

Complete Solutions | March 2008

Sky Ranch, Santee, CA



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Project Name: Sky Ranch

Location: Santee, California

CONTECH ESS Products: Keystone Compac II Unit * and Vista DSM®* Unit; *The Keystone Compac and Vista DSM units were produced with a custom "Sky Ranch" mold design and color

Wall Coverage: 75 total walls; 104,641 total square feet; 10,892 total linear feet

Keystone Compac II: 43 walls; 81,592 total square feet; 7,708 total linear feet

Vista DSM: 32 walls; 23,049 total square feet; 3,184 total linear ft.

Keystone Manufacturer: RCP Block & Brick

Project Owner: Lennar Homes

Wall Contractor: Geogrid, Inc.

Engineer:

Red One Engineering, Inc. (Keystone Walls)

ZCS Engineering, Inc. (Vista DSM walls)

Hunsaker & Associates (Civil Engineer)

Leighton & Associates (Soil Engineer)

Project Site

The Sky Ranch village in Santee, California is a collection of four premier communities located on "RattleSnake" Mountain in the northeastern suburb of San Diego. Along with a view overlooking the city, the mountain also provided developers with a challenging terrain consisting of 1.5 to 1 slope ratios, large-sized boulders and limited access points.

To create buildable land on the mountain, Keystone® segmental retaining walls and Vista DSMTM dry stack modular block walls were uniquely combined to build approximately 100,000 square feet of walls located throughout the development.



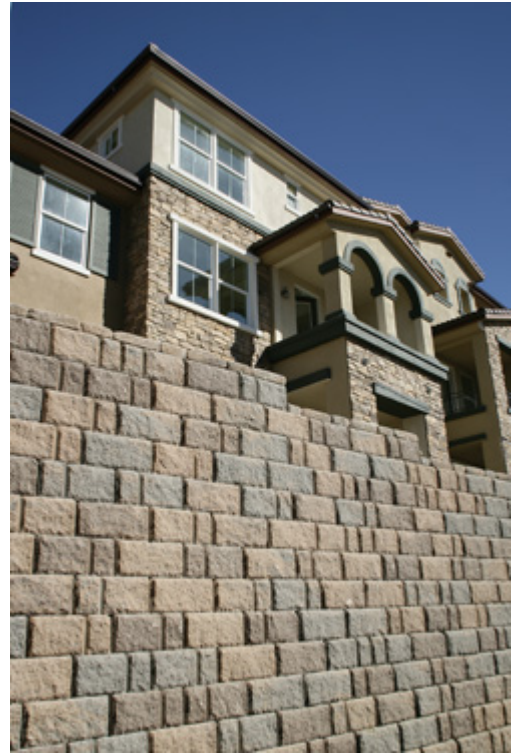
The combination of a customized Keystone Compac II Unit and Vista DSM unit for the Sky Ranch development resulted in maximum design flexibility, efficient installation and the ability to maintain one continuous natural stone aesthetic throughout the project.

Design/Installation

Sky Ranch developers wanted a random pattern, natural stone aesthetic for the project, however the original plans were already drafted with cast-in-place and masonry walls. The wall contractor, Geogrid, Inc., redesigned the project with Keystone retaining walls, featuring one size block, to provide a more cost-effective solution.

To combat the site's steep slopes, the Keystone walls would require extensive use of geogrid for reinforcement. However property lines conflicted with the reinforced zones for some of the proposed walls, not allowing for sufficient room for geogrid installation. The originally desired random-pattern look was also a critical need. To achieve both the desired aesthetic and structural needs, Geogrid proposed integrating Vista DSM walls, which do not require geogrid, with the Keystone walls.

Vista DSM is a dry stack modular block system that features vertical rebar for footing construction and horizontal rebar throughout the wall and vertical steel and concrete grouting for reinforcement. This combination eliminates the need for traditional retaining wall batter and geogrid.



"The beauty of combining the Keystone and Vista DSM wall systems is that because the units have very similar dimensions, if produced with the same aesthetic, a continuous design could be achieved. That couldn't be achieved with masonry walls. Also, the Keystone and Vista DSM combination allowed us to maintain the cost-savings the redesign provided because we didn't have to use a multi-size block system," said Ed McCaffrey, Chief Operating Officer and Project Manager, Geogrid, Inc.

RCP Block and Brick produced the customized Keystone Compac and Vista DSM units with a specially-created fluted mold design and block color. The fluted design allowed the use of one size block and to create the originally requested random pattern look.

The integration of the two wall systems and site challenges required a collaborative engineering effort by Red One Engineering (Keystone walls), ZCS Engineering, Inc. (Vista DSM walls) and various other consultants for the overall soil testing, grading plan and other efforts. The first major engineering effort was to establish in what areas it was more appropriate to build a Keystone or Vista DSM wall. The presence of property lines usually dictated a Vista DSM wall.

When Geogrid Inc. began building the first walls on the project, Vista DSM walls for the model home lots, they discovered large-sized boulders on the site. ZCS Engineering, Inc., was called in by Geogrid Inc. to provide consultation. It was determined the boulders, measuring 10 to 15 feet in diameter, would not be excavated because of the high cost associated with removal and importing the compacted, engineered fill for gaps produced from the excavation. The boulders extended two to four feet deeper than required for the footings of the Vista DSM wall.

"The soil around the large boulders was a sandstone that was not compatible with the boulders. We determined the footings for the Vista DSM wall could be poured in and around the boulders with the minimum of criteria. Epoxy was used to set the wall into the boulders and also around the rebar that would run through the footings. Basically, the boulders and wall were made into a monolithic structure," said Troy Lyver, P.E., S.E., ZCS Engineering Inc.

Geogrid installed the Vista DSM walls by drilling rock dowels into the boulders and placing rebar into the dowels. Per the design, epoxy was used to set everything. Some of the boulders were chipped down, so they did not interfere with the wall. The Vista DSM walls on the Sky Ranch project vary from two to 21 feet and feature three major designs: level backfill and no surcharge, building surcharge and parking surcharge with a two to one upslope. The Keystone walls reach total heights nearing 28 to 30 feet with exposed heights of approximately 20 feet.

"The Keystone walls are designed to withstand a fairly aggressive combination of terrace walls with slopes (1.5 to 1 ratio) above them. Some of the walls required geogrid, reaching 35 feet in length, installed at every course," said Matt Merritt, P.E., Red One Engineering.

Other project challenges included a tight construction timeline, limited access points and confined working spaces because of the site's steep slope and remote location. These conditions required extensive and daily coordination of deliveries and building schedules between the contractors, engineering consultants and developer. The collaborative efforts resulted in the integration of the two different wall systems where it is nearly impossible, unless you have an engineer's eye, to discern one wall system from the other.