



## MINISTRY OF PUBLIC WORKS OF ENVIRONMENT, PATHE MOTORWAY

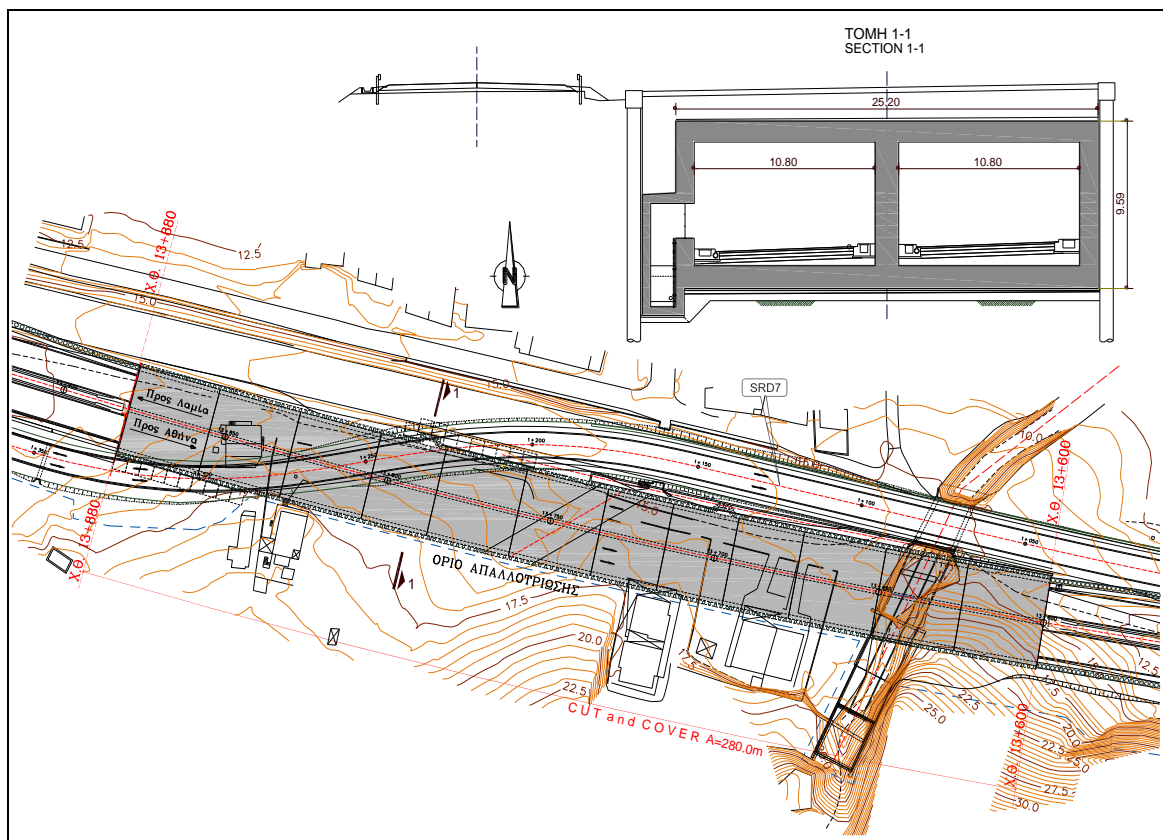
### SECTION: DEVIATION OF KAMENA VOURLA

PROJECT BUDGET: 61.620.000 €  
CONSTRUCTION: AEGEK S.A. - PROODEFTIKI S.A. (2004 -2007)  
DESIGN: KANON CONSULTING (2004-2005)

The section of Kamena Vourla deviation of PATHE Motorway, between the exit of the tunnel of Knimida to Skarfia is approximately 9km long section and is comprised of multiple highway civil works such as bridges, underpasses, pile retaining walls, etc.

The major structures of this particular section were made up of a series of four, Cut & Cover tunnels. As these tunnels were constructed near residential areas, nchored pile walls with a depth of excavation exceeding 15.0m in certain areas had to be designed. In some cases, piles were driven very close to residential buildings. Up to four lines of prestressing anchors were required for the construction of the wall.

Three out of the four Cut & Cover tunnels had a twin cell rectangular box cross-section with approximate dimensions measuring at 25x10m. The fourth tunnel had a single cell rectangular box cross-section measuring at 12.50x10.0m. The thickness of their walls was 1.10m to 1.30m and the clear width of each cell measured at 10.80m. The tunnels were constructed in a highly seismic area and were not only designed to sustain - without collapse - an earthquake of 0.65g magnitude ground acceleration, but also designed to withstand the destructive formation of ground seismic faults underneath. In addition, the project's geotechnical consultant, Dr. G. Gazetas, performed special seismic analyses which examined the soil structure interaction.



**General plan and cross section of Cut & Cover tunnel at chainage 13+600 (280.0m length)**



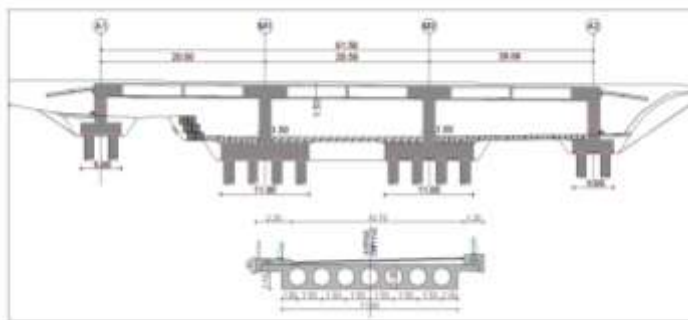
**Part of the Cut & Cover tunnel at chainage 11+824.0 during the roof construction phase**



**Completion of concrete works of the single cell Cut & Cover tunnel, 450.0m length between km 14+540 and 14+950**



**Bridge over Boagrio creek**



Pictured below is a typical case of a bridge constructed in this part of the PATHE motorway. Specifically, this case represents the two similar bridges over Boagrio creek: the bridges were integrally built - i.e., there were no expansion joints between the deck and piers or abutments. They measure at 61.50m long (3x20.50m) and were constructed of reinforced concrete. The deck's structure was made up of a circular voided slab, while the piers were wall-type, with circular ends to facilitate water flow.

**Longitudinal section and cross section of Bridge over Boagrio creek**