



SIKA AT WORK

Repair of passageways and gutters with
dry gunite, Olympia Motorway

SHOTCRETE PRODUCTION: Sigunit®-49 AF, SikaFiber® PP-540/52

BUILDING TRUST



REPAIR OF PASSAGEWAYS AND GUTTERS WITH DRY GUNITE, OLYMPIA MOTORWAY



GENERAL

Olympia Motorway is the Elefsina - Corinthos - Patra motorway, with a total length of 201,5km. Olympia Motorway is one of the most significant national projects of strategic importance for the development of the Peloponnese, Western Greece and Epirus. It connects the three Regions and the Capital of the Greece with the most important gate of Greece to Europe, the port of Patras.

Olympia Motorway is one of the most difficult projects ever constructed in Greece, because it was the only motorway that a large part of it - Corinthos-Patras - was constructed while being in operation.

The new, modern and comfortable motorway offers an upgraded and safer connection to the southwestern part of Greece, in particular to and from the port of Patras, the archaeological sites and touristic areas, will boost exports and agricultural production.

PROJECT DEMANDS

Olympia Motorway includes in its design very large technical projects, such as tunnels, bridges, upper and lower crossings and uneven nodes. The use of dry gunite concrete was required for the repair of passageways and gutters in the area of Aspropyrgos.

SIKA PROPOSAL

Dry shotcrete is very frequently selected for limited scale repairs. Its main advantages include the high speed of strength development and ease of management of the raw materials for the mixture.

Increased rebound and dust generation are the main drawbacks of this repair method. In order to limit these negative features of dry shotcrete, it was proposed to combine the use of strength accelerator in powder form and synthetic macrofibers.

The use of the accelerator in powder form contributes to faster strength development and lower rebound (fresh state and early strengths). The incorporation of macrofibers allows for concreting without conventional grid reinforcement, while contributing to increased mechanical strengths and long-term durability of the construction.

SIKA CONTRIBUTION

In the dry mix of Cs40/50 strength category, the non-alkali shotcrete accelerator **Sigunit®-49 AF** in powder form and the synthetic, graded macrofibers **SikaFiber® PP-540/52** were incorporated.

The non-alkali accelerator **Sigunit®-49 AF** provided the main advantage of increased adhesion of the mixture to the substrate and therefore reduced rebound - the most significant techno-economic benefit for the particular application. In addition, due to its composition, it eliminates the negative effects of additional alkalis on the mist generated and released to the atmosphere, reduces dust generation and does not –additionally- charges soil and groundwater with alkali leaching.

SikaFiber® PP-540/52 synthetic macrofibers are based on patented e3® technology. They are manufactured with optimum grading and precise orientation, features that allow them to have a greater contact surface with the concrete and thus increased interfacial adhesion, bending strength and construction efficiency. Just as aggregates are graded in concrete mass, in the same way, the graded macrofibers **SikaFiber® PP-540/52**, are designed to optimize their distribution and therefore the fiber reinforced concrete's resistance. Each **SikaFiber® PP-540/52** fiber pack contains graded fibers based on length, thickness and percentage ratio in the mix. The result is the ideal combination of crack control for optimum concrete performance.

With their use:

- The use of conventional grid reinforcement is reduced or totally eliminated
- No longer, any requirement exists for minimum reinforcement cover
- Rebound is reduced thanks to the production of a more cohesive mix
- We can achieve reduced equipment wear (mixer, conveyor and handling equipment) in comparison with the use of metallic fibers
- There is no risk of injury compared to using metallic fibers
- Faster completion of the project is achieved, as grid placement work is not required
- Lower total project cost is achieved due to reduced material and labor costs



In order to confirm that the designed strengths will be achieved, as well as the coherence/adhesion between substrate and dry shotcrete, cores were drilled from the repaired elements for fracture.

Both the aspect of the cores and the measured strengths confirmed the practical achievement of the theoretical design values.



PROJECT PARTICIPANTS:

Owner: **Greek State**

Sub-contractor: **CERS-Structural Rehabilitation**



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