

February 2019 Vol. 5 Issue 11

civil + structural ENGINEER

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Q&A WITH WAYNE SWAFFORD, P.E.

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Design of a regional gateway bridge





Two concrete vaults were designed and delivered in pieces that could be put in place using an excavator so the contractor would not have to add a crane to the heavy equipment list.

ONSITE STORMWATER FILTRATION

CONTAMINATED NEW JERSEY LANDFILL IS TRANSFORMED INTO A COMMERCIAL OFFICE COMPLEX.

THE LANDFILL on Harrison Avenue in Kearny, N.J., is gone and in its place is a new industrial/commercial office complex. Accepting refuse from the 1970s until the early 1980s, the site was recently remediated in an \$8 million project that included capping to control emissions of gas and protect against contact with contaminated materials and soils, reducing the amount of leachate generation and capturing stormwater runoff. The project was honored at the New Jersey Alliance for Action's Annual Distinguished Engineering Awards event in October 2018.

According to the New Jersey Department of Environmental Protection (NJDEP), hazardous organic and inorganic compounds were detected in the shallow groundwater, which would discharge into the adjacent wetlands and surface water. Volatile organic compounds, polyaromatic hydrocarbons (PAHs), pesticides, and metals were detected at the

site along with medical waste, chemical drums, and tanks. Because the landfill was constructed without a bottom liner, leachate was free to drain out of the waste materials and directly into the groundwater. NJDEP estimated that as much as 83,000 gallons a day of that leachate flowed into the Passaic River.

Part of the remediation effort was the installation of two large systems with a total of 109 cartridge filtration units that can trap and store nearly 30,000 pounds of sediment. The reason for the filtration system was the NJDEP's regulation that runoff from any new impervious surface be treated to remove 80 percent of total suspended solids. The six-acre remediated site was designed to have two warehouse-size buildings, the largest being nearly 200,000 square feet, along with new parking lots.

According to calculations required by NJDEP, the maximum treatment flow rate was to be 10.9 cubic feet per second (cfs) and that each acre would generate 600 pounds of sediment a year. In order to be in compliance with the NJDEP regulation, an underground system measuring nearly 2,000 square feet would be required. There was not space, however, for one system that would provide the required capacity because of the site's close proximity to the Passaic River, a road, and the size of the buildings that would be constructed.

Also, much of the area is unusable land with hills and slopes created



An ADS BayFilter is lowered into place in one of the two concrete vaults at the old Harrison Avenue landfill in Kearny, N.J. Each BayFilter unit can trap 80 percent of total suspended solids, meeting New Jersey's requirements.



To meet New Jersey Department of Environmental Protection requirements, 109 BayFilter units were used to create the stormwater filtration system at the old Harrison Avenue landfill in Kearny.

when it was an operating landfill. Design engineering firm, Paulus Sotolowski & Sartor, LLC (Warren, N.J.), decided to use two filtration units with a total of 109 BayFilter 545 cartridges, each of which can treat 0.1 cfs and can store 262 pounds of sediment. There would be 55 cartridges in one unit and 54 in the other.

This BayFilter filtration device from Advanced Drainage Systems, Inc. is designed to remove fine sediments, heavy metals, and phosphorus with its spiral-wound media filter cartridge. The storage capacity of the entire filtration system is 28,558 pounds of sediment. ADS engineers showed that the site could generate 3,606 pounds of sediment a year, which would set the maintenance timetable at almost every eight years.

Aside from being able to fit the available space, the two concrete vaults holding the cartridges were assembled onsite using six precast concrete parts. The interior dimensions of each vault are 10 feet wide, 42 feet long, and 6 feet high. BayFilter worked with the precaster to have the concrete vaults designed in pieces that could be picked up and installed using an excavator so the contractor, DS Meyers Enterprises, LLC (Waldwick, N.J.), would not have to add a crane to the heavy equipment list. This method, instead of using a box culvert, enabled the cartridges, outlet manifolds, and other internal components to be installed without the need for an OSHA confined space permit.

Water is conveyed to the filtration units from manholes on the site through an 18-inch-diameter inlet pipe. The layout of the filters inside the vaults ensures that water will be evenly distributed to the filter cartridges. Inside each vault is a trolley that will be used to remove and replace the filter cartridges, which are 22.5 inches tall, have a 30-inch diameter, and weigh 250 pounds.

During a storm, runoff begins to fill the structure. When the water surface elevation in the vault reaches the operating level, water flows



Instead of using a box culvert, the open precast segments enabled the BayFilter cartridges, outlet manifolds, and other internal components of the stormwater filtration system to be installed without the need for an OSHA confined space permit.

through the BayFilter driven by a hydrostatic head. Within the BayFilter, the water flows through a proprietary filter media and drains into a vertical pipe. The vertical drain is connected to the under-drain system, which conveys filtered water to the outfall.

After the filtration units were installed, the vaults were topped with a separate slab and several feet of cover.

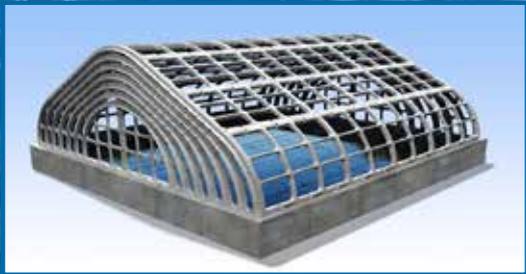
The completed site, redeveloped by Hartz Mountain Industries, is now home to a new 57,000-square-foot Cummins Power Systems facility and a specialized 200,000-square-foot storage facility for one of the largest refrigerated warehousing companies.

Information provided by Advanced Drainage Systems, Inc. (www.ads-pipe.com).

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