



Solutions
Foreva

WATER CIVIL ENGINEERING STRUCTURES

REPAIR, PROTECTION
AND STRENGTHENING



I M P R O V E , P R E S E R V E , S E C U R E



FREYSSINET
SUSTAINABLE TECHNOLOGY

THE PROBLEMS

All water related infrastructure age and undergo changes over time that may make them unsuitable for use. Freyssinet offers its clients proven solutions for the repair, the protection and the strengthening of these structures.

■ FIELD OF APPLICATION

- Concrete reservoirs, partially or fully buried,
- Steel water reservoirs,
- Concrete culverts,
- Pipes,
- Sewer drains,
- Water and wastewater treatment plants.

■ IDENTIFIED PROBLEMS

- Corrosion of reinforcing steel leading to:
 - Concrete delamination,
 - Concrete cracking,
 - Concrete spalling and flaking.
- Rusting of steel structures,
- Water leaks and infiltrations,
- Sealant deterioration.

■ NATURAL CAUSES

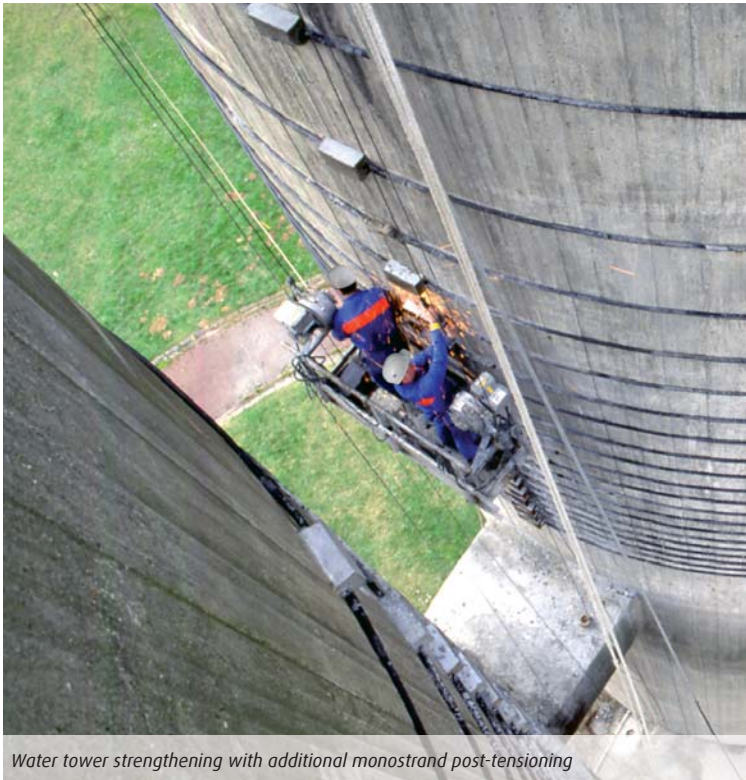
- Ageing of materials (steel, concrete),
- Concrete carbonation due to alkaline reaction,
- Chloride penetration in concrete cover,
- External chemical infiltration (polluted air, chlorine, H₂S).

■ STRUCTURAL CAUSES

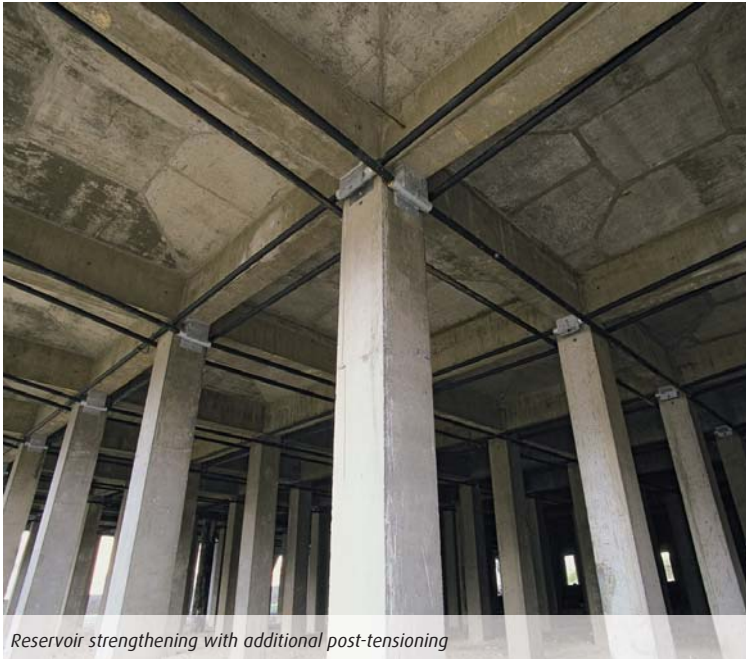
- Use of unsuitable materials,
- Design error, poor design or construction,
- Material fatigue (filling-draining cycles).

■ OTHER CAUSES

- Excessive loading;
- Ground movements.



Water tower strengthening with additional monostrand post-tensioning



Reservoir strengthening with additional post-tensioning



Culvert repairs



Aqueduct repair

Freyssinet, with more than sixty years of experience, as a main contractor in specialised works, has developed the Foreva® solution, a turnkey service guarantee for the long-term enhancement of your structures.

OUR SOLUTIONS

The Foreva® solutions enable Freyssinet to carry out repair and retrofit works in line with industry standards and good engineering practice while respecting the environment.

■ ASSISTANCE WITH THE STRUCTURAL INVESTIGATION

■ ASSISTANCE WITH THE DESIGN

■ PROTECTION WORKS

Concrete repair and protection

- Treatment of cracks
 - Resin and grout injection
 - Injection of cracks with water infiltration
- Concrete re-profiling
 - Patch repair
 - Shotcrete

Protection of reinforcing steel

- Cathodic protection with galvanic anode:
 - Discrete anodes (**Foreva® GP Guard+**)
 - Zinc coating (**Foreva® GP Zinc**)
- Cathodic protection with impressed current:
 - Discrete anodes
 - Anodic ribbons (**Foreva® CP Ribbon**)
 - Anodic meshes (**Foreva® CP Mesh**)
 - Conductive anodic coating
- Electro-chemical treatment of concrete
 - Realkalisation (**Foreva® PH+**)
 - Chloride extraction (**Foreva® CL-**)
- Surface treatment
 - Use of corrosion inhibitors
 - Protective coatings

■ STRENGTHENING WORKS

- Additional post-tensioning (Freyssinet products)
- Shotcrete
- Carbon fibre bonded composite
 - Fabric (**Foreva® TFC**)
 - Laminate (**Foreva® LFC**)
 - Rod (**Foreva® RFC**)
- Metal and timber reinforcements
- Load transfer using flat jacks (Freyssinet process)

■ REMEDIATION WORKS

- Reservoir steel roof replacement,
- Aqueduct renewal,
- Large diameter pipe replacement,
- Lining of sewer mains and manholes.

Freyssinet is AQUAPLUS certified.



Aqueduct repair



Repair of walk through drinking water pipe with HDPE liner



Strengthening metal tank for earthquakes with Foreva® TFC



Culvert wall strengthening with shotcrete

Our specialist teams are on hand to help you identify the Foreva® solution that meets your requirements.



1



2



3



4



5

1/Earthquake strengthening of reservoir 2/Earthquake strengthening of reservoir 3/Culvert shotcreting 4/Reservoir roof replacement 5/Sewer manhole coating

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