KEYSTONE® RETAINING WALL SYSTEMS
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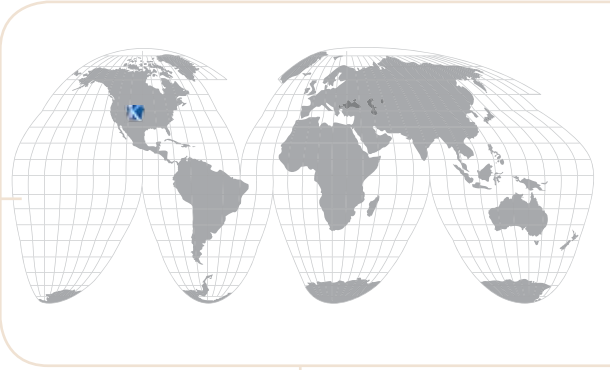
CASE STUDY

Rocky Mountain Metropolitan Airport

Broomfield, Colorado



When drivers pass Rocky Mountain Metropolitan Airport along Colorado State Highway 128, they see a soaring Keystone retaining wall adorned with the airport's tasteful logo in earth tones that attractively coordinate with the surrounding landscape.

Located in suburban Broomfield, Colorado between Denver and Boulder, Rocky Mountain Metropolitan Airport is owned and operated by Jefferson County. When recent FAA-funded airport improvements included the extension of a taxiway to accommodate bigger aircraft, the project required an expansive retaining wall.

Original plans specified a concrete panel wall system. But with the help of Keystone's engineering department, Craig Lyons of Boral Best Block, Littleton, Colorado, demonstrated that a segmental retaining wall using Keystone Compac II units and Mirafi geogrid would be a more economical and appealing option.

The resulting project not only saved the county money; it also met the airport's tight construction timeline. As an extra bonus, Keystone was able to integrate the airport's logo into the wall with custom colors.

Project:	*Rocky Mountain Metropolitan Airport*
Location:	*Broomfield, Colorado*
Keystone Product:	*Keystone Compac II*
Licensed Manufacturer:	*Boral Best Block*
Total Wall Area:	*32,000 square feet*
Wall Contractor/Installer:	*Max Retaining Walls*
Wall Engineer:	*Keystone Engineering*

"When we originally planned a panel wall system, we thought we had selected the least expensive option," says Ken Maenpa, airport manager. "But the block wall turned out to be a better choice economically, and it also looks much better than a panel wall system."

Designing for Value

Over 32,000 square feet of Keystone Compac II units were used in the project. The wall includes a 675' long lower tier with a maximum height of 55' and a 735' long upper tier with a maximum height of about 15'. A new access road runs between the two tiers.

Cost savings were achieved in part with the type and amount of soil reinforcement used. "Normally a wall of this height would be designed with steel soil reinforcement," says Artur Sakaev, staff engineer for Keystone. "Our goal was to use geogrid, a less expensive option than steel, and to use an economical amount of it."

With a combination of Compac II units and Mirafi geogrid in varying lengths and strengths, Sakaev created a highly efficient design that met strict AASHTO and Colorado Department of Transportation standards.

"One of the ways we accomplished this was with intermediate reinforcement," says Sakaev. To support the load of the taxiway and roadway, the geogrid depth was unusually long at 50' for the 55' tall wall. The bottom ten feet of the wall uses full-depth Mirafi10XT and 7XT at every course. The next eight feet of wall was designed using intermediate reinforcing layers of only 4'deep placed at every other course between the full-depth geogrid courses. The remainder of the tallest wall section uses 50' depths of Mirafi geogrid at every other to every third course of units in strengths of 10XT, 7XT, and 3XT.

With Keystone's extensive testing program, data was readily available to support this complex design. "We have testing data for several combinations of Compac IIs and different types of geogrid, so we can easily back up our designs," says Sakaev.

Quick access to this data was one of the reasons the bid was successful. "We were able to get in there, present our design and clearly show that it met the criteria they were looking for," says Lyons.

Once the Keystone Compac II wall was shown to be the clear winner in cost and performance, the added aesthetic appeal offered icing on the cake.

"We wanted to keep the wall color as close as possible to the colors in the surrounding area, and we had several decisions to make," says Maenpa. To help with these decisions Boral Best Block invited the entire airport staff down to their yard to view samples.

"We created mock-up walls using different blocks so they could choose their own special color," says installer Kevin Kerber, PE, CEO and General Manager with Max Retaining Walls. "This was a high-profile wall on a very popular stretch of highway, so the color and look was important."

Keystone downloaded the airport logo and Sakaev superimposed it onto the wall face elevation. Kerber and his team then installed the logo in a contrasting block color following the clear guidance provided in the plan.

"We're extremely pleased with how the project turned out," says Maenpa. "We know we got the best value, and instead of just a wall, it actually turned out to be a landmark for the airport."

For more information on the Keystone Compac II unit or other innovative Keystone products, please visit *www.keystonewalls.com* or call 800-747-8971. Keystone Retaining Wall Systems, Inc. is a subsidiary of CONTECH Construction Products Inc.

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