

# Bridge and Highway Solutions



## ► Bridge and Highway Solutions

Modern bridge infrastructure comprises primarily reinforced or pre-stressed concrete and steel structures. Over the service life of a bridge, these constituent materials are continually subjected to fatigue along with wear and tear due to dynamic vehicular loads. In addition, overloading due to increase in wheel loads has combined with regular exposure to aggressive external elements – like de-icing salts, oil and gas spills, carbon dioxide, and freeze/thaw cycles – to aggravate the situation further. Poor quality of construction and lack of regular maintenance also have contributed to accelerated deterioration of bridge structures. All of these factors have compromised the structural integrity and long-term durability of our nation's bridges, leading to safety and liability issues as well as a serious economic impact.

The rehabilitation of bridges involves addressing a myriad of complex problems, and no single technique or retrofit method offers a complete solution. Therefore, the answer lies in being able to address each individual problem with an appropriate solution to result in a durable structure. The Concrete Restoration Systems (CRS) division of MAPEI North America takes a comprehensive approach to outlining the principle causes of bridge problems and providing a variety of structural retrofit techniques for bridge rehabilitation. MAPEI's CRS specialists and engineers will perform a preliminary analysis and work with the Engineer of Record to establish existing conditions while determining rehabilitation and structural strengthening requirements.



**Highway 25 Bridge**  
Laval, QC

From repair and maintenance to protection to preservation, MAPEI provides owners, designers and contractors with effective solutions to the challenges of bridge repair and a single-source package that you would expect from a world leader in concrete repair. Backed by our field CRS specialists and in-house engineering and technical support, MAPEI brings more than 80 years of experience to the construction industry.

### A. Preservation

1. **Planiseal® Traffic Coat** 100%-solids, epoxy overlay system provides waterproofing (and skid resistance with the addition of aggregate) on bridge decks and suspended slabs. It prevents the penetration of chloride ions into concrete, thus giving high durability and extended service life for concrete decks. The fast-setting version of this product is **Planiseal Traffic Coat FS**.
2. **Planiseal® LVB** low-viscosity epoxy sealer penetrates both new and worn sound concrete decks, healing microcracks and forming a subsurface barrier of protection from carbonation and chloride ion attack as well as extending service life on bridge decks.

# Bridge and Highway Solutions



*Planiseal Traffic Coat*



*Planiseal LVB*



*Planiseal WR*

3. **Planiseal® WR** penetrating, water-based silane/siloxane water repellent helps to protect horizontal and vertical concrete surfaces from moisture-related staining and dirt buildup. **Planiseal WR 40** clear, water-based, 40%-silane penetrating water repellent and sealer is designed to protect concrete and masonry against moisture/chloride intrusion. **Planiseal WR 100** is a clear, high-performance, 100%-silane penetrating water repellent and sealer designed to provide outstanding water repellence on concrete and masonry.
4. **Mapelastic®** flexible cementitious membrane protects concrete pillars, concrete joists and road viaducts from the chemical attack of sulphates, chlorides, carbon dioxide and de-icing salts that can lead to costly repairs. Because of its crack-bridging capacity, it is ideal for concrete surfaces subject to vibration and subsequent cracking. A 5/64" (2-mm) layer of **Mapelastic** is the equivalent of 1" (2.5 cm) of concrete cover.
5. **Elastocolor®** protective and decorative acrylic coatings help to protect bridge abutments against moisture ingress and carbonation as well as the effects of atmospheric weathering, climate change and aging. **Elastocolor** coatings come in four tint bases and 25 standard colors, but an unlimited range of custom colors is available.



*Mapelastic*

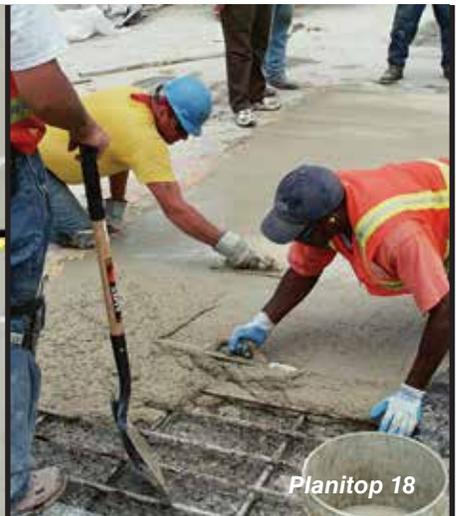
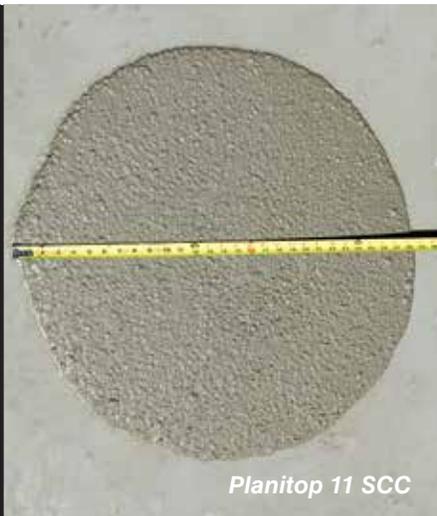


*Elastocolor coatings*

## B. Concrete Repair and Restoration

### 1. Horizontal Repairs

- a. **Planitop® 11** one-component, pumpable and pourable concrete mix is ideal for partial and full-depth repairs on horizontal, vertical and overhead bridge elements from 1" to 8" (2.5 to 20 cm).
- b. **Planitop® 11 SCC** one-component, cementitious, self-consolidating, polymer-modified concrete mix is designed for form-and-pour and form-and-pump applications on horizontal, vertical and overhead bridge structures. Containing silica fume and a corrosion inhibitor, it can be placed from 1" to 8" (2.5 to 20 cm).
- c. **Planitop® 18** and **Planitop 18 TG** are fast-setting, one-component repair mortars with a corrosion inhibitor that are well suited for bridge-deck overlays and various horizontal Department of Transportation concrete repairs. They can be open to vehicular traffic in as little as one hour, with good resistance to freeze/thaw conditions and de-icing salts.



- d. **Planitop® 18 ES** one-component, rapid-hardening repair mortar with extended working time can be opened to vehicular traffic in as little as six hours and meets the requirements for an ASTM C928 R3 repair mortar.
- e. **Planitop® 21** two-component rendering mortar is for resurfacing concrete segments on bridges that are subject to moderately aggressive pollutants. It is ideal for filling honeycombs, voids and cavities, and for treating all types of blemishes and defects on concrete surfaces.
- f. **Planitop® FD** full-depth repair mortar is for form-and-pour and form-and-pump applications. It is used for the deep-fill renovation of horizontal surfaces on bridges and retaining walls, as well as flatwork repairs.
- g. **Mapecrete™ Film** evaporation retardant and finishing aid is designed to retard moisture evaporation on freshly placed concrete surfaces, helping to prevent "plastic shrinkage" and cracking.



# Bridge and Highway Solutions

## 2. Vertical and Overhead Repairs

- a. **Planitop® X** is a very rapid-hardening, fiber-reinforced, vertical and overhead repair mortar, with a corrosion inhibitor, for renovating cast-in-place, pre-cast and post-tensioned concrete structures such as bridges, overpasses, tunnels and retaining walls. It achieves 3,800 psi (26.2 MPa) compressive strength in 3 hours at 73°F (23°C).
- b. **Planitop® XS** is a rapid-hardening, fiber-reinforced, polymer-modified repair mortar containing a corrosion inhibitor. *Planitop XS* provides outstanding workability from featheredge to 4" (10 cm) applications on vertical and overhead surfaces.



- c. **Planitop® 12 SR** fiber-reinforced spray or troweled-applied mortar, with a corrosion inhibitor and silica fume, is for vertical and overhead repairs up to 2" (5 cm). It is sulphate-resistant for a more durable product in adverse environments.
- d. **Planitop® 15** fiber-reinforced fluid mortar, containing silica fume, is for form-and-pour and form-and-pump applications from 3/8" to 4" (10 mm to 10 cm). It is designed for larger repairs of bridge pile caps and bent caps.
- e. **Planitop® 23** two-component, fast-setting, fiber-reinforced repair mortar has a built-in corrosion inhibitor and contains silica fume. It can be trowel-applied or sprayed in vertical and overhead applications up to 4" (10 cm) in two lifts. It is used on bridges, overpasses, retaining walls, tunnels and more.



### 3. Corrosion Reduction

- a. **Planibond® 3C** epoxy-modified corrosion inhibitor protects embedded steel reinforcement.
- b. **Mapefer™ 1K** unique polymer, cementitious anticorrosion coating inhibits oxidation and rust formation on steel reinforcement.



- c. **Mapeshield™ I** pure zinc galvanic anode is formulated to stop and prevent corrosion of reinforcing steel. It is available in two different lengths and with 10- and 20-year duration capabilities.
- d. **Mapeshield™ CI 100** surface-applied corrosion inhibitor is designed to penetrate concrete structures and protect embedded steel reinforcement.



# Bridge and Highway *Solutions*

## 4. Bridge Grouting

- a. **Planigrout® 755** general-purpose, nonshrinking, cementitious construction grout provides full load-bearing support and uniform load transfer for bridge-bearing pads/ seats. It can be extended 30% by weight and placed from dry-pack to flowable consistencies.
- b. **Planigrout® 712** high-performance, nonshrinking cement grout, free of aluminum powder and metallic aggregates, is used for precision grouting of columns, bridge pads and anchor bolts. It offers superior resistance to freeze/thaw conditions and de-icing salts.



*Planigrout 755*



*Planigrout 712*

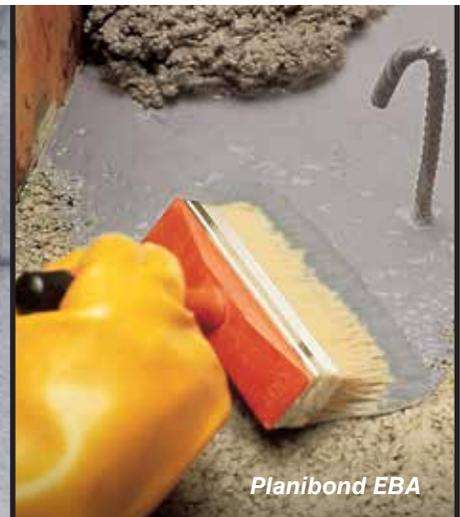
- c. **Planigrout® 830 SP** three-component, high-performance epoxy grout prevents chloride and carbon dioxide penetration and provides permanent protection of end-cap anchorages. It is exclusively used in areas exposed to dynamic loading and high vibration.



*Planigrout 830 SP*

## 5. Epoxy Injection and Bonding

- a. **Epojet™ LV** two-component, 100%-solids, ultra low-viscosity epoxy resin is used to penetrate hairline cracks by both injection and gravity feed to restore structural integrity to cracked concrete.
- b. **Epojet™** high-modulus, low-viscosity, 100%-solids epoxy resin is designed for pressure injection and sealing of cracks in structural concrete elements.
- c. **Planibond® AE** is a high-strength, moisture-tolerant, zero-VOC, two-part, non-sag, epoxy anchoring gel. And **Planibond AE Fast** rapid-setting, high-strength, moisture-tolerant, two-component, 100%-solids, epoxy anchoring gel is designed for a wide variety of vertical/horizontal bonding and repair applications. Both products are used as a cap seal for pressure-injection epoxy grouting, to seal cracks and to set anchor bolts.
- d. **Planibond® EBA** is a two-component, multipurpose bonding agent for screeds and repair mortars. It can also be used as a structural crack filler, as a mortar when combined with sand and as an anchoring grout.



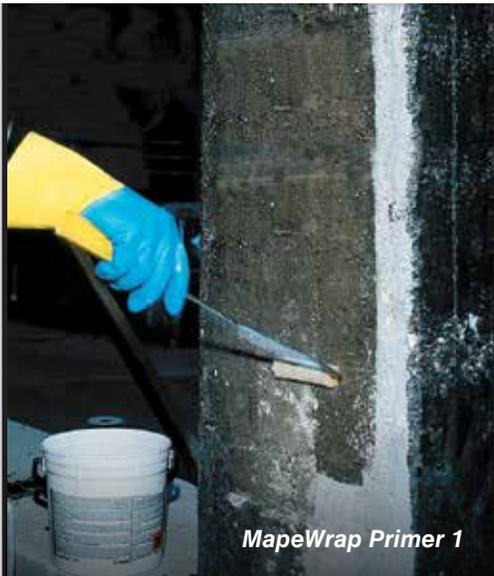
## 6. Structural Strengthening

- a. **MapeWrap™** fiber-reinforced polymer (FRP) structural strengthening systems are for structural repair and reinforcement of structural elements. They consist of flexible carbon and fiberglass fabrics with uni-directional, bi-directional and quadri-directional fibers that are applied with dedicated epoxy resins and topcoats. *MapeWrap* systems are used primarily for the repair and maintenance of deteriorated concrete elements (columns, piers and beams), to improve seismic performance, to upgrade load-bearing capacity and to rectify original design flaws.
- b. **Carboplate™** and **Maperod™** pre-impregnated carbon fiber plates and rods in epoxy resins are used for repair and upgrade of beams and slabs for flexural strengthening, for the reinforcement of structures subject to vibration, and for anti-seismic strengthening.



# Bridge and Highway *Solutions*

- c. **MapeWrap™ Primer 1** is a two-component epoxy primer for smoothing and leveling other *MapeWrap* products for FRP wrap, plate and rod installations. It is designed to work with the impregnating resins **MapeWrap 21**, **MapeWrap 31** and **MapeWrap 31 Slow-Set**, as well as the epoxy putties **MapeWrap 11** and **MapeWrap 12**. The low- and medium-viscosity impregnating resins are for the “dry” and “wet” layup wrap systems, and the thixotropic epoxy putties are for the smoothing of concrete surfaces and for the adhesion of plates and rods.
- d **MapeWrap™ C Fiocco** high-strength cord, made from uni-directional carbon fiber threads, is designed to be impregnated with *MapeWrap 21* to provide structural and functional restoration of concrete and masonry elements. *MapeWrap C Fiocco* is particularly suited for restoration of historic structures, including vaulted ceilings and masonry walls.





**Construction Grouts**



**Waterproofing**



**Concrete Repair Mortars**



**Self-Leveling Underlayments**



**Decorative Toppings**



**Exterior Finishing**



**Epoxy Adhesives**



**Corrosion Protection**



**Fiber-Reinforced Polymer**

For more information on the complete line of MAPEI products, visit our Website at [www.mapei.com](http://www.mapei.com).

***Elastocolor* =  
High hiding power and  
superior coverage with  
less effort**

***Elastocolor*<sup>®</sup>**  
**Protective and decorative acrylic coatings  
for facades and walls**

Climate, weather and aging can take a severe toll on a building's facades and walls. Yet vertical surfaces treated with MAPEI's *Elastocolor* weatherproof coatings can enjoy long-term durability with brilliant color and low maintenance.

- High hiding power on substrates, which means less product and fewer applications are needed
- Minimized maintenance, thanks to exceptionally low dirt retention
- An unlimited number of color options, all highly resistant to UV fading over time
- A high level of reflectivity, reducing energy costs
- Flexibility to accommodate movement and minor cracking of surface



# Bridge and Highway Solutions



MAPEI USA  
MAPEI Canada

#### MAPEI Headquarters of North America

1144 East Newport Center Drive  
Deerfield Beach, Florida 33442  
1-888-US-MAPEI (1-888-876-2734) /  
(954) 246-8888

#### Technical Services

1-800-365-0614 (U.S. and Puerto Rico)  
1-800-361-9309 (Canada)

#### Customer Service

1-800-42-MAPEI (1-800-426-2734)

#### Services in Mexico

0-1-800-MX-MAPEI (0-1-800-696-2734)

For the most current **BEST-BACKED<sup>SM</sup>**  
product data and warranty information,  
visit [www.mapei.com](http://www.mapei.com).

**Edition Date:** November 20, 2018

