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Chesapeake Seals the Deal

Pipe Sealing Project Prevents Future Flooding, Cave-ins

The City of Chesapeake, Va. is located in the region called Hampton Roads, the 27th largest metro area in the country with more than 1.5 million residents. Chesapeake's population comprises a little more than 200,000 of this total. It is one of the fastest growing cities in Virginia, with a population increase of more than 21 percent since 1990.

Chesapeake's growth and prosperity historically has been linked to water. It has access to Chesapeake Bay and is adjacent to the world's largest natural harbor and the world's largest naval base in Norfolk, Virginia. It also is situated on the Atlantic Intracoastal Waterway.

Located in the southeastern quadrant of Virginia, Chesapeake has an overall area of 353 square miles. With an annual rainfall of approximately 48″, its designers must contend with the prospects of determining where 294 billion gallons of water will go. A large share of this rainfall will find its way into the storm sewers.

According to Richard Broad, City of Chesapeake Stormwater Administrator, the soils in their municipal drainage area, typical of most of the coastal plain, are composed of clay and sand. Pipe and structures normally are placed in these insitu-soil conditions with no special fill or bedding materials. However, the installation techniques are specified.

The groundwater in this area is normally not significantly above the pipe, so there is the potential for exfiltration of run-off contaminates into the groundwater in addition to infiltration into the line. Broad's response to this concern highlights the many different aspects for watertight systems that are municipality specific. He stated, "We are mainly concerned about restoring the structural integrity of our piping and ditch system in the city to prevent flooding and property damage that could be caused by cave-ins. Groundwater is quite shallow, therefore, any pollutants transported by runoff would easily reach the groundwater even if there were no stormwater facilities present."

The City maintains a Public Works Customer Service Center available for citizens to report cave-ins and other traffic hazards and inconveniences. The availability of this Center helps to mitigate citizen frustrations. Follow-up calls normally are only made if too much time elapses between their initial call to report a cave-in and the associated repair, or if the temporary filling fails before a permanent repair can be made.

When notified of a cave-in, the City responds quickly to eliminate any potential hazard to the public by filling the depression caused by the cave-in with crusher run material and placing traffic cones around the area, if warranted. When the permanent repair is initiated, a television camera is run through the line to assess the damage and any possible safety hazards. The line is then cleaned, utilities marked and the cave-in excavated. The damaged structure or pipe is repaired or replaced, joints wrapped with

filter fabric and backfilled. The repair is completed with the replacement of the roadway pavement. When excavation is required, a watertight repair generally takes four days to complete.

In any given year, the City has 200 to 300 collapses around pipes and a little under 50 around structures. Broad indicated that it is difficult to obtain an accurate count at this time because the City is so far behind in responding to the cave-ins that complaints sometimes get called in multiple times when temporary fillings fail.

However, the scope of the problem is starting to be recognized. Last year, the City Council appropriated an extra $467,600 for contract cave-in repairs. The average cost of a repair is not easy to ascertain as the nature of each cave-in is somewhat unique and thereby the costs vary. The average bid cost of the contracted cave-in repairs was approximately $2,500 per repair. The City generally uses their own crews for shallow and small diameter repairs. They estimate work accomplished by municipal personnel for these repairs to be roughly in the range of $1,000 to $1,500 per repair. These costs would include all labor, equipment and materials.

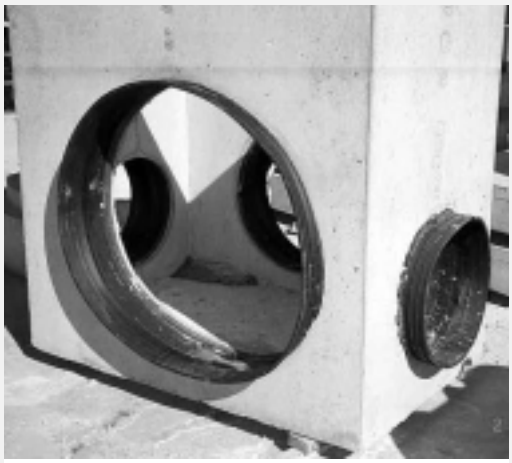
The problems experienced in Chesapeake are not unique or new, but they are receiving more increased scrutiny and study as their overall part of the municipal budget increases. Most cave-ins are the result of leaking joints either in the pipeline or to a structure. These leaks represent not only a structural problem and traveling hazard, but may result in groundwater or stream contamination. Prevention is more cost effective than any repair or retrofit, but it does require changing what historically has been done for the installation and specification of underground pipelines and structures.

The City of Chesapeake has recognized this problem and is developing a program to address it.

"Currently the City of Chesapeake's Stormwater Division is trying to catch up on a large backlog of drainage complaints, so our work effort is being focused on responding to these old service requests as well as new ones that are called in. But we are making good progress on the past service requests and expect to eliminate the backlog," Broad said.

Once the city is up to date, they will become more proactive. More inspections and a regular maintenance schedule will be set up for piping and ditches.

Chesapeake changed their specifications several years ago to require that all joints be wrapped in filter fabric. Most failures of their system are the result of pipe being installed without wrapped joints prior to the wrapping requirements being implemented, or as a result of poor installation.



A new catch basin structure with resilient flexible connectors.

The City of Chesapeake's specifications now require watertight joints. For concrete pipe, these may be obtained by using a preformed flexible plastic sealing compound or an approved equal. Corrugated metal pipe joints are linked with connecting bands that are corrugated or hugger type bands. These bands engage at least one annular corrugation on each side of the joint. The bands are asphalt coated, with a minimum 7″ wide neoprene gasket. This requirement is increased to 12″ bands for pipe 36″ to 84″ in diameter. Under no conditions are dimple bands permitted. PVC pipe gaskets must conform to ASTM F-477, "Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe." HDPE pipe has to conform to AASHTO M252, "Corrugated Polyethylene Drainage Tubing," and M294, "Corrugated Polyethylene Pipe, 12″ to 36″-Diameter." All pipe joints, except PVC storm drainage pipe, must be wrapped with a non-woven erosion control filter material.

Joints from pipe-to-structures and within structures are required to be watertight. Precast sections must provide tongue and groove joints sealed with preformed flexible plastic sealing compound. Joints are to be plastered from the inside and outside with a mortar grout made of one part Portland Cement and two parts sand. Where pipe enters a manhole, they must be mechanically sealed with a resilient flexible connector.

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Broad believes that with the specification changes they have implemented in sealing pipe and structures with watertight connections, the problems they are currently dealing with eventually will be eliminated.

Chesapeake's approach to water treatment has been one of consistent and persistent efforts to provide the highest quality drinking water and minimize contaminates entering their system and the Chesapeake Bay, one of the most environmentally sensitive watersheds in the country. For example, in 1998 they brought a reverse osmosis plant online for treating groundwater. In 1999, another reverse osmosis plant went online for treating surface water. These plants can remove particles as small as ions from solution.

This article was put together by the Watertight Storm Sewer Group, York, Pa.

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