



A composite manhole replaces a manhole approaching failure in a lightly used turn lane. (Photos courtesy of Gwinnett County Public Utilities)

### BETTER MOUSETRAPS

**PRODUCT:**

Steel-reinforced polymer concrete manholes

**MANUFACTURER:**

U.S. Composite Pipe  
817/783-3444  
[www.uscompositepipe.com](http://www.uscompositepipe.com)

**APPLICATION:**

Replacement of deteriorating manholes

**BENEFITS:**

Corrosion-resistant material requires no coating or lining

**USER:**

Gwinnett County (Ga.)  
Public Utilities

# CONQUERING CORROSION

Steel-reinforced polymer concrete manholes enable a Georgia utility to overcome the ravages of hydrogen sulfide

By *Scottie Dayton*

**“The structures cost more than others, but after factoring in the excavation, manpower, and materials, the results we’ve seen since the initial install have justified the purchases. And composite manholes are maintenance free.”**

Howard Buck

A service call to unblock an 8-inch gravity main fed by a 6-inch force main packed a surprise for the Gwinnett County (Ga.) Public Utilities crew. When they popped the cover on the dump manhole, they found the four-year-old epoxy-coated concrete structure disintegrating.

The city requires dump manholes to be lined with epoxy, but contractors choose the product.

Howard Buck, sewer collections manager, sent two workers to inspect the 197 dump manholes on 280 miles of force mains. They found that lined and unlined structures alike were corroding. “Hydrogen sulfide was eating through the lining as if it wasn’t even there,” he says.

Buck attended the 2008 American Water Works Association show looking for solutions and met Eric H. Davidson, P.E., vice president of U.S. Composite Pipe. Davidson

shipped a steel-reinforced polymer concrete manhole as a pilot project. Installed that October, the manhole still looks like it did the day it arrived.

### Prime suspects

The county’s 2,850-mile gravity sewer system has 231 pump stations and more than 70,000 manholes. Only those on the force mains were involved; five were approaching imminent failure. To educate



**Gwinnett County workers prepare to install the sections of a composite manhole.**

the finance department, Buck photographed the composite manhole and those in jeopardy.

“That gave me the justification I needed and they authorized the purchase,” says Buck. “We were fortunate that four of the manholes were in easements or on the shoulder and one was in a lightly used turn lane. Had they been in the road, a couple would have failed from the weight of traffic.”

The polymer concrete used in composite manholes contains selected blends of aggregates and fillers held together with a high-strength, corrosion-resistant, thermosetting resin. Polymer concrete is its own protection from corrosion and can be used in pH 1 to 13 environments. The steel reinforcement handles severe live load and backfill dead loads.

A dedicated inspection crew used one of four new CCTV vans with CUES Inspector General portable mini mainline systems to identify severely deteriorated manholes and monitor those with less corrosion. They found six more ready to fail. “The usual turnaround time from the factory is two weeks, but Eric shipped the first order in one,” says Buck. “I ordered six more manholes in July and replaced 20 more by October.” The oldest lined structure was installed in 2001 and the newest in 2006.



**LEFT: Hydrogen sulfide ate through an epoxy lining and attacked the concrete manhole. RIGHT: Hydrogen sulfide corrosion in a 6-inch force main. A worker's shovel went straight through the main during excavation.**

are down,” says Buck. “The team also is very good at what they do, and they hustle like worker ants. They haven’t hit a manhole that they couldn’t replace in eight hours.”

A call to the lift station shuts off the pumps, and the workers then cut the incoming and outgoing pipes, remove the manhole, and set the monolithic composite base slab, which prevents cold joint leaks. They then reattach the pipes so the station can pump if need be.

Manhole sections seal with an offset rubber gasket joint. When the structure reaches the top, the team installs the original ring and cover, calls the station to turn on

splashes against the opposite wall as it shoots out. If it’s a shallow manhole, corrosion reaches the top cone section and stops. We don’t know why.”

### Field trip

Buck saves everything pulled from the ground in the county yard, then escorts Finance and Engineering personnel to view the collection. “Pictures are great, but seeing the epoxy lining hanging off the walls makes an even greater impression,” he says. “It’s one thing to say that the metal on some failed mains is paper thin. It drives home the point when I rip off a chunk with my bare hands.”

Another call to relieve a blocked manhole held more surprises. After clearing the obstruction, the cleaning crew jetted the line using a Vactor truck. When unfamiliar material washed down, they called the inspection crew. The camera revealed that the pipe’s concrete lining was falling off, creating the backup.

“They inspected 1,400 feet and found the dump manhole and next three downstream structures badly corroded,” says Buck. “My 2012 budget includes 20 to 30 composite manholes. Once we install them, replacements should taper off to one or two per year. The structures cost more than others, but after factoring in the excavation, manpower, and materials, the results we’ve seen since the initial install have justified the purchases. And composite manholes are maintenance free.” ♦



### Professionals at work

Buck coordinates with pump station personnel to determine hold time, as some manholes have two to four force mains. A dedicated three- or four-member crew replaces a structure in one workday.

Depending on the manhole’s depth, the team uses rubber-tired backhoes or trackhoe excavators to dig around the existing structure and expose the concrete-lined ductile-iron pipes. If they find corrosion, they strip back until they hit solid material, then replace the bad section with PVC pipe.

Meanwhile, a lift station mechanic pumps down the wet well and drains back the force main. A two-member crew with a Vactor 2100 combination truck remains at the lift station in case it should begin to fill.

“By the time the guys set up, it’s 9 or 10 in the morning and flows

the pumps, and backfills if there are no leaks.

“So far, the hydrogen sulfide hasn’t reached our rings and covers,” says Buck. “It’s usually the bottom section and maybe the next one up, depending upon where the force main enters. If it comes in three or four feet high, sewage