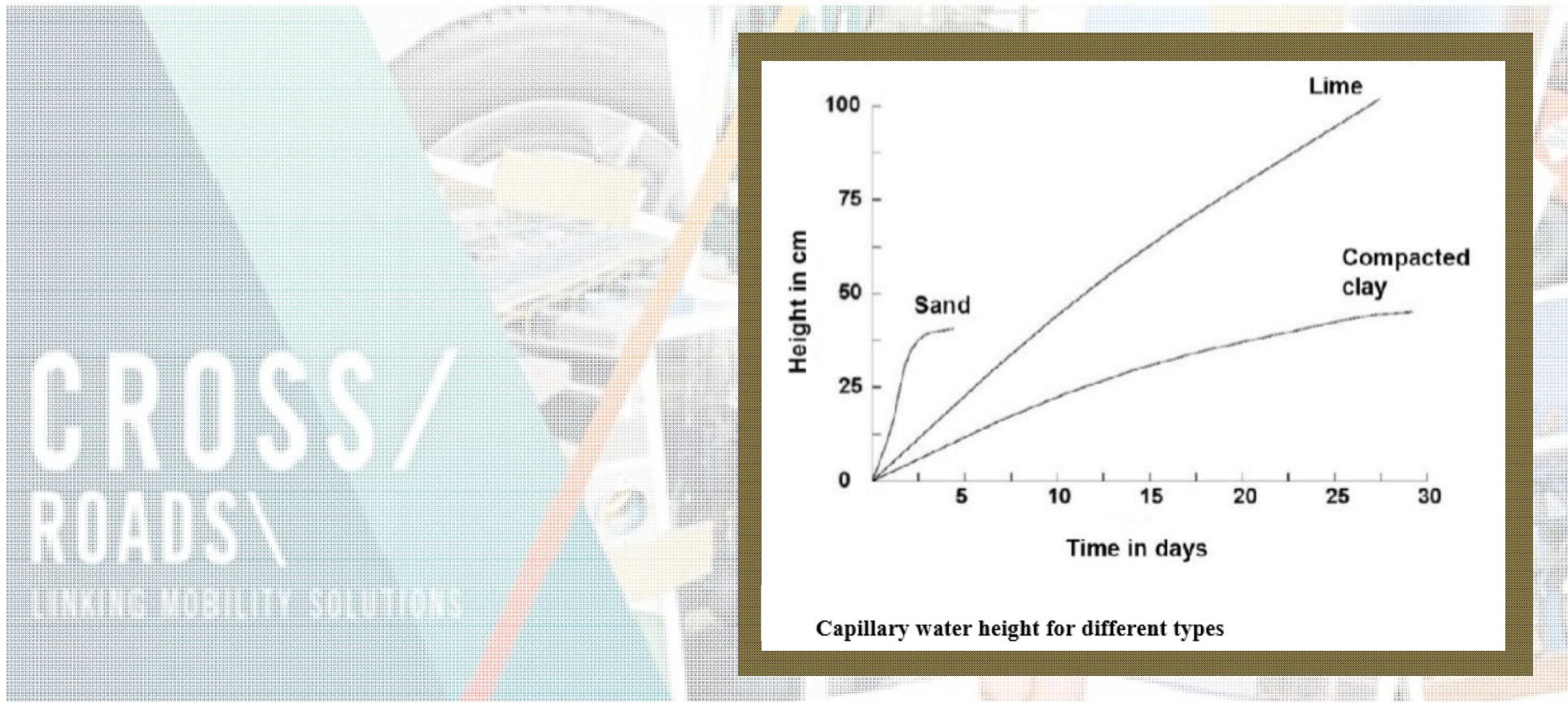




Summary table of materials possibly used on the route

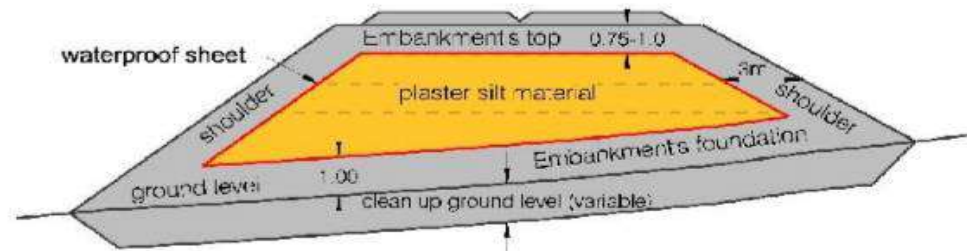
Geological Unit	Type of soil	Use	Remarks
Sandy loams with gypsum	Marginal-Inadequate	Landfill/Core	High gypsum content
Loams with gypsum and limestones	Marginal-Inadequate	Landfill/Core	High gypsum content
Grey Sandy loams	Marginal-Inadequate	Landfill/Core	High gypsum content
Loamy fine sands with stones	Tolerable	Core, foundation and top	Top with prior treatment
Loamy fine red sands with stones	Tolerable	Core, foundation and top	Top with prior treatment
Alluvial deposits	Tolerable-Selected	Core, foundation and top	Top with prior treatment
Mixed floodplain facies deposits	Tolerable	Core, foundation and top	Top with prior treatment
Colluvial alluvial deposits	Tolerable-Marginal	Landfill and core	Top with prior treatment
Heterogeneous man-made filling	Marginal-Tolerable	Landfill and core	Top with prior treatment







Embankment's cross section taking advantage of silts and plaster materials.



Embankment section actually constructed with marginal materials at the core. This is the main difference with the planned design. For everything else, the Design Project has been strictly followed

CROSS/
ROADS/
LINKING MOBILITY SOLUTIONS



Peculiarities of the Construction

➤ Placement of the sheet.

Continuity between the different polyethylene sheets has been achieved by welded joints (hot air welding). These joints represent a critical point in waterproofing, and thorough checking is therefore necessary.

➤ Constructing the core with marginal material.

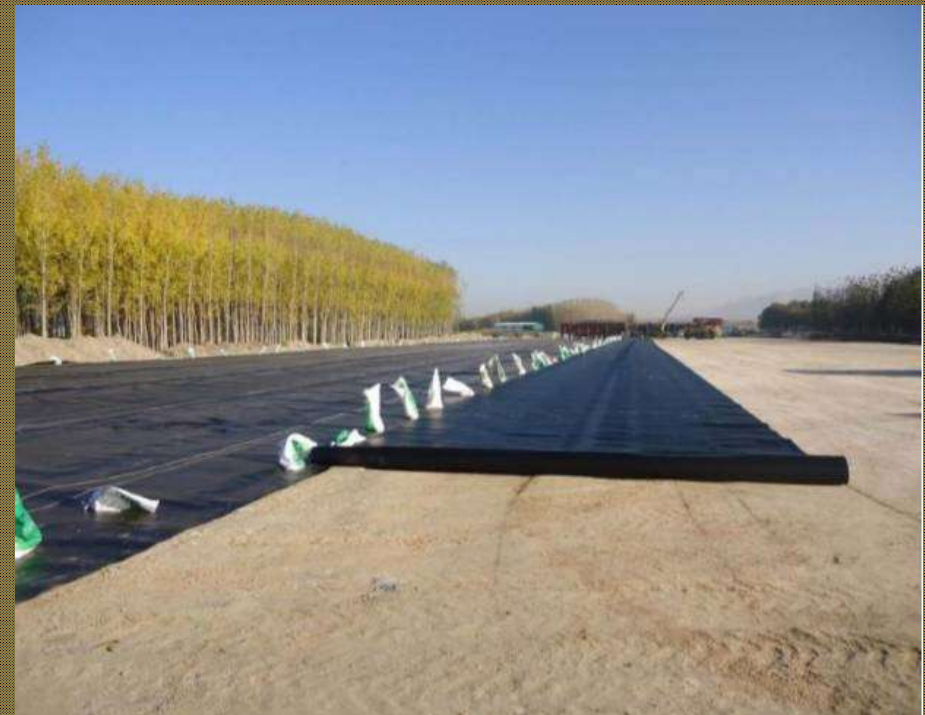
These types of materials are difficult to work with it, being necessary to apply a disintegration process beforehand to facilitate their compaction. Several test sections were required to determine the optimum wetting and the number of operations with the compactor.



SOME PHOTOS TAKEN IN THE PROCESS OF PLACING THE SHEET



Sheet placed over the foundation





Placement of the sheet on the slope





Execution the welded joints in horizontal





Execution the welded joints in the slope





Remodeling and clean-up of the sheet on the foot of the slope





General view of the execution of the shoulders



Thank you

ayesa 