

Applications

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LAUDERDALE

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TERRE ARMÉE

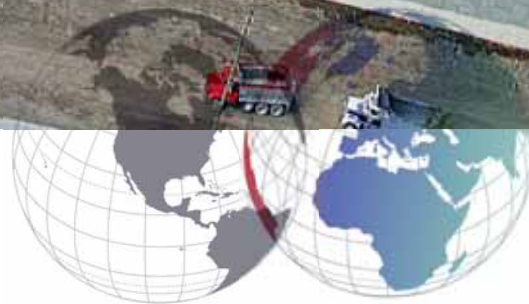
Magazine

P. 06 REINFORCED EARTH® STRUCTURES
FOR HIGH-SPEED RAIL LINES

P. 07 AROUND THE WORLD:
PROJECTS OF OUR SUBSIDIARIES

P. 12 THE EXPRESSWAY OF SALVADOR DE BAHIA

P. 18 1963 : PATENTING OF REINFORCED EARTH®



TERRE ARMÉE

THE IMAGE

UNITED KINGDOM The highest TechSpan® arch in the UK

As part of the Heads of the Valleys Road project in South Wales involving conversion of the A465 into a dual roadway, Reinforced Earth UK constructed the highest TechSpan® arch ever created in the UK, measuring 9.6 m. Due to its location on a slope, the structure required placement of the largest quantity of backfill above a TechSpan® arch in the UK, and custom-designed

facing panels had to be manufactured. This technique enabled the structure to be installed more easily and in complete safety. Designing this record-breaking project was provided by colleagues in three Terre Armée Group entities: Reinforced Earth UK, Tierra Armada Spain and Terre Armée France.



More about
TechSpan®.



 **The word** Over 50 years, Reinforced Earth® has undergone profound changes

In 2013 Terre Armée celebrated the fiftieth anniversary of the filing of the Reinforced Earth® patent by Henri Vidal. The technique is now present across the entire world and over 50 million m² of Reinforced Earth® walls have been installed since 1963.

Over these fifty years our Reinforced Earth® technology has undergone profound changes. Our research and development teams have perfected it and developed ground breaking techniques opening up new opportunities for the company in numerous fields.

Terre Armée offers an extensive range of products for diverse applications including mining structures, airports, industry, energy, hydraulic structures, rail systems, stadiums and military facilities.

Thanks to the involvement of our teams, who every year design and develop new techniques, Terre Armée retains its position as world leader in retaining structures.



ROGER BLOOMFIELD,
CEO OF TERRE ARMÉE

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Welcome to the new Terre Armée magazine format. «Terre Armée Magazine» is the successor to «Soils and Structures», providing a twice-yearly overview of our projects worldwide. The magazine complements our web site www.terre-armee.com, which contains more news and information about our business.

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50 million



The figure

Number of square metres of Reinforced Earth® constructed since Henri Vidal filed the patent in 1963. The 1st million m² mark was reached in 1978.

The contract



United States: in Texas, the Reinforced Earth Company (RECo) won a major road contract.

The project involves construction of a new segment of the « Grand Parkway », a massive 290 km long peripheral state highway serving the Houston area. The opening of this new section situated to the northwest of the city is scheduled for completion in 2015.



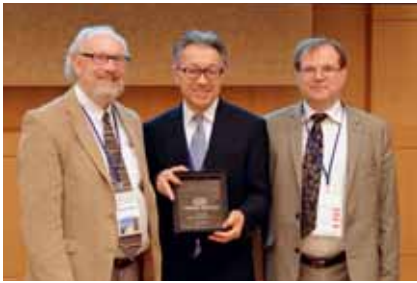
The country



Peru

The newest of our South American subsidiaries. Following creation of our entities in Columbia and Panama, we strengthened our presence in Latin America with the launch of our Freyssinet-Tierra Armada Perú subsidiary based in Lima as from 1st August 2012.

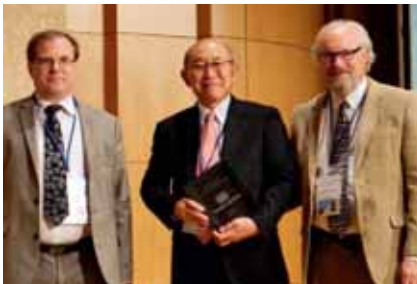




The award

40 years of Terre Armée in Japan

We mark 40 years of working with our Japanese licensees, Sumisho Tekko Hanbai Co., Ltd and its sub-licensee Hirose & Co., Ltd and Kawasho, now JFE Shoji Terre One Corporation.



The event



African Mining – INDABA

From 3 to 6 February 2014, Reinforced Earth South Africa (RESA), alongside Soletanche Bachy, Menard and Freyssinet, was one of the 407 exhibitors at Investing in African Mining Indaba. Recognized as the largest mining conference in the world, the event was a forum



for all of the sector's decision makers and professionals: 7,800 participants from 110 countries attended.

Find all our events (trade shows, conferences, etc.) at www.terre-armee.com/events



The next big thing

New Terre Armée website in October!

Enjoy its new look while visiting us on www.terre-armee.com and browse all our news, techniques and history, plus links to the websites of our subsidiaries all over the world.





The technology



SEA high-speed rail project, Reinforced Earth® structures for high-speed rail lines

Terre Armée has won approval for construction of Reinforced Earth® structures for the SEA

(South Europe Atlantic) high-speed rail project for which 320 km of a new railway line between Paris and Bordeaux will be built (France). Construction of the initial track bed support structures is underway.

On this SEA project there will be 11 Reinforced Earth® structures:

- 8 flyover junctions
- 2 road bridges
- 1 underpass wall

Of these 11 structures, 9 of them support rail track with maximum height 12.50 m. Train speeds will reach 320 Km/hr on these tracks, making this a world first for Reinforced Earth® structures.

An excellent precedent for future projects!

More about
our Railways
applications.



AROUND THE WORLD



Chile ANTUCOYA

Chile's Tierra Armada teams constructed four 12 m high retaining walls in less than two months at the Antucoya copper mine situated to the north of Antofagasta in Chile.

Terre Armée's Chilean subsidiary was responsible for design, calculation and implementation of the works on this mining site with very saline soil. The Composite Earth® system was employed on this project: synthetic reinforcements (to prevent corrosion due to high salinity) with the addition of secondary reinforcements (to prevent deformation). The fact that we were able to offer the customer a «turnkey» wall solution was a key factor in success of this project which was completed with zero accident.

MAARTEN VAN DEN BERG,
CEO, FREYSSINET TIERRA ARMADA CHILE S.A.



“When you are the chosen supplier for a mining project, the primary factor is trust. Quality and safety are key axes both for our customer Tenova Takraf and for Tierra Armada. Our teams successfully met the challenge: by working 24/7 and completing installation of the walls without accident.”



United States FASTRACKS

In the district of Denver (Colorado), RTD's FasTracks Program, (RTD: Regional Transportation District) is a multi-billion dollar comprehensive transit expansion plan. 200 km of new commuter rail and light rail lines, 30 km of bus rapid transit lines and 21,000 new parking places at rail and bus stations are to be built. For this project, Reinforced Earth Company USA (RECo) has been contracted in ten different projects to design and supply over 130,000 m² of Reinforced Earth[®] retaining wall structures. RECo provided cutting edge engineering solutions meeting all the project constraints, especially in terms of multifaceted architectural treatments and specific solutions driven by right of way issues.



Morocco MEDITERRANEAN RING ROAD

Over 50,000 m² of Reinforced Earth[®] walls have been installed on the Mediterranean ring road, an extensive road system in northern Morocco. The walls, comprised of Geostrap[®] reinforcement strips and TerraTee[®] facing panels, measure up to 25 m in height. The purpose of the project is to ease congestion in the region, which is a strategic gateway between Africa and Europe. In total, 250 km of existing roads have been upgraded and 300 km of new roads built. The solution put forward by Terre Armée Maroc, a subsidiary of Terre Armée SAS (France), met with client satisfaction due to the proposed speed of construction and the fact that road traffic could continue during the earthworks.





Croatia SVETA TROJICA WALL

On the Rijeka - Zuta Lokva highway in west Croatia, the new Rijeka-Križišće section is now in service.

1 km west of the village of Križišće stands the imposing Reinforced Earth® structure of Sveta Trojica: a three-tiered wall with max. height 34 m and 375 m long. The total surface area is 11,170 m². Terre Armée designed the structure and supplied the GeoStrap® reinforcements, and connections.



Spain ROAD WIDENING AND UPGRADING IN NAVARRE

With traffic flow at around 13,000 vehicles a day, the Pamplona-Estrella-Logroño route is a strategic communication link in Navarre.

As part of access road renovation works for the Pamplona freeway and extension of the LO-20 partial beltway, in June 2013 Tierra Armada Spain won a contract for the construction of 14,000 m² of Reinforced Earth® walls. This section of the works includes construction of a divided expressway. Tall Reinforced Earth® structures comprising TerraPlus® panels and galvanized steel reinforcing strips will be created along this 8 km east-west route to the south of Logroño. Delivery of the first structures began in September 2013 and ended mid-2014.



08
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09





India WHEN AIRPORT ACCESS IS DOWN TO REINFORCED EARTH®

Reinforced Earth India (RECo) has just completed construction of the first TechAbutment for a pedestrian underpass in India in front of Bombay's international airport. The city therefore joins New Delhi, Chennai, Bangalore, Hyderabad, Calcutta and Guwahati having all adopted Reinforced Earth® solutions for construction of their airport access areas. India, like many other countries, chose this solution due to the numerous benefits it offers for assured technical superiority. Benefits include: greater speed of installation, aesthetic qualities and better return on investment. To create the structures, RECo India used high-adherence galvanized steel strips as soil reinforcement and TerraClass® cruciform panels.



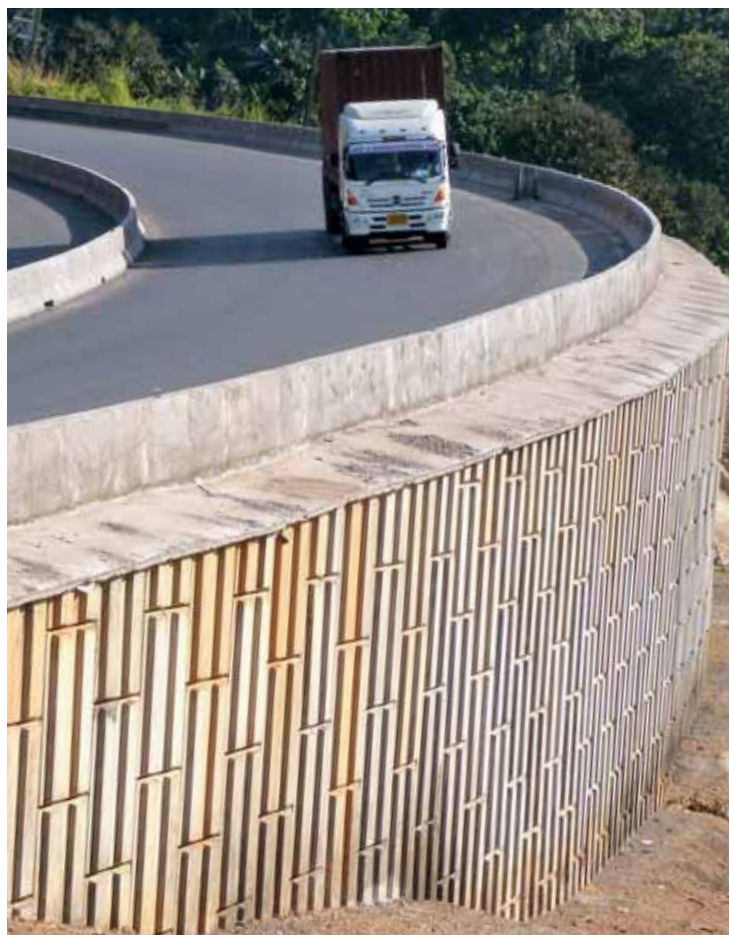
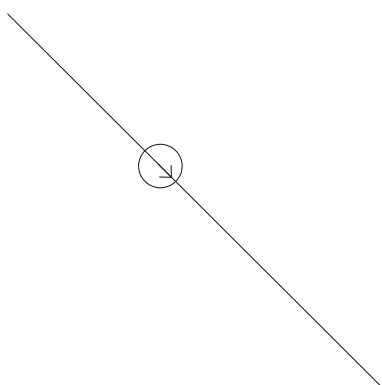
Poland LUBLIN CITY BYPASS

As part of a major project to improve road links in south-east Poland, Terre Armée was contracted to design, supply and install 17,483 m² of Reinforced Earth® walls and 5,178 m² of facing panels. The project, extending over 3,8 km, includes construction of five viaducts, two bridges and one footbridge. The company has also provided ongoing technical assistance throughout the works. Begun in December 2013, the project was completed in June 2014.



United States NORD TARRANT EXPRESS

In Tarrant County, Texas, the North Tarrant Express project (NTE) is along one of the most congested highway corridors in the Dallas-Fort Worth region. For this project, intended to improve mobility on neighbouring roads and the airport freeway, Reinforced Earth Company USA (RECO) will have provided a total of 204,500 m² of Reinforced Earth® walls. As well as adding new lanes, the project involves rebuilding the existing main lanes and frontage roads. RECO's previous experience with large design-build projects was instrumental in securing this contract. The work is scheduled for completion in 2015.



Australia RETAINING WALL FOR THE CAVAL RIDGE COAL MINE

The Bowen mine development project is an initiative to expand coal mining operations in Queensland. As part of this project Reinforced Earth Australia (RECo) was contracted to design and supply a 17.4 m high Reinforced Earth® supporting wall for the Caval Ridge mine, an open-cut coal mine expected to produce up to 5.5 million tonnes per year. To ensure long term durability in the corrosive coal environment, our teams chose to use concrete facing panels and positioned an HDPE membrane at the top of the structure to prevent ingress of contaminated water. Another constraint was related to managing routing of the facing panels, not an easy task given the remoteness of the mine location in the middle of Queensland. Close coordination between the various players was essential to meet the requirements of an evolving design. The project was successfully completed on time and in accordance with contractual obligations.



Thailand WIDENING HIGHWAY 11

To manage increased traffic flow on Highway 11 connecting the cities of Uttaradit and Denchai in the north of the country, the Department of Highways decided to widen this route passing through mountainous country from two to four lanes. To avoid the need for large volumes of backfill required in conventional systems, this alternative solution involving design of appropriate Reinforced Earth® walls was a natural choice. Working with a team of consultants, Reinforced Earth Thailand was involved at the initial phases of the project in design of the structures comprising TerraClass® facing panels with high adherence steel strips. Between 2010 and 2012, ten walls with surface areas ranging from 400 to 2000 m² were built. The total surface area is 12,000 m².

10
11



VIA EXPRESSA DA BAIÁ

➤ The essentials

- The project Creation of an expressway reducing the congestion of Salvador de Bahia's city center.
- Mission of Terra Armada Formwork and materials design & supply, plus full time technical assistance for the twenty structures (19,030 m² of TerraClass® walls and more than 195,000 linear metres of high adherence steel reinforcing strips) and the post-tensioning.
- Duration 22 months.



BRAZIL

TerraClass® walls for the expressway of Salvador de Bahia.

On 1st November 2013 the highway known as the «Via Expressa da Baía de Todos os Santos» was officially opened to traffic in Salvador, capital city of the Brazilian state of Bahia.

This 4.5 km expressway was designed to link the port of Salvador to the BR-324 highway, reducing access time to the port and removing a significant proportion of heavy freight vehicles from the city centre.

The project includes ten traffic lanes: six for urban traffic and four for freight vehicles only.

There are also three tunnels, eighteen flyovers, two footbridges, bicycle paths and walkways.

Terra Armada's polyvalence: an asset

The main contractor for the project contracted Terra Armada (Brazil) for design and supply of formwork and materials, plus full time technical assistance for the twenty TerraClass® structures, totalling 19,030 m² of wall surface. Most of these structures, some reaching 12 m in height, were designed to support the access ramps for the eighteen flyovers. This major project, completed in 23 months, required over 195,000 linear metres of high adherence

steel reinforcing strips.

On this same project Terra Armada carried out most of the post-tensioning services. In just under 22 months, over 525 tonnes of strands and anchors were installed and post-tensioned in more than 200 prefabricated beams.

A crucial axis for urban mobility

At the inauguration ceremony, Brazilian President Ms Dilma Rousseff declared that this important urban mobility project, co-financed by the Federal Government of Brazil and State Government of Bahia, "will benefit the whole city transport network" and that will mean "more competition, better working conditions and improvements for the population of Salvador".

525 tonnes

It is the amount of strands and anchors that Terra Armada installed and post-tensioned in more than 200 prefabricated beams.



➤ The expressway is fitted by twenty structures in TerraClass® walls, totaling 19,030 m².

The partners

- Client: CONDER - Companhia de Desenvolvimento Urbano do Estado da Bahia - Urban Development Company of the State of Bahia & DNIT - Departamento Nacional de Infraestrutura de Transportes - Federal Transport Department
- Design: Geometric Design: APT Engenharia Structural Design: JMB Engenheiros Associados
- Main contractor: Construtora OAS Ltd
- Specialized contractor: Terra Armada Ltda



CRISTIANO RODRIGUES,
MANAGING DIRECTOR OF TERRA ARMADA LTDA (REINFORCED EARTH IN BRAZIL)

“Working in this important project, allowed us to develop the spirit of «Resonance», providing both: the Reinforced Earth® solutions for access ramps, and prestressing services for the flyover structures.”

More about
our Roads & Motorways
applications.






















Applications

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APPLICATIONS

The techniques developed by the Terre Armée group are particularly suited to many achievements. The various applications of our techniques are the following:

-  Airports
-  Bridges
-  Construction materials
-  Dams & Reservoirs
-  Energy
-  Environmental
-  Industry
-  Land development & Building
-  Military
-  Mining & Minerals
-  Ports & Coastal works
-  Railways
-  Rivers & Waterways
-  Roads & Motorways
-  Sports & Leisure
-  Waste management
-  Water management



ENLARGED AND CONSOLIDATED RUNWAYS TO ACCOMMODATE LARGER AIRCRAFT

To keep pace with the phenomenal increase in traffic at Fort Lauderdale Airport (FLL) in Florida, now amounting to over 22 million passengers a year, Broward County Aviation Department launched a massive expansion project comprising enlargement and extension of the south runway and the construction of new runways extending over US Highway 1 and the existing railroad.



22 million passengers

Fort Lauderdale airport annual attendance has grown exponentially and it hosts an annual average of more than 22 million passengers. This explains the significant investments in a major expansion project.

46,000

The number of square metres of Reinforced Earth® walls that the Reinforced Earth Company USA (RECo) designed and supplied for Fort Lauderdale International Airport expansion project.

More about our Airports applications.



A huge project and weight constraints

For the project to be feasible, the ground level at the eastern edge of the site had to be raised by 18 m. Given constraints associated with the significant load exerted by aircraft, a major ground improvement programme preceded installation of backfill. The choice of contractor was based largely on the proven performance of tall Reinforced Earth® walls. Reinforced Earth Company (RECo) won the contract for the design and supply of over 46,000 m² of 19 m high Reinforced Earth® walls and 7,000 m² of GeoTrel® facing 14 m in height. The main runway wall, which only took four months to build, is now the largest ever single wall constructed in Florida totalling 14,950 m² and with a live load surcharge of 630 KN/m².

Innovative and tailored solutions

Given exceptionally high load at aircraft landing and take-off, special provisions

were taken when designing the walls and runways. «High adherence» (ribbed) reinforcements, known to be high performing, are used on the tall walls so that the structures can bear the heavy stresses exerted by large aircraft such as the Airbus A380 and Boeing 747-8. Use of thicker reinforcing strips (6 mm rather than the usual 4 mm) enabled RECo to reduce their quantity by 35% and so improve on completion time.

Precise clocking to meet deadlines

Thanks to the use of prefabricated parts, RECo was able to stay ahead of the tight deadlines imposed by the general contractor throughout the project with a weekly supply of 1115 m² of facing product and 80 tonnes of reinforcement bars. The project, launched in October 2012, was completed in mid-2014.

The main runway wall

The main runway wall, which only took four months to build, is now the largest single wall ever constructed in Florida totalling 14,950 m² and with a live load surcharge of 630 KN/m².

The partners

- General Contractor: Odebrecht CFE Joint Venture
- Subcontractor for reinforced walls: DANE Construction
- Design and supply of Reinforced Earth® walls: The Reinforced Earth Company (RECo USA)
- Ground improvements design: Hayward Baker
- Engineering: Atkins
- Designer: RS & H

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CONSTRUCTION OF A REINFORCED EARTH® SEAWALL IN CANADA

Situated in eastern Canada, the Gulf of St Lawrence opens onto the Atlantic Ocean. In the county of Sept-Rivières in the Northeast of Quebec province, the town of Port-Cartier, 640 km from Quebec City and on the north shore of the St Lawrence river, launched a waterfront improvements program to attract shoreline residents and visitors to the town.

Renovation against all odds

As part of the project Reinforced Earth Canada (RECo) was contacted to renovate a timber jetty supporting a walkway and cycle path alongside the Rivière aux Rochers park. The former timber structure and walkway/cycle path were to be replaced by a seawall and riverside park.

This project, performed under difficult climatic conditions (water level variations of around 2.25 m due to the tides, hydraulic load, submerged walls, the river current alongside the walls, exposure to wind) and in a marine environment (salt water) presented a real challenge for our teams.

A first in Canada

To meet the various constraints, RECo Canada constructed 1017 m² of 3.5 m high Reinforced Earth walls using TerraClass® facing together with 4 m long GeoStrap® reinforcing strips via the intermediary of GeoMega® connectors. This was the first use of this system in a marine environment in Canada. Large rocks already present on the site served as foundation material. For drainage, a filter backfill was used combined with a suitable geotextile. Reduced water pressure was achieved thanks to the use of draining backfill enabling rapid run-off as the water rises. 20 mm joints between panels ensure the draining capacity of the reinforced backfill.

In addition and to ensure protection

against erosion, our teams embedded the base of the wall 1 metre more than the norm. To meet the very tight timescale for this project, our teams worked 24/7 during two weeks.

Success thanks to a suitable planning

RECo Canada rose to the challenge thanks to innovative design appropriate for submerged structures in a saline environment, provision of a drainage and erosion protection system and a production schedule taking account of climatic constraints.

The partners

- Client: Ville de Port Cartier
- Engineering: Axor Experts-Conseils Inc.
- General Contractor: Construction Polaris Inc.
- Wall construction: Les Entreprises P.N.P. Company



First marine application of GeoMega® system in Canada: 1,017 m² of 3.5m high Reinforced Earth® walls using TerraClass® facing together with 4 m long GeoStrap® reinforcing strips via the intermediary of GeoMega® connectors.



More about
our Ports & Coastal
works applications.





JOHN SANKEY, ENGINEERING MANAGER OF THE TERRE ARMÉE GROUP

Engineering at Terre Armée, a true asset

Engineering represents a mission-critical activity at Terre Armée. Driven by its dedicated teams, the company can deliver a highly specific response to its customers' requirements worldwide. John Sankey, Engineering Manager of the Terre Armée Group, provides an insight into the activity.

Terre Armée Magazine: Based on your experience, what is the role of engineering in a group such as Terre Armée?

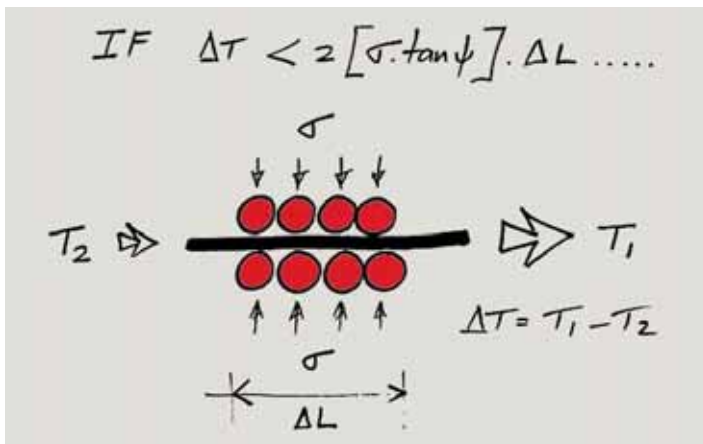
John Sankey: Engineering at Terre Armée could be compared to Haute-Couture, meaning that we deliver specific high-quality and customized solutions that are geared towards the customer's requirements. Engineering is the "glue" that bonds sales and operations. Whether in San Francisco, Dubai or Singapore, no two projects will ever be alike. Each contract has its own list of specifications, meaning that the project will be unique. We are a company that prides itself on construction solutions that include reinforced backfill structures, precast arches, sound walls and anchored precast panel systems. All of these solutions are available for a wide range of applications. This is where engineering is required, so that systems can be tailored to the constraints specific to those applications, whether retaining walls in the transport industry, bridge abutments, mining structures, tunnels or dams, to name but a few. Most of our technologies occupy niche areas that generally need to associate elements of civil, structural and geotechnical engineering design capabilities.

T.A.M: How do you operate?

J.S: Terre Armée's strength lies in its dedicated teams which, for each project around the world, will carry out all the technical studies required to provide best-fit and innovative solutions. Each project is therefore perceived and pursued as a challenge.

T.A.M: Can you mention projects in which our engineering proved to be the key factor?

J.S: The examples that especially come to mind include the research aimed at showing negligible effects in Reinforced Earth® walls from vibrations for a high-speed train in Poitiers, France, customizing mining structures to support high equipment loads in Canada and Australia, and the provision of intermediate reinforcements for strict vertical facing tolerances in tall mine dump walls located in the mountains of Chile. Within Soletanche Freyssinet, the need for engineering has proven particularly important for the Group's companies when integrating technologies with one another. For instance, in New Jersey, USA, Reinforced Earth® walls combined with ground improvement techniques based on Menard's Controlled Modulus Column system have proven to save money and time over traditional solutions. Cooperation between the engineering departments of Terre Armée and Menard has generated other project opportunities for both companies in a combination unique to us. /



The year

More about
our History.



1963

Patenting of Reinforced Earth®

While playing with his children on a beach on the island of Porquerolles (France) in the late 1950s, Henri Vidal, architect graduate of the Ecole Polytechnique and Ecole Nationale des Ponts et Chaussées, had the idea of using pine needles and sand to improve the strength of sand structures. This experience marked the start of five years of research culminating in the filing of a patent application for Reinforced Earth® in 1963. There followed construction of the first structure in 1964 and subsequent exponential growth resulting in installation of Reinforced Earth® structures throughout the world.

Around the world...

...In Germany

At the Frankfurt Motor Show, Porsche presented its 901 model which, following a complaint by Peugeot, later became the 911. Right from its launch the 911 was a commercial success and notched up numerous race successes. Over 50 years after its launch, this car is still the brand's most iconic model.

...In the UK

On 22 March 1963 the Beatles released their first album: Please Please Me. The album contained fourteen songs for the most part recorded in February 1963 at EMI's Abbey Road studios. This release marked the start of the band's extraordinary career and they rapidly became known and idolized worldwide.



The Soletanche Freyssinet Group



SOLETANCHE FREYSSINET



The Soletanche Freyssinet Group, the global leader in the soil, structural engineering and nuclear sectors, brings together an unrivalled set of skills in the specialist civil engineering industry. In almost one hundred countries, its 19,000 employees offer clients their ability to design and implement solutions that meet the specific requirements of each project, however large or complex.

19,000 employees 80 countries 5 companies



FREYSSINET



THE CONSTANTINE VIADUCT, THE SECOND AFRICAN CABLE-STAYED BRIDGE

The closing operation for the "eighth wonder" of the city of Constantine in Algeria was completed on Thursday 29 May 2014 after 18 months of concurrent work on four fronts including three balanced cantilevers and a cast-in-place span, on a 24/7 work schedule. This 1,150m long structure crosses the Rhumel and is supported by a single central plane of 64 Freyssinet stay cables. Freyssinet also supplied and provided technical assistance for installation of the 367 tonnes of longitudinal and transverse prestressing. Located in an earthquake risk zone, the bridge is designed and produced to withstand major earthquakes and to adapt to large variations in temperature (approximately 60°C).



MENARD

VANCOUVER AIRPORT (CANADA)

To cope with steadily increasing air traffic, the Vancouver International Airport (YVR) launched two major developments in 2013 that called for additional work by the Canadian subsidiaries of Menard (Geopac) and Soletanche Bachy (Agra Foundations). In the first project to extend the international terminal, Agra Foundations installed Franki type driven piles to support the building structure and Geopac densified the soil by means of vibrodensification using the wet method with the addition of ballast. Geopac then treated the soil under the Templeton outlet centre, similarly at risk of liquefaction, using the same densification method.



NUVIA

HEAD END STACK DECOMMISSIONING - SELLAFIELD

Nuvia Limited is responsible for the delivery of a complex and technically challenging project, to remove a 60m stack, which sits on top of the UK's first fuel reprocessing plant situated at the centre of the Sellafield nuclear site. The stack was constructed in the 1950s as part of the early UK nuclear industry and has been earmarked for demolition as part of Sellafield's ongoing hazard reduction programme. The stack's location makes the demolition work particularly challenging. The constrained nature of the site and ongoing nuclear operations in adjacent facilities makes conventional demolition unfeasible. The Nuvia UK team has developed a unique self-climbing platform system which will rise up the external wall of the stack, providing access for operators to undertake phased deconstruction using a bespoke diamond wire cutting system.



SOLETANCHE BACHY



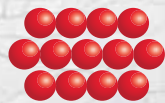
HONG KONG: EXPRESS RAIL LINK

In 2017, a high-speed rail line will connect Hong Kong and Guangzhou in 48 minutes.

As part of the Hong Kong side of the project, Bachy Soletanche Group Limited, within a consortium, is building a 300 metre long cut-and-cover tunnel. The main difficulty lies with the crossing of the existing metro line. This imposes a very specific sequence of works and limits the allowable settlement and displacements. To minimise movement of the line in service, the existing barrettes will be used as the foundation of the new structure. The load transfer from the old to the new structure – a delicate operation – is carried out in cooperation with Soletanche Bachy's sister company Freyssinet Hong Kong.



Walsh River - Canada



TERRE ARMÉE
SUSTAINABLE TECHNOLOGY

Railways
Roads & Motorways
Bridges
Airports

Dams & Reservoirs
Ports & Coastal Works
Rivers & Waterways
Water Management

Industry
Energy
Mining
Military



Ehime road - Shikoku Island, Japan

Terre Armée
Since 1968

50

The original

Prado Dam - California, USA



www.terre-armee.com

Coal Slot Dorstfontein - South Africa



Photo Credits: Solmanche Freyssinet Photo Gallery - 2013

➤ **REINFORCED EARTH AT THE 18TH INTERNATIONAL CONGRESS ON SOILS MECHANICS & GEOTECHNICS**

Advertisement published in the guide of the 18th International Congress on Soils Mechanics & Geotechnics, held in Paris from September 2nd to 5th, 2013.