



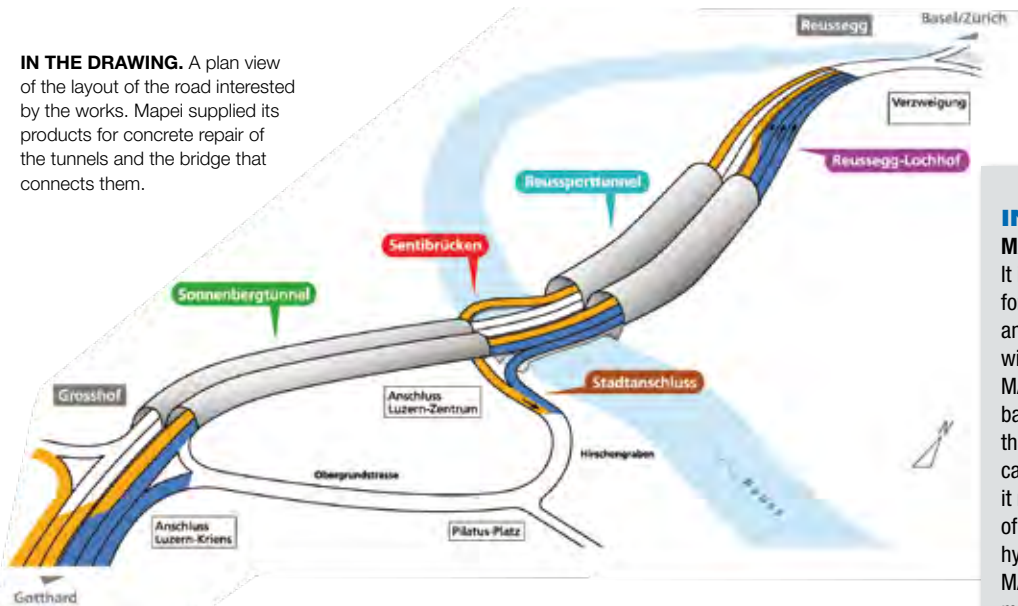
CityRing Project in Lucerne

Renewal of a critical stretch of motorway for road traffic in Switzerland



ABOVE. The surfaces of the tunnels after applying MAPEGROUT 430 mortar mixed with PLANICRETE.
BELOW. MAPEGROUT GUNITE 300 AF mortar was applied inside the tunnels.

IN THE DRAWING. A plan view of the layout of the road interested by the works. Mapei supplied its products for concrete repair of the tunnels and the bridge that connects them.



With an average of 85,000 vehicles every day, the A2 motorway near Lucerne is one of the busiest roads in the whole of Switzerland. After more than 30 years of intense use, the local motorways authority decided to modernise this stretch of the motorway from both a construction and safety point of view, as part of an overall modernisation programme called CityRing, which when complete will cost more than 400 million Swiss Francs (about 326 million Euros). A complete renewal intervention of the motorway near Lucerne started at the end of 2010, and is scheduled to be completed in the middle of 2013. In order to prevent the amount of traffic increasing in the urban areas, work has been carried out mainly at night and it has taken around a year to complete each carriageway.

Interventions in the Tunnels

The main interventions were the renewal of the Sonnenbergtunnel and the Reussport-tunnel. In the two tunnels, 1.5 km and 665 m long respectively, repair and reconstruction of

the concrete was carried out, the road was resurfaced, safety booths and a new ventilation system were installed and a new drainage system was built. The Mapei Technical Services Department assisted the contractor for the entirety of the work, recommending the most suitable products for each single phase of the work, while respecting the tight schedule imposed by the client. The surfaces of the tunnels were repaired using MAPEGROUT GUNITE 300 AF mortar with accelerated setting for dry mix shotcrete. To repair the deteriorated sections of the concrete structure, MAPEGROUT THIXOTROPIC fibre-reinforced mortar was used, mixed with MAPECURE SRA curing admixture to improve its air curing cycle and further reduce hygrometric shrinkage. Before applying the mortar, the exposed steel reinforcement rods were treated with MAPEFER anti-corrosion mortar. The surfaces were repaired using MAPEGROUT 430 fine-grained, fibre-reinforced, thixotropic mortar mixed with 30% of PLANICRETE latex. Reconstruction work was completed by

IN THE SPOTLIGHT MAPECOAT I 24

It is a two-component epoxy paint for protecting floors, reservoirs and concrete pipes in contact with aggressive chemical agents. MAPECOAT I 24 is epoxy-resin based paint with special pigments that provide excellent covering capability. After drying completely, it resists the aggressive action of acids, alkalis, salts, oils, hydrocarbons and solvents. MAPECOAT I 24 resists frost, maintaining the appearance of the surface treated. MAPECOAT I 24 complies with principles defined by EN 1504-9 and EN 1504-2 standards. It can contribute up to 2 points to obtain the LEED certification.



BELOW LEFT. Anchoring metal elements with PLANITOP FIX. **BELOW RIGHT.** Reconstruction of the surface patches on the carriageway of the bridge connecting the two tunnels with MAPEGROUT SV and MAPEGROUT SV T.





ABOVE. The walls inside the tunnels after applying MAPEFINISH two-component mortar.

smoothing the surfaces with MAPEFINISH two-component mortar. To renovate the tunnels, PLANITOP FIX cementitious mortar (produced and distributed on the Swiss market by Mapei Suisse SA) was also used, as well as MAPEFILL high-flow grout to anchor the metal parts to the concrete structure and ADE-SILEX PG4, two-component epoxy adhesive for waterproofing joints and bonding curbs on asphalt. In both the Sonnenbergtunnel and Reussporttunnel, jet fans were installed to

help extract fumes in the event of a fire. The surfaces of the ventilation ducts were treated with ECO PRIM GRIP primer and ULTRAPLAN MAXI levelling compound. The drainage system in the Sonnenbergtunnel was also in need of repair, and TRIBLOCK FINISH was recommended. This three-component thixotropic mortar has the capacity to protect and smooth out concrete surfaces subject to damp (channels, drainage manifolds and pipe-work) where good chemical resistance and high resistance to abrasion is required. LAMPOSILEX ultra-fast setting and curing hydraulic binder was used to stopping water leaks. While MAPECOAT I 24 epoxy resin coating was used to finish off the surfaces, an ideal protective and anti-acid coating product for concrete surfaces. The surface of some of the concrete elements in the Sentirbrücke (the bridge that connects the two tunnels) was deteriorated in certain areas. Work started by removing the deteriorated portions using high pressure water jets. The areas where the concrete had been removed were then repaired with MAPEGROUT THIXOTROPIC. MAPEGROUT THIXOTROPIC was also used to repair certain areas of the concrete of the carriageway on the bridge. Another solution proposed to repair and reconstruct the surface patches of the north and south-bound carriageways was to remove the deteriorated parts with high pressure water jets, saturate the substrate with water and apply MAPEGROUT SV and MAPEGROUT SV T controlled-shrinkage, thixotropic mortars, suitable for repairing concrete and fixing inspection shafts, manholes and highway dressing materials. MAPECURE E30 film-forming curing compound in water emulsion was used to protect fresh mortars due to short hardening time (traffic after 2 hours).

Technical Data

CityRing, Lucerne (Switzerland)
Period of Construction: 70's
Period of Intervention: 2011-2012
Intervention by Mapei: supplying products to repair the concrete, anchor metal elements, protect the concrete and to form an anti-acid coating in the tunnels and on the bridge
Client: ASTRA (Bundesamt für Strassen, Zofingen)
Works Direction: Inge City Luzern (Lobardi AG; Aegerter & AG)
Contractor: Arge CityRing Luzern
Mapei Distributor: Mobau Partner
Mapei Co-ordinators: Bernhard Bieri, Mapei Suisse SA (Switzerland)

Mapei Products

Concrete repair: Adesilex PG4, Eco Prim Grip, Lamposilex, Mapecoat I 24, Mapecure E30*, Mapecure SRA, Mapefill, Mapefinish, Mapegrout Gunite 300 AF, Mapegrout SV, Mapegrout SV T, Mapegrout Thixotropic, Planicrete, Planitop Fix*, Triblock Finish, Ultraplan Maxi.
 *These products are manufactured and distributed on the Swiss market by Mapei Suisse SA.

For further information see the websites www.mapei.com and www.mapei.de