



*Retaining Excellence™*

## Stagecoach Compressor Station

### Owego, New York

Hiding an unsightly structure below grade is a good idea— if the walls hold. That was precisely the problem with the walls in the Stagecoach Compressor Station constructed as part of a natural gas storage facility in Owego, New York.

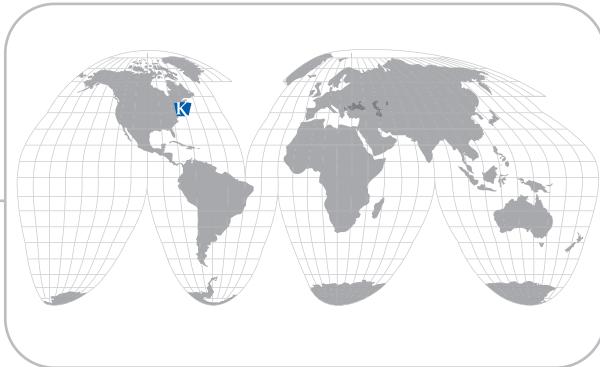
After an inadequate cast-in-place wall buckled under the weight of the earthen berm built to hide the structure, a geogrid reinforced Keystone retaining wall was chosen to take the load off the berm without the need to remove the existing wall.



According to Greg Piper of Keystone product supplier Domine Builders Supply—approximately 4,000 square feet of Keystone Standard Units were used on this project. Keystone Standard Units are the preferred product for tall walls and critical structures.

The wall is reinforced concrete approximately 30 feet in height above the interior finished floor and approximately 93 feet in length. On the exterior face, the earthen berm constructed to 'hide' the structure varies from approximately 17 to 24 feet in height at the ends of the wall to 28 feet high at the middle.

The wall initially failed when the wall stem contacted the interior structural steel frame causing the columns to be nearly six-inches out-of-plumb. Hawk Engineering, PC, was contacted to find a solution to the problem. The wall was temporarily stabilized with a steel brace designed by Hawk. The original contractor removed the berms and the wall stem returned closer to plumb. The original engineer redesigned the berm using a wedge of geofoam (expandable polystyrene) between the wall and the berm.



**Project:** Stagecoach Compressor Station

**Location:** Owego, New York

**Keystone Supplier:** Domine Builders Supply  
Rochester, New York

**Keystone Product:** Keystone Standard Units

**Square Feet:** 4,000 sq. ft.

**Wall Contractor:** Calvin C. Cole, Inc.  
Sayre, Pennsylvania

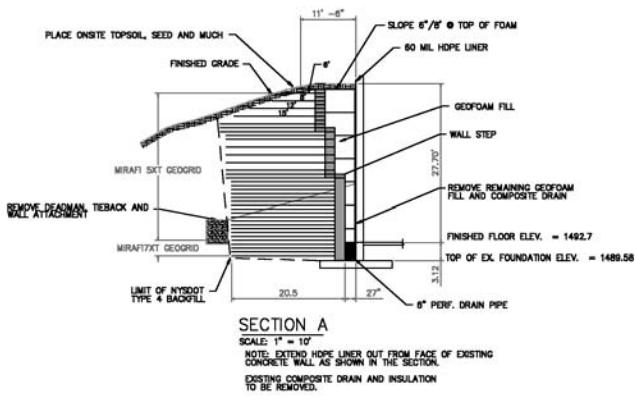
**Structural Engineers:** Hawk Engineering, PC  
Binghamton, New York



However, the wall failed again and Hawk was hired to redesign the berm. According to Hawk's Structural Department Manager, Robert P. Jahelka, P.E., the first step was to analyze two options for the mechanically stabilized earth wall. "The first was a system with the geogrid wrapped around the berm face. The second included the construction of a modular block wall adjacent to the concrete wall," said Jahelka. "Analysis indicated that the 'wrapped' option would likely exert lateral pressure on the concrete wall. The modular wall option was selected. Keystone was chosen because of our familiarity and sense of comfort with the products produced by Keystone. Also, Keystone has always been very helpful in assisting us in various projects."

CASE STUDY





The choice of a segmental retaining wall initially surprised Leo Dradinsky of Calvin C. Cole, Inc., project contractor. "My first thought was that it seemed like an expensive use of a modular retaining wall that would be completely buried and not at all visible," Dradinsky said. "But, using Keystone later made a lot of sense because the removal of the failed wall was unnecessary. They didn't have to pay to have the wall removed or have to shut down the natural gas operation during demolition and re-construction."

A mechanically stabilized earth system utilizing a Keystone segmental retaining wall and geofoam between the Keystone wall and the concrete wall was designed. Geogrid was used to reinforce the earthen berm. The geogrid was pinned to the modular units as courses were completed. The first course of modular units was placed on a sand cushion on the existing footing. The modular wall 'stepped' back at approximately 15 feet and at 22 feet above the top of the footing. The 'steps' were placed on an 8-inch compacted stone leveling pad. Drainage fill was placed within and behind the modular units. NYSDOT item 4 was used for the earthen berm. The soil was placed in 8-inch lifts, compacted to 95 percent of the maximum density as determined by ASTM D1557. A high-density polyethylene (HDPE) liner was placed on top of the geofoam and connected and sealed to the concrete wall to prevent water infiltration.



The Stagecoach Storage Project facility is an underground natural gas storage project owned by Central New York Oil and Gas Company, LLC (CNYOG) in the Towns of Owego and Nichols in Tioga County, New York.

The Stagecoach Storage Project has a working gas capacity of up to 13.6 billion cubic feet (Bcf), with the capability to withdraw as much as 500 million cubic feet per day (MMcf/d) and inject as much as 250 MMcf/d.

The Stagecoach Storage Project called for a product that was strong enough to handle heavy lateral loading. Because of the Keystone Standard Unit's outstanding product integrity and ease of installation, along with the problem-solving skills of the Hawk Engineering team, the Stagecoach Storage Project is now a model for large-scale wall repairs and re-engineering.

For more information on Keystone Retaining Wall Systems, Inc. and Keystone products, please call (800) 747-8971 or visit [www.keystonewalls.com](http://www.keystonewalls.com). Keystone Retaining Wall Systems, Inc. is a subsidiary of CONTECH Earth Stabilization Solutions Inc. ([www.contechess.com](http://www.contechess.com)).



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