

## Vipel<sup>®</sup> Fixes L.A. Sewers

**Market Segments:** Infrastructure  
Sewer Rehabilitation

**Composite Application:** Sewer liner panels

**Resin:** Vipel<sup>®</sup> vinyl ester  
Vipel<sup>®</sup> unsaturated polyester

**Manufacturing Process:** Hand Lay-up

**Semi-Elliptical Dimensions:** 47 inches  
(1194 millimeters) wide  
40 inches  
(1016 millimeters) high

**Installed:** 2008

**Location:** Los Angeles, CA, USA



*The composite panels were shipped to the Los Angeles job site and installed in a matter of weeks*

When an almost 80-year-old, semi-elliptical sewer pipeline in Los Angeles showed signs of imminent failure, the emergency solution was a new liner of fiber-reinforced polymer (FRP) composite panels manufactured by Channeline International, Ltd. The resin formulation for Channeline's composite production incorporated Vipel<sup>®</sup> corrosion-resistant technology from AOC.

The new composite liner was part of a major emergency repair of the North Outfall Sewer (NOS) of the City of Los Angeles. A brief history of the NOS helps explain the nature of the problem. The NOS was built between 1923-1929 using cast-in-place concrete to form a semi-elliptical pipeline that connected the San Fernando Valley to the Los Angeles sewer system. Clay tiles were applied to the pipe interior to form a protection layer.

In 1939, the Army Corps of Engineers lowered the bed of the Los Angeles River to ease the threat of flooding during Southern California's November to January rainy season. In the process, a river siphon was created with round reinforced concrete pipe. When part of the concrete siphon was undermined and collapsed in the Summer of 2007, the adjacent sewer pipe was exposed to create the potential for sewer discharge into the river come the rainy season.

The City of Los Angeles commissioned emergency response contractor Vido Artukovich and Sons, of El Monte, CA, to repair the damaged siphon. Artukovich and Sons quickly set up a sewer flow bypass and rehabilitated the precarious siphon by October 15, before the start of the rainy season.

During the repair, a video inspection of the NOS system revealed that the 290-foot (88-meter) long upstream section of the old, non-circular concrete sewer pipe had deteriorated. The reach included several curved alignments of about 100 feet (30 meters). With most of the clay tile protective layer missing, the potential for failure in the near future was imminent.

A solution was needed, and needed fast. As a result, Channeline International Ltd. was contracted in late October to assist in the design and installation of composite liner panels on an emergency basis. Channeline manufactured the panels using a design solution based on the work of WRc, a UK-headquartered, global engineering consultancy that specializes in water and wastewater systems.

The panel cross section was semi-elliptical in shape and had a width of 47 inches (1194 millimeters) and a height of 40 inches (1016 millimeters). The panels were manufactured in a resin matrix that used Vipel technology from AOC to achieve required structural properties and long-term resistance to corrosive attack.

To make the panels, Channeline used a hand lay-up construction in which a polymer resin core was sandwiched between layers of Vipel resin-impregnated glass fabrics. The reinforcement was a combination of unidirectional fiberglass mat and chopped strand mat.

Two different Vipel technologies were involved. The inner first layers were made with a vinyl ester to give a high



*The original concrete pipe was in danger of failure because much of its protective tile liner was missing.*



*The new composite liner panels conform to the semi-elliptical shape of the host pipe.*

degree of chemical resistance in the sewerage environment. The core laminate and outer layers were made with an unsaturated polyester.

“The AOC resins met our needs to have a fairly long pot life and be able to lay up the thick laminates and core without slump or sag,” said Robert Walters, Chairman, APS Dubai, of which Channeline is a wholly-owned subsidiary. “The AOC service was generally of an exceptionally high standard. We particularly appreciated the fact that AOC export manager Steve Olle saw to it that we got what we needed when we needed it.”

The composite panel sections were shipped by mid-February 2008 from the Channeline manufacturing facility in Dubai. The panels arrived at the Los Angeles jobsite in mid-April and were installed in a matter of weeks. The panels were site-bonded together using a proprietary epoxy putty bonding agent called “Channeline 3000,” which provides exceptional high strength and a long term bond.

The bypass pumps were shut off in May to allow the full flow to pass through the newly rehabilitated system. The North Outfall Sewer was ready for the next time it pours in Southern California.

#### About Channeline

Channeline International is a world leader in composite solutions for the structural rehabilitation of pipelines, ducts and culverts used for sewer and storm drainage systems. Over more than a quarter century, Channeline has accumulated an unrivalled degree of experience in the rehabilitation of both circular and non-circular

large diameter buried pipeline structures. Channeline is a wholly-owned subsidiary of Anticorrosion Protective Systems (APS Dubai). For more information, phone +971 4 3372877 in Dubai or e-mail [sales@apsdubai.com](mailto:sales@apsdubai.com). In North America, phone offices in Ontario, Canada, at +1 289 668 0351 or e-mail [channelineintl@cogeco.ca](mailto:channelineintl@cogeco.ca). The company’s Internet home is [www.channelineinternational.com](http://www.channelineinternational.com).

#### About AOC

AOC is a leading global supplier of resins, gelcoats, colorants, additives and synergistic systems for composites and cast polymers. AOC knows technology, lives quality and delivers service better than any other resin supplier. For more information, e-mail [corrosionresins@aoc-resins.com](mailto:corrosionresins@aoc-resins.com), phone (901) 854-2800 or go to [CorrosionResins.com](http://CorrosionResins.com) or [AOC-RESINS.com](http://AOC-RESINS.com).



**“The AOC resins met our needs to have a fairly long pot life and be able to lay up the thick laminates and core without slump or sag.”**

*Robert Walters,  
Chairman, APS Dubai*

Channeline is a wholly-owned subsidiary