RECO NEWS
VOLUME 4: ISSUE 4
The Reinforced Earth Company

# A New *SLANT* on Reinforced Earth Walls

When the New Mexico Department of Transportation (NMDOT) planned improvements to US 84/285, just north of Santa Fe, they faced the challenge of widening the roadway while preserving a number of small hills along the adjacent right-of-way. The Department ultimately decided to construct a series of individual and terraced Mechanically Stabilized Earth (MSE) walls to retain these small land formations. The terraced walls were planned to avoid the imposing appearance of one tall vertical wall facing the roadway. The complicated geometry of the terraced structures required the NMDOT Foundation Engineer, Mr. Bob Meyers, to evaluate global stability and specify minimum soil reinforcement lengths for each terrace.

The Owner's consultant engineer, Parsons Brinkerhoff, also faced the challenge of bringing an aesthetic appeal to the face of the panels. Since the Santa Fe area is widely recognized as an artistic community – one with strong Native American influences – it was decided to contract a local artist, Federico Vigil, to create images of native wildlife to be depicted on the panels.

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## What's inside

## A New *SLANT* on Reinforced Earth Walls

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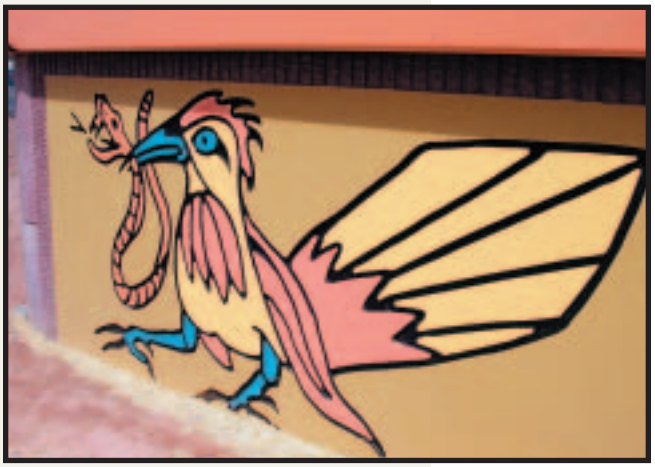
Before completing final design drawings, The Reinforced Earth Company (RECo) offered two significant modifications that were accepted as improvements by both the Owner and the General Contractor – FNF Construction. First, the precast panel system was converted from the usual stacked arrangement to a full-height panel system. Full-height panels should be used with caution at taller heights, but since all walls and terraces were a constant height of only 10 feet (3 m) their use was a reasonable extension of MSE technology. A panel length of 8 LF (2.5 m) was used with the exception of the artwork panels, which were 16 LF (5 m). As a result, Mr. Meyers favored full-height panels because they eliminated the risk of developing a crack in the artwork panels that would have otherwise spanned the vertical joint between the two panels below it.

The other modification was the utilization of sloped leveling pads throughout the project. This was feasible because the top of wall profile was parallel to the adjacent roadway at the front face of each wall. By employing this change, a multitude of steps in the leveling pad was eliminated. Furthermore, the panel area furnished was minimized and as an unexpected benefit, the sloped leveling pad allowed the wildlife on the panels to be positioned in a natural position parallel to the adjacent roadway. This presented an improvement over the original configuration where the wildlife panels would look awkward in a true horizontal position, while the adjacent roadway was descending at a 4% to 6% grade.

**Each wall is parallel to the adjacent roadway slope.**



**Black outline of wildlife image is recessed 1" into the concrete.**

Finally, the successful execution of this project can also be credited to the precaster, Mr. Rich Castillo of Castillo Ready Mix in Belen, New Mexico. Rich used automated design and manufacturing techniques to form the blockouts necessary to create the wildlife images. The quality of his work will be viewed by millions of travelers who will recognize it as artwork that is distinctive of Santa Fe, New Mexico.

# Curved Walls Add to Architectural Appeal of RECo Walls

The structure shown in the adjacent photo has several curved segments. A serpentine wall was used to enhance the look of the structure, but also to follow the contour of the traffic circle interchange and feeder roads above. The centre wall segment has a 35 m (115 ft) concave curve which transitions into a convex radius of 35 m (115 ft) on the lower right hand side. The wall at the top right of the photo has a convex radius of only 15 m (49 ft). The average total wall height is 12 m (39 ft).

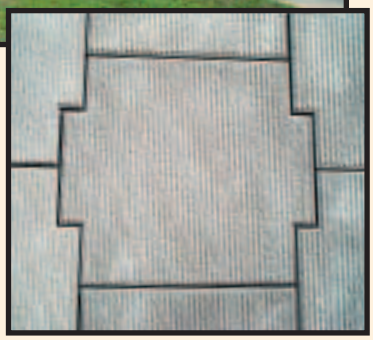
The minimum radius for a curved wall is 20 m (66 ft) without modification to the concrete panels. For a radius of less than 20 m (66 ft), panels must be modified to achieve the small curve. A radius as small as 9 m (30 ft) can be achieved if required for technical reasons, but it may result in less aesthetically pleasing joints.

Individual panels form the chords of the curve, with the wings of the panels acting as the point of rotation. The staggered arrangement between adjacent columns assist to disguise the chord arrangement and provides a smooth transition between adjacent panels, which when observed from even a slight distance away, appears as a smooth curve.

When curved walls are used in combination with architectural finishes and a few landscaping additions, the appearance of large structural walls can be greatly enhanced for integration into municipal and residential settings.

# Reinforced Earth® Selected for City of Saskatoon Interchange

**The City of Saskatoon completed a major interchange at Circle Drive and 22nd Street that included 10 Mechanically Stabilized Earth (MSE) retaining walls forming abutments for 5 bridges and additional ramp structures. Reinforced Earth Company Ltd. (RECo) was the awarded MSE wall design and supply.**



The total area of precast concrete retaining walls, over 4,000 $m^2$ (43,000 $ft^2$), serve as "false bridge abutments" since the bridge seats are supported on piles. The interchange retaining walls were specified with a "fractured fin" architectural relief finish. In addition, RECo TerraTrel wire facing retaining walls were also used in the design to take the soil loading behind the bridge pile caps.

Murray Totland, P. Eng., City Municipal Engineering Manager indicated that the MSE walls were incorporated into the design to reduce the effective bridge spans (resulting in project cost savings), and an MSE system worked well with the integral abutment design. Three systems of MSE wall were prequalified, and the RECo package was selected by the General Contractor - Graham Industrial Services Ltd. Totland added the fractured fin raised panel finish was selected over a smooth panel to provide some architectural enhancement to the finished structure and has acted to effectively deter graffiti since the project was completed in 2002. For the design team, the complete engineered product by RECo was a welcome addition to the project by providing a turnkey solution to the abutments, which accommodate 5 overpasses and the associated roadworks in a relatively congested area.

The site foundation material conditions were typically a variable layer of fill or clay overlying competent clay till. The maximum wall height was 6.9 m (23 ft). Also, for aesthetic appearance the walls were built on a 1 to 12 slope back into the fill to add a pleasing dimension to the highly visible walls in a municipal setting . The project schedule was compressed for the amount of work to be completed during the summer construction season. Construction was carried out between June and September, with a peak panels erection rate of 70 panels/day, 150 $m^2$/day (1,615 $ft^2$). Fast delivery and erection of the Reco components allowed the earthwork and on site concrete to proceed during the most favorable months of a short summer.

The companies contributing to the success of this project, owned by the City of Saskatoon, included- Prime Consultant – Stantec Consulting Ltd, Geotechnical Consultant – AMEC Earth and Environmental Ltd., General Contractor – Graham Industrial Services Ltd, Designer and Supplier of Retaining Walls – Reinforced Earth Company Ltd, MSE panel precaster – Con-Force Structures Ltd.

## International Corner


# CHILE-A 140 m long wall for Copper Mine

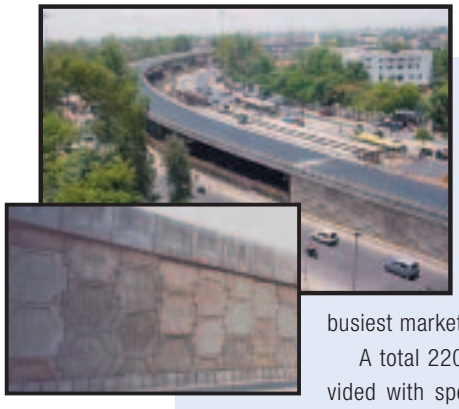
The Chuquicamata copper mine on the west slope of the Andes Range, 250 km (155 mi) to the North-East of Antofagasta, is one of the largest copper mines in the world. Tierra Armada SA, Reinforced Earth's Spanish sister company, designed, supplied and provided technical assistance for a 140 m (460 ft) long, 9 m (30 ft) maximum height Reinforced Earth wall with a total area of 868 $m^2$ (9,343 $ft^2$). Wall construction, which included a railway crossing an existing high slope, was completed in less than two months.

# 4,000 m² of TerraTrel

Terre Armée, Reinforced Earth's sister company in France provided design, materials supply and technical field services for the construction of a 4,000 $m^2$ (43,000 $ft^2$) TerraTrel structure. The wall included a quarry rock facing façade behind the hot dipped galvanized wire mesh panels. Pilasters were incorporated into the design to support handrails and safety rail for pedestrians along the top of the wall.

This long approach and retaining wall in the town of Montpellier (Herault Department) forms part of the construction of a link between a boulevard and a roundabout. The structure has maximum height of 9 m (30 ft).

# Lajpatnager flyover, New Delhi, India



Aimil Limited, the licensee of Terre Armée in India, was recently engaged with the design and construction of Reinforced Earth walls for the 1.2 km (0.8 mi) long Lajpat Nagar overpass on the arterial ring road in New Delhi. The consultants for the project were L&T-Ramboll, under the aegis of Delhi Travel and Tourism Development Corporation (DTTDC), as the clients. The project involves the construction of Terraclass approach walls to the overpass bridge in one of the busiest market locations of the city.

A total 2200 $m^2$ (23,700 $ft^2$) of Reinforced Earth panels were provided with special aesthetic finish of a depressed hexagonal shape with four vertical serrations and DTTDC logo at periodic intervals. Slag cement was used to enhance the surface finish and texture.

The Reinforced Earth portion of the project is completed, and one side of the carriageway is open to traffic. The flyover will be fully operational by December 2004.

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### United States
**The Reinforced Earth Company**

8614 Westwood Center Drive
Suite 1100
Vienna, Virginia
22182-2233
Tel.: 1-800-446-5700
Fax.: 703-821-1815

www.reinforcedearth.com

- Atlanta (770) 242-9415
- Boston (978) 664-2830
- Chicago (630) 898-3334
- Dallas/Ft. Worth (817) 283-5503
- Lake Forest, CA (949) 587-3060
- Orlando (407) 240-3257
- Seattle (425) 391-0111
- Vienna, VA (703) 821-1175

### Canada
**Reinforced Earth Company Ltd.**

1550 Enterprise Road
Suite 229
Mississauga, Ontario
L4W 4P4
Tel.: 1-800-263-7097
Fax.: 905-564-2609

www.reinforcedearth.ca

- Edmonton AB (780) 453-8983
- Montreal PQ (450) 466-6566
- Toronto ON (905) 564-0896
- Truro NS (902) 897-0982
- Vancouver BC (604) 714-0766