Continuous Deflective Separation Technology Helps Protect Destin Harbor from Stormwater Pollution

Sanford Payton

When U.S. Highway 98/State Road 30 was first built through Destin, the only thought given to stormwater was how to get it off the road. At that time, Destin was little more than a roadside bait shop and a few fishing camps. Seventy-five years later, the highway is lined with high-rise condominiums facing one of America's most beautiful beaches.

The local economy revolves around tourists who come to enjoy the pristine, white beach and clear, emerald-green water. As the area became more popular, pollutants washed by stormwater from the highway and bordering parking lots threatened the water quality of the harbor. All the stormwater falling along a four-mile-long strip of the highway flows to three outfalls which empty into Destin Harbor. Two of the outfalls are 30" diameter pipe, and the other is a 72" diameter pipe. As a result, city officials asked the Florida Department of Transportation (FDOT) for help.

Finding an Affordable Solution

According to Scot Golden, P.E., FDOT District 3 drainage engineer, the department almost never does stormwater treatment enhancement projects unless they are connected to new roadway work, so the FDOT used a special enhancement fund to contract with Faller Davis & Associates of Tampa to design a solution.

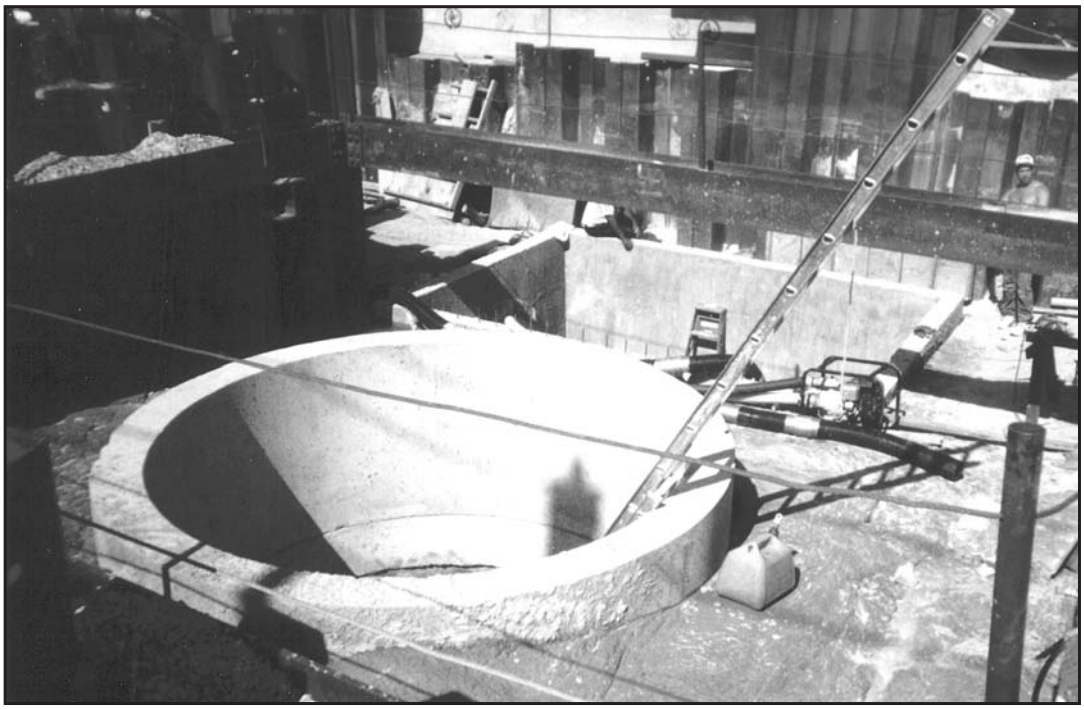
Nancy Faller, president of Faller Davis, knew that land along the beachfront highway is far too scarce and expensive to allow stormwater treatment ponds to be built, so she began a study to find the best alternative. Her investigation led her to several small-footprint stormwater treatment structures which qualify as Best Management Practices (BMP). Only one of the technologies, Continuous Deflective Separation (CDS), could handle the flow from a 72" pipeline, and it was the only technology that captured and retained all floatables which entered it.

Sanford Payton is a freelance writer in Brentwood, Tennessee.

CDS Technology

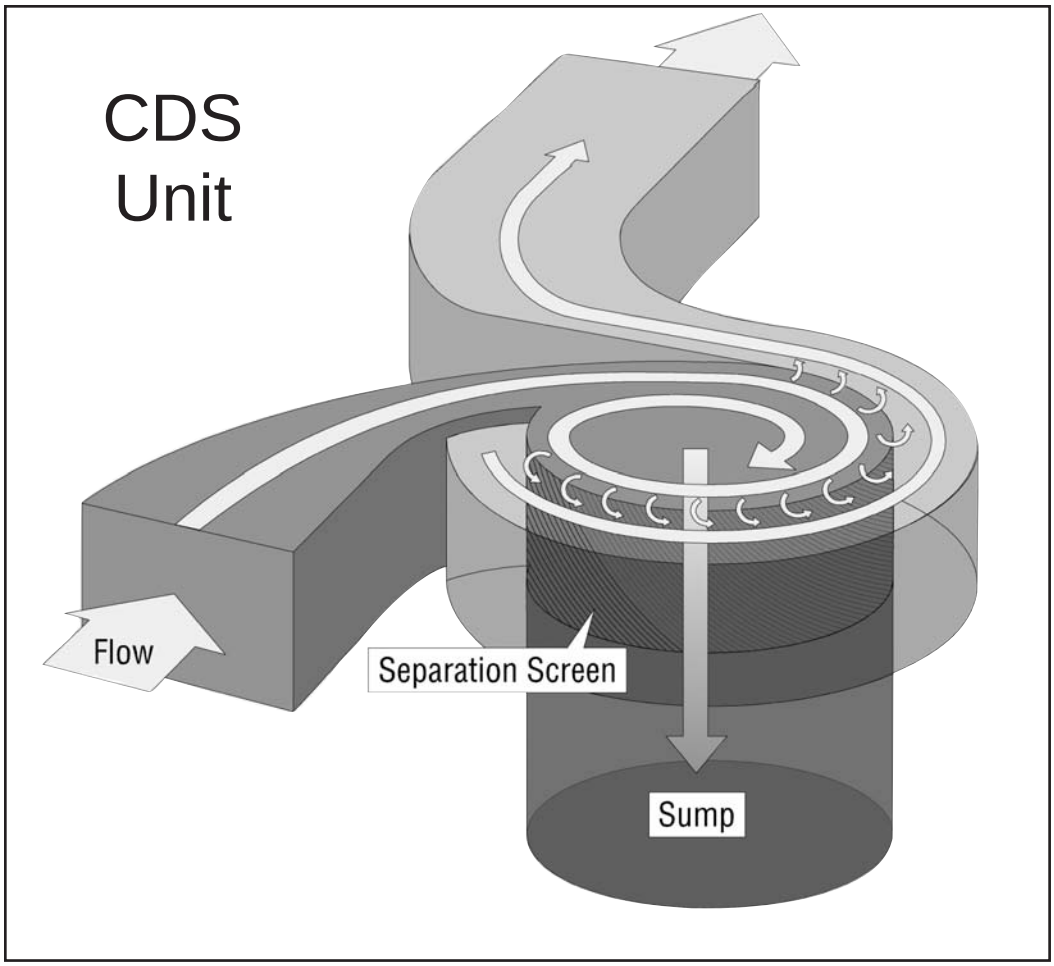
CDS units are cylindrical underground structures which can be designed to treat flow ranges from one cfs to 300 cfs and higher, according to Chris Landt, a project engineer with CDS Technologies Inc. in Winter Park. Treatment flow is diverted from a storm sewer drain into a CDS unit where the non-mechanical screening technology uses the hydraulic energy of the water to screen and trap pollutants.

As water enters the separation chamber of a CDS unit, it begins a circular motion which is hydraulically designed to allow it to pass through a cylindrical stainless steel screen while the screen separates and retains pollutants. The circular flow is carefully balanced to assure that the tangential flow around the interior of the screen keeps the screen clean. Floatable debris, neutrally buoyant debris, sediment, and other pollutants are collected in the center of the chamber. Heavier pollutants settle into a central sump where they can be removed by vacuum, as needed (one to four times each year). After the water passes through the screen, it is returned to the stormwater drain.



A wide range of CDS units is available in precast concrete or premanufactured fiberglass. Units with treatment capacities over 64 cfs are cast in place.

CDS units permanently remove virtually 100 percent of floatables from stormwater. Once trapped in a CDS unit, debris can not be flushed back into the downstream system. The units also remove 100 percent of all particles greater than one-half the size of the screen opening. Standard screens are available with



Flow in a drainage pipe is temporarily diverted through a CDS unit where suspended solids, sand, floatables, oil and grease, and other pollutants are captured and retained.

openings from 4,700 microns (0.185")to 2,400 microns (0.095"). Studies show the units remove 93 percent of all particles which are one-third the size of the screen opening, and 53 percent of all particles one-fifth that size. A conventional oil baffle within the CDS units effectively controls oil and grease in stormwater. Studies have shown that with the addition of sorbents, the capture efficiency of free oil and grease is approximately 80–90 percent.

Designing the Treatment System

Frank Synychak, senior drainage engineer with Faller Davis, was responsible for selecting the appropriate CDS units and designing how the structures would fit into the existing system. One drainage basin consisted of only 2.5 acres, so a unit which could treat three cubic feet per second (cfs) was selected. A unit which can treat 11 cfs was selected for a six-acre drainage basin. The largest basin consisted of 122 acres, so a CDS unit which can treat 30 cfs was used.

"No other technology could handle a 72" pipe, much less treat a flow that large," said Synychak. "My calculations show that five units from the next best technology would have only been able to treat 5 percent of the total flow from the basin. One CDS unit treats it all."

All three units were precast concrete. Each installation design was different, to meet site requirements. The smallest unit was the least complicated because the CDS unit could simply replace a short section of the existing drainage pipe. Installing the next larger unit was more complicated because a building had been erected very close to the drainage pipe. It was feared that driving sheet piling so close to the building would be destructive. As a result, the unit was placed in the street, and the storm drain was diverted into it. The third and largest CDS unit was also installed in a street because that was where the 72" diameter reinforced concrete pipe was located.

The Final Result

All maintenance and operation of the treatment units will be the responsibility of the city. "We don't know yet just how often the units will have to be emptied," said Charles Meister, P.E., Destin city engineer. "It will depend upon the amount of rainfall we get, and how clean we keep our city streets. But other than cleaning, there shouldn't be any maintenance since the units have no moving parts."

Meister expects to see more municipalities go to units like this, instead of retention ponds. "When your real estate is expensive and scarce, you don't have the luxury of buying land and building retention ponds," said Meister. "That's the beauty of this technology. They can go inline, within the existing right-of-way in most cases, so you don't have to buy more land."

Pollutants trapped in the CDS sump can not be flushed back into the drainage system.