

REINFORCED EARTH

SUSTAINABLE
TECHNOLOGY

 JFE SHOJI TERRE ONE CORPORATION



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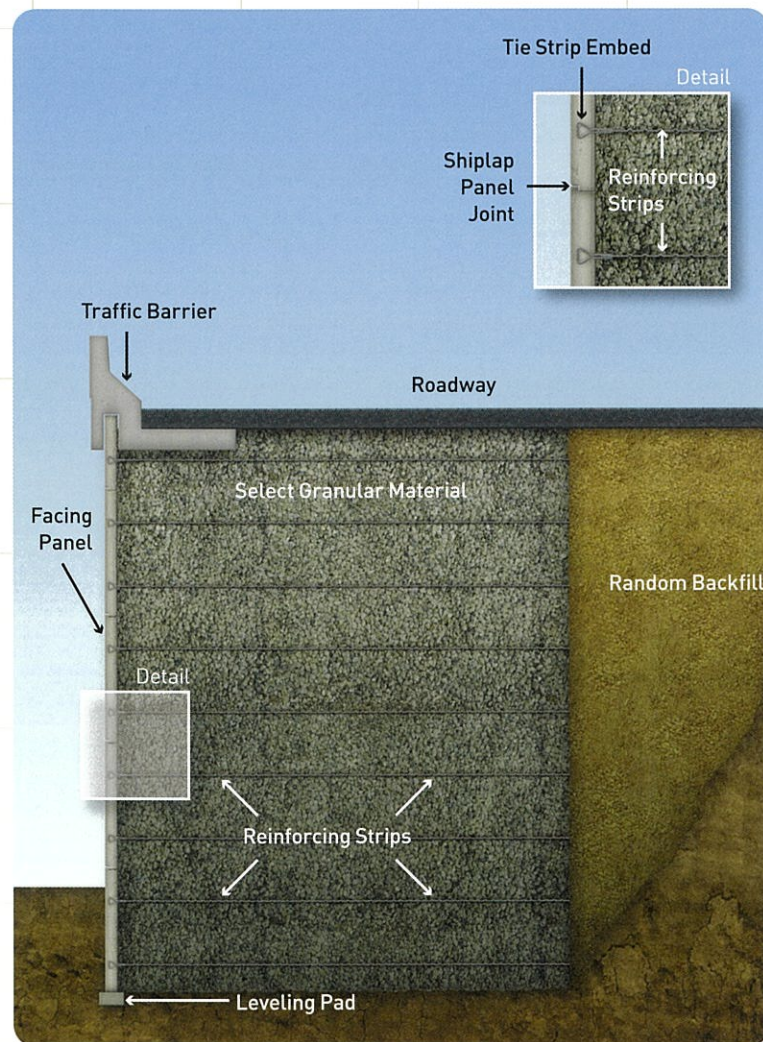
Technology

Reinforced Earth® retaining structures are an economical way to meet ordinary and extraordinary earth retention and load support needs for highways and bridges, railroads and mass transit systems, waterfronts, airports, loading docks, industrial and mining facilities and commercial and residential developments. Each wall is a custom-engineered by JFE SHOJI TERRE ONE CORPORATION (TA-1) to project-specific requirements including applied loading, foundation conditions, and aesthetics.

The key components of a Reinforced Earth wall are galvanized steel high adherence reinforcing strips, granular backfill and precast concrete facing panels. The frictional bond between the backfill and the reinforcements is permanent and predictable and there is a reliable mechanical connection between reinforcements and facing panels. Reinforced Earth is a unique, composite construction material having great strength and stability, a limited footprint and the ability to distribute loads uniformly, even on poor foundation soils.

The connection between Reinforced Earth facing panels and reinforcements is achieved by way of a special tie strip embed and high strength nut/bolt/washer assembly. Exceeding the requirements of Standard major international and other specifications, the connection is stronger than the soil reinforcement it is connecting. Metal loss at the connection is minimized due the sandwiching of the reinforcing strip within the tie strip, limiting exposure of the interior surfaces of the connection. And with the bolt hole diameter only 1mm larger than the bolt, panel misalignment due to connection free-play is restricted, making construction alignment simple and predictable.

The inherent strength and flexibility of the Reinforced Earth wall system gives owners, engineers and contractors a powerful way to find structural, geotechnical and economic solutions for projects of all types, sizes and complexities. And by working with TA-1, customers can reduce uncertainty and improve their bottom line.



Reinforced Earth Wall Typical Section

Experience the engineering excellence, the architectural creativity, and the unyielding focus on quality and customer support that we bring to every project.

Make Your Next Project a Success by Selecting Reinforced Earth.

The Value of Experience

TA-1 has completed over 50,000,000 m² in Japan, building a reputation for engineering excellence, architectural creativity, and an unyielding focus on quality and customer support. With over 40 years of experience, TA-1 brings structural, geotechnical and economic value to projects of all types, sizes and complexities. Our experienced team of regional managers, engineers, and project managers is committed to finding the most practical and economical solutions for your projects large and small, simple and complex.

We work with owners, consultants and contractors to provide a full range of professional services at every stage of your project:

Conception and Feasibility

We'll meet to discuss concepts, options and budget. Our extensive experience and creativity takes us beyond the obvious answers to find the best solutions for each situation. We can also suggest specifications, construction methodologies and aesthetic treatments to help you achieve your project goals.

Procurement

During the procurement phase we can produce a preliminary design that provides more detail on how TA-1's solution will be applied. Drawings, quantity estimates and firm pricing can also be provided.

Design

Professional engineering is our strength and your benefit. Upon contract award, you will see the value of our experience as we prepare appropriately detailed and professionally sealed drawings, calculations and, if needed, specifications. These documents will not only help you to obtain pre-construction approvals, but also will guide you in the construction process.

Material Fabrication

Once we have client approval, the manufacture of specialized Reinforced Earth materials can begin. Materials are fabricated at manufacturing facilities that are approved and monitored by TA-1 and, in many cases, have years of experience producing our products. This work is performed under quality-controlled conditions to ensure conformance to project specifications.

Construction

Manufactured materials are scheduled to arrive at the jobsite either just in time for installation or on a convenient schedule for onsite storage. A TA-1 project manager coordinates these material deliveries and assists with on-site construction advice. You will also receive our Construction and Quality Control Procedures Manual and our construction procedures video, *Constructing Strength*, for reference throughout the project.



Applications

Reinforced Earth MSE walls are economical gravity structures having high strength, a limited footprint, the flexibility to distribute loads evenly, and a wide variety of creative architectural finishes. Owners, engineers, and architects save money, time and space by using Reinforced Earth technology in all forms of transportation construction, as well as for industrial, waterway, commercial, public and even blast-protective structures. The benefits of Reinforced Earth structures are especially evident on projects with challenging design conditions such as very large structural loads, extreme height, restricted space, obstructions within the MSE soil mass, poor foundation soils, high or variable water level and seismic loading. With more than 50,000,000m² Reinforced Earth structures constructed in the Japan since 1973, the applicability of this technology to a broad range of technical and economic challenges is unmistakable.

Highways & Roads

Highway retaining walls are constructed to address many design problems and Reinforced Earth MSE walls are almost always the perfect solution. There are simple ramps and complex grade separations at interchanges. Many cuts and fills are needed within highway rights-of-way, between highways and adjacent properties, or along rugged terrain. And there are challenging landslide repairs on mountain slopes. Reinforced Earth walls along highways and local roads frequently include structurally-integrated traffic barriers and a standard or customized architectural finish, adding beauty to functionality.



Bridges

Bridge abutments are considered critical structures and the unique strength and load distribution capabilities of Reinforced Earth address that criticality in an economical and structurally efficient way. For many bridges, a spread footing bridge seat can be supported directly on the reinforced soil, thus eliminating the piles. When piles are necessary, they are easily fitted between the reinforcing strips or the strips can be pivoted to clear the piles, resulting in a simple retaining wall surrounding the abutment structure. In both configurations, the shallow foundation depth typical of Reinforced Earth structures and the limited use of cast-in-place concrete lead to significant time and cost savings.



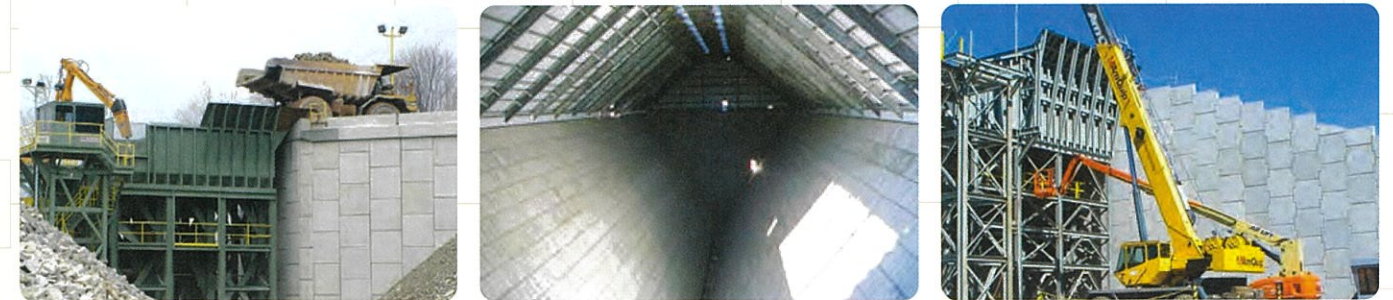
Railway Structures

Reinforced Earth technology is ideally suited for support of track bed, bridge and trestle abutments, for earth retention structures adjacent to rights of way, and for deflector walls to protect bridge piers from impact in the event of a derailment. The load-carrying capacity and resistance to both vibration and stray currents make Reinforced Earth a preferred solution for use on light and heavy rail transit systems and for freight, passenger and high speed railway projects.



Industrial

Industrial projects often require loading ramps and truck dump headwalls which are subjected to extremely high loads. Reinforced Earth meets these needs at mines, power plants and manufacturing facilities. "Slot" or "glory hole" bulk material storage facilities, having a "V" or a conical shape, respectively, are made of special sloping panels to provide live, gravity-retrievable storage of material such as coal. Traditional retaining walls and bridge abutments are also found on industrial projects as part of general site development and roadway systems.



Waterways & Dams

Reinforced Earth walls are often used along coastal highways and riverbanks, for docks, sea walls, dams and spillways. Flooding, tides, impounded water and rapid water level drawdown all create complex hydraulic loading conditions that benefit from the open facing joints and free-draining backfill characteristics of Reinforced Earth structures. In addition, the precast facing panels can move slightly relative to each other, giving the wall system flexibility, resiliency, and the ability to resist storm-driven waves, debris and even pack ice.



Protective Structures

Reinforced Earth technology is a proven and cost-effective solution for protective structures. Tested against both US DOD and industrial standards, Reinforced Earth walls have a demonstrated ability to deflect or control explosive blasts and to resist thermal excursions of over 2200°F. They are used for ammunition storage magazines and igloos on military bases, as well as to provide secondary containment walls surrounding oil and liquid natural gas storage tanks.



Commercial and Public Facilities

Reinforced Earth walls are constructed to support buildings and garages, to create access or provide a safety runway, and to relieve earth pressure or other loads that would be applied to buildings. Commercial and public facilities such as airports, hospitals, apartment buildings, hotels, manufacturing facilities and department stores have all benefited from the strength, economy space saving and aesthetic benefits of Reinforced Earth technology.



Construction

Construction of a Reinforced Earth structure begins with delivery of pre-manufactured components – panels, reinforcements, fasteners and joint materials.

Rapid

A crew of four plus an equipment operator can install 20-40 sq.m of wall per day, including backfill placement and compaction.

Simple

Pour an unreinforced concrete leveling pad. Set panels (brace bottom row only), place and compact backfill, attach reinforcements, place and compact more backfill. Repeat these four steps to top of wall. Finish by adding coping, barrier or other top-out feature.

Predictable

Manufactured materials are easy to handle, crew size is small, and construction processes can continue year-round in many regions. Building a Reinforced Earth wall uses repetitive processes so crews can learn quickly and erect the wall as fast as backfill supply and placement allows. A predictable bottom line is the ultimate benefit of Reinforced Earth construction.



Steel Reinforcements

The strength and stability of a Reinforced Earth structure derives from the frictional interaction between linear metallic reinforcements and granular backfill, producing a permanent and predictable bond and a unique composite construction material. By offering three reinforcement types, JFE SHOJI TERRE ONE CORPORATION can customize each client's project for maximum structural efficiency and lowest cost.



High Adherence Reinforcing Strips

High adherence reinforcing strips are hot-dip galvanized steel strips with ribs perpendicular to their long axis and a single bolt hole at one end. The strips are structurally connected to the galvanized tie strip embeds in the facing panels using a high strength nut/bolt/washer assembly. Advantages of high adherence reinforcing strips include their high tensile strength, high pullout resistance, and their ability to rotate in the horizontal plane to clear obstructions such as bridge abutment piles and drainage structures. The sandwiching of the reinforcing strip within the tie strip limits exposure of the interior surfaces of the connection, minimizing metal loss due to corrosion.

Architectural

TA-1 offers several standard precast panel shapes and sizes to meet the structural and aesthetic needs of most projects. Our cruciform and square panels are nominally 1.5m by 1.5m. Custom panel sizes may be possible in certain circumstances.

Panels are erected in an offset alternate pattern, automatically creating a distinctive and pleasing appearance in every Reinforced Earth wall. You can further enhance the beauty of your structure by using one of our many standard architectural form liners, or we can customize a liner pattern to meet your needs. Several examples are shown here, but contact us for more information about the architectural result you desire.



Square - Custom Brick



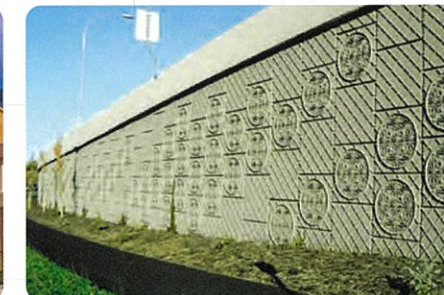
Cruciform - Ashlar Stone



Rectangular - Smooth/Fractured Fin



Rectangular - Custom Mural



Square - Custom Lattice



Cruciform - Raised Relief



Cruciform - Fractured Granite



Rectangular - Ashlar/Fractured Fin



Square - Fractured Fin



Square - Custom



Cruciform - Custom Mural



Rectangular - American Flag Mural