



THE OAKS AT PORTOLA HILLS

Belgard® Wall Systems Crucial to Creating Nearly 100 Buildable Acres in Harsh Geological Conditions

LOCATION:

Lake Forest, California

MANUFACTURED BY:

Oldcastle® APG, Inc., Sierra

PRODUCTS:

Belgard's 18" wide by 8" tall retaining wall blocks with a combination of 4" and 8" tall caps, including:

- Vertica®
- Vertica Pro Stone Cut® Virtual Joint
- Diamond Pro Stone Cut® Virtual Joint
- Vertica® Cap 8"
- Vertica® Cap 4"
- Belgard® Plantable Unit

COLOR:

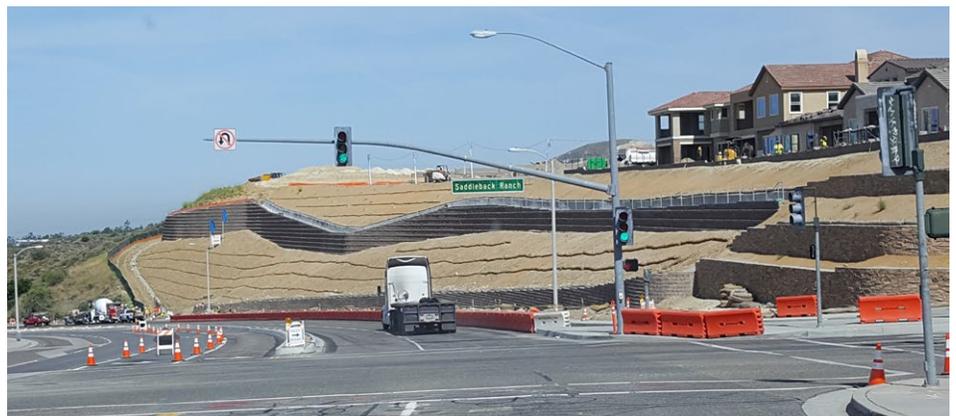
Toscana Blend (custom color)

QUANTITY:

75,715 SF

INSTALLER:

Geogrid Retaining Wall Systems, Inc.



Background

In 2014, California-based developers Baldwin & Sons planned a housing complex on 99 acres of land in the city of Lake Forest, California, at the base of the Santa Ana Mountains. The Oaks at Portola Hills is comprised of seven neighborhoods of both single-family and multi-family residences with many amenities. Located in one of the fastest-growing yet safest cities in the state, it has easy access to restaurants, shops and interstates.

The Challenge

Developing Portola Hills required converting the site from its natural state of valleys and steep hillsides into acres of construction-ready flat pads. Among the challenges were that it was in a seismic area and had poor soil quality, with failure planes throughout. A failure plane is a weak clay layer that causes instability. These thin layers are like grease which, once exposed, cause landslides as dirt and rock slip over them. This is especially the case when there is

significant rainfall, as there was throughout the fall and winter of 2015/2016. There were also design requirements the team had to meet for the project, including the city's demand that most of the walls be plantable.

The Solution

An expansive segmental retaining wall system was needed to create the buildable space. Baldwin & Sons chose to work with Geogrid Retaining Wall Systems, Inc., the largest

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segmental retaining wall installer in Southern California. "There's not much flat land left in Southern California, and there is a shortage of homes in Orange County, so installation of a retaining wall system is an investment in creating more property square footage to build homes on," said Geogrid owner Mike Stevenson.

The project was broken into three phases: Portola Northwest, Portola Northeast and Portola South. A variety of Belgard Diamond Pro blocks as well as Belgard's Vertica Virtual Joint (VJ) and Planter blocks were chosen to make up the wall system.

Geogrid's in-house design engineer, Matthew Merritt, P.E., of Red One Engineering, designed walls comprising the entire perimeter of the project to develop "super pads," acres of flat land for Baldwin to build on. Many of these walls reached up to 49 feet tall and 1,000 feet long.

"We worked with the geotechnical engineer on the global stability analysis and incorporating Mirafi global stability geogrids into the wall design. Portola South had a long (100'+) and very strong geogrid for global stability. Portola NE had two walls incorporated into a large landslide buttress," said Merritt. "We also worked with a shoring contractor to incorporate the Diamond Pro block facing over the shoring elements."

To address global stability in the seismic areas, the team designed a system of secondary geogrids, placed between the standard grid layers. A grid's length is usually

equal to 100 percent of wall height. At the Portola site, between every layer of standard-length grid and compacted fill was another, smaller grid of only four feet long. These strata provided the necessary additional stability in the seismic area.

Geogrid's choice of Belgard plantable blocks gave Baldwin & Sons the maximum amount of space on which to build homes. This is because Belgard's Plantable system has an 8:1 batter and the competitor's block has a 4:1 batter.

"The wall batter is a ratio of vertical feet to horizontal feet, so 8:1 means for every eight feet vertical the wall slants backwards one foot so one foot of useable property is lost to the wall batter. The competition at 4:1 loses one foot every four feet of height, or two feet for every eight of height," explained Merritt. "Using the various Belgard products provided the client with an additional 66,500 SF (1.5 acres) of usable land compared to using the competition at 4:1 batter."

The fact that Belgard offers so many complementary products that we could use both as vertical and plantable walls was a huge asset. The manufacture of the product was also outstanding. We were installing more than 1,000 square feet of block a day and they were always timely with manufacturing and delivery.

*Mike Stevenson
Owner, Geogrid Retaining Wall Systems, Inc.*

The Result

The last portion of the project, Portola Northeast, is scheduled to be finished in December, 2023. "We used the full line of Belgard products available to us to meet the needs of the owner and requirements of the City of Lake Forest. The result was great looking plantable and non-plantable walls that blend into the site, provide an excellent aesthetic and most importantly provide lasting confidence in their structural capabilities," said Merritt.

About Belgard®

Belgard, part of Oldcastle APG, offers a complete collection of paver and wall products for outdoor living spaces, walkways, driveways, parking areas and retaining walls. Available in a range of styles, premium Belgard products have been found in America's finest homes and award-winning commercial and retail properties since 1995. For more information, visit Belgard.com or call 1-877-Belgard (235-4273).

Oldcastle APG is part of CRH's Building Products division. CRH is a leading global diversified building materials group, employing c.85,000 people at c.3,600 operating locations in 32 countries worldwide. CRH is the largest building materials company in North America and the second largest worldwide.

