



SIKA AT WORK

Hippocrates Lyceum, Kos, Dodecanese, Greece

Masonry reinforcement with Sika® TRM system

Anticorrosion protection & structural reinforcement of reinforced concrete: Sika® FerroGard®-903 Plus & Sika® CarboDur®

HIPPOCRATES LYCEUM, KOS, DODECANESE, GREECE



PROJECT DESCRIPTION

The Hippocrates Lyceum of Kos (today it the 1st General High School of Kos) is the first and only second-tier school in the island that has operated for more than fifty years on the island, with a huge educational, national and general education offer. Located in the center of the city, it is a typical example of the inter-war Italian architecture in the Dodecanese. Its construction dates back to the 1920s and 1930s.

Its history begins in 1918, when Kos and the Dodecanese were under Italian occupation. Since then, this school structure has condensed the harsh, difficult, and often heartbreaking educational conditions that prevailed in Greece and the island in particular - due to its geographical location – caused by the historical events of the 20th century. The inhabitants quickly realized that the operation of the Hippocrates Lyceum would meet the educational needs and spiritual pursuits of young people, but could also mitigate social injustice, since until its inception, only a small number of pupils could cope with the financial requirements of attending a 6 grade-high school of the surrounding islands.

After years of disruption, in 1948 the Hippocrates Lyceum is fully staffed and functional with 94 students and 10 teachers and is being relocated to its current location on Hippocrates Street. The upgrowth and spiritual growth of Hippocrates Lyceum continued in the following years, becoming the center of the island's spiritual life, known in the panhellenic, while its diverse activities and events transcended the school boundaries and gained a pungent dimension and recognition.

Of great historical interest is the archive of school documents and books, which is preserved intact and kept in a suitable place. The Hippocrates Lyceum of Kos has always provided high levels of education and has for decades been a model school for the Dodecanese and one of the most important schools of Hellenism.

Many of its approximately 3,500 graduates have emerged as important figures in the political, scientific, cultural and economic life of our country.

The Hippocrates Lyceum of Kos was the reference point for the educational things of the island, the center of spiritual life, a stronghold of hope and pride of this place.

At the dawn of the new century, of the new millennium, despite the leveling erosions of modern life, Hippocrates Lyceum preserves in the consciousness of the inhabitants the fame and recognition it deserves, making proud those who were lucky enough to be a student in it.

PROJECT DEMANDS

Following the earthquake of July 21st, 2017, the Regional Council approved the conclusion of a Planning Agreement between the South Aegean Region and the Municipality of Kos for the project "Restoration of Damages in the School Complex of the 1st Hippocrates Lyceum in Kos". The South Aegean Region has provided funding of five hundred thousand euros (500,000€), of which two hundred thousand euros (200,000€) have come from the Republic of Cyprus as aid in the context of the rehabilitation of the damage to the 1st Hippocrates Lyceum in Kos.

The earthquake of July 21st, 2017 strained mainly the transverse walls of the structure and revealed pre-existing local damage to the school complex. The purpose of the interventions was not only to repair the local damage caused by the recent earthquake, but to increase the level of structural safety and durability of the building, respecting its authenticity, as it is a preserved building.

The project was integrated into the Public Investment Program 2018 of the South Aegean Region.

SIKA SOLUTION

Sika's Textile Reinforced Mortar (TRM system) has been proposed to restore the traditional stone structure of the building, which is an extremely flexible and easy solution for reinforcing masonry against seismic effects. The system consists of two main components, the **SikaRep®-200 Multi** mortar and the **SikaWrap®-350 G Grid** glass mesh and can be mounted with **SikaWrap® FX** anchor if required. **SikaWrap® FX** anchors are used for bonding masonry & concrete panels, to improve masonry deformation capacity in areas with strong seismic activity and to repair and fill cracks in masonries.

Its main benefits include:

- The ease of handling and application of the entire system
- The mortar's excellent workability (applicable with trowel or spray) and the easy mesh embedding
- Excellent adhesion to brick, weak concrete or stone (traditional or conventional load-bearing masonry)
- Strengthening of irregularly shaped constructions
- The effective restoration of masonry
- High strength of fiberglass

In addition, there was a requirement for structural reinforcement of reinforced concrete elements (slabs) and application of anti-corrosion protection.



Fixing of the Sika® TRM system was done using **SikaWrap® FX-75 G** glass fiber anchor.

SIKA SOLUTION / APPLICATION

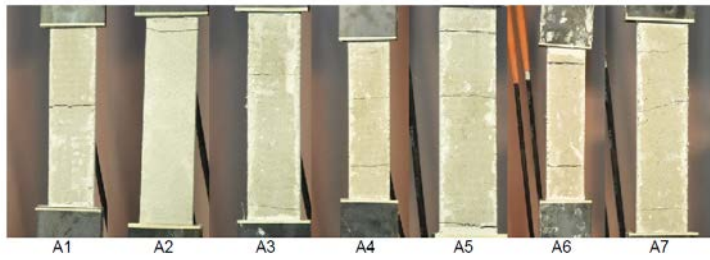
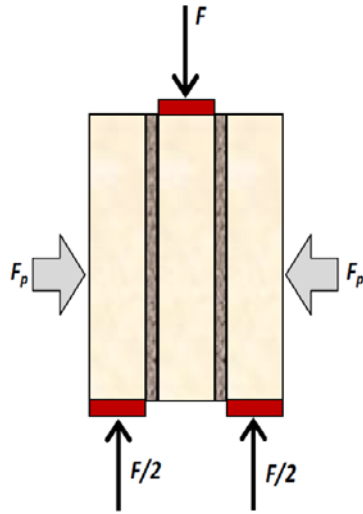
Sika® TRM Textile Reinforced Mortar System: After loose materials were removed from the existing masonry, jointing took place, aiming to level it as much as possible. Grouting was performed with the low E-modulus, class M20 **SikaRep®-200 Multi** mortar, certified according to EN 998-1 (GP, general use).



Subsequently, the **Sika® TRM** System, consisting of **SikaRep®-200 Multi** lightweight mortar was applied by spraying (4-5cm), forming any architectural details. **SikaWrap®-350 G Grid** glass fiber was embedded into the mortar. Anchoring of the system was performed using the **SikaWrap® FX-75 G** glass cords to secure the system's final anchoring and ensure tension transfer. The repaired and reinforced facade masonry was painted.



In the context of the technical support provided by Sika for reference projects and not only, the proposed **Sika® TRM** System has also been subjected to simulation tests at the University of Patras, in order to ensure the quality of application and system selection. Tensile strength (ACI 549 / AC434 - RILEM TC 232-TDT), shear bond strength - RILEM TC 250 -CSM) as well as shear strength (EN 1052-3: 2002) was evaluated on **SikaRep®-200 Multi** and **SikaWrap®-350 G Grid** coupons, in stone and brick, with excellent results.



At the same time, in a research program at the Aristotle University of Thessaloniki, traditional stoneworks were subjected to cyclic loading (seismic stress) and after their failure they were reconfigured with **SikaRep®-200 Multi** mortar and reinforced with **Sika® TRM** system, aiming to compare the proposed system with traditional methods of rehabilitation & reinforcement.



Anticorrosion protection and structural reinforcement of reinforced concrete elements:

For reinforcing the plates that were subjected to tensile strength, **Sika® CarboDur® S-512** polymer-reinforced carbon fiber laminate system was used in combination with 2-component **Sikadur®-30** epoxy resin for bonding.

Sika® CarboDur® FRP systems are bonded on the construction as an external reinforcement designed to increase bearing capacity, reinforce damaged structural members, improve functionality and durability, change static system and resist catastrophic events. Sika's FRP systems are non-corrosive, feature high strength, excellent durability and fatigue resistance, require minimal preparation, are available in various dimensions and are extremely thin, allowing cross-over or overlapping applications. Their extremely low weight enables easy installation, especially in roof applications (without the need for temporary support).

Sika's FRP systems have an extensive range of tests and approvals from many countries worldwide.



Finally, **Sika® FerroGard®-903 Plus** impregnation corrosion inhibitor was applied to prevent oxidation of the reinforced concrete elements. **Sika® FerroGard®-903 Plus** features dual function, both inhibiting the onset of corrosion and reducing the corrosion rate of steel reinforcement. Corrosion protection with **Sika® FerroGard®-903 Plus** results in an extended service life of up to 15 years.



Product quantities:

- SikaRep®-200 Multi: 280 tns
- SikaWrap®-350 G Grid: 5000 m²
- SikaWrap® FX-75 G: 500 m
- Sika® CarboDur® S 512: 100m
- Sika FerroGard®-903 Plus: 440 Kg
- Sikadur®-52 LP, Sika Anchorfix®-3+

PROJECT PARTICIPANTS:

- Owner: **Ministry of Education**
- Specification: **Christos Papadopoulos**
- Contractor: **Vast Make IKE**

Our most recent General Sales Terms shall apply.
Please consult the most recent Product Data Sheets prior to any use and processing.



Sika Hellas ABEE
15 Protomagias Str.
145 68, Kryoneri
Attica - Greece

Contact
Tel.: +30 210 8160600
Fax: +30 210 8160606
www.sika.gr / sika@gr.sika.com

BUILDING TRUST

