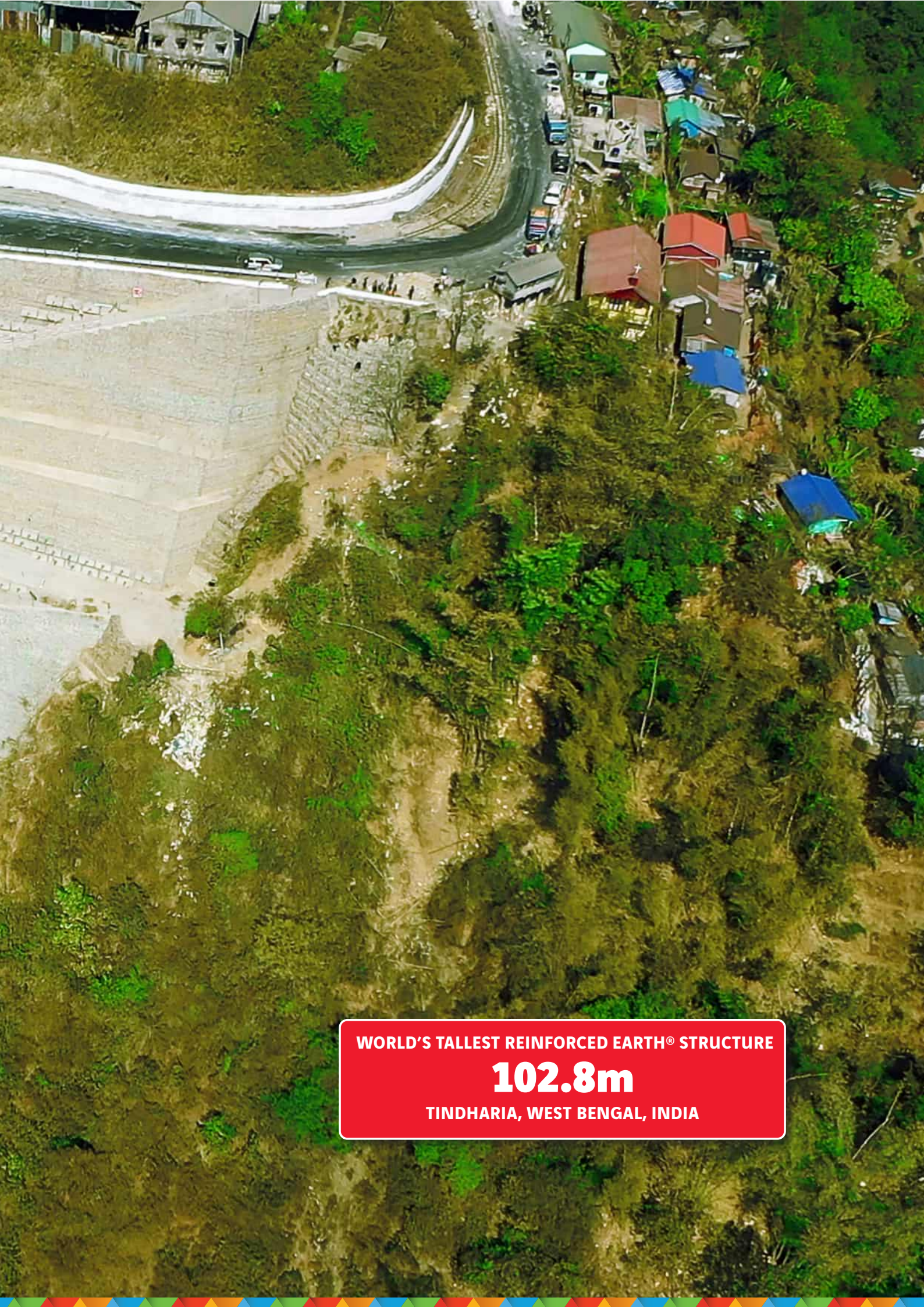
REINFORCED EARTH
PHILIPPINES

CORPORATE PROFILE

FREYSSINET
Freyssinet International Manila, Inc.


TERRE ARMEE



WORLD'S TALLEST REINFORCED EARTH® STRUCTURE

102.8m

TINDHARIA, WEST BENGAL, INDIA

Integrating Innovative Engineering Solutions

Our technical solutions are defined by four functions corresponding to the application: Retain, Cross, Protect, Strengthen. **Retain:** As the inventors of Reinforced Earth® and leaders in the soil reinforcement sector, we offer solutions for all types of retaining projects. **Cross:** Our customized crossing solutions are used to build bridge abutments, bridges, and tunnels under backfill. **Protect:** Our solutions help protect people, infrastructure, and the environment from natural and industrial hazards. **Strengthen:** Our engineered solutions help improve foundation of soil using high strength, low modulus proprietary geosynthetics for basal reinforcement applications, bi-axial geogrids, and woven geotextiles for ground stabilization applications along-side improvement of drainage systems with low creep, low intrusion, and low deformation drainage geocomposites.

REINFORCED EARTH

About the Group

SOLETANCHE FREYSSINET

Soletanche Freyssinet is the world leader in soil, structural and nuclear engineering.

The Group brings together an unparalleled array of construction and engineering expertise and brands – Soletanche Bachy, Menard, Reinforced Earth, Freyssinet, Nuvia and Sixense – that provide technical excellence to boost the performance and durability of structures. Operating in about 100 countries with a workforce of 23,070+ employees (2022), the Group earned a revenue of €4.341 billion in 2022.

23,070+ employees (2022)

100 countries

6 companies

4.341 billion € turnover in 2022

REINFORCED EARTH

Invented by Henry Vidal in the 1960s, the Reinforced Earth® technique revolutionized soil reinforcement and backfill construction. Over the past 60 years, Reinforced Earth has developed unparalleled expertise, completing over 60,000 projects across five continents. Our solutions set the industry benchmark for reinforced soil structures, and we continuously innovate to meet the evolving needs of the construction industry. With a commitment to operational excellence, we strive to deliver high-performance, sustainable, and reliable engineering solutions worldwide.

FREYSSINET

Founded over 70 years ago by Eugène Freyssinet, the inventor of prestressing, Freyssinet brings together an inimitable range of skills in the specialist civil engineering sector, offering integrated technical solutions in the fields of new structure construction and structural repair. Freyssinet is involved in numerous projects across five continents, making it the world leader in its areas of specialization: prestressing, cable-stayed structures, construction methods, structural accessories, structural repair and structural maintenance/upgrade.

NUVIA

Nuvia represents a unique approach and has a 50-year-old heritage. It can trace its roots to the beginning of the French and British nuclear industries. The Group has grown organically and through mergers and acquisitions. Pioneering work in construction, engineering, energy, nuclear R&D, design, build, operations, radiation protection and decommissioning has been undertaken, always with a strong emphasis on safety, quality and sustainability.

MENARD

Menard brings its extensive experience to projects in the planning and design phase to provide optimal ground improvement and stabilization solutions. Menard's expertise lies in ground improvement, specialist foundations, all methods of grouting, and environmental remediation; and has facilitated the delivery of cost-effective solutions for the construction of a large range of structures. Menard's scope includes small to large infrastructure-based solutions across a broad range of market segments for private and public stakeholders.

SOLETANCHE BACHY

Soletanche Bachy specializes in geotechnical and civil engineering. Specialists have mastered the full range of geotechnical engineering processes, special foundations, underground works, ground improvement and pollution treatment and control. They serve a wide range of clients in the public and private sectors: central and local governments, industrial, general building, and civil engineering contractors. With this expertise, Soletanche Bachy has always helped customers resolve their ground problems and build their foundations and underground structures.

SIXENSE

Soletanche Freyssinet group launched its sixth branch SIXENSE. The new entity brings together 10 companies with a current combined workforce of 600 employees and operations in 20 countries. It specializes in digital services and solutions for structures, soils, and the environment. It is structured in three areas of expertise: Engineering, Digital and Technologies. It helps customers to optimize design, understand structural behavior and support decision making throughout the infrastructure life cycle.

Vision

We aspire to attain a Technical Leadership position in the civil construction industry by integrating innovative engineering solutions in the fields of Retaining Structures; Crossing structures; Preventing and Protecting infrastructures; and Soil Reinforcement and Ground Stabilization.

Keeping our pioneering spirit alive, we continually create, design, and supply innovative technologies to meet the requirements of our customers and end users for various engineering and market sectors.

We are actively working towards a sustainable future by implementing definitive actions to reduce carbon emissions, optimize and preserve natural resources; and nevertheless, protect the civilization in the long run.

We provide economical and sustainable solutions with a strong commitment towards creating a legacy of "Excellence" in engineering services.

We continually create, design, and supply innovative technologies for various market segments.

Mission

At Reinforced Earth, we are determined to provide quality service to our esteemed customers. To fulfill this mission of creating a distinct identity, the Reinforced Earth team affirms what we stand for.

To create a distinct identity, we are determined to provide quality and responsive services to our esteemed customers.

As dependable and steadfast performers we seek to consistently provide our customers with high technical expertise in engineering, products, and methods.

For our stakeholders and shareholders, we aspire to be identified as a customer-centric, well-diversified, successfully growing and professionally managed company.

Reinforced Earth offers solutions that helps protect the environment while reducing the carbon footprint in projects. Through our engineering expertise and sustainable technologies, we protect human settlements, wildlife and nature, public assets and infrastructure against natural disasters and industrial risks.

We continuously strive to be a coveted and thriving institution to share work and life experiences by procreating value and respect, providing equal opportunity and solidarity to all our employees, and by creating a robust health and safety culture in the organization.

Our Policies

Occupational Health & Safety

The company places a strong emphasis on the health and safety of everyone in offices and job sites. Employees are encouraged to step away from any unsafe situations, even if it may impact production targets. Pre-start meetings and toolbox talks are conducted and documented to address safety concerns, with a commitment to reporting any unsafe conditions. Resources are allocated for training and fostering a robust health and safety culture. The Health and Safety Policy highlights the importance of ergonomics, work-life balance, stress management, and the prevention of harassment and violence. Aiming for a zero-accident rate, regulations and tools are in place to support this important goal.

Excellence in Client Care

Reinforced Earth is dedicated to striving for excellence in client care. The primary objective is to earn respect, build trust, and establish strong, long-term relationships with clients.

The mandate are:

- Know and respect your client
- Provide an image of excellence
- Build a relationship with the client
- Promote clear communication
- Be a solution provider
- Deliver your commitments
- Always maintain a positive and controlled attitude

Quality Management System

Reinforced Earth operates on the fundamental principle of providing quality products and services to customers. As a premier quality system certified organization, it specializes in the structural design, procurement, and supervision of installation for Mechanically Stabilized Earth and Prefabricated Concrete Arch structures for overpasses, underpasses, and interchanges, as well as the manufacture of Geosynthetic Strap soil reinforcement products. Stringent and regular internal audits are conducted to ensure that processes meet and satisfy client requirements. The organization fully complies with all regulatory requirements and has established a systematic approach for proactively identifying and correcting discrepancies to prevent potential non-compliance.

Environment Management System

Sustainable development is a fundamental aspect of social responsibility at Reinforced Earth. The organization is committed to providing not only advanced, innovative technology but also eco-friendly solutions. Recognizing the environmental impact of high-tech innovations on future generations, Reinforced Earth Philippines utilizes supplementary cementitious materials like fly ash to effectively reduce carbon emissions. This strategy achieves a carbon footprint reduction of approximately 30%, enhancing the sustainability of Reinforced Earth's concrete panels. Routine internal audits are conducted at worksites to ensure compliance with established control measures. In-house training programs are designed to strengthen the knowledge of site managers, engineers, technicians, superintendents, and supervisors in environmental risk awareness, assessment, and remediation. Core values include a strong commitment to environmental legislation and regulations, along with a dedication to continuous improvement.

Sustainable Technology

Reinforced Earth is committed to parenting the innovation gene with sustainable technology.

- Sustainability is the core theme of Reinforced Earth's activities, with ongoing initiatives focused on environmental protection.
- Impact assessment studies are conducted for significant projects to ensure a reduction in negative environmental consequences.
- Customized design and build solutions are developed to minimize adverse effects on the environment and reduce the consumption of natural resources.
- An innovative sustainability approach involves a continuous pursuit of improvements in pollution prevention, chemical storage, and waste sorting.
- The products offered are superior alternatives conventional methods, leading to reduced resource consumption and lower greenhouse gas emissions.
- Innovation in product development promotes sustainable methods and techniques that utilize recycled and marginal fills for backfills.

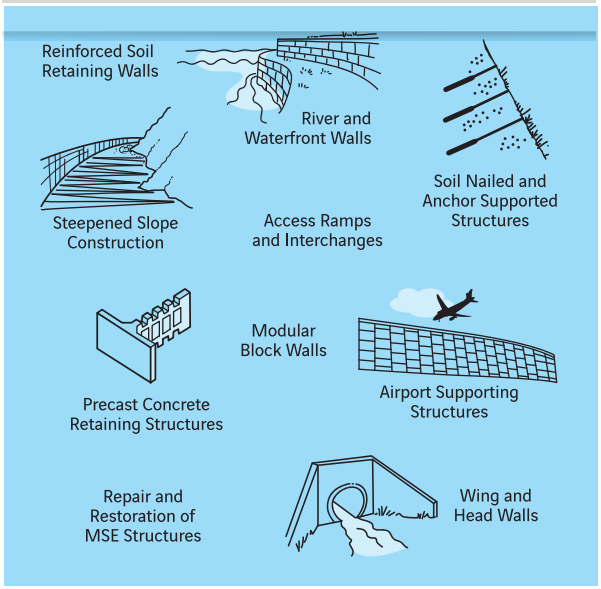
Business Lines and Applications

In order to meet the increasing diversity of infrastructure, construction and urbanization challenges in today's changing world, Reinforced Earth provides tailor-made solutions for a variety of applications.

RETAIN

RETAINING STRUCTURES & SOIL REINFORCEMENT

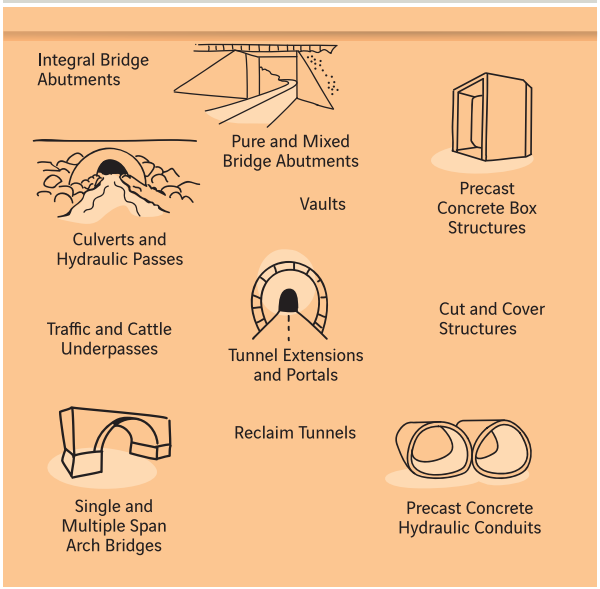
APPLICATIONS



CROSS

CROSSING STRUCTURES

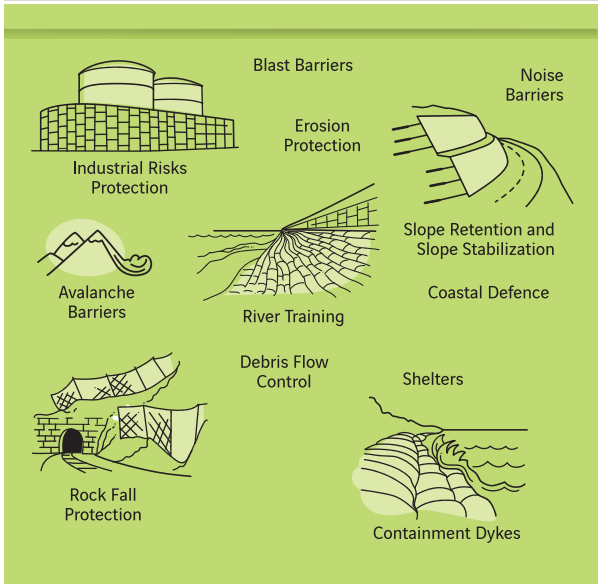
APPLICATIONS



PROTECT

PREVENTING & PROTECTING INFRASTRUCTURES

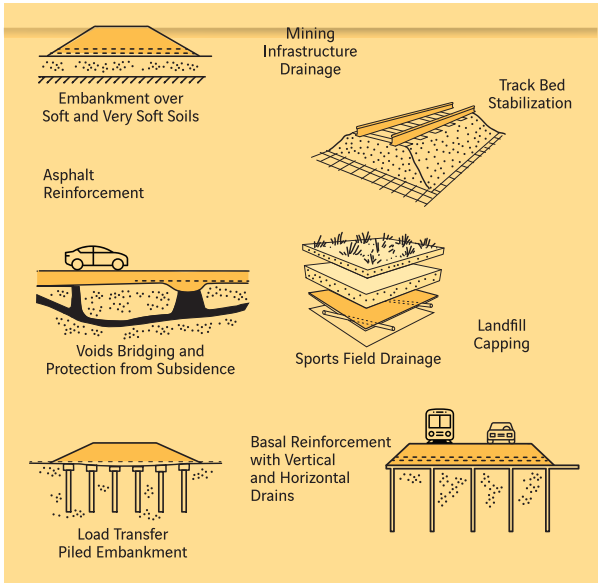
APPLICATIONS



STRENGTHEN

REINFORCEMENT, STABILISATION AND DRAINAGE

APPLICATIONS



Market Sectors

Being at the forefront of innovation and path-breaking technology, Reinforced Earth has forged an unrivaled level of expertise and experience to provide unique and bespoke solutions to a wide array of market segments.

Roads & Motorways

Railways

Rivers & Waterways

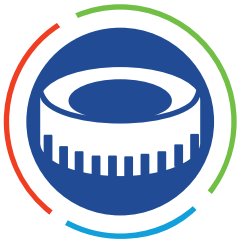
Ports and Harbours

Urban Development

Water Management

Airports

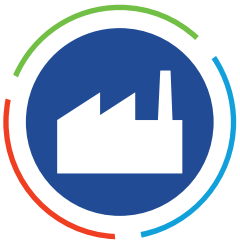
Mining & Minerals



Sports & Leisure

Energy, Oil and Gas

Military



Industry

Waste Management

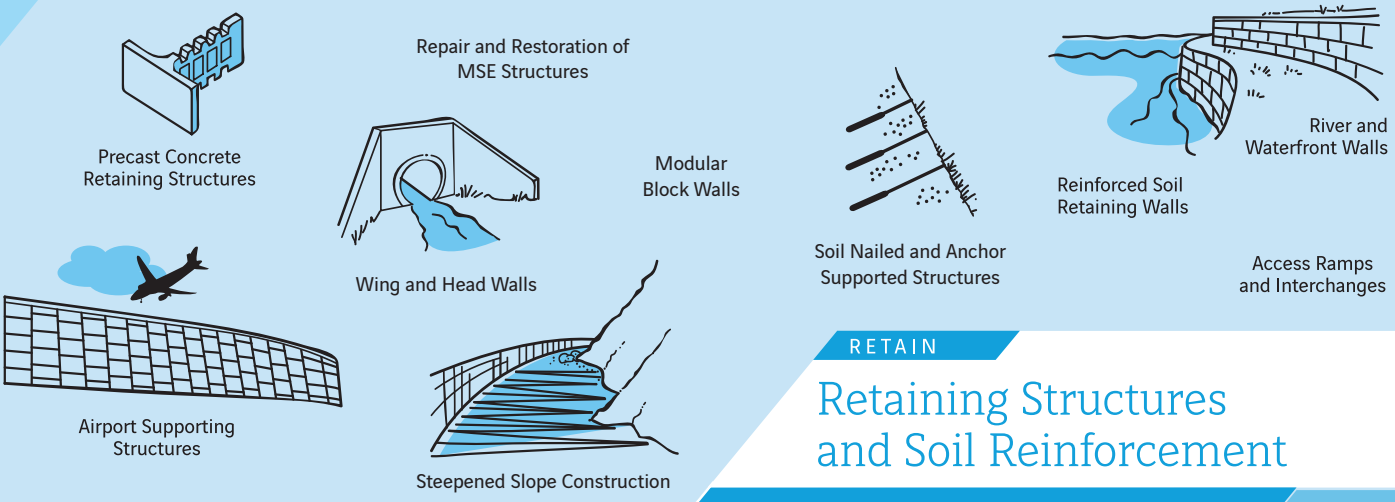
Land Development and Buildings

Disaster Management

Dams and Reservoirs

Coastal Restoration and Enviromental Protection

Business Line: RETAIN



RETAIN

Retaining Structures and Soil Reinforcement

RETAIN

The RETAIN business line relates to technologies that involve earth retention and earth reinforcement applications. Being the inventor and pioneer in back-filled soil retention systems and earth reinforcement business, this business line targets projects and techniques involving externally built-up earth retention structures and in-situ improvement techniques.

Our precast TechWall® and T-Wall® techniques can be applied to a wide range of land development, building and civil infrastructure projects. The soil reinforcement techniques can be applied to a variety of applications - from Mechanically Stabilized Earth structures (Reinforced Earth® slopes and Reinforced Earth® walls) to reinforcement of cut and fill slopes through grouted soil nails, driven and stressed anchors and ground/rock anchors.

Each technique by itself is an engineered solution and the combinations of techniques in this business line open the possibility to address solutions in more complex, hybrid, and technically challenging project environments. Our ability to interface these techniques with a diverse portfolio of solutions assists our customers to build and restore assets with our superior product quality and reliability, proven design engineering detailing, and scientific know-how.

Reinforced Earth® Technology

Dong Da Boat Station, Vietnam

C5 Segment 2, Philippines

MSE wall with steel reinforcement, Philippines

Reinforced Earth is a global leader in retaining wall design and the local leader of Mechanically Stabilized Earth (MSE) wall system in the Philippines, being the original creator of the renowned Reinforced Earth solution.

Reinforced Earth developed **Reinforced Earth®** more than 50 years ago. This innovative solution has revolutionized the way retaining walls are designed today. We offer high-performance and durable solution that is rapid and predictable to install. Reinforced Earth® consists of engineered backfill that is reinforced with a choice of engineered elements, normally geosynthetics or steel. These soil reinforcements are connected to any one of a wide choice of facing elements including concrete panels, steel panels, or wire mesh.

TerraClass™

TerraClass™ structures combine engineered backfill with steel or synthetic tensile reinforcement and a precast concrete facing system. This ideal combination creates a durable and resilient earth retention structure. Additionally, **TerraClass™** is available in several attractive architectural finishes.

TerraTrel™

TerraTrel™ is a wire-faced wall system consisting of steel reinforcing strips with bolted connection to the wire mesh facing. This system provides a cost-effective solution for wall applications where aesthetics is not a critical constraint, precast facing is not required, or panel lifting is not feasible.

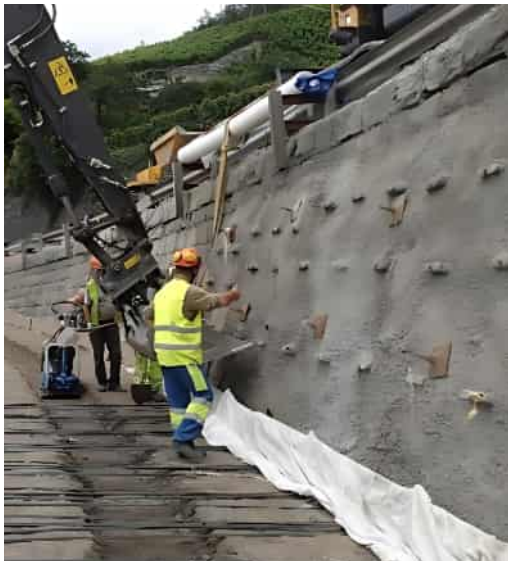
GeoTrel™

GeoTrel™ is a wire-faced system that has geosynthetic straps as reinforcement. It is projected at an angle greater than 76° or even vertical. This does not necessarily require a green facing but can be incorporated with vegetation. Where there is more supply of cobbles, GeoTrel™ can be utilized instead of a precast facing wall.

ArmaStone®/ArmaGreen®

Reinforced Earth employs both **ArmaStone®** and **ArmaGreen®** to develop reinforced steep slopes for diverse infrastructure projects. The reinforcement can either be reinforcing steel strips or geosynthetic straps. ArmaStone® has a stone facing while ArmaGreen® has vegetated facing. Known as Reinforced Soil Slopes (RSS) or Geosynthetic Reinforced Slopes (GRS), these designs function as earth retaining walls with inclines generally between 45° and 76°.

TerraLink™

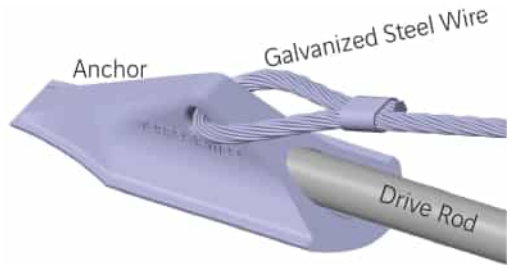


TerraLink® technique allows building of earth retention structures connecting existing profiles stabilized by soil nails and/or anchors. It is a useful technique for construction of benches and for road widening projects with limited available space, and activates the best optimization between cut and fill requirements.

Precast T-Wall®

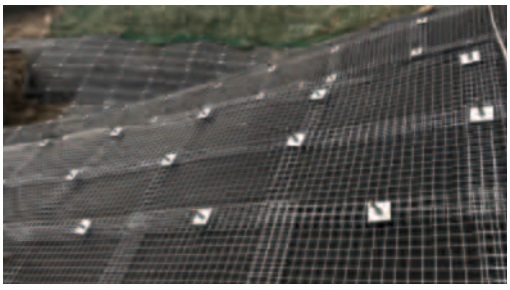
The **T-Wall®** system is a precast modular gravity type reinforced concrete retaining wall system. It is most suited for railway load supporting structures and construction of submerged retaining structures. The **T-Wall®** system decreases in stem length course by course – reducing materials, excavation and backfill as compared to other wall systems.

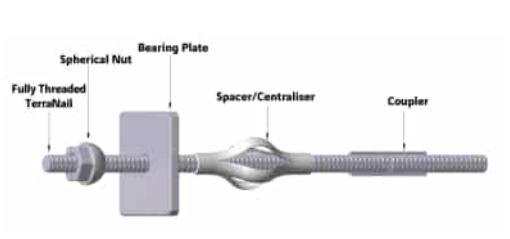
TerraAnchor™



TerraAnchor™ technology is an active soil reinforcement system used for permanent as well as temporary stabilization of existing slopes/structures by using high tensile steel as soil reinforcement (galvanized bars for permanent and strands for temporary). It is a driven and stressed soil anchoring system used with suitable facing.

TerraNail®



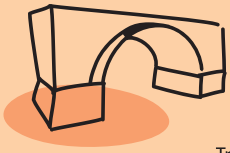


TerraNail® is an in-situ method of reinforcing existing soil/rock mass by installing solid or hollow fully threaded hot-dip galvanized high tensile geotechnical steel bars encased in grout. **TerraNail®** is typically used to stabilize existing slopes or excavations. It is also a reliable solution for landslide rehabilitation and active rockfall protection.

Business Line: CROSS

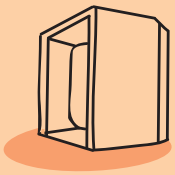
Culverts and Hydraulic Passes

Cut and Cover Structures

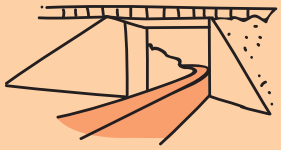


Single and Multiple Span Arch Bridges

Traffic and Cattle Underpasses



Precast Concrete Box Structures



Pure and Mixed Bridge Abutments

Integral Bridge Abutments

Tunnel Extensions and Portals

Vaults

Reclaim Tunnels

Precast Concrete Hydraulic Conduits

CROSS

Crossing Structures

CROSS

The Cross business lines focus on technologies and applications related to crossing structures. Reinforced Earth® true and integral bridge abutments (True Abutment®) are the preferred choice for bridge engineers, EPC contractors, and private project developers.

Precast concrete arch (TechSpan®) and box (TechBox®) structures are used for the construction of minor bridges in single or multiple spans, hydraulic passes, material and water conveyance tunnels, vehicle, cattle and pedestrian underpasses, and cut and cover tunnels.

As an expansion to the technique, these structures are also used as extensions to tunnel portals and construct hydraulically pused tunnel envelopes. Both precast box (TechBox®) and precast arch (TechSpan®) structures can be used to act as rockfall and debris flow sheds and shelters, as a more reliable alternative for prevention and mitigation of geohazards. TechSpan® arches also have proven use as ammunition storage bunkers in military applications.

Finite element modeling realizes the benefits of soil-structure interactions and provides optimum structure geometry and size and thus savings in the material consumption. It is possible to achieve complete water tightness of these segmental structures using state-of-the-art products and installation methods.

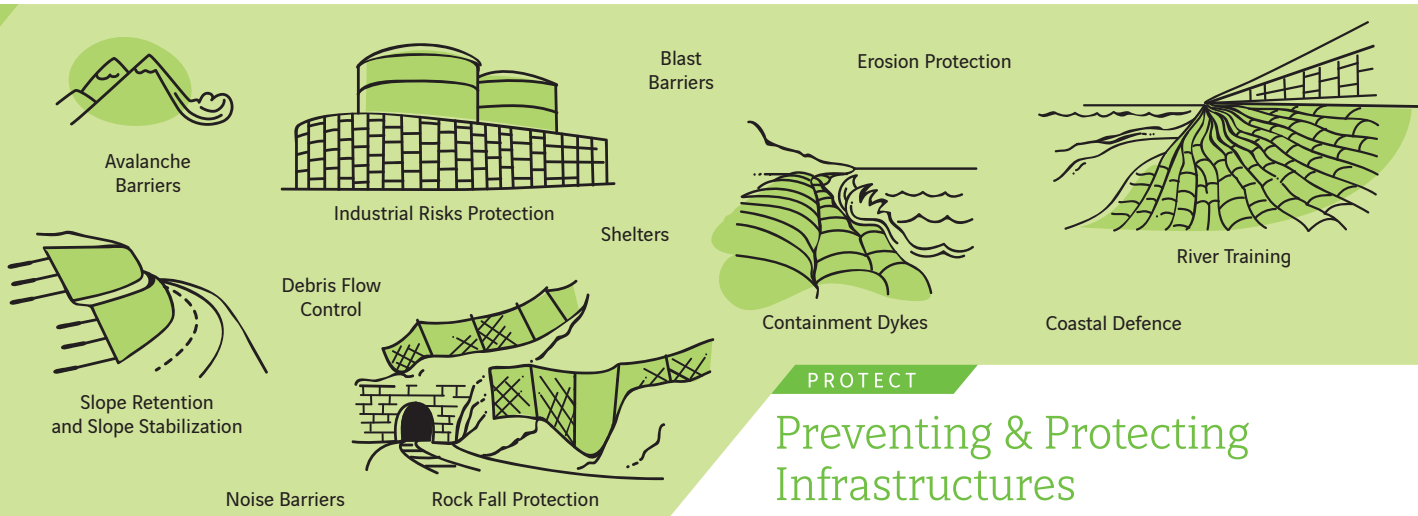
TechSpan®

TechSpan® is a one of the most reliable, cost effective precast concrete arch systems available for cut and cover structures. It is widely used in the construction of bridges, underpasses, conveyance and reclaim tunnels, portals, ammunition storage bunkers and rockfall sheds and shelters. Typically, 15-20 linear meters of **TechSpan®** can be installed in one work shift.

True Abutment®

True Abutment® is an alternative solution for reinforced concrete column/ piled abutments. A highly engineered technique, it has been adopted throughout the world successfully for over 40 years. It is a Reinforced Earth® structure designed to support bridge load as an alternative to conventional RCC abutments. This is used for bridges, underpasses, fly-overs, road over bridges and road under bridges.

Business Line: PROTECT



PROTECT

Preventing & Protecting Infrastructures

PROTECT

The Protect business lines assist the owner and our customer to prevent and protect critical and sensitive infrastructures from natural and man-made (including industrial) disasters.

The approach is to integrate our existing product, process and engineering knowledge and know-how and offer our customer the best-in-class solutions based on project specific needs. In this business segment, we also work with the best-in-the-industry associates and our strategic alliance partners to establish best practices and proven time-tested solutions.

Reinforced Earth offers a complete protection system package against erosion, rockfall, unstable rock and loose rock slopes, landslides, debris flow and avalanches.

Reinforced Earth®

Fukushima Daiichi Nuclear Power Plant, New Sea Wall

With the increase in potential for industrial explosions, fire and pollution, the use of the **Reinforced Earth®** technique for vital structures designed to protect against such hazards has been a logical extension of our technology. They are commonly used to counter dangerous natural forces like landslides, tsunami defenses, and magma flows.

TerraDyke™

The combined forces of water and water borne debris require special attention while designing structures in coastal areas. **TerraDyke™** is a custom made, state-of-the-art technique developed as a protective structure for coastal and marine works. TerraDyke™ structures are used as a system core for breakwaters, groins and spurs.

TechRevetment®

TechRevetment® is a pre-engineered factory costumed grouted mattress system used for permanent erosion protection works. This technology is used to protect embankments, protect bridge abutments against scour, for bed protection of major rivers and waterways, and for shoreline protection. This system can be installed at rapid speed and under water without the need for dewatering.

TerraBund®

TerraBund® is a Reinforced Earth protection bund. It is a gravity structure built using soil reinforcement and flexible or semi-rigid facing systems. It is a passive protection system used typically as a geo-hazard solution against rockfalls, avalanches, debris flow and mud slides. **TerraBund®** can withstand more than 8000kJ of impact energy in the event of landslide or rockfall.

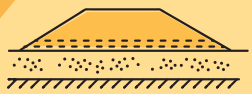
TerraGreen®

TerraGreen® is a custom designed erosion control mat / blanket useful for protecting dry and intermittently wet and erodible slopes. **TerraGreen®** as a stand-alone technique or mixed with other solutions like TerraNail® or TerraAnchor™ and high-tensile steel netting is often used to mitigate low to medium grade surface erosion and soil slips and slides.

Artificial Reef

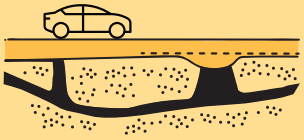
Climate change is significantly affecting the global coastlines. More than 70% coastlines are either eroded or damaged. Coral reefs already provide excellent natural protection for coastal regions. On an average they reduce wave heights by 84%. Unfortunately, most of these reefs have died and 90% are projected to be lost by 2040.

Reinforced Earth can rapidly grow artificial reefs that dampen the waves and protect coasts from erosion using advanced digital technologies, natural seawater minerals and renewable power. We analyze the wave dynamics and design high tech steel structures that are easy to install underwater. These steel structures act as an attenuator by breaking the wave at a designated location and reduces its impact on the shoreline.



Embankment over
Soft and Very Soft Soils

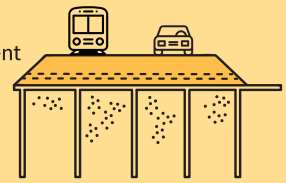
Mining
Infrastructure
Drainage



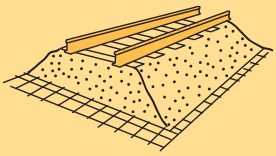
Voids Bridging and
Protection from Subsidence

Landfill
Capping

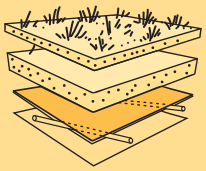
Basal Reinforcement
with Vertical
and Horizontal
Drains



Asphalt
Reinforcement



Track Bed
Stabilization



Sports Field Drainage

Load Transfer
Piled Embankment

STRENGTHEN

Soil Reinforcement and Ground Stabilization

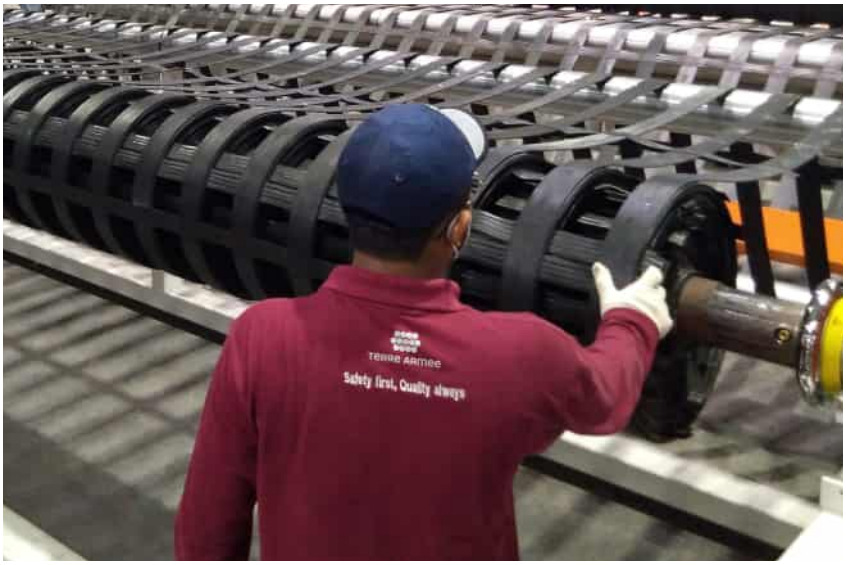
STRENGTHEN

The Strengthen business line relates to technologies that involve Soil Reinforcement and Ground Stabilization.

This business line also deals in projects involving subgrade stabilization and improvement works, engineered solutions like bridging voids and subsidence, capping and piggy bagging of landfills, reinforcing lagoon closures, reinforcing, and stabilizing embankments on soft and very soft foundations, load transfer platforms over piles, controlled modulus columns and stone columns.

Our engineered solutions help improve foundation of soil using high strength, low modulus proprietary geosynthetics for basal reinforcement applications, bi-axial geogrids and woven geotextiles for ground stabilization applications alongside improvement of drainage systems with low creep, low intrusion and low deformation drainage geocomposite.

ArmaLynk™



ArmaLynk™ is a soil reinforcement geosynthetic, manufactured from high tenacity polyester yarns, extruded to form polymeric strips encased in polyethylene sheath, and welded together to cross strips to generate a stable and strong geogrid structure. **ArmaLynk™** is used for various basal reinforcement applications like embankment over soft soils, embankment over subsistence, void bridging and challenging ground stabilization of building roads, bridges, runways, railways, working platforms, and heavy-duty pavements.

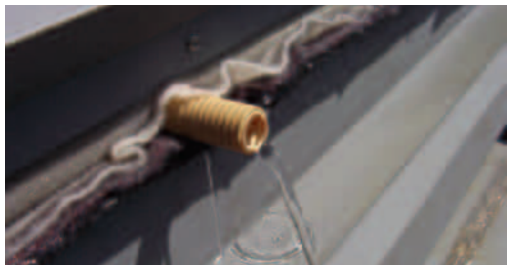
ArmaGrid™

ArmaGrid™ is a uniaxial or biaxial geogrid made from either polyester, polypropylene, or HDPE. It is used as soil reinforcement in various applications such as foundation improvement, track bed stabilization, basal reinforcement etc. Reinforced Earth uses in-house design capacity to select the type and strength of material based on the actual site condition.

ArmaWeb®

ArmaWeb® is a 3-dimensional soil stabilization and erosion protection system. It is made of High-Density Polyethylene (HDPE) and welded at junctions to form cellular confinement systems. **ArmaWeb®** offers higher performance and faster installation for various applications such as supporting heavy loads, protection of bare embankments, channel banks and sub-grade stabilization.

DRAINTUBE™



DRAINTUBE™ has unique benefits over other geocomposite drainage systems; such as no geotextile intrusion, no creep and no peel adhesion issue. These ensure long term performance in most difficult conditions. Each roll performs the functions of separation, filtration and drainage.

STRENGTHEN

TerraFlow®

TerraFlow® Geocomposite consists of bi-planar High-Density Polyethylene (HDPE) geonet having non-woven polypropylene (PP) geotextile heat bonded on both sides. Bi-planar geonet is designed with two HDPE strands crossing each other at a constant angle to form a diamond structure to provide better planar water flow under high loading. Tri-planar geonet consists of three HDPE strands to improve the lateral drainage and transmissivity.

TerraDrain®

TerraDrain® is modular light weight, high strength and high impact cellular drain board wrapped with a custom designed geotextile and used for subsurface drainage. The drainage board and the non-woven geotextile used in **TerraDrain®** are manufactured from polypropylene. The open surface design and high internal void volume enables the rapid capture and transport of high amount of water.

TerraLine®

TerraLine® Geosynthetic Clay Liners (GCL) are factory made hydraulic barriers consisting of very low-permeability bentonite powder supported by geotextiles and/or geomembranes. The engineering function of a **TerraLine®** – GCL is containment as a hydraulic barrier to water, leachate or other liquids and sometimes gases.

TerraTextile® (Woven + Non-Woven)

TerraTextile® is a specially made technical textile, either woven or non-woven. They offer excellent strength and hydraulic characteristics; and cater for a wide range of applications. **Woven TerraTextile®** is used for soil reinforcement, separation, and filtration, secondary reinforcement, erosion control, ground stabilization, silt fence etc. **Non-woven TerraTextile®** is very popular in applications such as filtration, separation, sub-surface drainage and transmission erosion control.

STRENGTHEN

REINFORCED EARTH

Some of our Projects

First True Abutment, Cebu-Mactan Airport

True Abutment, Clark International Airport

Veterans Flyover, Zamboanga

Some of our Projects

STAR Tollway, Batangas

Wall for bridge at Tinaan, Ilocos Sur

Daang Hari Flyover at Molino, Cavite

REINFORCED EARTH

Some of our Projects

Balagtas Flyover, Batangas

C5 Segment 2, Paranaque, Philippines

Metro Rail Transit line 3 (MRT-3)

TECHREVETMENT® FOR COASTAL PROTECTION, MAHESHKHALI, COX'S BAZAR, BANGLADESH

REINFORCED EARTH
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