

The Tyfo[®] Tribune

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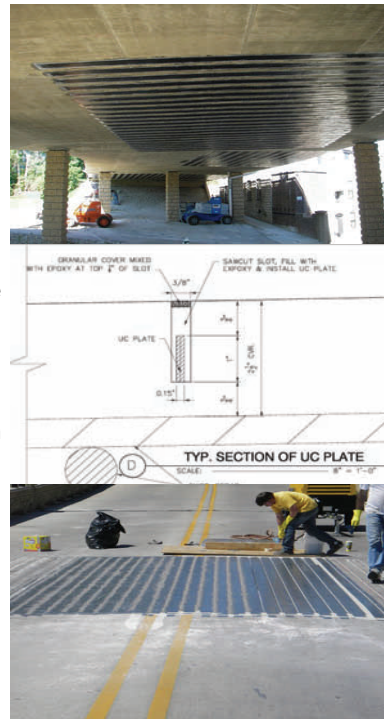
PROFILE—MICHAEL KARANTZIKIS FYFE EUROPE 4

Near Surface Mounting of Tyfo UC Strips in Iowa

The City of Burlington Iowa found severe cracking on an “X” shaped bridge intersection that had a flat slab spanned over columns.

Though the bridge is relatively new, a shop drawing error during construction meant that the proper steel reinforcement was not placed in several regions of the bridge. There was severe cracking over the columns from negative bending, along with strength issues in the positive bending areas.

Composite Systems Inc installed the Tyfo SCH-41 System to the underside of the bridge slab in seven areas identified



for strengthening. The unique feature of this project however was the Near Surface Mounting (NSM) of Tyfo UC Carbon Strips.

Sawcuts were made in the slab surface to a depth of 39mm (1.375”). The UC Plates were cut to a width of 24mm (1”) and bonded together for total thickness of 4mm(0.15”)

The laminates were placed in the sawcuts which were then filled with Tyfo S Epoxy.

Due to the grade of the slab, epoxy viscosity was carefully monitored to prevent it from draining from the channels prior to curing.

Fire Damaged Factory Rehabilitation—Indonesia

In March of 2005, the Yamaha Music Manufacturing facility in Jakarta, Indonesia was damaged during a major fire inside the structure. The factory is one of Yamaha’s main production plants for musical instruments that are distributed worldwide.

An initial visual inspection discovered spalling and cracking on the reinforced concrete beams, slabs and columns. An in depth structural assessment determined that the fire had severely deteriorated the concrete and steel strength.

Fyfe Asia Pte. Ltd. Singapore was

contacted by the project consultant to provide strengthening recommendations using the Tyfo[®] Fibrwrap[®] System. The final design proposal called for reinforcing the columns by traditional methods and for the beams to be strengthened with FRP.

The Tyfo[®] SCH Carbon and SEH Glass Systems were used to provide additional flexural and shear capacity.

PT. Huls Tirtacitra, the Tyfo[®] Certified Applicator in Indonesia completed work in the short span of fifteen days.



Tyfo[®] Fibrwrap Applied to Fire Damaged Beams.

TYFO SYSTEMS IN THE NEWS:

- Oct. 22, 2005—Los Angeles Times—Pasadena City Hall Retrofit Project.
- Pittsburgh Engineer Magazine—Hoover Dam Bridge Project
- Oct. 11, 2005—Los Angeles Times Kaiser Permanente Project, Panorama City
- Concrete News—ACI Kuwait Chapter, Column Retrofit Profile
- Composites Weekly—Tyfo[®] Systems Feature

First Fyfe Company Project Completed in Armenia at the Armenian American Wellness Center

Fyfe Company is proud to have recently participated in a program to provide medical relief and assistance in Yerevan, Armenia.

The Armenian American Cultural Assoc. (AACA), located in Arlington VA, USA, has established a clinic in Yerevan to specifically address the health and medical needs of Armenian women. The clinic provides breast and cervical cancer screening, family medical and infertility treatment. Since 1997 they have provided treatment to over 60,000 women.

The Soviet era building that

houses the clinic was determined to need seismic strengthening in the beam slab connections as well as upgrades to the columns. Full renovation was undertaken to not only structurally upgrade the building but also to install modern solar energy and environmentally sound cooling and heating systems. ARKA Inc. provided the FRP design and specified the use of Tyfo® Fibrwrap® for the retrofit.

The renovation project was sponsored by the AACA, the U.S. Agency for International Development, the government of Armenia and several

other contributors. Work began in the summer of 2005 and is scheduled to be completed in 2006.

The Tyfo® BC System was applied to the beam-slab connections in the lower portion of the building and the Tyfo® SEH System was installed on the columns of every floor.

Fyfe Company's Technician, Tyler Maas, was on hand to provide training for the local installers and Quality Control and Assurance to ensure the successful completion of the project.

“My experience working with Fyfe Co. has been a real pleasure. ...(They) immediately realized the importance of our humanitarian project in Armenia, and made every effort to ensure that our new wellness center would be housed in a safe, seismically sound building .”

Rita Balian, President and CEO of the AACA and Founder of the Wellness Center .



OIL FACTORY PIER REPAIR AND REINFORCEMENT IN KOREA

Fyfe Korea Ltd. is currently working on a long term project to reinforce a waterfront structure in Walhadong, Yeosu City in the Junra Province of Korea. The client GS Caltax Oil Company undertook a program to strengthen its existing piers. The plan included increasing the capacity of the jetty by enlarging and strengthening the beams and reinforcing the slabs.

The original beam depth was increased by 30cm and then further strengthened with the Tyfo® Fibrwrap® SEH-51A System.

The project began in 2002 and is ongoing . Each year additional phases are completed. From 2002 through 2005 over 9,000 square meters (97,055 square feet) of the Tyfo® Systems have been applied.

The close proximity of the

water line caused some exposure of the cured Fibrwrap® jacket to moisture prior to the application of the final protective coat of paint. Fyfe Korea's Certified Applicators used their extensive experience in marine and coastal work to overcome this hurdle.

Additional phases are scheduled to begin in 2006 using a similar reinforcement design.



The Tyfo® SEH-51A System is applied to the beams supporting the pier.

Waterfront Café Renovation, Piraeus Greece

If you anchor your yacht in the Zea Marina in Piraeus Greece, you will soon be able to enjoy a meal or an espresso at a newly renovated café directly across from the docks.

The building is owned by the government of Greece which has mandated that it be used for a café-restaurant. It is a two story reinforced concrete building with pre-stressed beams and slabs.

Currently the space is leased by Fretida S.A., owners of several popular cafes throughout Greece.

In order to assume occupancy of the building Fretida S.A. was obligated to strengthen the structure to bring it up to the current Greek Seismic code.

This required shear and ductility enhancement of the columns, beams and

walls. In addition, the beam-slab assemblies were reinforced with Tyfo® UC Carbon Strips in some areas to carry increased live loads.

exelKat, Fyfe Europe's Certified Applicator for Greece, paid careful attention to the detailing of the column-beam joints which included the Tyfo® SEH-51A System, Tyfo® UC Strips and Tyfo® FibrAnchors.



Telecommunications Towers Retrofitted for Wind Loading in Brazil

Four telecommunications towers in the city of Macaé, Brazil were found to be damaged due to wind loading. The concrete surface was severely cracked and corrosion damage was visible. Macaé is in the state of Rio de Janeiro and located on the sea. The towers sit approximately 100 meters (328) from the water line. The steel reinforcement suffered from corrosion after the cracked towers remained unrepaired for some time. The towers are used for transmission of cellular phone signals. There is a high amount of mobile phone use in this area due to the presence of large petroleum drilling facilities.

Projemart Engenharia, Fyfe's Certified Applicator, was asked to find a solution. The original

strengthening proposal called for external steel jacketing. This was quickly dismissed when it was determined that the existing footings would not be able to bear the additional weight of these jackets. Projemart proposed using FRPs. A Finite Element analysis was conducted to determine what reinforcement was needed.

The Tyfo® SCH-11UP Carbon System was used to provide additional strength in the moment regions as identified during the analysis. The Tyfo® WEB Bi-directional Glass System was used over the remaining surface to prevent crack propagation and provide additional protection against chloride infiltration.



Cell Towers strengthened with Tyfo® Systems

THE FIBRWRAP® COMPANY



For the past seventeen years Fyfe Company has been at the forefront of the composite strengthening industry. Our Patented Tyfo® Fibrwrap® Systems have been used to reinforce over seventy six thousand structural elements throughout the world. In addition, our Tyfo® materials have been tested at over fifty universities and private labs. This research includes full-scale structural tests, long-term durability studies (currently at the 20,000 hour mark mimicking 100 years of service life), blast mitigation and fire resistance. Fyfe Company's team of engineers and Fibrwrap® technicians provide design assistance and budget estimates to consulting engineers at no obligation. Because our focus is solely on composites we are able to offer a wide variety of options and unique solutions for structural strengthening.

If you would like to contribute to the next edition of this bulletin please contact Ed Donnelly at ed.donnelly@fyfeco.com.

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Michael Karantzakis - Director, Fyfe Europe S.A.

Fyfe Europe S.A. is headquartered in Athens Greece. Mike Karantzakis, the Director of Fyfe Europe, was born in 1974, in Thebes. A small city located 80km north of Athens. Thebes is well known as the Ancient Greek birthplace of Hercules and the poet Pindaros.

Mike moved to Athens to study at the National Technical University of Athens where he received a Bachelor's Degree in Civil Engineering and a Master's

Degree in Structural Analysis and Design. The topic of his thesis work was the use of FRP anchors which he completed with Dr. Triantifillou.

Mike started working with exeITEK, Fyfe USA's representative in Greece in 1999. He moved to Fyfe Europe S.A. when it was founded in 2003.

When he is not sailing in the Greek islands or scuba diving, Mike works hard to let customers know that Fyfe provides state of the

art technical advice, cutting edge developments and solutions to strengthening problems.

When asked what he enjoyed most about working at Fyfe he said, " When after preliminary design, calculations, final design, drawings and specifications, supply of materials, supervision, quality control and application of the Tyfo Fibrwrap Systems, ...I get photos of the completed project!"



Mike Karantzakis of Fyfe Europe S.A. at a recent conference