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maccaferri.com

Engineering a Better Solution

Maccaferri's motto is **'Engineering a Better Solution'**; We do not merely supply products, but work in partnership with our clients, offering technical expertise to deliver versatile, cost effective and environmentally sound solutions. We aim to build mutually beneficial relationships with clients through the quality of our service and solutions.

GLOBAL ENGINEERS

In the second half of the 19th century, we invented Gabions and dramatically changed the civil engineering landscape. We are still changing today. We work every day to find better solutions for our clients at every degree of latitude and longitude. Our worldwide network grows through innovation and diversification of sectors of activity and through an increasing range of high quality and environmentally friendly products and applications.

OFFICINE MACCAFERRI GROUP PROFILE

Founded in 1879, our Group soon became a worldwide reference in the design and development of advanced solutions, with offices in over 70 subsidiaries and 20 factories worldwide.

Our mission is to pursue excellence through continuous improvement, while delivering to customers engineered solutions that are innovative, advanced and environmentally friendly. We are committed to outstanding safety, quality and sustainability, to create value for all stakeholders as well as our communities.

- | | | | |
|--------------------------------------|---|--------------------------|--|
| RETAINING WALLS & SOIL REINFORCEMENT | SOIL STABILISATION & PAVEMENTS | DRAINAGE OF STRUCTURES | FENCING & WIRE |
| HYDRAULIC WORKS | BASAL REINFORCEMENT | TUNNELLING* | AQUACULTURE NETS/CAGES |
| ROCKFALL PROTECTION & SNOW BARRIERS | COASTAL PROTECTION, MARINE STRUCTURES & PIPELINE PROTECTION | LANDSCAPE & ARCHITECTURE | CONCRETE FLOORING, PRECAST & OTHER USES* |
| EROSION CONTROL | ENVIRONMENT, DEWATERING & LANDFILLS | SAFETY & NOISE BARRIERS | INDUSTRIAL MANUFACTURING |

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THE GABION
Our legacy in every twist



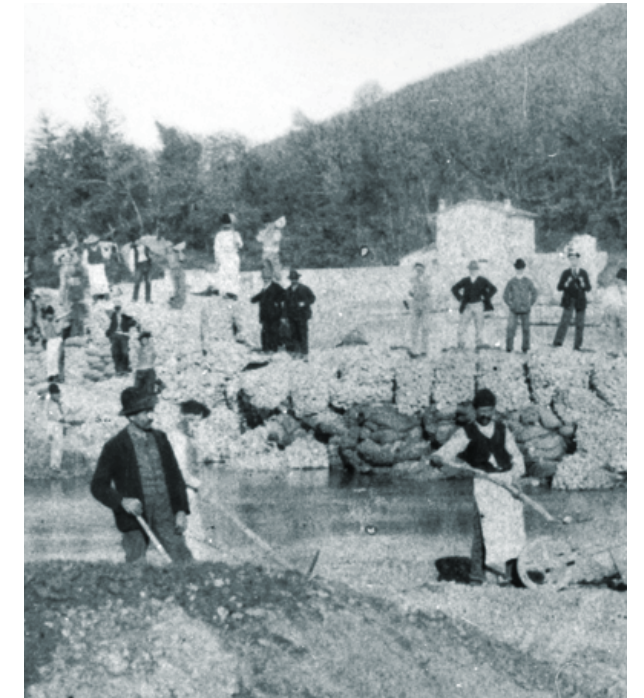
GABION130

In 1894, Maccaferri **revolutionized civil engineering** by introducing Gabions **to restore the Chiusa di Casalecchio di Reno** near Bologna, Italy, after a devastating flood.

These wire mesh cages filled with stones provided an **innovative solution to a critical infrastructure problem**. The project's success showcased the effectiveness and versatility of gabions, marking the start of a new era in construction. Maccaferri's gabions not only transformed Casalecchio di Reno, **fostering community development and prosperity**, but also gained global recognition, establishing their role in modern infrastructure projects worldwide.



Since 1894, we have covered the world with Gabions, delivering **projects across the globe**. Our efforts have not only strengthened infrastructures but have also built a stronger and more resilient global community, marking **our lasting legacy in civil engineering** and social development.



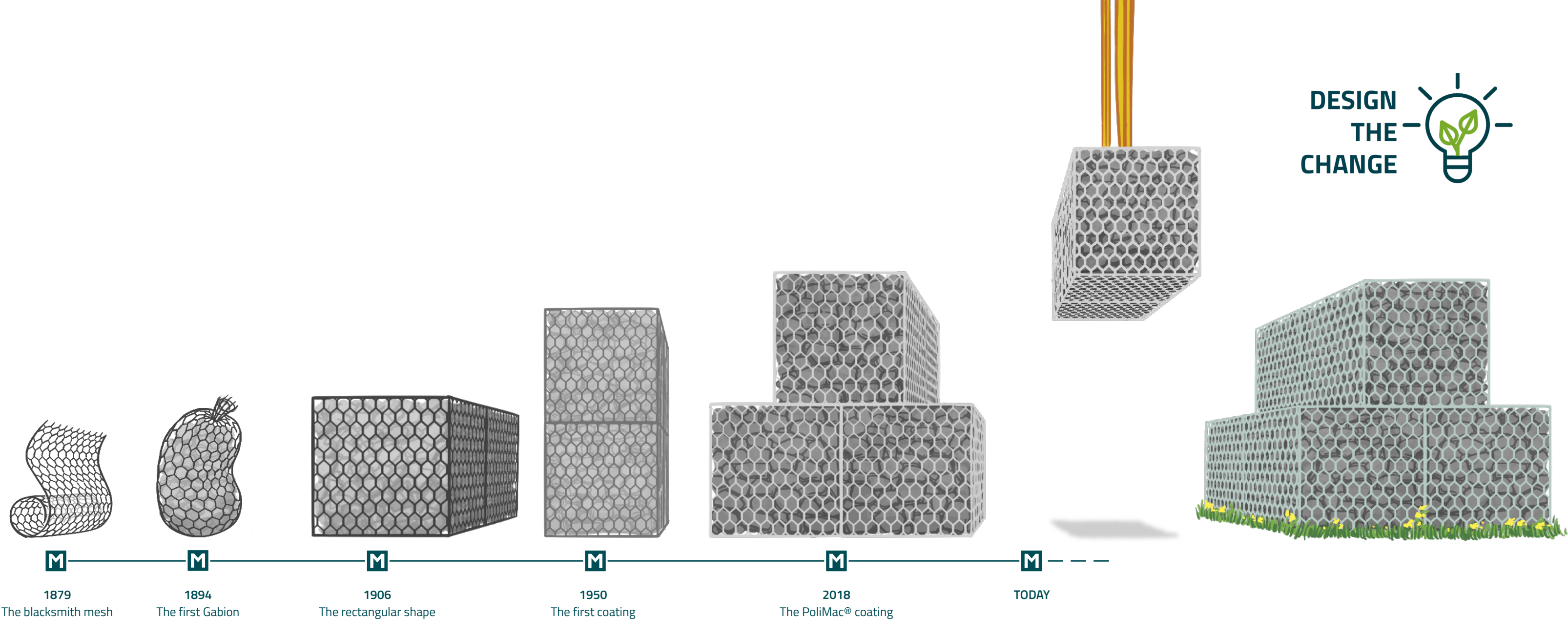
From the Chiusa di Casalecchio di Reno, Maccaferri **Gabions spread to five continents**, enhancing major road and river infrastructures worldwide.



THE GABION EVOLUTION

How did we arrive at the modern gabion? Much like the human race has adapted over time to changing environments, **the gabion has evolved significantly.**

Initially used to **restore the Chiusa di Casalecchio di Reno** with simple woven baskets filled with stones, gabions have advanced with new materials like galvanized steel wire and polymer coatings. These innovations have expanded their use in riverbank stabilization, erosion control, and retaining walls. Today, modern gabions are sophisticated, **environmentally friendly solutions** designed to meet the diverse demands of contemporary engineering and construction projects.

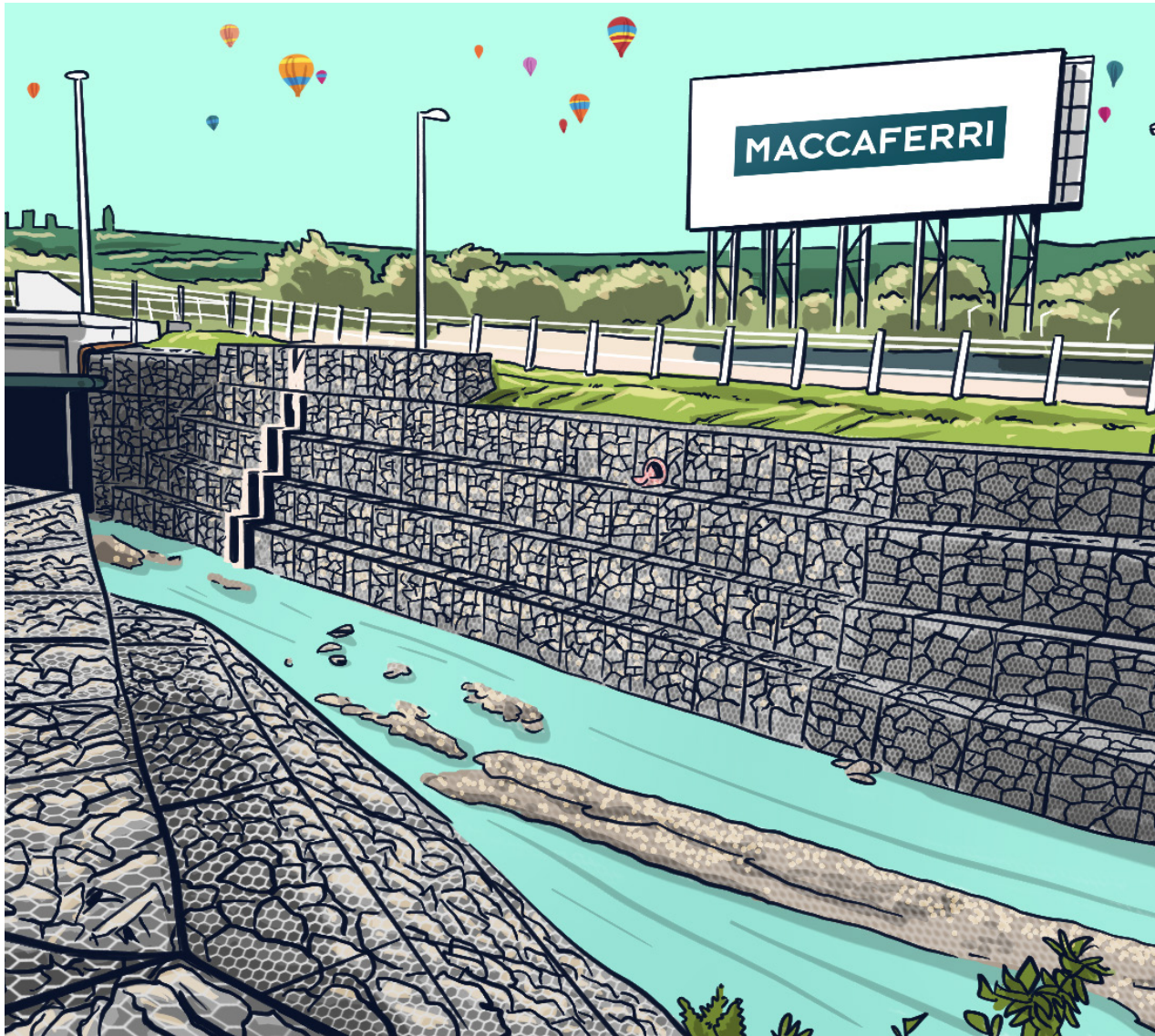


THE GABION TODAY

Gabions are not just metal wire cages filled with stones; they represent **the future of sustainable construction**. Known for their **flexibility**, **permeability**, and **eco-friendliness**, gabions are perfect for modern building practices.

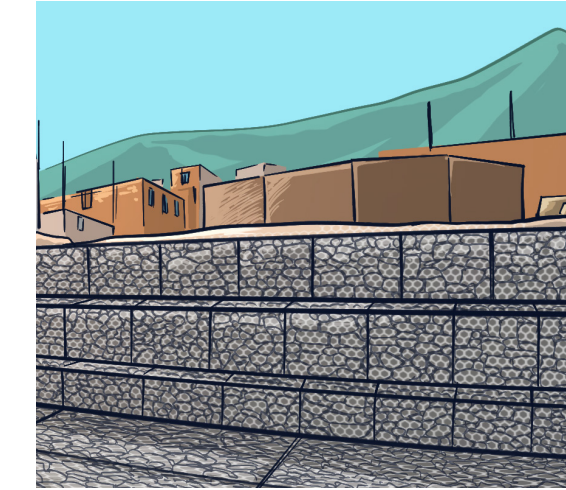
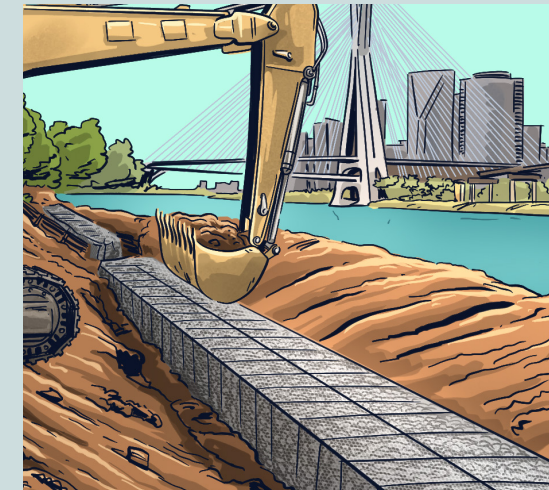
Maccaferri Gabions are delivered flat-packed, making them **easy to assemble** and fill on-site. They are **versatile**, ideal for retaining walls, channel linings, hydraulic control structures, erosion protection, and even architectural applications.

Crafted from heavily galvanized steel wire and available with an additional polymer coating for harsh environments, Maccaferri Gabions ensure **high quality and durability**. A variety of gabions is available, including prefilled options and those designed for soil bioengineering techniques, to meet your project's unique needs. **Durability**, **sustainability**, and **innovative design** make Maccaferri Gabions perfect for any project, big or small.



HEAVY GABIONS

To optimize construction times, **Heavy Gabions with stronger and thicker wires** are essential, enabling pre-assembled, ready-to-use solutions. Enhanced Wires with polymer coatings significantly reduce installation times and ensure **greater efficiency** and **speed in construction processes**. The portfolio offers polymer coated mesh sizes of 6x8 with diameters of 2.7/3.7 mm and 8x10 with diameters 3.0/4.0 mm.

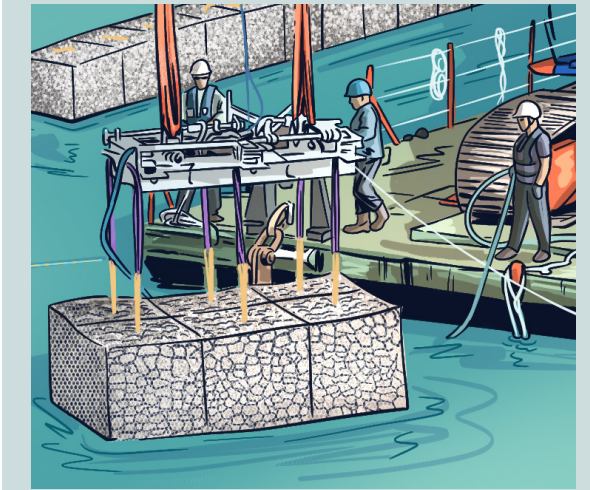


STRONG FACE

Strong Face Gabions are baskets manufactured from double-twisted hexagonal woven steel wire mesh, made of **PoliMac®** coated steel wire. The face panel (or the side panels) is constructed with a **larger wire diameter**, providing **extra strength**. Maccaferri Strong Face Gabions are an **excellent solution for gabion walls** or revetments requiring a stronger face. These units are ideal for structures that need to **withstand higher loads** or where **increased abrasion resistance** is necessary on the face or one particular side of the gabion.

CUBIMAC®

CubiMac® are **preassembled, strong, and ready to use**, made from durable steel wire mesh with a special PoliMac® coating and a 3.4 mm diameter. They're **perfect for** construction sites where filling on-site is difficult, such as **underwater projects**. CubiMac® can be easily filled using a special setup that shakes the stones to ensure they are tightly packed. They come with strong polyester slings, making them easy to lift with cranes and other standard equipment. CubiMac offers a **hassle-free, reliable solution** for your construction needs.



THE GABION PERFORMANCE

Maccaferri has conducted **extensive test campaigns** over the years to determine the most representative resistance values to use for its gabions.

TENSILE STRENGTH TEST AND PUNCH TEST

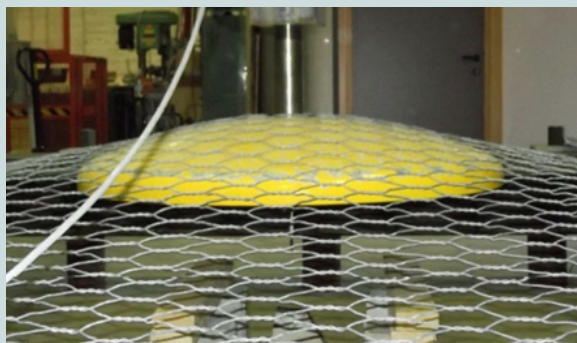
Gabions' tensile strength and puncture resistance are **rigorously tested for performance and mechanical characterization**; making them reliable for projects like retaining walls and erosion control.

FLEXIBILITY TEST

In addition to tensile strength and puncture resistance, **flexibility** is another **crucial characteristic** of gabions. The flexibility test is essential for understanding how gabions **behave under large loads**, ensuring they perform reliably in various construction projects.

DEFORMABILITY TEST

To introduce serviceability limits to gabion design, it's essential to define allowable compression stress and deformation through **real scale compression tests**. The goal is to increase durability and **maintain gabion resistance characteristics long-term**.



GSC

Gabion Serviceability Coefficient

An **experimental coefficient** that evaluates the **gabion performance over time**, considering **mechanical and environmental stresses**.

GSC introduces **long term performance** at **120 years** of service life through the following Reduction Factors (RF):

$$GSC_{120yrs} = \frac{GMC_{t=0}}{RF_{env}RF_{id}RF_{uv}RF_d}$$

- ☑ Chemical & Environmental effects [Corrosion] (RF_{env})
- ☑ Installation Damage (RF_{id})
- ☑ Weathering + UV degradation (RF_{uv})
- ☑ Extrapolation of data (RF_d)

POLIMAC® PERFORMANCE

MECHANICAL PERFORMANCE

ABRASION TEST

ASTM A975-21; EAD 20019-01-0102

HARDNESS TEST

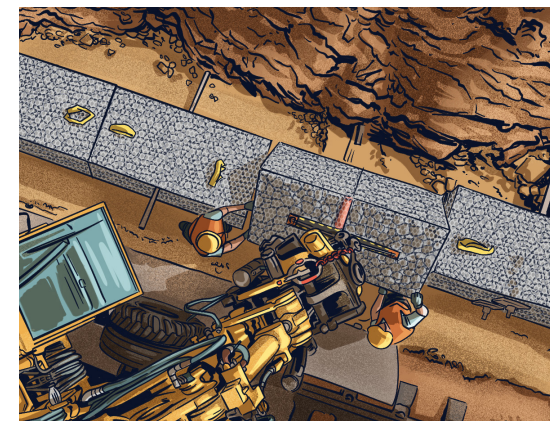
ASTM D 2240

x12

Better resistance to abrasion, including installation damage

+23%

Harder than traditional polymeric coatings



ENVIRONMENTAL FRIENDLINESS

PoliMac® is not only **suitable for use in the most aggressive environments**, it is also **free of heavy metals** and **does not release pollutants**, thus becoming one with the environment and its fauna.

LECHEATE TEST

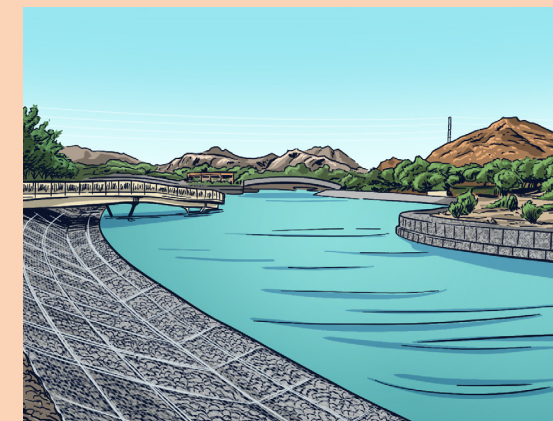
EPA 1312

ELUATE TEST

M Geok E:2016

0

Contaminants



120

YEARS OF
DESIGN LIFE

WEATHERING RESISTANCE

LOW TEMPERATURE BRITTLINESS

ASTM D 746

UV EXPOSURE

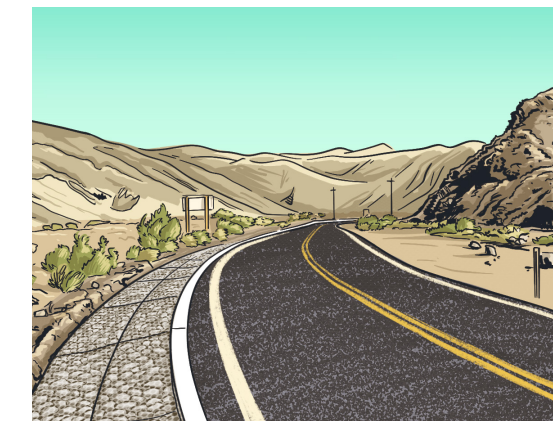
ISO 4892-3; ISO 527-1

-35 °C

Maintains its properties up to very cold conditions

x4

Better elongation than traditional polymeric coating



THE GABION SOFTWARE

Today, the **design criteria** behind the development of **civil engineering structures** are not only based on economic considerations but also on the environmental and social impacts of the structure.

Maccaferri has developed a **full suite of software solutions** to design sustainable and long-lasting structures in harmony with nature.

The suite also includes specific software applications for designing retaining walls that blend with natural surroundings.



GAWAC 3.0

GAWAC 3.0 is the **software developed for the design and optimisation of Gabion Walls**. GAWAC 3.0 takes into account the **wall performance over the time**.

The wall behaviour is evaluated through an experimental coefficient called GSC (Gabion Serviceability Coefficient).

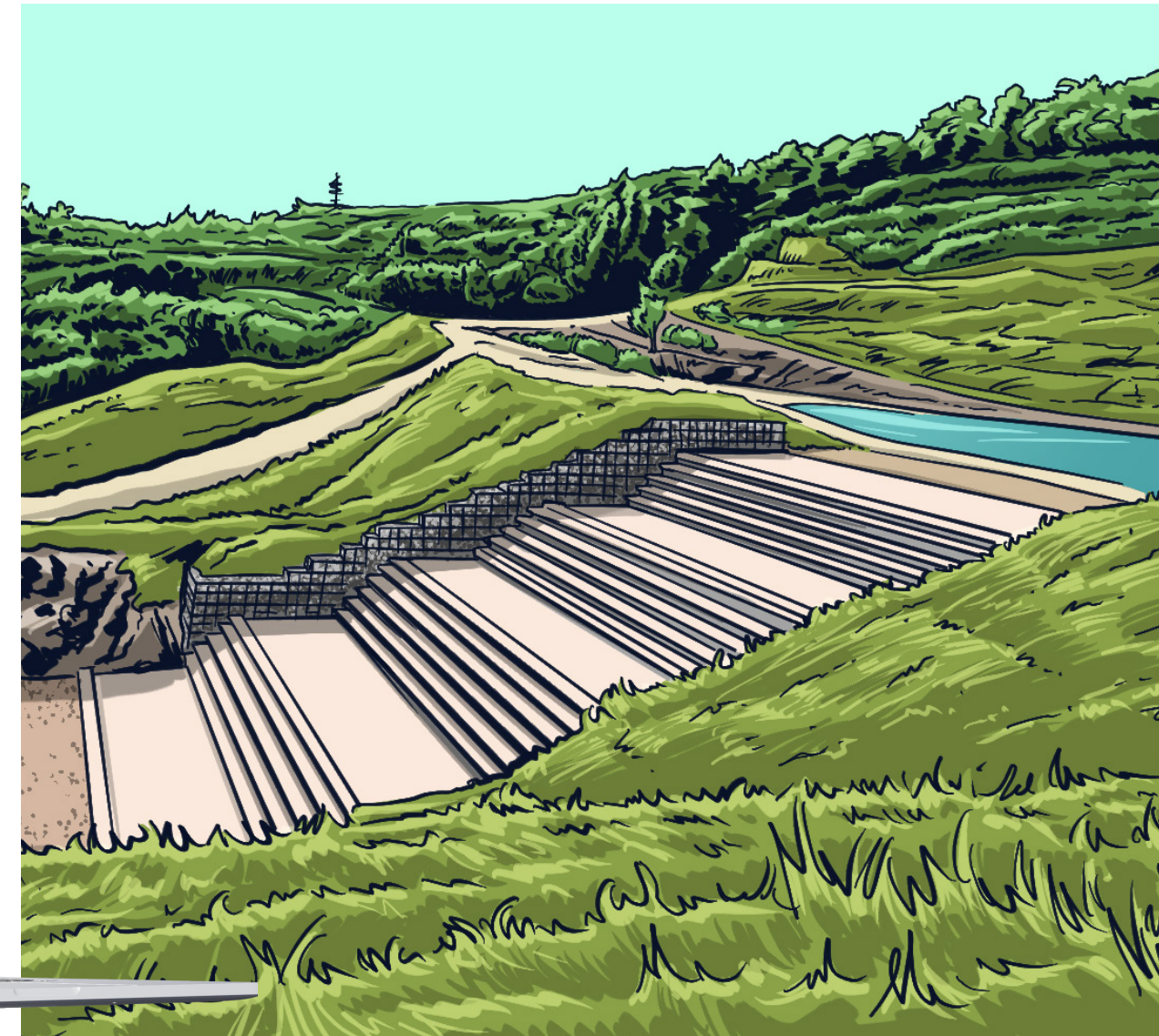
The GSC takes into account the long term performance of the wall at 120 years of service life considering the environmental exposure conditions.



MACSTARS

MacSTARS is a powerful tool that enables the **design of high-end and challenging structures** in the most diverse conditions. Within MacSTARS, engineers can select the **most up-to-date and certified products**, such as BBA and CE marked items, ensuring the **highest standards of quality and safety**.

This platform allows for **precise selection and integration** of certified products into **retaining walls or reinforced soil slopes/walls**, optimizing the overall structural integrity and performance.



PIONEERING SUSTAINABILITY

Maccaferri is dedicated to addressing environmental, economic, and social aspects holistically

Maccaferri believes in **sustainable approaches** throughout a project's life cycle. **From design to construction** and decommissioning, our engineering solutions aim to create long-term benefits beyond the product itself.

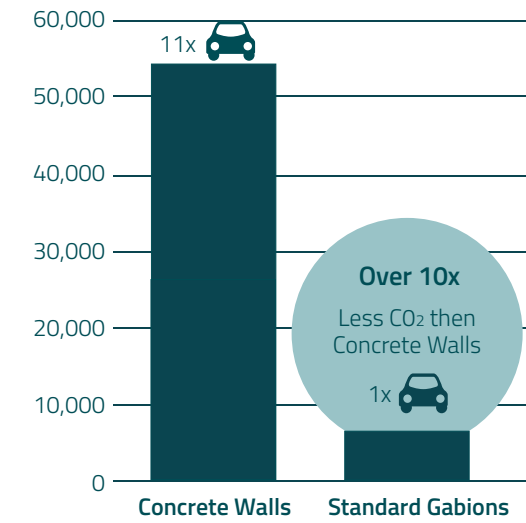
Maccaferri solutions with gabions **mitigate natural and human-made hazards**, respect the environment, enhance safety, and improve lives. Inspired by the UN's call to achieve the SDGs, we have committed to meeting these goals step by step.



EPD CERTIFICATE

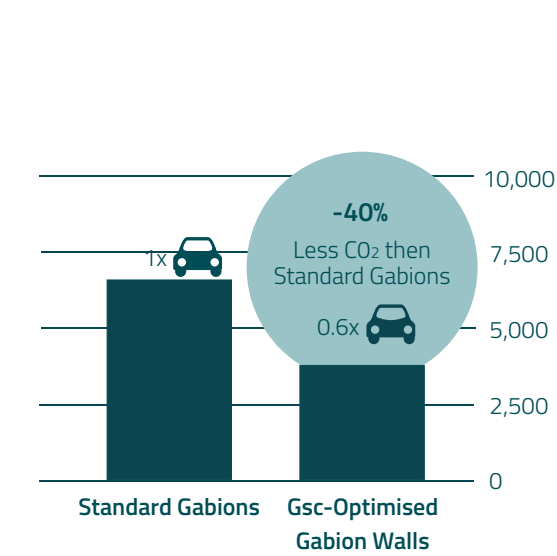
By integrating PoliMac® with the GSC concept, we're **setting new standards in sustainability**—**reducing material use, slashing CO₂ emissions by 40%**, and **fostering an environment where nature thrives alongside human ingenuity.**

Concrete Walls VS Standard Gabions



Annual CO₂ emissions of a passenger vehicle
 Total Carbon Footprint (kgCO₂eq)

Standard Gabions vs Optimized Gabion Walls



*Comparison based on a 8 m high wall, assuming the availability of a stone quarry within 100 km from the jobsite.

BIO POLIMAC®



PoliMac® is also available as **full green wire coating**. **BIO PoliMac®** is the **bio version** of our polymer coating. **BIO PoliMac®** is made of **bio-nafta derived from sustainable raw materials** originated from **biobased feedstock**.

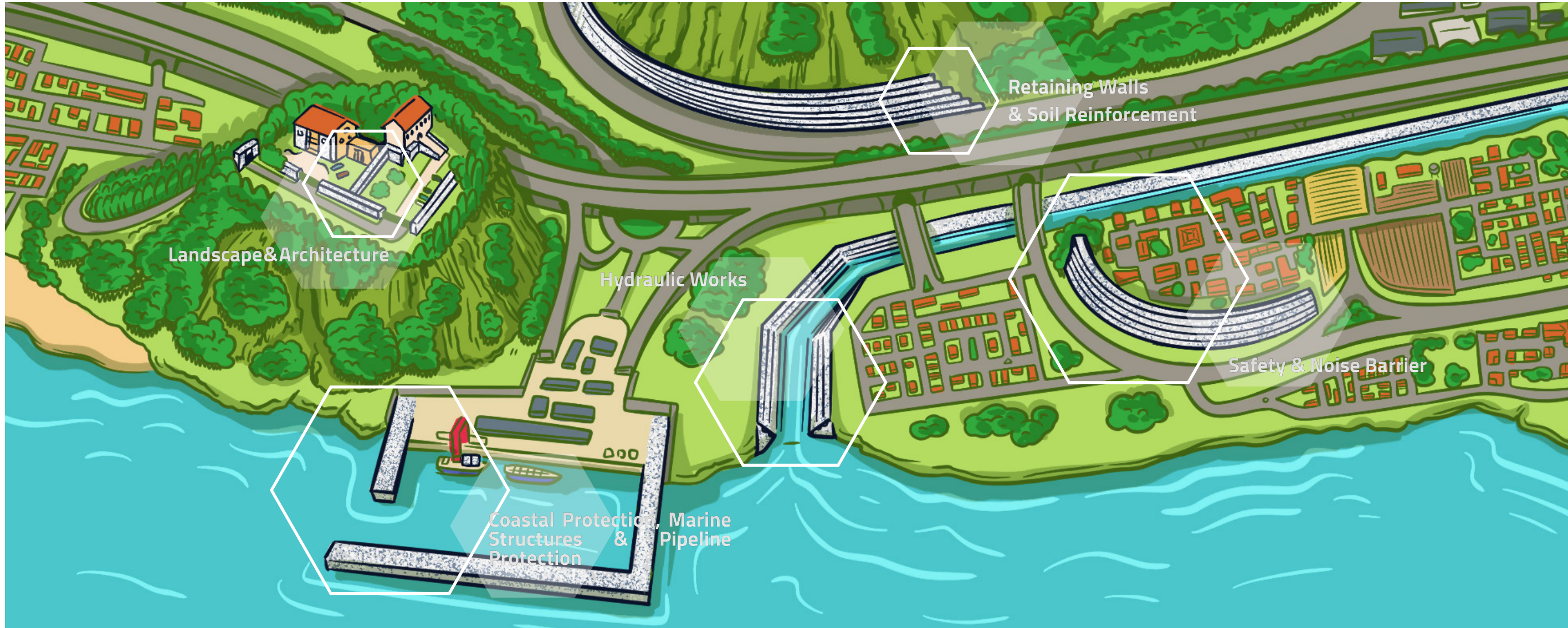


APPLICATIONS

The Gabion is more than just a mesh of wires; it is a **complex solution defined by its simplicity**. With over a **century of expertise**, we have embraced every longitude and latitude, establishing a global presence on all five continents. Yet, we preserve a deep local knowledge, intimately connected to the terrain and the precise needs of each specific market.

Gabions, made of **wire mesh filled with rocks**, are **versatile in engineering**. They control erosion, stabilize riverbanks, and protect against floods in hydraulic structures. In architecture, gabions create **attractive retaining walls and facades**. They reduce noise pollution for highways and industrial areas.

For coastal defenses, gabions **stabilize shorelines and protect against erosion**. In geotechnical applications, they **stabilize slopes and prevent landslides**. Their **flexibility and structural integrity** make gabions essential for diverse engineering needs in hydraulic, architectural, acoustic, coastal, and geotechnical projects.



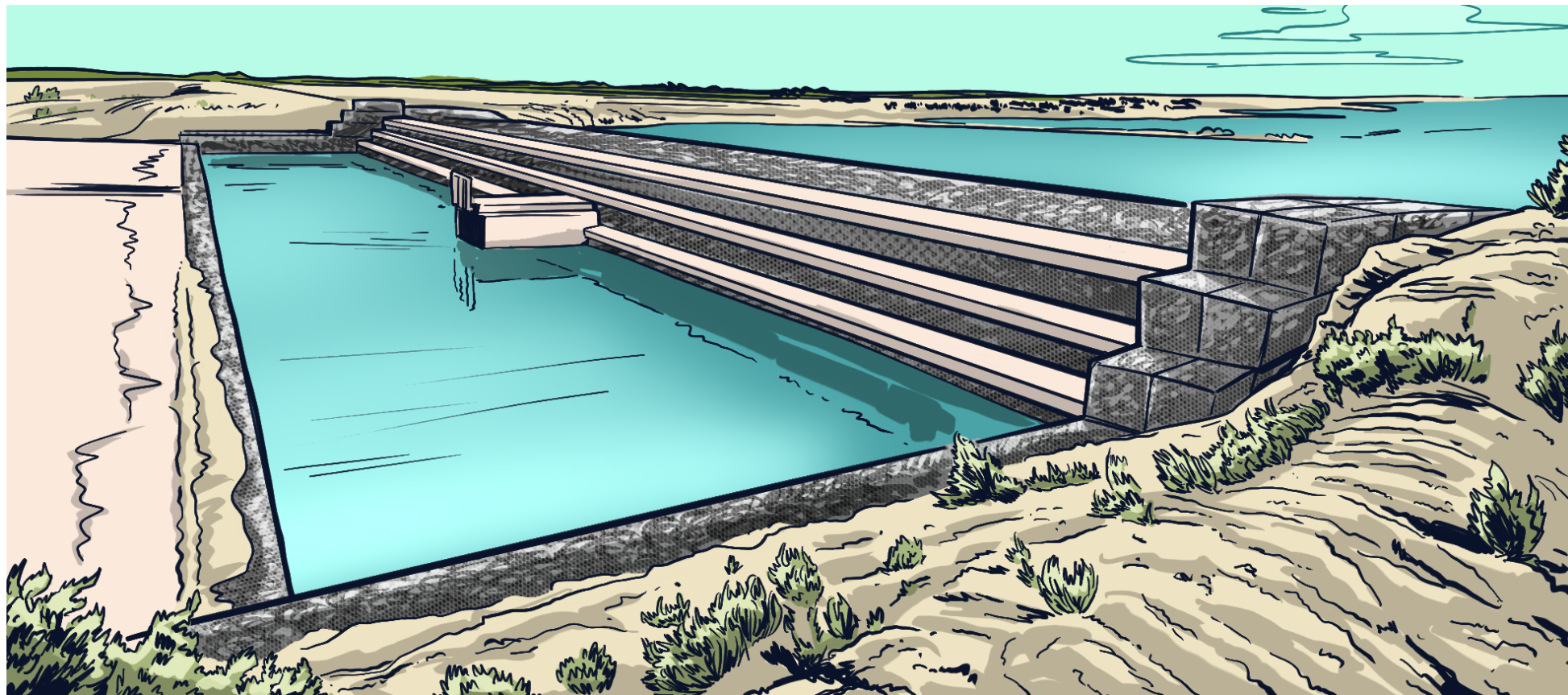
DISCOVER MORE



HYDRAULIC WORKS

Gabions are extensively used in hydraulic engineering, where they **contribute significantly to the construction and maintenance of water-related structures** like dams, channels, and weirs. Their robustness **provides critical stability and erosion control**, essential for

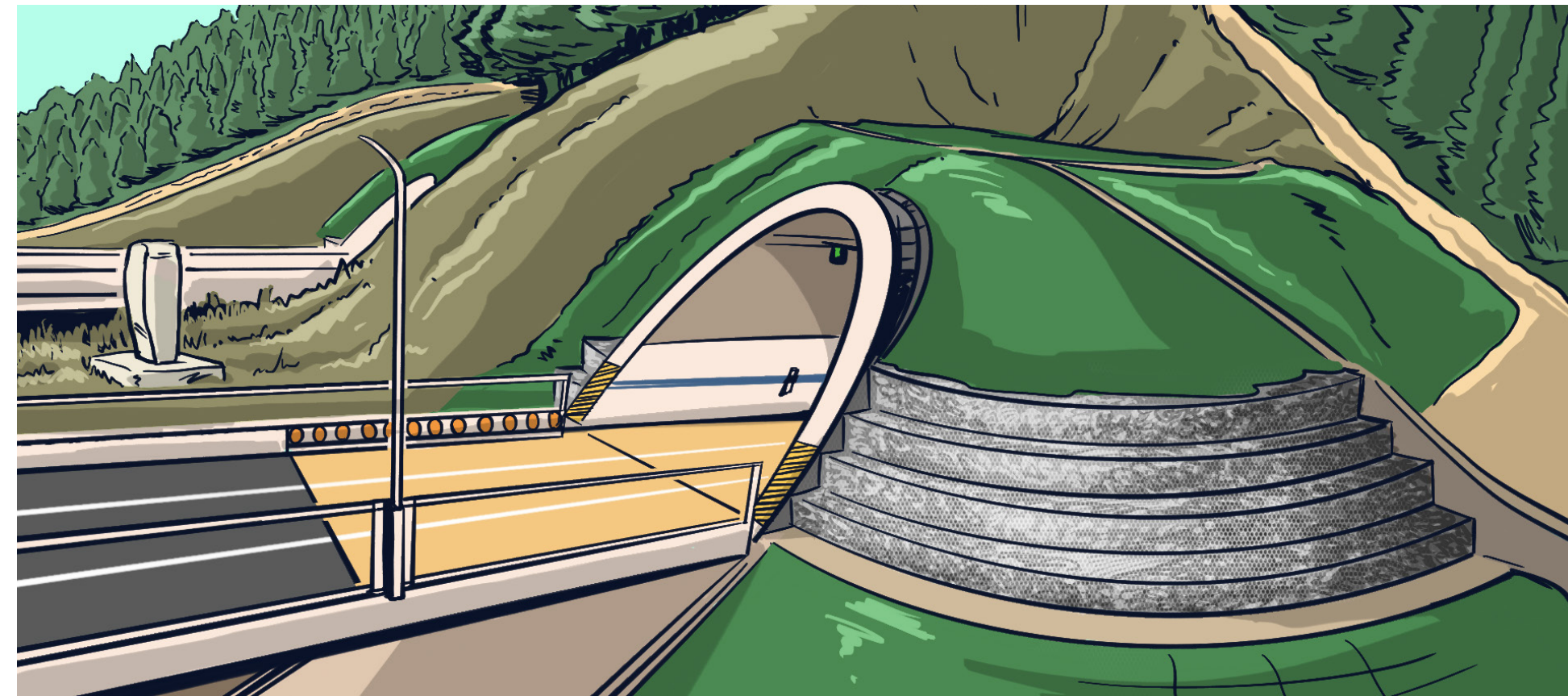
preserving the integrity of water management systems. Gabions are particularly effective in areas prone to heavy rains and flooding, where they **help to manage water flow and prevent soil erosion over time**.



RETAINING WALLS & SOIL REINFORCEMENT

In geotechnical engineering, **the strength and flexibility of gabions make them ideal for retaining walls**. These structures are particularly effective in **maintaining soil stability in sloped areas** and managing hydrological

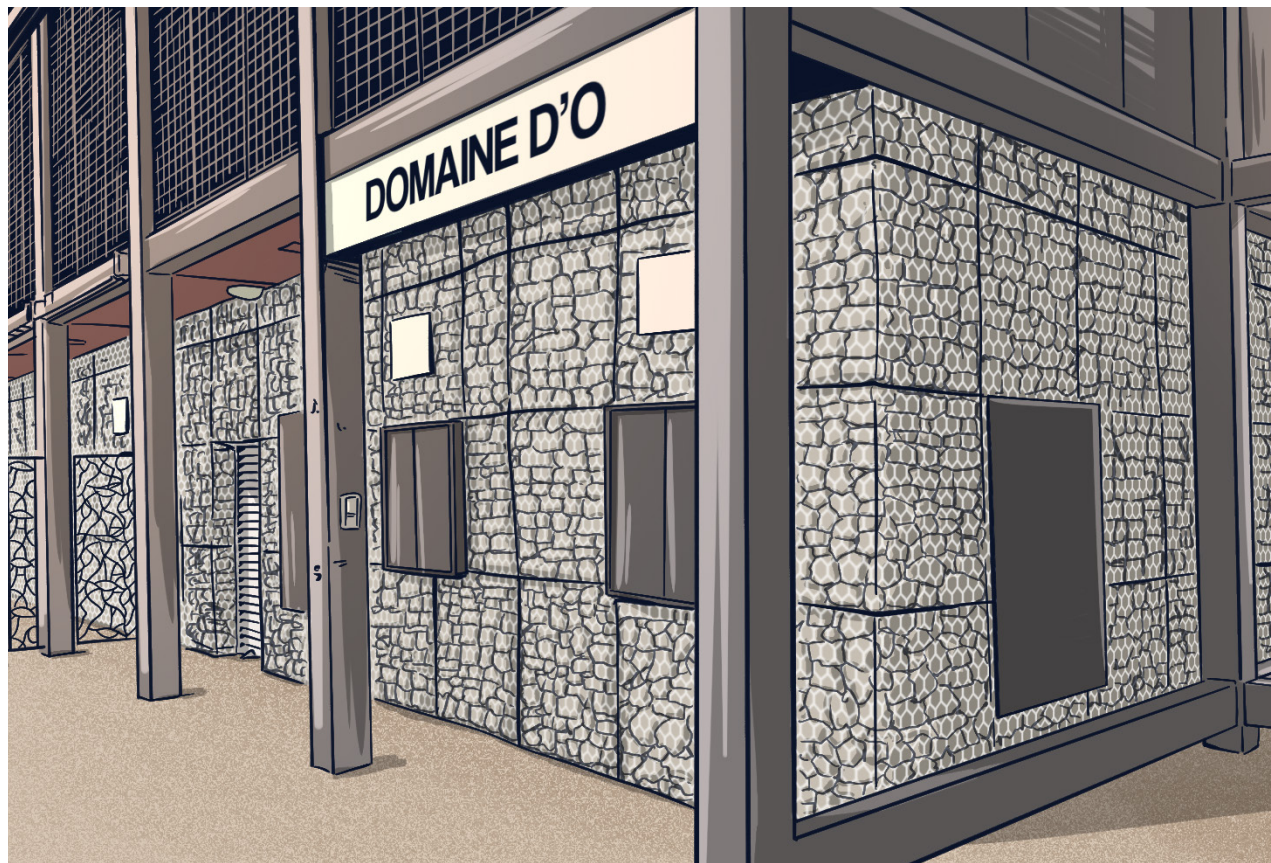
pressures. Gabions **adapt well to ground movement** and help in **managing water drainage**, ensuring the long-term integrity and safety of hillside and embankment constructions.



LANDSCAPE & ARCHITECTURE

Gabions offer **unique aesthetic and functional properties** that make them popular in modern architecture. Used in **building facades, cladding, and as decorative features**, gabions provide a distinctive look while offering practical benefits such as **durability**

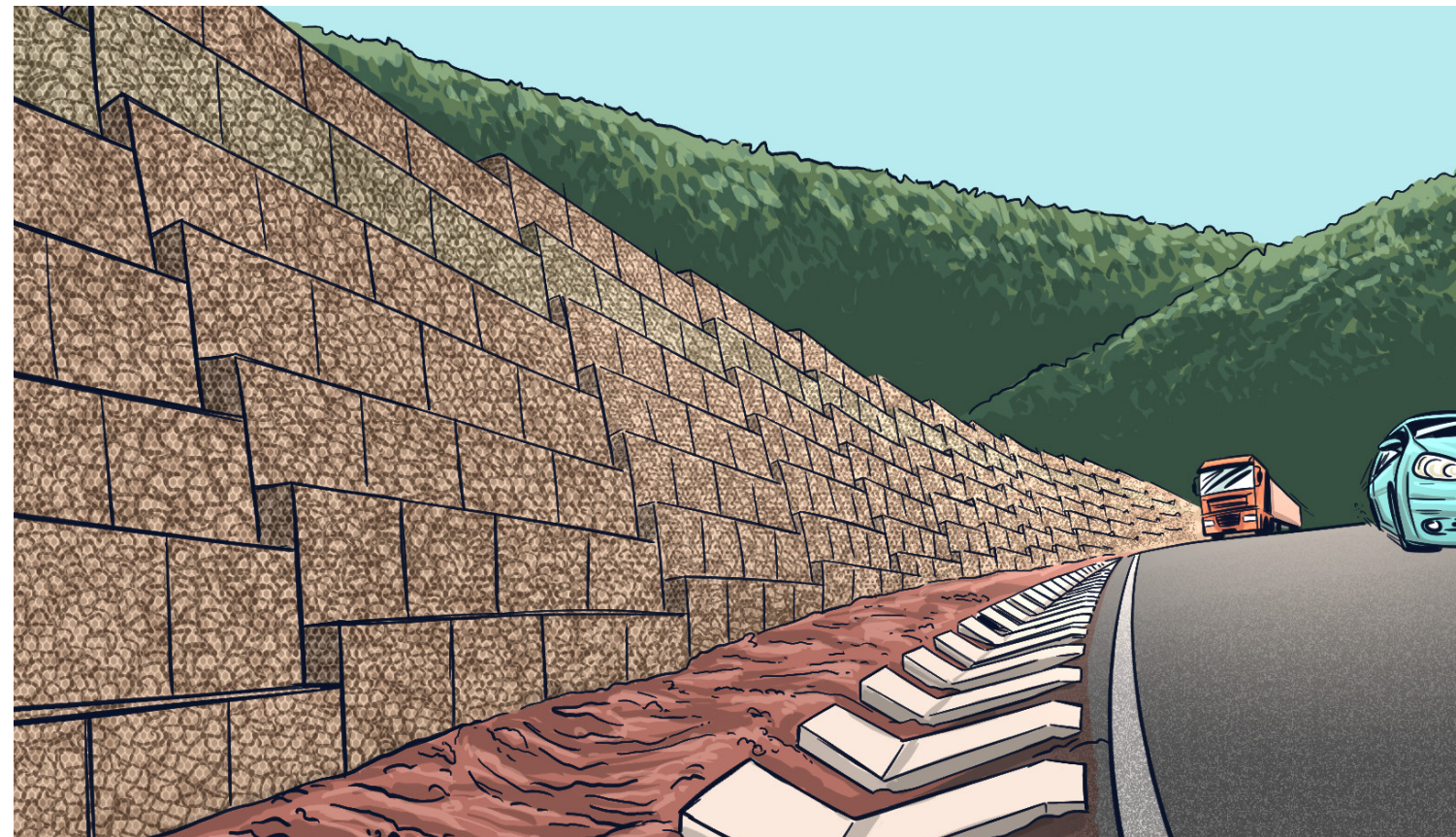
and **ease of installation**. Architects often choose gabions for their ability to **integrate naturally with the environment** and for the creative freedom they offer in design, allowing for **dynamic, eco-friendly building practices**.



SAFETY AND NOISE BARRIERS

In urban and roadside environments, gabions serve dual purposes as **effective sound barriers and safety shields**. They **mitigate noise pollution**, contributing to more tranquil urban settings, and **enhance safety** by acting as protective barriers. These structures are

particularly valuable in densely populated areas or near busy roads, where they absorb and **reduce the propagation of sound waves** and **provide robust physical barriers to improve road safety**.



COASTAL PROTECTION, MARINE STRUCTURES & PIPELINE PROTECTION

Gabions are essential in **coastal management for protecting shorelines** against erosion and for stabilizing beachfronts. They are **designed to withstand marine environments**, reducing erosion phenomena. Additionally, gabions support marine infrastructure by

providing foundations and reinforcements that are both **permeable and robust**, accommodating the dynamic nature of marine ecosystems.

