

## Mining Project

# Expansion of bauxite red mud disposal embankment

Viotia, Central Greece

### Project

Preparatory works for the 2<sup>nd</sup> stage of red mud disposal in Ag. Nikolaos Viotia, at the processing facilities of the Mytilineos Group of Companies

### Construction Cost

Total cost : approx. € 1,5 m.

### Project Schedule

Design: 2017

Construction: 2017 - 2018

### Project Description

- Horseshoe shaped culvert expansion
  - Effective dimensions: 2,5m x 2,5m
  - Length: ~430m
  - Overburden: ~60m
- New service road to Tarsos settlement
  - Road length: ~1.400m
  - Pavement width: 5,5m
  - Cuts' max. height: ~12m
  - Embankments' max. height: ~6m
  - Gabion walls' max. height: ~5m

### Geology

Limestone, loose riverbed deposits, limestones debris

### Our Services

- Detailed design of a horseshoe-shaped culvert
- Detailed hydraulic design of the horseshoe-shaped culvert
- Detailed road design
- Detailed geotechnical design of the road earthworks (cuts, unreinforced embankments, gabion walls)
- Bill of Quantities— Budget Estimate

### Construction Details

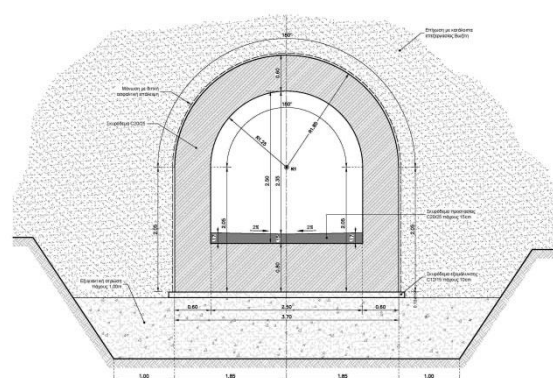
- Design of a horseshoe-shaped culvert in significant overburden
- Road formation works in adverse natural terrain

### Client

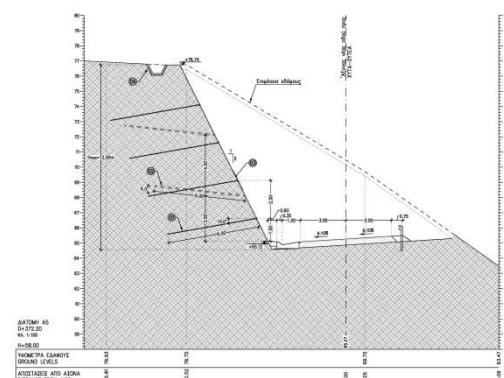
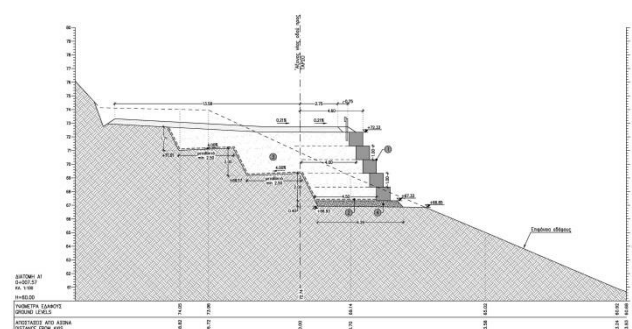
Mytilineos Group of Companies (ALUMINIUM OF GREECE)



General view of the project



Typical section of the horseshoe-shaped culvert



Typical road sections

# Mining Project

## Bauxite Red Mud Dry Stack Embankment

### Viotia

Central Greece

#### Project

Dry stack disposal embankment of bauxite red mud at St. Athanasios area, south of "Alouminium of Greece" industrial facilities

#### Construction Cost

Total cost: approx. € 34 m.

#### Project Schedule

Design: 2005, 2009, 2011

Construction: 2009 - today

#### Project Description

- Design of five discrete stages of dry stack disposal embankment of bauxite red mud at a privately owned area
- Total dry stack area: ~ 600.000 m<sup>2</sup>
- Total dry stack height: ~ 60 m.
- Total dry stack volume: ~ 17 mil. m<sup>3</sup>
- Total dry stack weight: ~ 32 mil. ton

#### Geology

Limestones, loose riverbed deposits, limestones debris

#### Our Services

- General final design of the red mud embankment
- Detailed design of red mud embankment
- Alternate solutions investigation during the design phase
- Design of intermediate deposition stages
- Design of hydraulic works
- Determination of construction sequence
- Technical description of the intermediate stage works
- Bill of Quantities
- Tender documents

#### Construction Details

- Embankment geometry according to the natural terrain 1:3 - Slope formation
- Dry stack disposal embankment mainly without compaction
- Design of compacted stacking zones of 50m maximum width
- Hydraulic design of river training works and design of horseshoe shaped culvert
- Design of perimetric drainage ditches

#### Client

Mytilineos Group of Companies (ALUMINIUM OF GREECE)



General Layout of the red mud dry stack



## Industrial - Mining Project

# New industrial facilities of bauxite processing

Viotia, Central Greece

### Project

New plant & disposal facilities for bauxite processing and associated works in Ag. Nikolaos Viotia of the Mytilineos Group of companies.

### Construction Cost

Total Cost: approx. € 34 m.

### Project Schedule

Design: 2017

Anticipated Construction Commencement: 2019

### Project Description

- New plant facilities for bauxite processing
  - Total area: ~0.12km<sup>2</sup>
- Expansion of bauxite red mud deposition (dry stacking)
  - Disposal area: ~1km<sup>2</sup>
  - Total red mud volume: ~47.2Mm<sup>3</sup>
  - Deposition max. height: ~120m
- Stream rearrangement at the vicinity of the new plant & disposal facilities
  - Rearrangement layout: Box culvert
  - Culvert's dimensions: 3 cells, 6m x 5m each (width x height)
  - Culvert's total length: 1288m
- New service road for the local settlement
  - Total length: ~4.150m
  - Pavement width: 5,5m

### Geology

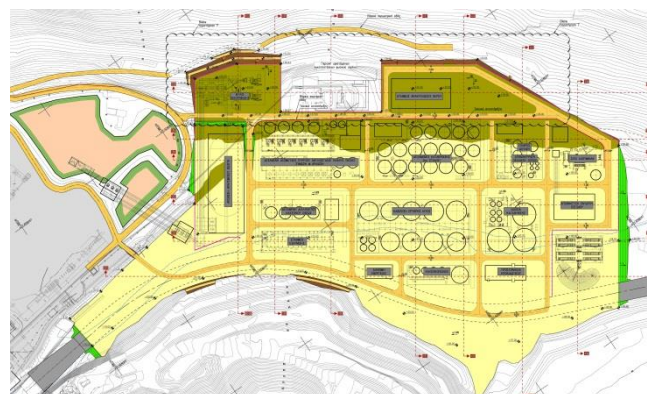
Limestone, loose riverbed deposits, limestones debris

### Our Services

- Volumetric and geometric investigation and design of bauxite red mud dry stack embankment expansion
- General hydraulic design in the perimeter of the dry stack
- Preliminary hydraulic and structural design of the box culvert for the stream rearrangement at the area of the new facilities
- Determination of streamline in the area of the new facilities
- Preliminary leveling design for the construction of the new process plant
- Estimation of the geotechnical parameters for the foundation of the new process plant facilities
- Preliminary road design for the relocation of the service road to the local settlement
- Investigation of alternative technical solutions
- Bill of Quantities – Budget Estimate

### Client

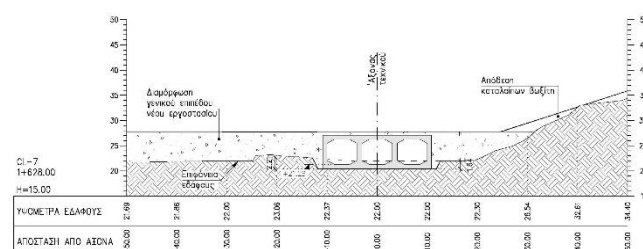
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General view of the new plant facilities for bauxite processing



General 3-dimensional view of the bauxite red mud dry stack area



Box culvert for stream rearrangement

# Landscape Rehabilitation – Mining Project

## “Kleisoura” Open Pit Mine Rehabilitation

### Parnassos

Central Greece

#### Project

Landscape rehabilitation of the “Kleisoura” bauxite open pit mine

#### Construction Cost

Total cost: approx. € 0,3 m.

#### Project Schedule

Design: 2005

Construction: 2005

#### Project Description

Backfilling with the red mud originating from the bauxite processing with the Bayer method

Open pit mine dimensions:

Max. height: approx. 60m

Max. width: approx. 200m

Backfilling modulation with slopes of gradient 1:3 with max. height 16m

#### Geology

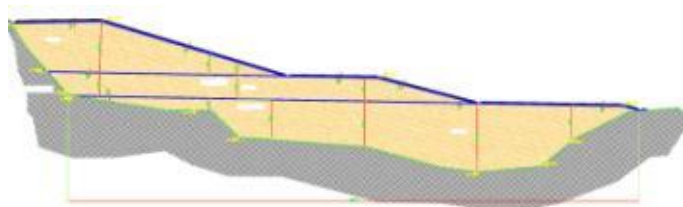
Limestones

#### Our Services

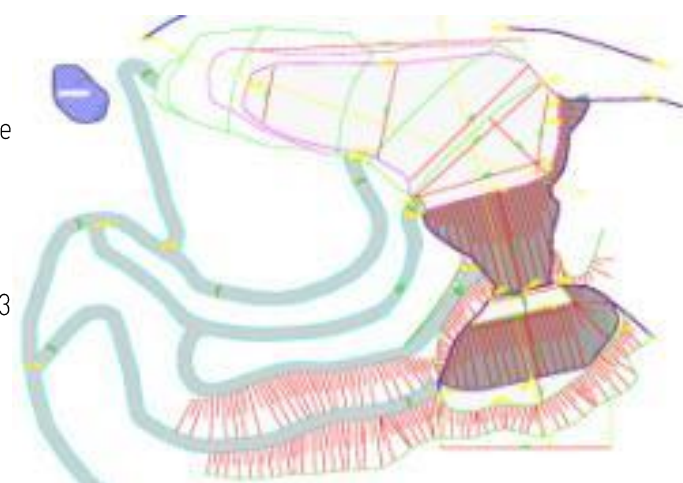
Detailed geotechnical design

#### Client

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Backfilling typical cross section



Backfilling area plan view