REINFORCED EARTH

Leaders in Innovation and Technology

RETAIN / CROSS / PROTECT / STRENGTHEN

CORPORATE PROFILE

Business Lines and Applications

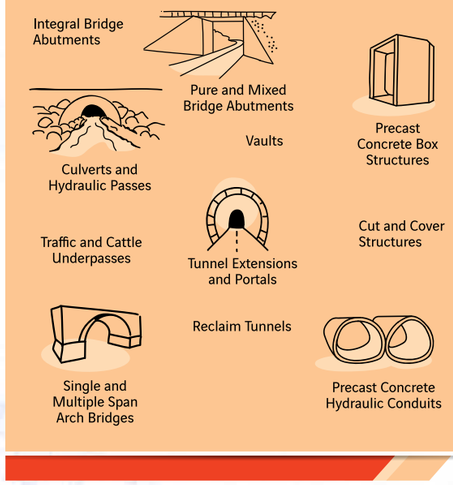
In order to meet the increasing diversity of infrastructure, construction and urbanisation challenges in today's changing world, The Reinforced Earth Company (RECo) provides tailor-made solutions for a variety of applications.

RETAIN
RETAINING STRUCTURES & SOIL REINFORCEMENT

APPLICATIONS

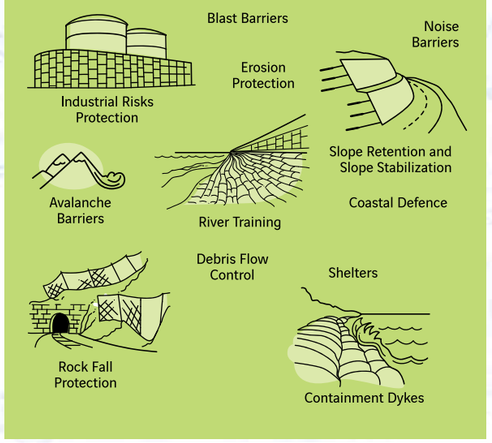
CROSS
CROSSING STRUCTURES

APPLICATIONS



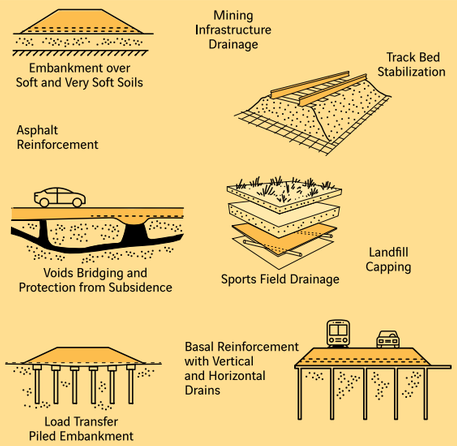
PROTECT
PREVENTING & PROTECTING INFRASTRUCTURES

APPLICATIONS



STRENGTHEN
REINFORCEMENT, STABILISATION AND DRAINAGE

APPLICATIONS

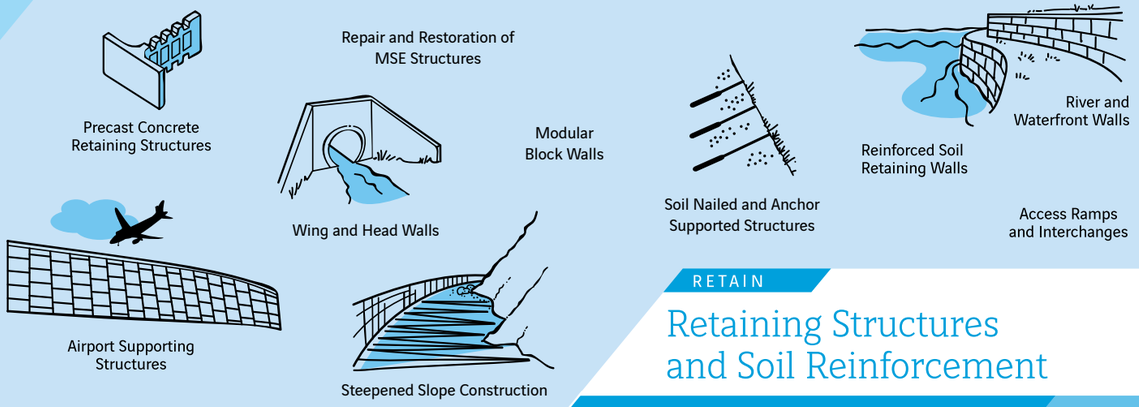


Market Sectors

By being at the forefront of innovation and path-breaking technology, Terre Armée India has forged an unrivalled 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
- Water Management
- Airports
- Mining & Minerals
- Sports & Leisure
- Urban Development
- 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® Wall

Reinforced Earth® structures combine engineered backfill with steel or synthetic tensile reinforcement and a modular concrete facing system. This ideal combination creates a durable and resilient earth retention structure. With **Reinforced Earth®** structures we can create several attractive architectural finishes.

ArmaGreen & ArmaStone

Reinforced soil slopes (RSS) are an extension of the Reinforced Earth® technique. This structures are designed and built to retain with a face inclination of between 45° and 70°. ArmaGreen is the name of our vegetated facing solution, while ArmaStone is the name when we use a mineral facing.

Precast TechWall®

TechWall® precast retaining walls and abutments are effective solutions when a standard footing is used or when site conditions rule out the use of Reinforced Earth® structures. **TechWall®** is developed as an engineered product with low lifecycle costs and long- term performance, which helps minimize overall construction duration and reduces site works.

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.

Composite Earth®

Composite Earth® technology adopts primary and secondary soil reinforcement systems for the design of Reinforced Earth® retaining walls. It aims to control the lateral deformation of the facing during construction and operation, including during seismic events. This is an effective way to design and construct tall and critical structures.

Shored MSE®

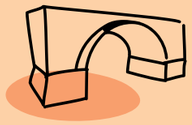
Shored MSE® technique allows building of earth retention structures connecting existing profiles stabilized by soil nails and/ or anchors. It is a useful technique for construction of benches and for road widening projects with limited available space, and activates the best optimisation between cut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

RETAIN

Business Line: CROSS

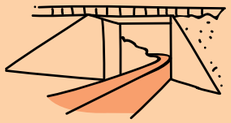
Culverts and Hydraulic Passes

Cut and Cover Structures



Single and Multiple Span Arch Bridges

Traffic and Cattle Underpasses



Pure and Mixed Bridge Abutments

Integral Bridge Abutments

Tunnel Extensions and Portals

Vaults

Reclaim Tunnels

CROSS

Crossing Structures

CROSS

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

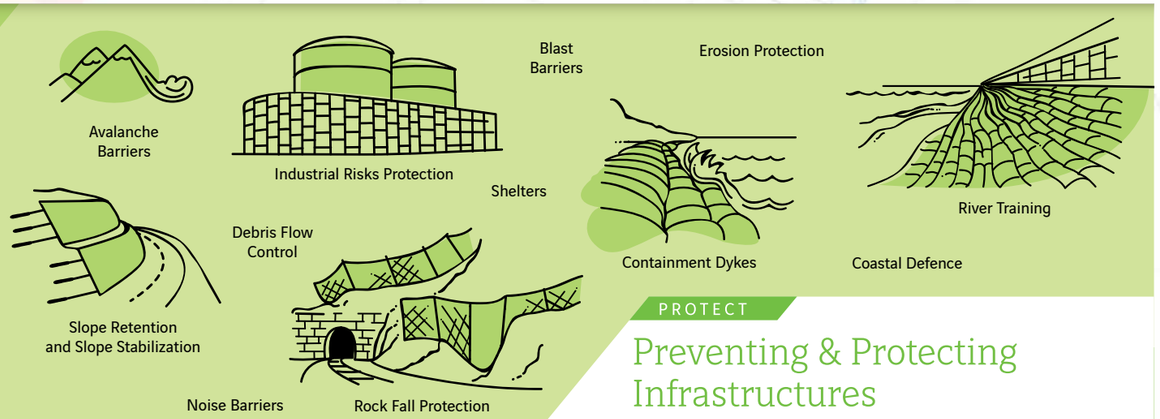
Precast concrete arch (TechSpan®) structures are used for the construction of minor bridges in single or multiple spans, hydraulic passes, material and water conveyance tunnels, vehicle, cattle and pedestrian underpasses, and cut and cover tunnels. As an expansion to the technique, these structures are also used as extensions to tunnel portals and construct hydraulically pushed tunnel envelopes. 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 modelling realises the benefits of soil-structure interactions provides optimum structure geometry and size and thus savings in materials 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 'n' 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.

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 systems package against erosion, rockfall, unstable rock and loose rock slopes, landslides, debris flow and avalanches.

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.

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 erosions and soil slips and slides.

TerraBund®



TerraBund® is a Terre Armée 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.

Rockfall Barrier



The Reinforced Earth Company offers both passive and active engineered structural solutions that mitigate rockfall risk and control levels of damage. **Rockfall protection barriers** are made of metallic, non-metallic and/or composite materials. It is primarily applied to arrest and catch rocks, boulders, shooting stones or debris that can be flowing or falling due to natural causes. The **rockfall protection barrier** is a support solution allowing to hold these disintegrating and falling elements, subsequently avoiding damages to infrastructure and preventing disruptions such as traffic blockages.

Slope Retention



The Reinforced Earth Company offers engineered solutions for **Slope Retention** to retain the masses in situ and prevent erosion and shallow landslides. This systems is designed on a site to-site basis. Depending on the site characteristics and strength requirements, a large variety of net and netting products are available. Re-stabilization of the slope using mesh and natural vegetation is highly encouraged. Furthermore, netting can accommodate pre-existing vegetation such as tree trunks with minimal effort.

Debris Flow Barrier



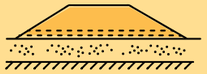
The Reinforced Earth Company offers engineered solutions to protect infrastructure, and assets from debris flows and debris floods. The threat of climate change raising the global temperatures, potentially causes a change in weather patterns, thawing of permafrost areas, increasing wildfires, debris flows, and shallow landslide activity. The use of flexible-net barriers can be an efficient alternative to the other traditional and costly mitigation measures such as dams and other rigid barriers.

Avalanche Barriers

Avalanche Barrier systems are designed on a site-to-site basis to protect infrastructure, utilities, buildings, reforestation, and lives from avalanches. Snow nets, snow rakes and steel snow bridges are installed in the initiation zones to prevent avalanches from forming. Static defense structures, snow catchment fences/ barriers are used which effectively reduces the run-out length of an avalanche.

PROTECT

Business Line: STRENGTHEN

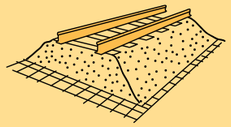


Embankment over
Soft and Very Soft Soils

Mining
Infrastructure
Drainage

Voids Bridging and
Protection from Subsidence

Asphalt
Reinforcement



Track Bed
Stabilization

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 geocomposites.

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 or polypropylene or HDPE. It is used as soil reinforcement in various applicatons such as foundation improvement, trackbed stabilization, basal reinforcement etc. The Reinforced Earth Company uses in-house design capacity to select the type and strength of material based on the actual site condition.

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 stabilisation, silt fence etc. **Non-woven TerraTextile®** is very popular in applications such as filtration, separation, sub-surface drainage and transmission erosion control.

STRENGTHEN

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