2017 Rising Stars
THE COMPLEXITIES OF the built environment are many and ever changing, continually challenging the limits of civil engineering and construction. For even the most experienced professionals involved in designing, building, and maintaining roads, bridges, and highways there is always something new on the horizon. For Betty Purdie, P.E., of Ralph L. Wadsworth Construction, the combination of facing new challenges and improving public infrastructure makes the work fulfilling.

“In a 30-plus year career, I’ve seen a lot of dynamic innovations in the way engineering challenges are resolved,” said Purdie, a civil engineer who worked for the Utah Department of Transportation (UDOT) for more than 25 years before joining Ralph L. Wadsworth in 2010. Today, as a project manager for one of Utah’s largest builders of heavy highway and mass transit projects, Purdie leads a team effort to tackle challenges by using new materials and methods to solve old problems. This was the case on a recent highway overpass project her team completed on the edge of Brigham City, Utah, about an hour north of Salt Lake City.

“The biggest issue on the Brigham City Bridge project was the natural geological conditions surrounding the site,” Purdie said. The scope of work was to widen an existing highway overpass and improve the associated interchanges where I-15 and U.S. 91 intersect to relieve traffic congestion. Offering only a single lane in each direction, traffic was frequently backing up. In response, the design team began investigating adding a sister bridge adjacent to the first as a means of increasing roadway capacity; however, early analysis indicated that might cause more harm than good.

“Initially during design, the plan was to put two additional lanes on a second structure adjacent to the first,” said Jeff Gilbert, P.E., a geotechnical engineer with Terracon, a national consulting firm with more than 130 offices nationwide. “However, calculations on both settlement and global stability indicated that the weight of a traditional embankment built with soil for the second bridge would adversely impact the original bridge and we had to look for other options.”

Other options included trying to improve the embankments’ foundation soil slope stability using driven piles or other intensive methods. Lead engineering firm, Michael Baker International, suggested using expanded polystyrene (EPS) geofoam as an embankment fill to reduce load settlement and decrease the driving force in the stability calculations.

“Using the geofoam blocks to support the bridge embankments was certainly a first for me,” Purdie said, despite a long tenure of tackling similar situations all over Utah. “When we were awarded the contract, I was excited to be working with a new material. Discovering geofoam manufactured by ACH Foam Technologies right here in Utah opens up a lot of new possibilities in the future.”

Developing the exact configuration of the blocks to maximize strength while minimizing waste on a large, complex project like the Brigham City Bridge benefits from careful scrutiny. Purdie worked with EPS geofoam design and testing expert, Marvin Cook of Oracle Construction in Utah, to review the specification and determine how to configure the blocks to best support the weight of the roadway and live traffic loads while also being mindful of the budget.

“With the EPS geofoam, this really became a bit like a design-build project,” Purdie said. ACH Foam did some upfront testing on the material, which Oracle validated while fine-tuning the block placement patterns. Though the cost of an EPS geofoam fill is certainly more than a traditional soil-filled embankment, the biggest savings must be measured in time and convenience.

“When using soil as an embankment material, primary settlement could take six months or more,” Gilbert said. “Furthermore, calculations showed the possibility of 1-1/2 to 2 inches of long-term settlement over a period of 10 years or more, which was deemed excessive.”

With the design established and the settlement and stability issues resolved, the geofoam portion of the project moved into construction. Working with a combination of two grades (EPS 22 and EPS 29), Purdie and the ACH Foam Technologies’ team calculated the precise material requirements and delivery schedule to ensure product was available well ahead of installation.

“ACH Foam was great with the logistics,” said Purdie, who recommended that others using large volumes of geofoam for civil infrastructure
consider both production time and travel time to the site for material ordering. The Foam-Control geofoam blocks used on infrastructure projects can be quite large and there was limited storage space along I-15. Purdie also noted that despite their size, the blocks are very lightweight and have the potential to be blown by strong winds, which is not a safe condition next to a highway. ACH Foam Technologies organized a just-in-time delivery, supplying several truckloads of geofoam a day to get the required material to the site as it was needed without excess.

As the geofoam arrived, Purdie’s team built the embankments using manual labor and no specialized or heavy equipment over a period of just a few weeks. Though ACH Foam Technologies pre-cut most of the blocks prior to delivery, the complex nature of the diverging diamond interchange on the west end of the project required some block customization, which was done with a hand-held hot wire cutter. Once the embankments were built, they were covered with a reinforced concrete slab and finally the roadway above.

“Working with ACH Foam’s geofoam we were able to complete two phases of bridge construction over I-15 without ever having to shut the Interstate down,” Purdie said proudly. Though traffic did have to be diverted around the construction site, the project kept people moving, which was a primary goal.

“The most rewarding part of any project is when the work is done,” Purdie said. “Our superintendent was standing along the bridge during the final stages of construction and a lady pulled up to thank him for the great new overpass and cool diverging diamond interchange. She said it was so much easier and faster than before and like most people using that bridge today, I’m sure she had no idea she was driving on geofoam.”

TERRY MEIER, is with ACH Foam Technologies (www.achfoam.com).

The completed overpass relieves traffic congestion where I-15 and U.S. 91 intersect near Brigham City, Utah.

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“The IAGI Installation Awards recognize those IAGI members who make significant contributions to the field of geosynthetics installation. So often the installer gets forgotten in the discussion of a project,” said Laurie Honnigford, managing director of IAGI. “In reality, a project is a set of plans on a piece of paper until the installer gets involved. The installer can make or break a project and we need to recognize those who improve and advance our industry.”

Award of Excellence
Simbeck and Associates (Mancos, Colo.) received the Award of Excellence for the Blue River Restoration project. The Blue River, which feeds Dillon Reservoir and eventually connects with the Colorado River, is one of several tributaries heavily affected by mining operations. From the late 1800s to the 1940s, dredging was the predominant method of extracting gold in the area. In this process, the valley floor was turned upside down as 70 to 90 feet of cobble was brought to the surface and exposed. The practice was repeated up and