RECO NEWS
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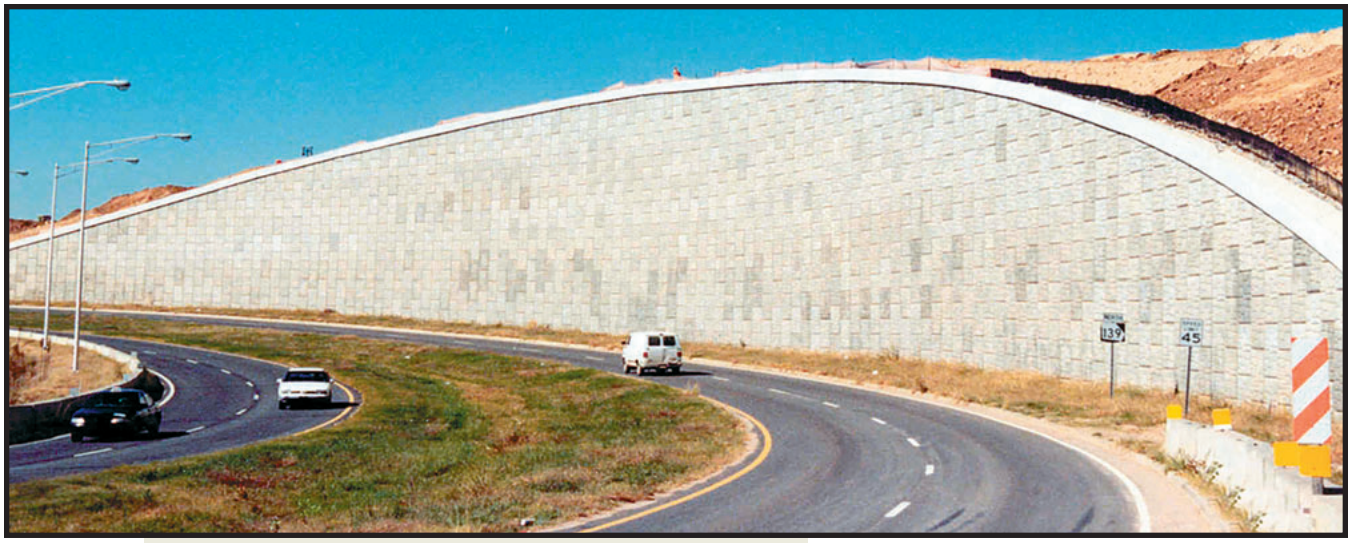
The Reinforced Earth Company

The Great Wall of Atlanta-Hartsfield International Airport



Completed wall during fill construction

Hartsfield-Jackson International Airport in Atlanta Georgia, is recognized as the busiest airport in North America, handling more than 76 million passengers annually, with a projected growth of 121 million by 2015. An additional fifth runway was required as a result of this projected growth. The City of Atlanta Department of Aviation approved this expansion requiring the placement of 21 million m^3 of fill.

Two existing roads that ran directly through the footprint of the proposed runway and aircraft safety zone had to be relocated. To accommodate the road relocation and runway construction, a Mechanically Stabilized Earth (MSE) retaining wall was required to support the 21m high embankment and the surcharge loading of aircraft. The resulting structure is 230 m long and 18 m high at its highest point and sloping uniformly downward from its apex. In plan, the wall has a 200 m radius.

The foundation was undercut to a depth of 3.6 m below the leveling pad and replaced with shot-rock to obtain adequate bearing capacity to support the loads of the retaining wall structure along with a surcharge imposed on top to account for aircraft loading.

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What's inside

The Great Wall

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Although the project specifications required the walls to be designed for a 600 mm traffic surcharge, it was Reinforced Earth's recommendation to design the walls with a temporary 3 m surcharge in the event an airplane left the runway and ended near the edge of the safety-zone. This recommendation was based on an extensive review of the overall project plans and RECo's vast experience with similar projects of this type.

Another design concern for the retaining wall was the anticipated settlement, expected to be in the range of 125-450 mm. The actual wall settlements varied from 75-600 mm. Due to the ability of RECo walls to accept large amounts of settlement without creating distress to the structure, RECo was able to adopt two 30-day waiting periods to allow the foundation soils to settle at a more controlled rate. At the end of the second waiting period, RECo was then able to re-design the top panels to the proper elevation.

The general contractor, 5R Constructors of Atlanta Georgia, selected for the $350 million section of Atlanta's capital improvement project chose RECo to provide the design and components for estimated 6300 m^2 of retaining wall products in this phase of the 5.4 billion dollar improvement project. The erection services were carried out in record time and ahead of schedule by M.C., Inc., of Peachtree City, Georgia.

Making the connection? Make it a bolted connection

The main components of an MSE wall are soil and soil reinforcement. It has been proven by strain gauge monitoring of actual structures that the tension at the connection between the facing and reinforcement can reach 100% of the maximum tension from mid-height to the base of an MSE structure. From the top of the wall to mid-height it is 85%. In addition to stress from static earth pressure, effects of earthquakes, heavy trains, frost and differential settlements can place added stress on the connection.

RECo has long maintained the approach used by designers for structural steel, that the connection must be stronger than the members it is connecting. The following design checks are carried out on the connection with our precast panels:

- Shear resistance of concrete against pullout of tie strip connector.
- Tensile resistance of galvanized structural steel plates of tie strip connector.
- Shear strength of A325 galvanized structural steel bolt.

All of the above checks are carried out to confirm that the connection is stronger than the soil tensile member it is connecting.

With the bolt hole diameter only 1mm larger than the bolt, panel misalignment due to connection free-play is restricted, making construction alignment easy. This also reduces metal loss considerations. Providing a reliable connection between the soil reinforcing and the concrete facing ensures a dependable connection during regular service life and earthquakes.

Reinforced Earth supports the gateway to Nova Scotia's Cabot Trail

In 2001, the Nova Scotia Department of Transportation and Public Works (TPW) decided to replace the existing bridge over the Margaree River at Margaree Harbour. This bridge is a critical link to the famous Cabot Trail Highway and the national park that the trail circumvents in Cape Breton.

The new bridge was called as a design-build tender project spread over a two-year construction term. The contractors were faced with numerous challenges including weather, wind, salt water, tides, environmental issues, fish habitat, remote location, communications, material delivery schedules, limited access and foundation quality. The limited geotechnical investigation bore logs indicating very soft underlying silts with an unknown depth. The identified soils posed significant uncertainty in how the contractors would deal with settlement of the bridge abutments. The TPW specified MSE to be used as false abutment walls that would be extended along the new alignment to support the new highway configuration. The wall designers had to allow for corrosion and incorporate tidal high water levels into their calculations.

Dexter Construction Limited, the low bid contractor, was awarded the project and subcontracted to their subsidiary company Granite Environmental Inc.. Faced with a tight schedule to install the first phase of in-stream work, Granite required one-third of both the abutment walls to be onsite within a four week period after drawing approval. Granite awarded the MSE walls to RECo as they had installed numerous Reinforced Earth walls, and understood the technical capability of RECo's engineering department. Further geotechnical investigation on the east side indicated expected large settlement and vertical slip joints were incorporated into the design. This design allowed for columns of panels to settle independent of the adjacent panels without distress.

The steel strips used were of two types; the lower level in the brackish water condition were non-galvanized 7.5 mm thick strips and the upper levels incorporated RECo standard 4.0 mm galvanized strips. With all design parameters identified, RECo's engineering department provided a quality design and operations performed at capacity to meet the work schedule due to the onset of winter and the ever worsening weather conditions.

New abutments with extending retaining walls permitted keeping the same road alignment. Once traffic was diverted to the new bridge, the old bridge was demolished.

The first phase including the false bridge abutments was completed just prior to the end of 2002. Work re-started in May of 2003 on the phase two retaining walls. In total, nearly 1400 m^2 of wall were installed over a length of 500 m. The wall was capped with a cast-in-place coping to finish all exposed edges. Due to the construction technique selected, all construction milestones were met and the new bridge opened one month ahead of schedule on October 31-2003.

Where necessary, reinforcing strips are skewed to avoid battered piles. Note the old bridge in background.

International Corner

Nature Bridges provide the realization of a remarkable and vital conservation project

Reinforced Earth Netherlands

A Nature Bridge is a wildlife friendly connection between several forested areas, which are separated by a transportation infrastructure. Nature Bridges allow all forms of wild life to freely range in a natural way, over their traditional territory without facing the danger of fast moving automobiles and trains. Animals are able to find the connecting routes and roam the extended territory.

Rock faced TerraTrel abutment walls, inclined inward 15°, support the bridge structure and the high loading of the landscaping. Wing walls are also inclined and faced with organic mats that will root vegetation.

Reinforced Earth Netherlands is involved in the construction of an 800 m long Nature Bridge. The Nature Bridge consists of 2 bridges spanning local highways and a 4 span bridge over rail that is slated for completion later this year. RECo supplied 1200 m^2 of the TerraClass concrete facing and 1650 m^2 of TerraTrel wire facing. Generally, the TerraTrel had a local rock material behind the facing, however on some wing walls, an organic mat was used to encourage the growth of vegetation and provide a lush facing.

The flexibility of the TerraTrel facing is used to give the abutment and wing walls a visually pleasing contoured shape for passing motorist.

The completion for this entire project is slated for 2005. Reinforced Earth is pleased to be providing the abutments for the newly re-connected areas, which will now be large enough to support many species at viable population levels while keeping the rails and highways safe for travelers.

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