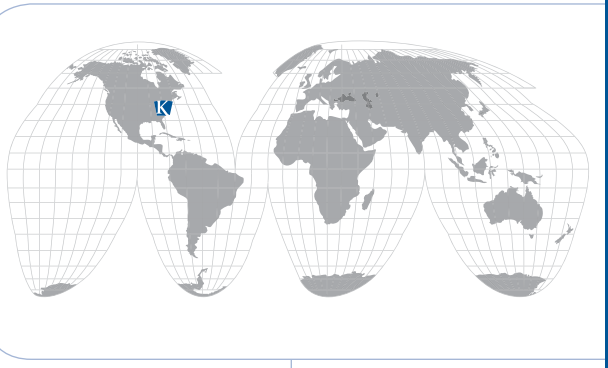
KEYSTONE®
RETAINING WALL SYSTEMS

The Metropolitan Plant Exchange

Fort Lee, New Jersey



A relocation site for The Metropolitan Plant Exchange in Fort Lee, New Jersey provided the larger-sized area needed to operate its retail nursery, florist and greenhouse services. However, the land needed to be leveled before the facility could be built. The proposed site solution of building a structural retaining wall, first thought to be routine, was complicated by area rock outcroppings, the discovery of subsurface bedrock and local construction codes.

The final solution was to excavate some of the area's bedrock and build a Keystone Compac™ Victorian wall on and in vertical coordination of the remaining bedrock. The Keystone Compac Victorian was selected because it met the site's challenging demand for a design-flexible, structurally sound wall system that was both long-term and aesthetically-pleasing.

Project:	*The Metropolitan Plant Exchange*
Location:	*Fort Lee, New Jersey*
Keystone Product:	*Keystone Compac™ Victorian*
Licensed Manufacturer:	*Anchor Concrete Products Manasquan, New Jersey*
Total Wall Area:	*11,923 square feet*
Wall Contractor:	*Pillari, LLC*
General Contractor:	*J.Fletcher Creamer & Son, Inc.*
Wall Engineer:	*Keystone Engineering*
Site/Civil Engineer:	*Costa Engineering*
Geotechnical Engineer:	*Melick-Tully Associates*
Surveyor:	*Creamer Engineering Services*

CASE STUDY

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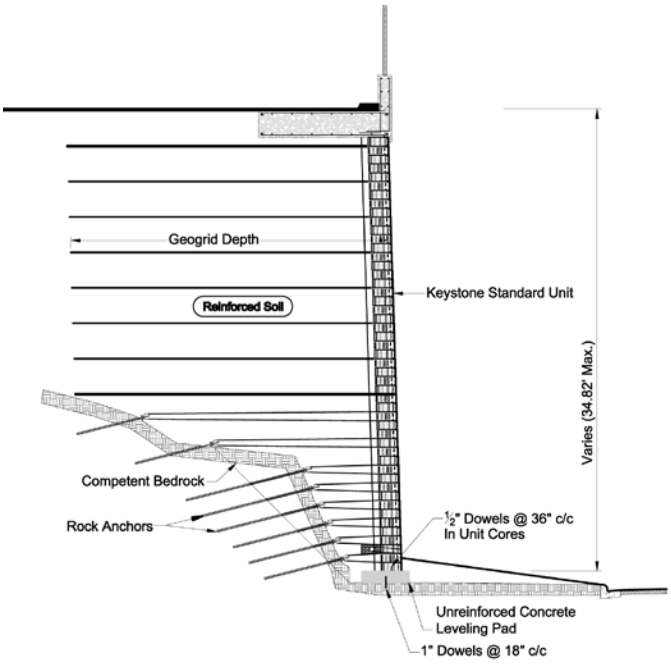
Working with Bedrock

The Metropolitan Plant Exchange's site is located only a little more than 10 miles from New York City, at an intersection of major highways in downtown Fort Lee, NJ. To level the land, a 36' retaining wall was to be built on the site's south side, an area with a 45° slope, rock outcroppings and related subsurface bedrock. In some areas, the bedrock reached a height of approximately five feet above finished grade. The related subsurface bedrock varied in its depth. Along with the site conditions, the project was further complicated by a construction code that restricted any blasting to occur on the area. Also, all construction plans and building had to be approved by the New Jersey Turnpike Authority and local municipal authorities.

"*Local codes did not allow for any blasting and hammering out all the bedrock would have used more time and equipment. It was cheaper to just go over the bedrock, so you had to work with it,*" said George Kreis, General Contractor, J. Fletcher Creamer & Son, Inc.

Since excavation of all bedrock was not an option, the wall was to be reinforced with a combination of geogrid and drilled-in-place rock anchors. Extensive site surveying and soil testing established what portion of the bedrock was competent to hold the anchors. The testing also classified some of the soils as SM or SP/SM soils and suitable for use as a controlled compacted fill for the retaining wall.

The weaker bedrock was removed in a non-benched excavation by drilling, splitting and hammering. The excavation of the established non-competent bedrock produced gaps along the wall's base which were filled with crushed stone. Excavation efforts also included establishing the retaining wall's leveling pad and drilling holes for rock dowel placement. After the dowels were placed, the concrete leveling was poured and pinned to the bedrock and the first course of the wall was pinned and grouted to the leveling pad.



Typical Wall 1 Section - Sta. 1+75
Standard Unit - Near Vertical Setback

"*It was a restricted space and we couldn't work from the front at all. Also, both contractors had to work simultaneously in the same area. At some points, we would build the wall to a certain elevation and they would continue driving in the rock dowels as we got to a certain elevation. Overall, the installation went well, it was just a coordination effort,*" said Joseph Pillari, Wall Contractor, Pillari, LLC.

The presence of bedrock in many sections of the wall's reinforced zone prevented some geogrid from being placed at its required length. Rock anchors were used in these areas. More than 200 rock anchors were used at various elevations at the base of the wall. Some anchors were placed up to eight feet high on the wall. A five-inch diameter galvanized schedule 40 steel spreader pipe was drilled and fastened to the rock anchors.

According to Jon Hansberger, Engineer, Keystone Retaining Wall Systems LLC, much of the remaining bedrock occurs at varying angles that produce additional forces exerted on the anchors and grid. The additional forces required extensive analysis that included a combination of hand and design software calculations. Also engineered was a length extension for the wall. The Keystone Compac Victorian wall system's flexibility allowed the wall to be extended to take advantage of additional parking space, however the extension required the execution of an acute angle. The engineered design solution combined the reinforcement grid and lean concrete to accommodate the 60° angled corner.

The Metropolitan Plant Exchange presented unique design and installation challenges requiring a flexible wall system. Keystone Compac Victorian provided a long-term and aesthetically-pleasing solution that produced the maximum structural integrity while maintaining a reasonable project cost.

For more information on Keystone Compac Victorian units or other innovative Keystone products, please visit www.keystonewalls.com or call 800-747-8971.

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