

JEA Northside Generating Station – Flume Road Bridge Repair

PROJECT OVERVIEW

MAPEI's fiber-reinforced-polymer (FRP) products, plus the company's concrete restoration products, were used as a system solution to repair the JEA Northside Generating Station flume road bridge in Jacksonville, Florida.



PROJECT INFORMATION

Project Category: Transportation – Bridge
MAPEI Sales Rep: Carlos Hernandez
Project Owner: JEA
Concrete Contractor: Premier Corrosion Protection Services, Inc.
Photographer: Raul Ballester
Project Size: 1,500 cu. ft. (42,5 m³) of concrete restoration; 7,100 sq. ft. (660 m²) of FRP



MAPEI PRODUCTS USED

- Planibond® 3C
- Planibond EBA
- Planitop® X
- Planitop XS
- Planitop 15
- MapeWrap™ Primer 1
- MapeWrap 12
- MapeWrap 31
- Carboplate™ E 170/100/1.2 mm
- MapeWrap C Uni-Ax 300
- Mapeflex™ P1 SL



JEA Northside Generating Station Flume Road Bridge Repair – Jacksonville, Florida

MAPEI provides system solution for repairing bridge at electricity generating station

JEA, created by the City of Jacksonville to serve the city and surrounding communities, provides electric, water and sewer services while protecting the area's natural resources.

According to company information, "JEA owns and operates an electric system with five generating plants, and all transmission and distribution facilities, including over 745 miles of transmission lines and more than 6,500 miles of distribution lines. JEA is also a joint owner with Florida Power & Light Company (FPL) of a sixth power plant, the St. Johns River Power Park (SJRP), which is operated by JEA. [The utility] also [receives] 9.6 megawatts of methane-generated power from Trail Ridge Landfill and 12.6-megawatts of energy from a 100-acre solar project on the Westside that contains 200,000 solar panels. In 2013, JEA generated 12.5 million megawatt hours of energy."

One of the generating plants owned by JEA, the Northside Generating Station (NGS), reportedly "uses natural gas, fuel oil, coal and petroleum coke in three large steam units and four small diesel-powered peaking units to produce more than 1300MW of peak electric capacity... [and is] among the cleanest solid fuel plants in the world. NGS was originally placed into service in 1966, but the oldest unit currently operating (Unit 3) was completed in 1977."

As part of a design/build project to maintain NGS, MAPEI was asked to come up with a repair solution using FRP composite materials (specifically carbon fiber) to strengthen the bridge beams and pile caps on the flume road bridge that spans Nichols Creek and links the generating station to raw materials barges from the Jacksonville Port Authority.

Deterioration over time had caused the bridge beams to torque, and they needed structural reinforcement. MAPEI worked alongside the contractor, Premier Corrosion Protection Services (PCPS), and the design engineer (B² Engineering, LLC) to meet the requirements of the specifications.

The physical aspects of undertaking the project were challenging due to the extent of the damage in the

concrete structure, difficult access to the repair area, an aggressive environment, low clearance between the repair area and the water, and environmental regulations.

MAPEI products at work on the jobsite

Much of the work on the bridge was at or just above water level, so the PCPS crews worked aboard a system of 30 rafts that were moved between the beams and pile caps. The project consisted of repairs and structural strengthening of 63 beams, each 2' x 2' x 15' (0,6 x 0,6 x 4,57 m) long. Repairs were also made to 64 pile caps that were each 5' x 5' x 2' (1,52 x 1,52 x 0,6 m) thick, 15 of which had to be reconstructed due to the extent of deterioration.

The first step in the repair process was the removal of deteriorated concrete and the cleaning of corroded rebar that was exposed. The rebar was then coated with MAPEI's **Planibond 3C**, which acts as a corrosion inhibitor and as a bonding agent for repair materials. In areas where there was no exposed rebar, **Planibond EBA** was used as the bonding agent.

In areas where deterioration was less than 4" (10 cm) deep, the concrete repairs were made with **Planitop X** mortar and **Planitop XS** mortar, depending on the open time needed for the application. **Planitop X** can be applied from featheredge to 4" (10 cm) per lift and is engineered to provide high early strength with ease of application. **Planitop XS** is an extended-working-time variation of **Planitop X**.

For those caps and beams that had extensive deterioration (beyond 4" [10 cm] deep), the PCPS crews used MAPEI's **Planitop 15** mortar, which is well-suited for form-and-pour and form-and-pump applications where high early strength and flowability are required. **Planitop 15** was extended with 3/8" (10 mm) pea gravel for the full-depth pours.

Once repairs to the beams and pile caps were complete, the second phase of operations involved structural strengthening with MAPEI's FRP system. **Carboplate E 170** was applied in four locations along the length of each beam – one strip along the inside face, one strip

along the outside face and two strips along the bottom. Next, **MapeWrap C Uni-Ax 300** carbon fiber fabric was applied in 15 3/4" (19 mm) wide strips in stirrup fashion at 24" (61 cm) centers along the full length of the beam. Then, the entire beam was encapsulated with **MapeWrap C Uni-Ax 300**.

For the 64 piles, two layers of **MapeWrap C Uni-Ax 300** were wrapped around the circumference of one end, and one layer was wrapped horizontally around the entire pile, all per B² Engineering's design.

The epoxy system used for setting **Carboplate E 170** and **MapeWrap C Uni-Ax 300** included **MapeWrap Primer 1**, **MapeWrap 12** and **MapeWrap 31**.

MapeWrap Primer 1 is used as a seal coat for consolidating and priming concrete substrates. After mixing, **MapeWrap Primer 1** becomes a low-viscosity resin that is able to penetrate a cementitious pore structure and provide a high bond for the other components of the **MapeWrap** composite system on horizontal, vertical and overhead surfaces.

MapeWrap 12 is a two-component, 100%-solids, moisture-tolerant, structural epoxy used as an adhesive for the **Carboplate** composite system.

MapeWrap 31 is a 100%-solids, moisture-tolerant, medium-viscosity epoxy resin for impregnating **MapeWrap** composite system fabrics by a dry layup method. **MapeWrap 31** was specially developed to saturate and encapsulate carbon and glass fiber fabrics and to cure to a high-performance laminate. Once cured, **MapeWrap 31** provides high mechanical strength properties.

As a final touch to the system, **Mapeflex P1 SL** was used as a joint sealant for expansion joints on the bridge deck, and **Planitop 15** was used to restore the edges of the joints.

MAPEI was proud to be a part of this project that delivered a structurally sound concrete bridge in order to support the work vehicles traveling across it to service the raw materials cargo delivery systems.

