



SIKA AT WORK

Strengthening & upgrading indoor gym in Kilkis Municipality, N.Greece

Structural strengthening: Sika® CarboDur®, SikaWrap® & Sika® CarboShear L FRPs

BUILDING TRUST



STRENGTHENING & UPGRADING INDOOR GYM IN N.GREECE



PROJECT DESCRIPTION

The old indoor, type T3b Kilkis gym was built in the early '80s with plans submitted by the General Secretariat of Sports, as a public building, with supervision and acceptance of the project. From that time, there has been no change in its use, or intervention that imposes additional building loads. It is home of the local Kilkisiakos team and has a capacity of 6,000 fans. It is used by track teams, is the venue of the 3rd class football games and also functions as a training center.

PROJECT DEMANDS

On the north side (rear side) columns of the building, due to the guttering in the structure's body, combined with the small covering thickness of the reinforcement, reinforcement corrosion, peeling and partial disintegration of the concrete occurred at various points of the construction.

EVALUATION OF CURRENT STATUS / STUDY

The assessment of the situation was followed by a technical report. Structural intervention in the project aimed at:

- Restoring the bearing capacity of the problematic columns and part of their beams according to the safety margin proposed by the Greek Regulation of Interventions and thus well above their construction period.
- Increased resistance to roofing parts of the roof that show weaknesses in their bearing capacity in seismic and permanent vertical loads.

The specification of restoring – rehabilitation followed 3 phases:

Phase I

- Impression of the building with emphasis on visible building blocks
- Non-destructive sampling of the thickness of the reinforcement coating on columns, beams and plates, as well as estimation of the diameter of the reinforcement.

Phase II

- Mathematical simulation of the vector, with as much accuracy as possible

Phase III

- Selection of efficiency level and application of seismic load factors

SELECTION OF STRUCTURAL STRENGTHENING & UPGRADING

With the overall mode of intervention, it was possible to restore the entire building closer to the requirements of the modern building regulation by applying FRPs (Fiber Reinforced Polymers) as reinforcement, along with intervention on concrete foundations. The selection criteria for the strengthening method were:

- Minimizing the "disruption" of the gym's logistical infrastructure, such as avoiding the destruction of wooden floors, electrical installations and other infrastructure
- Minimizing the time of implementation of the strengthening system, which relates to the immediate re-use of space by the Sports Clubs
- Recognition of the method internationally, but also by the Greek Intervention Regulation and EC8.
- The cost of the application

Restoration-reinforcement of the indoor gym using FRPs will greatly improve the behavior of the building elements, up to twice their original strength and increase their elasticity (at cross-section level), reaching the level of today's structures.

Sika® CarboDur®, **SikaWrap®** & **Sika® CarboShear** FRP systems were adhered on the construction as an external reinforcement, designed to increase the bearing capacity, troubleshooting damages in structural members, improve functionality and durability, change static system and resistance against potential catastrophic incidents. 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 of temporary support). Sika's FRP systems carry an extensive range of tests and approvals from many countries worldwide.



SIKA SOLUTION

As a fast and effective method of reinforcement, **Sika® CarboDur®** and **SikaWrap®** carbon fiber systems were applied in combination with **Sikadur®** epoxy resin on the columns. Prior to the application of the structural reinforcement systems, **Sika MonoTop® Dynamic HP** repair mortar was applied to restore the geometry of the elements.

Structural reinforcement work of columns

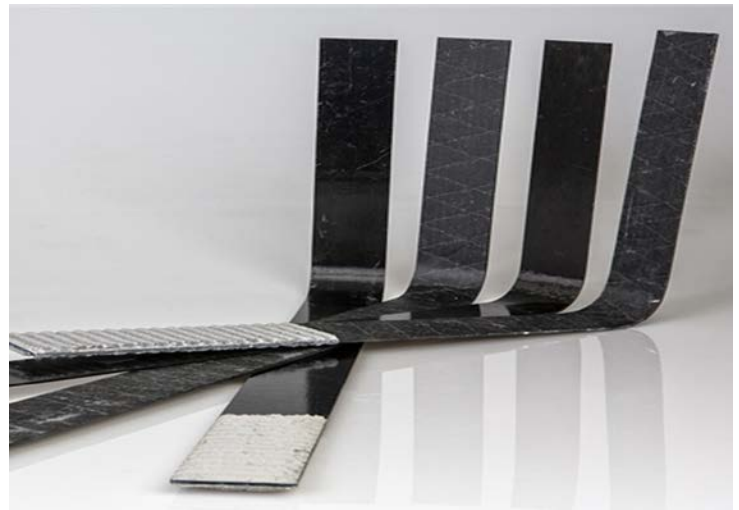
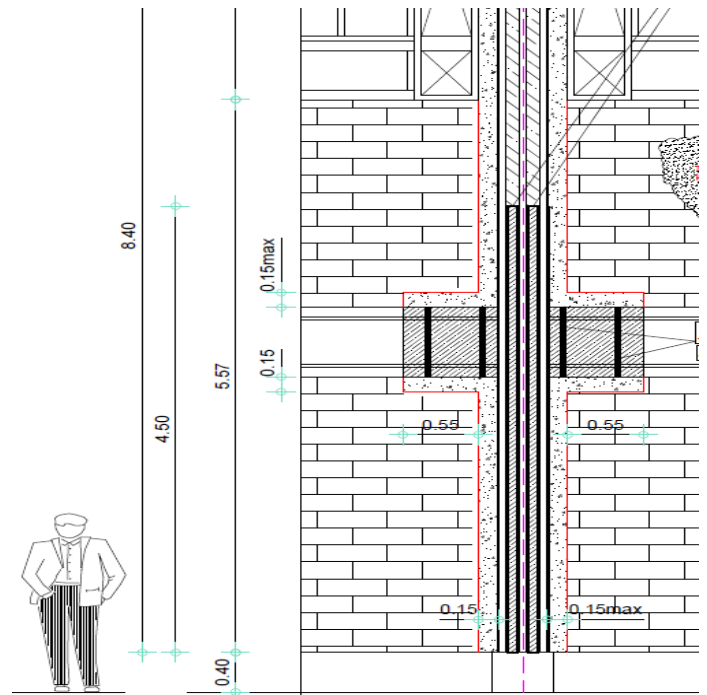
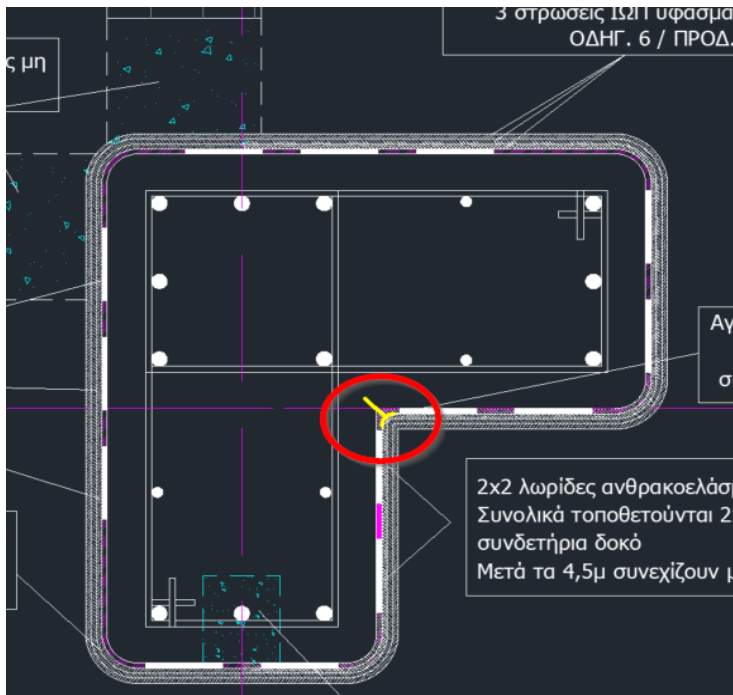
The columns were shear strengthened using **SikaWrap®-600 C** carbon fiber fabric in a predetermined number of layers, following a specification and applied by the wet method, using appropriate **Sikadur®-330** resin as primer and **Sikadur®-300** epoxy resin as impregnating agent. The fabrics of the corner pillars as well as the pillars with a ratio of > 2 were anchored with the **SikaWrap® FX-50 C** carbon anchors in specific arrangements.

Extruded **Sika® CarboDur® S** and **Sika® CarboDur® E** carbon fiber plates were used to increase the flexural strength of the columns (secant), in combination with the 2-component epoxy resin **Sikadur®-30**.

Structural reinforcement work of beams

The beams were also strengthened in the critical areas using **SikaWrap®-600 C** carbon fiber fabrics together with **Sika® CarboShear L 4/30/70** prefabricated corner angles.





Product quantities:

- Sika® CarboShear L 4/30/70: 80 pcs
- Sika® CarboDur® E1014: 1000m
- Sika® CarboDur® S1512: 80m
- SikaWrap®-600 C: 500 m²
- SikaWrap® FX-50 C: 50 m
- Sikadur®-30: 800 Kg
- Sikadur®-330: 150 Kg
- Sikadur®-300: 400 Kg

PROJECT PARTICIPANTS:

Owner: **Kilkis Municipality**
 Specification: **Dimitrios Boufidis**
 Contractor: **DOMIKI & IETA Ltd**

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

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