

RETAINING FOCUS

Quarterly Publication for the Customers of KEYSTONE Retaining Wall Systems, Inc. • Volume 4.4

“The Great Wall of Scripps Ranch”

The new Thurgood Marshall Middle School in the Scripps Ranch community of San Diego, California welcomed its first students in fall 2007 with a campus and athletic fields rivaling that of some colleges.

Along with premier educational facilities, the new school's campus is also home to one of the tallest Keystone segmental retaining walls ever built in California. The wall, which was built to combat a 150-foot elevation change, reaches approximately 45 feet at its tallest point and nears 48,000 square feet in total coverage.

“Originally a cast-in-place wall was discussed, but the cost was way out of budget. Soltek changed the site design a bit and reconfigured it to segmental retaining walls to make it more cost-effective for the school,” said William Naylor, Design Build Program Manager and Vice President, Soltek Pacific.

Fifteen other Keystone retaining walls were built throughout the site, along with the 45-foot tall wall, to level the area and create enough room to

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Keystone Retaining Wall Systems, Inc.



Keystone is a subsidiary of

After over 20 years at the forefront of the industry, Keystone Retaining Wall Systems, Inc. continues to set the standard for excellence and innovation within the segmental retaining wall industry. Keystone represents the global benchmark in soil retention, erosion control and landscape systems. Holding over 50 patents, Keystone symbolizes cutting-edge design, performance and aesthetics.

Keystone is a subsidiary of CONTECH Earth Stabilization Solutions Inc. (ESS). CONTECH ESS is the nation's leading provider of complete solutions for earth stabilization projects of every description. CONTECH ESS is one of four operating divisions of CONTECH Construction Products Inc. The most extensive selection of bridge, drainage, earth stabilization, and stormwater solutions comes from CONTECH, the only true nationwide, single source provider. To learn more about the CONTECH family of products, visit www.contechess.com.

To learn more about the quality and value in Keystone Retaining Wall Systems products and services, please visit us on the web at www.keystonewalls.com or call 800-747-8971.

New Keystone Compac Hewnstone Completes Grand Lakeside Residence



The Keystone Compac Unit features an open core design and high strength pin connection system. Its lighter weight and shorter tail design make it easy to handle for installers and a perfect choice for projects that do not require the deep embedment length of the Keystone Standard Unit. The Keystone Compac Unit is available in sculptured (tri-planar) or straight face options along with weathered finish options, which includes the new Hewnstone face.

For more information on the Keystone Compac Hewnstone, please visit www.keystonewalls.com or contact your Keystone Sales Manager.

Project: Lake Michigan Residence, Wisconsin
Wall Coverage: Approximately 700-800 square feet
Manufacturer: Best Block Company

The homeowners of a newly built and premier Lake Michigan residence needed a solution to an eight-foot elevation change between their backyard and upper-level drive area. The owners selected the Keystone Compac Hewnstone because along with its structural capabilities, the unique aesthetic complemented and offered a finishing touch to the Mediterranean villa design of their home. The home has an exposed three-story back which features a walkout to a patio with a lakefront view. An elevation change required a smooth transition that would build the backyard up to meet the driveway. The transition was made by building three, two-foot walls with planting beds.

The Keystone Compac Hewnstone

The new Keystone Compac Hewnstone offers a rough cut, natural stone look in a structural retaining wall unit that is specifically crafted for ease of installation. This combination of superior design and structural capabilities brings a new, valuable option for any wall project.



Keystone Compac Hewnstone Unit:

*Size: 8" h x 12" d x 18" w (200 x 300 x 450mm)

*Weight: 85 lbs. (39 kg)

Exposed Face Area: 1 sq. ft.-8" x 18"

**Note: Unit colors, dimensions, weight, and availability vary by manufacturer.*

Hong Kong Building its First Keystone Wall

The first Keystone wall in Hong Kong is now under construction with a total face area of approximately 5,500 square feet (1,700 square meters) and a maximum height of 52 feet (16 meters).

The wall is being built at Discovery Bay, a residential development located on the mountainous terrain of Lantau Island. The Keystone Wall is built vertical, 295 feet (90 m) in length and features a 7m radius external corner. After which, the foundation steps up to tie in with the adjacent slope. At the other end, aligning the wall against an existing RC wall posed some problems for the site team due to the requirement for tight control on vertical alignment. The original site development plans included a conforming, tiered grey panel faced wall, however a Keystone KeySystem I® wall alternative was selected for the final design. VSL Hong Kong, part of VSL International Group, Keystone's



licensed manufacturer for several Asian countries, proposed the Keystone KeySystem I wall because its structural integrity, design flexibility and aesthetics provided a superior yet cost-effective solution for the client.

While providing the improved aesthetics of a sculptured rockface block, the Keystone wall design allowed for additional building loads to be withstood by the reinforced fill block. The Keystone KeySystem I utilized in the Discovery Bay wall combines patented Keystone modular concrete units and inextensible steel soil reinforcement. The additional load capacity of the Keystone design partnered with the vertical wall profile will enable the site owner, Hong Kong Resort Company, to build additional apartments at the crest of the sloping ground, above the wall, a significant benefit of the Keystone solution. Curves, foundation steps and planter walls in front of the main reinforced soil wall, were also easily incorporated into the wall design.

The imposed building load in the Keystone KeySystem I wall solution required longer and higher grade soil reinforcing mesh than the original design. However, the removal of the tiered design's RC planter boxes and the additional usable land made the Keystone KeySystem I wall a more cost-effective solution.

Working for general contractor China Overseas Civil Engineering Ltd, VSL Hong Kong provided a full scope package including wall design, mate-



rials, installation and compaction of more than 78,000 square feet (24,000 square meters) of backfill, an RC parapet capping wall and associated drainage features.

Wall installation began in June 2007. Automated block production in China allowed the colored facing blocks, for the entire project, to be cast within three days. Currently, the parapet capping wall and drainage channels are being cast at the top of the wall.

With more than 30 international locations, Keystone Retaining Wall Systems represents the global benchmark in soil retention, erosion control and landscape systems. For more information on the Keystone KeySystem I®, Keystone's entire family of products or Keystone's international manufacturing, visit our website at www.keystonewalls.com or call 800-747-8971. Keystone Retaining Wall Systems, Inc. is a subsidiary of CONTECH Earth Stabilization Solutions (ESS) Inc. (www.contechess.com). 

Thurgood Marshall Middle School • San Diego, California

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construct the school and its facilities. The Keystone Standard unit was selected for all the walls, which totals approximately 100,000 square feet, because it provided a structurally sound and cost-effective solution that also met the critical needs of efficient installation and aesthetic appeal.

Project Site Challenges

The Thurgood Marshall Middle School and its facilities are built on 36 acres of a hillside that is near the Marine Corps Air Station Miramar. Before it was reestablished solely as a Marine Corps Air station, the navy and army both occupied this area. The past military activity conducted at Miramar

required the site undergo an extensive "unexploded ordinance removal" effort before any construction could begin. The original unexploded ordinance removal effort, which was planned to be a two-inch screen for 120,000 yards, was changed to a one-inch minus screen for the entire site of 400,000 yards. The extension of the unexploded ordinance removal screening delayed an already tight construction schedule and made efficient wall production an even more critical factor.

Along with site challenges, stringent building codes and the rigorous approval process of the Division of the State Architect (DSA) added to the project's complexity. The DSA ensures California's K-12 schools and community colleges are seismically safe and accessible by reviewing all construction project plans for structural safety, fire and life safety and accessibility.

Design/Installation

"The wall designs had to meet the stringent DSA requirements considering the high seismic accelerations at the site, global stability and on-site soils," said Daya Bettadapura, P.E., President, ABI Engineering Consultants, Inc.

The retaining wall design includes extensive reinforcement with geogrid lengths reaching 40 to 50 feet. The original wall design proposed screening all the on-site material, which consisted of conglomerates of rock and boulders for larger sized soil, and excavating the soils that could not be used for backfill.

"Since the school's construction could not begin until the wall was finished, there was concern about whether the project could be completed on time especially considering the additional screening and excavation of on-site material. Geogrid proposed using a portable crusher to crush the on-site material instead of screening it. Crushing the material meant that it could be used as backfill and that we could immediately start building the wall. Also, significant costs would be saved," said Ed McCaffrey, Chief Operating Officer and Project Manager, Geogrid, Inc.

Crushing the on-site material and building the 48,000-square-foot wall, now referred to by the local community as "The Great Wall of Scripps Ranch", was conducted at the same time. Approximately 20,000 yards of 3/4-inch crushed



Project:	<i>Thurgood Marshall Middle School</i>
Location:	<i>San Diego, California</i>
Keystone Product:	<i>Keystone Standard Unit</i>
Keystone Manufacturer:	<i>RCP Block & Brick</i>
Wall Area:	<i>16 walls totaling approximately 100,000 square feet Largest wall: 45 ft. high; 1,700 ft. long</i>
Wall Contractor:	<i>Geogrid, Inc.</i>
General Contractor:	<i>Soltek Pacific</i>
Wall Engineer:	<i>ABI Engineering Consultants, Inc. Daya Bettadapura, P.E.</i>



rock/gravel, 20,000 yards of class 2 base and miscellaneous materials were produced from the crushing. According to Bettadapura, the more than 80 foot-wide backfill area was filled with the crushed on-site material that was deemed to provide high internal angle of friction.


Geogrid, Inc. constructed the 48,000-square-foot wall within 29 days. The use of several 627 CAT scrapers to import the fill expedited the wall's construction because it allowed Geogrid to place 155,000 yards of backfill behind the wall in the shortest time possible. Also, an estimated \$1 million was saved by crushing and using on-site material.

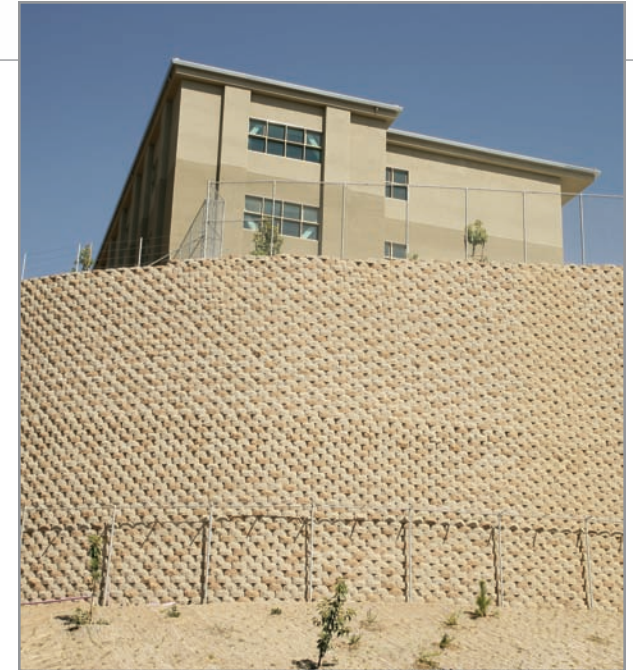
“Overall, the construction and coordination between Geogrid, Soltek's team and subcontractors, went unbelievably well for walls that size and a site that complex,” said Naylor.

The remaining walls were also built to create level areas for athletic facilities, other buildings and parking areas for the school. The walls vary in height reaching up to 25 feet and

were built at various times throughout the school's construction. The tallest wall was one of the most important elements of the site's development and its efficient installation generated a three-month advance in the overall construction schedule.

Development of Thurgood Marshall Middle School required a major land development solution that would also work within a tight construction schedule and meet stringent building requirements. The Keystone Standard unit provided a complete solution that was structurally-sound, aesthetically appealing and could help maximize production.

For more information on Keystone Standard Unit or other innovative Keystone products, call 800-747-8971 or visit www.keystonewalls.com. Keystone Retaining Wall Systems, Inc. is a subsidiary of CONTECH Earth Stabilization Solutions (ESS) Inc. (www.contechess.com). 



Keystone 133Elite® Increases Efficiency for Walls

133 KEystone
ELITE®

A forward-thinking design, which includes an 8" x 24" face dimension, makes the Keystone 133Elite® a superior choice for wall applications. The larger face dimension not only matches the aesthetic and feel of a taller wall, but also reduces the number of units required to complete the job. The same effort that nets one-square-foot of wall area with other wall systems produces 1.33 square feet of wall area with the Keystone 133Elite.

In addition, Keystone 133Elite can be installed by one person—maximizing man-hours. Keystone's StoneArt embossing technology allows units to be produced with a variety of high-quality textures in combination with the wide variety of colors available in most Keystone products.

Please contact your local Keystone manufacturer or your Keystone Regional Sales Manager for additional information on Keystone 133Elite.



KEYSTONE SEMINAR SPOTLIGHT

Keystone's wide variety of unique seminars includes basic design and installation presentations to American Institute of Architecture (AIA) and National Concrete Masonry Association Certification (NCMA) accredited seminars. For your convenience, our seminars are offered nationwide and in several different formats including on-site, off-site, Spanish language, homeowner, box-lunch seminars and more. To get more information on Keystone seminars, call 800-747-8971 or contact your local Keystone sales representative.

Contractor Seminars

Quality installation practices are essential for continued growth and success of our industry. Training on proper installation procedures for new and existing contractor promotes the quality expected by Keystone customers.

- Gives the opportunity to learn of new products.
- Allows you to meet the demand for innovative new landscaping applications.

National Concrete Masonry Association Certification (NCMA) Seminars

The NCMA's certification program is for individuals who primarily install retaining walls.

- Keystone offers the full-day NCMA Certified Installer Program course program across the country as needed.
- Keystone was one of the first to offer the NCMA's certification program.

The American Institute of Architecture (AIA) Seminars

Keystone Retaining Wall Systems, Inc. is an American Institute of Architects (AIA) accredited provider of Continuing Education Credits (CEUs).

- Training seminars to help architects understand and solve site issues are offered throughout the United States.
- Seminars are filled with information also useful for engineers and general contractors.

Engineering Seminars

From state highway and government agencies to local consulting and geotechnical firms, our Structural Wall Specialists give you the needed support to use Keystone structural products.

- Keystone's Structural Wall Specialists have more than 60 years of SRW and MSE design experience.
- Educating design professionals in the marketplace is their expertise and specialty.

Do you have the latest version of the Keystone Technical CD?

The new 2007 Technical CD by Keystone, featuring KeyWall® 2007 design software with Load Resistance Factor Design (LRFD) methodology, specifications and technical literature, is available for its structural product line.

The 2007 Technical CD has several upgrades from the 2006 version. We recommend replacing your existing software with the newer version. To receive the 2007 Keystone Technical CD, please contact your licensed manufacturer or Keystone at 800-747-8971 and request a copy today!



2007 Tech CD

Keystone Directory

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- Product Information
- Technical Notes
- Design Charts
- Construction Details
- Specifications
- CAD™ Details
- Installation
- Keystone Literature
- Photo Library
- Much More!



Engineering & Design Services

- Design & Technical Assistance
- Design Software and Support
- Design & Construction Literature
- CAD™ Details
- Specifications
- Education and Training Courses for Design of Segmental Retaining Walls
- Seminars Available with Continuing Education Credits

Local Representation

Contact Keystone to have a local representative provide you with an updated Technical CD or product information.

HOW TO CONTACT US

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Retaining Excellence™

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