



Canal do Sertão - Hinterland Water Channel

Brazil



Completion Date
EST. 2026

Contractors
QUEIROZ GALVÃO (Stage I)
SA PAULISTA (Stage II)
GRUPO SERVENG (Stage II)
ODEBRECHT (Stage III)

Waterproofing Engineers
PETRA (Stage III)

Applicators
BETONPOXI
ENGENHARIA LTDA (Stage I)
PIRES, GIOVANETTI,
GUARDIA ENGENHARIA

Products
CONCENTRATE, MODIFIED,
ADMIX C-500 NF

In the Northeast Region of Brazil, there is a central area referred to as the Sertão Nordestino. This remote area is known to be very dry, receiving only 12% of Brazil's annual rainfall and having a long history of water shortages. The region is home to over 2.2 million inhabitants with a per capita income 88% lower than the Brazilian average.

The Federal Government's goal was to construct a 1,000 km water channel to bring water from Brazil's 5th largest river, the São Francisco, to the Sertão Nordeste region. Before the Canal do Sertão water project was started, water was brought in by truck; approximately 2,400 truckloads of water per day (31 million litres).

The project team for the Canal do Sertão scheduled construction in three stages, beginning in 2010. The objective was to capture 26 m³/s of water from the São Francisco River to supply the rivers and reservoirs for the 390 cities of the Sertão Nordeste. Several construction companies, design teams and ap-

plicators were involved in the different stages to construct an ambitious 1,000 km water channel. This consisted primarily of trapezoidal concrete sections that utilized a HDPE membrane under the concrete elements as the sole waterproofing system. Additionally, 20 km of elevated aqueducts, pump stations, flood gates and small hydroelectric plants were to be built where no waterproofing system had been specified at the design stage.

Fast, Permanent Repairs

In Stage I, the contractor Quieros Galvão experienced problems with the elevated aqueducts resulting in thermal/dry shrinkage cracks every 2 meters – more than 2,000 linear meters of leaking cracks. Quieros Galvão engineers recalled a presentation given by Xypex distributor, MC Bauchemie, several months earlier and contacted them for assistance in how best to address the leaks. Due to the extent of the shrinkage cracking, resin injection was discounted as a repair solution. Other technologies were considered but, as they required significant and time-consuming



Preparing and wetting concrete prior to application of Xypex Concentrate



Application of Xypex Concentrate using a hopper gun



Interior of aqueduct after application of Xypex Concentrate

surface preparation, would not fulfill the requirement to keep the project on schedule. Additionally, as the continuous supply of water was essential to the region, future shutdowns for maintenance would not be possible and so a highly durable solution was required.

Xypex Crystalline Technology, as it requires minimal surface preparation and permanently waterproofs concrete, was considered as a potential solution for the problem. Xypex Concentrate and Modified were applied to a 0.5 km test section of the 3.5 km aqueduct to confirm waterproofing effectiveness. The ap-



Curing of Xypex Concentrate in hot conditions

plication was a resounding success and the remaining 3.0 km of elevated aqueduct were also treated, stopping all leaks within 30 days. The use of Xypex saved significant time and costs in addressing the issues and enabled the contractor to proceed without having to resort to injecting the 2,000 linear metres of cracks. In Stage I, 38 tonnes of Xypex Concentrate and 38 tonnes of Xypex Modified were used to treat elevated aqueducts, pump stations, flood gates and hydroelectric plants.

Integral Waterproofing

The project progressed from Stage I to Stage II (constructed between 2013-2016) and new construction companies became involved (Serveng & SA Paulista). As a result of the lessons learned from Stage I and the success of Xypex crystalline waterproofing, the design team incorporated Xypex Admix C-500 NF into the concrete for 4.0 km of elevated aqueducts as well as pump stations, flood gates and hydroelectric plants. This stage of the project utilized on-site concrete batch plants. The utilization of Xypex Admix C-500 NF in the concrete mix facilitated project scheduling and provided the owner with waterproof, durable structures that were maintenance free. Stage II used 80 tonnes of Admix C-500 NF and, when put into service, no leaking was observed in any of the Xypex treated structures.

Stage III (constructed between 2017-2020) - the final stage of this ambitious project - presented the contractor (Odebrecht), the owner and design team with further challenges. As Stage III was located in the remotest regions, the ability to control concrete mix designs and batching processes was complicated so the design team of Petra opted to use a combined approach incorporating both Xypex Admix C-500 NF and the Xypex Concentrate/Modified

coating system on the elevated aqueducts, pump stations, flood gates and hydroelectric plants. Stage III presented other challenges as the concrete design had higher compressive strengths than the previous stages thus needing more rigorous surface preparation than before. Additionally, the extreme heat during application required strict compliance to the Xypex coatings curing procedure. Stage III used 17 tonnes of Xypex Admix C-500 NF, 45 tonnes of Xypex Concentrate and 15 tonnes of Xypex Modified.

Xypex Crystalline Technology was introduced to the project as a means to solve a specific problem in the early stages of construction. As a result of its performance it became an important component of the whole project to solve the waterproofing challenges. The combined efforts of the federal government, the design team and the contractors together with technical assistance from Xypex distributor MC Bauchemie, enabled the timely delivery of these stages of this highly important project for the Sertão Nordestino region of Brazil.



Exterior of aquaduct showing self-healing of cracks after application of Xypex – the crystalline effect



Floodgates after application of Xypex Concentrate



Repaired and sealed joints