



SIKA AT WORK

COLORADO RIVER BRIDGE ON THE HOOVER DAM BYPASS PROJECT

BUILDING TRUST



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PROJECT DESCRIPTION

The Hoover Dam and Lake Mead are located in Black Canyon on the Colorado River in the USA straddles the border between the states of Arizona and Nevada. Construction of the 220 m high dam began in 1931 and more than 4 million m³ of concrete were placed by the time it was completed in 1936. Today it is one of the world's best known man-made structures and draws around 10 million visitors every year.

Highway 93 is built into the top of the dam to cross the canyon, but the sharp bends and narrow widths of the highway, combined with the visitor numbers and necessary security, led to an astronomical increase in traffic, so that long delays and bottlenecks had become the norm.

A bypass river crossing was first recommended many years ago, but due to the sensitive environment, there was extensive consultation and fierce debate. This covered just about every aspect of the new crossing and the rest of the bypass – As the new bridge will also effectively frame the Hoover Dam for future generations.

The final decision was for a composite bridge structure with a reinforced concrete deck, over steel box girders, supported on concrete piers from twin concrete rib arches. The bridge carries with four lanes, is nearly 700 m long, and crosses the canyon above and to the south of the dam at a height of around 300 m above the river. Construction of the bridge began in 2005 and it was completed in October 2010, on budget at a total cost of \$ 114 m.



PROJECT REQUIREMENTS

For the cast-in-place reinforced concrete foundations and ribs of the arch, a High Performance Concrete mix design was specified that had to achieve a compressive strength of 69 MPas (10'000 psi), together with strict limits on shrinkage and long-term creep. This had to be developed and then adapted to provide consistent performance in the extreme temperature conditions, which can vary from below -20°C in winter, to higher than +40°C in summer.

The precast concrete pier segments had to have an excellent visual finish and also required very high early strengths of up to 30 MPas (4'500 psi), which had to be achieved within 12 - 16 hours, even during the cold winter months, so that the

formwork could be stripped and prepared for pouring the next segment.

The segmental pier assembly and post-tensioning process was undertaken in a similar way to segmental bridge construction and a proven adhesive / lubricant was required. This was for application between the adjacent segments, to assist in their final positioning and tensioning, then to ensure a uniform sealed and watertight joint in service.

Finally, after tensioning the cables also had to be sealed and protected in their ducts with a non-shrink, high flow grouting system to prevent any future corrosion and water ingress to the structure.





SIKA SOLUTIONS

All of the engineers High Performance Concrete (HPC) requirements were met using Sika® ViscoCrete® Technologies. Sika's concrete technicians worked closely with the engineers, the contractor and the concrete producer to ensure the specified consistence, performance and finish.

Sika® Rapid Technology was used for accelerated hardening to achieve the high early strengths of over 30 MPas within 16 hours where required, to enable the formwork to be stripped and accommodate early loading. For the segmental adhesive the engineers selected Sikadur®-31 SBA (Segmental Bridge Adhesive), as Sika is the global leader in this field and has previously completed numerous projects with Obayashi and others in China, Japan, the USA and worldwide.

Finally the necessary cable grouting around the post-tensioning tendons in their ducts, was successfully completed using the well known Sika-Grout® PT system, which was developed by Sika USA as members of the American PTI (Post Tensioning Institute).

SIKA PRODUCTS

- Sikadur®-31 SBA
- SikaGrout®-328
- SikaGrout®-300 PT
- Sikament® MP
- Plastiment®
- Sika® ViscoCrete®-2100
- Sika® ViscoCrete®-4100
- Sika® ViscoCrete®-6100

PROJECT PATRICIPANTS

Owner: USA Government, Federal Highways Department

Engineers: HDR Services Inc. & T. Y. Lin International

Contractor: Joint Venture of Obayashi Corporation and PSM Construction

Concrete Producer – Readymix: Casino Readymix Inc.

Our most current General Sales Conditions shall apply. Please consult the most current local Product Data Sheet prior to any use.



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