



Looking Good for Storm Water

New retail plaza installs underground chamber system

By Gina Carolan

Montgomery, Ala., was slated to receive a new retail plaza with eight 1,500-sq-ft rental units and a 17,000-sq-ft Looking Good store, which offers men's clothing and sportswear. When planning for the new development commenced, the engineers at Larry Speaks and Associates joined the design team to create a storm water system for the site.

The gently sloping, grassy field previously had been used for soccer and football games and needed no engineered storm water control. Developed areas, featuring their own retention systems, surrounded the new retail spot on all sides. These retention systems, however, were not capable of taking the additional runoff from the new parking lot and building area. A new storm water system was needed to detain runoff on site and release it slowly into a municipal system, as required by the local regulations.

As often happens in urban areas where land is at a premium, the

3.65-acre site did not have enough space to accommodate both a detention pond and a 143-space parking lot. The space constraint issue traditionally had not been common in Montgomery, but as more land was developed and land prices increased, the engineers began confronting that challenge more frequently. At the Looking Good site, the engineers undertook the only possible option: designing an underground storm water system.

"Underground chamber systems are the first alternative we consider when faced with any restriction to installing a detention pond," said Paul McClendon, a project engineer with Larry Speaks and Associates. "These systems are relatively inexpensive, but most importantly they are easy to install. This reduces errors in construction, allowing for a better end product."

"If the engineers used an above-ground detention system, the site would have lost 22,000 sq ft, which would have cost the owner about \$166,000,"

said Danny Clements, contractor with Danny Clements Builders. "Instead, an underground system is conveniently located under the parking lot, taking up no usable space."

The engineer estimated that, due to the limited depth to discharge storm water, roughly a third of the parking lot would have been lost with an above-ground detention system.

Shopping Around

Cultec Inc. provided the storm water system for the Looking Good site. Clements said that he preferred this to an alternative product because it allowed him to get the job done more cost-effectively. The alternative system required more stone and greater depth. The Cultec system's unique internal manifold design eliminated the need for a costly external pipe header, and its quick and straightforward installation helped further reduce costs. The company also offered a short lead time, delivering the product in less than two weeks.

"Cultec's system was simpler, had less interconnected pipes, and its one-side entrance was much easier to maintain level," Clements said. "Overall, the company offered a lower cost of material and time, saving us about 5% on material and 10% on labor, as compared to another product."

Built to Last

While the city of Montgomery requires local storm water systems to handle 25-year storms, Looking Good's system was designed for a 50-year storm. The Department of Transportation in Montgomery directs storm water systems to have increased



Choosing to detain storm water underground saved the owner 22,000 sq ft and about \$166,000.



Runoff from the retail plaza is stored in the chambers, then piped into a drainage swale.

capacity when they discharge runoff into a state right-of-way. The new chambers detain the plaza's runoff, which then is piped along Highway 80 into a drainage swale.

The engineers originally designed the system to send about 15% of runoff into a 420-ft underground reinforced concrete pipe. This pipe would have released the water to a municipal sewer that also served the neighboring

residential community. But because the local sewer had reached its capacity at that time, Looking Good's system later underwent a redesign to increase the bed size by 25% and send the runoff from the entire site into the new chambers.

Clements worked with the manufacturer to calculate the extra area needed for the storm water system in order to garner additional

storage volume. That addition, he said, did not increase the cost of the system significantly while eliminating potential flooding problems for the residential community.

From nine available chamber sizes, the engineers selected the Recharger 150, a lower-profile chamber typically used for installations with depth restrictions or when a larger infiltrative area is required. The unit is 8.5 ft long, 33 in. wide and 18.5 in. high, with a storage capacity of 19.88 cu ft per unit. The engineers calculated the required storage capacity using the SCS Method due to the small land area and employed Bentley Systems Inc.'s PondPack to model the outlet control structure.

"We had to use a shallow system, as the site was very flat—compounding the drainage issues—and required that drainage structures be placed very shallow in order to discharge," McClendon said. "The elevation of the swale is 218.5 ft, and the elevation of the parking lot is only 224 ft—5.5 ft



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above the swale. This chamber was a good fit in these conditions.”

About 460 Recharger 150 units were installed in a 14,580-sq-ft bed of crushed limestone, providing 21,175 cu ft of storage. While Clements had seen underground systems installed on other projects, this was the first time he had to conduct the installation.

Installation & Results

Clements began the installation by excavating a bed, spreading a 6-in. stone base at the bottom of the bed and aligning the chambers together with connectors. He then backfilled between the chambers with stone and connected the end chambers and the overflow. The final steps included backfilling above the chambers with 6 in. of stone and installing the filter fabric, after which the site was backfilled with dirt and prepared for pavement.

“Cultec was helpful and responsive to all our needs,” Clements said. “Mr. Dotson, the company’s vice president, flew in from the headquarters



The site’s approximately 460 chamber units provide more than 21,000 cu ft of storage.

in Connecticut to oversee the installation. This job is the easiest thing I have ever done.”

Looking Good’s new underground chamber system helped engineers solve the issues of space constraint and flat terrain. The contractor benefitted from the system’s cost-effectiveness, ease of installation and short lead times. At the same time, the new retail plaza received a larger parking lot than a detention

pond would have allowed. **SWS**

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