

Good Connections

Information on Watertight Storm Sewers

Water Facts

How much water does it take to produce one serving of:

Item

1. Lettuce (1 cup)
2. White Bread
3. Tomato Paste
4. Brown Rice
5. White Rice
6. Pasta (2 oz)
7. Milk
8. Orange Juice (1 cup)
9. Tofu (1/2 cup)
10. Chicken (8 oz)
11. Steak (8 oz)

(Answers Inside)

Source: Water Education Foundation, American Water Works Assoc. & US Dept. of Agriculture

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Eye on Chesapeake

As part of our on-going effort to inform the owners, engineering and specifying community of the need and benefits of watertight storm sewers, we will periodically highlight a municipality and discuss with their officials some of their stormwater problems and the programs they implement for addressing them. Today we visit Chesapeake, Virginia.

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

Chesapeake's growth and prosperity has historically been linked to water. It has access to the Chesapeake Bay and is adjacent to the world's largest natural harbor and the world's largest naval base at Norfolk, Virginia. It is also 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 inches, their 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 to the storm sewers.

To assess the overall impact of these flows on the integrity of the system, we contacted Mr. Richard Broad, City of Chesapeake Stormwater Administrator, and inquired if he would address any problems they have identified and solved regarding joint and connection seals. He kindly agreed to provide his insights to our inquiries.

Mr. Broad described the soils in their municipal drainage area as typical coastal plain soils comprised of clay and sand. Their pipe and structures are normally placed in these insitu-soil conditions with no special fill or bedding materials utilized. The installation techniques, however, are specified.

The groundwater in this area is normally not significantly above the pipe, so there is the potential for exfiltration of run-off contaminants into the groundwater in addition to infiltration into the line. Mr. Broad's response to this concern highlights the many different aspects for watertight systems which 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



Richard Broad, Chesapeake, VA Stormwater Administrator

(Continued Inside)

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 are normally 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, there are 200 to 300 collapses around pipes and a little under 50 around structures. Mr. Broad indicated 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.

The scope of the problem, however, 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 has historically 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. Mr. Broad's summary of the current conditions and his vision of the future reinforce this point: “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 no later than January, 2003. Once this is accomplished, we will change our operations to be more proactive. We will perform more inspections and set up a regular maintenance schedule for our piping and ditches. Chesapeake changed their specifications several years ago to require that all joints be wrapped in filter fabric. Most failures we see are the result of pipe being installed without wrapped joints because they were installed prior to the wrapping requirements being implemented, or as a result of poor installation.”

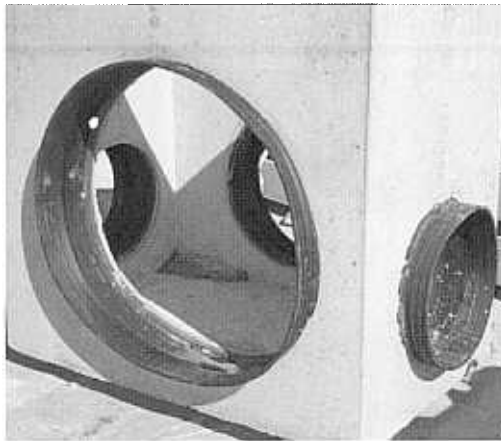
The City of Chesapeake's specifications now require watertight joints. For concrete pipe, these may be obtained by using a preformed flexible plastic sealing compound or an approved equal. Corrugated metal pipe



With 200 to 300 collapses around pipe and under 50 around structures per year, City Council appropriated an extra \$467,000 for contract cave-in repairs like this one.

joints are linked with connecting bands, which are corrugated or hugger type bands, that engage at least one annular corrugation on each side of the joint. The bands are asphalt coated, with a minimum 7-inch wide neoprene gasket. This requirement is increased to 12-inch bands for pipe 36-inch to 84-inch 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-inch 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 pre-formed 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 2 parts sand. Where pipe enters a manhole, they must be mechanically sealed with a resilient flexible connector.



Catch Basin structure with resilient flexible connectors.

Mr. Broad believes, 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.

Our interview with Mr. Broad concentrated on the structural concerns associated with leaking stormwater systems. The reason, of course, was this is their main problem at this time. That is not to say the City of Chesapeake is not concerned with water quality. Chesapeake's approach to water treatment has been one of consistent and persistent efforts to provide the highest quality drinking water and minimize contaminants entering their system and the Chesapeake Bay, one of the most environmentally sensitive watersheds in the country. As an 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. As one says, there is no reason to address a problem that does not exist.

We were pleased to have the opportunity to discuss these issues with Mr. Broad prior to the completion of their watertight stormwater system. The problems and issues facing the City of Chesapeake represent what most municipalities are dealing with on a daily basis. It is the process of stepping back, recognizing the scope of the problem, developing a plan to address the causes, and then implementing the program, which is difficult to accomplish when day-to-day fires are burning on all fronts. We commend the City of Chesapeake on putting out one of these fires.

WANTED

Storm Sewer Job Profile Using Flexible Connectors

Do you have an upcoming or in progress drainage job where flexible connectors have been specified or requested? If so, we would like to profile it for an upcoming issue of our newsletter. Please fax Mailroom at 717-840-1795 or e-mail mailroom@frankgroupinc.com.

BENEFITS

Watertight Storm Sewers help prevent...

- Structural Failures
- Non-Point Stream Pollution
- Groundwater Contamination
- De-Watering of Wetlands

With Watertight Storm Sewers You Can Count On...

- Faster and Lower Cost Construction
- High Product Quality
- Exceptional Value

Water Facts Quiz

Answers

1. - 3 gallons
2. - 11 gallons
3. - 12 gallons
4. - 16 gallons
5. - 25 gallons
6. - 36 gallons
7. - 48 gallons
8. - 49 gallons
9. - 61 gallons
10. - 330 gallons
11. - 1,232 gallons

FREE Newsletter Subscription

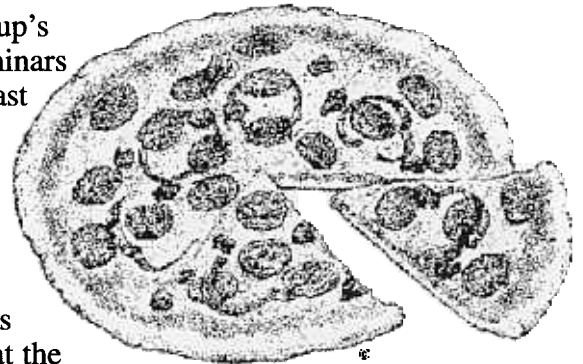
The Watertight Storm Sewer Group Newsletter, Good Connections is published semi-annually and is free of charge. If you would like to be added or deleted from our mailing list, fax to mailroom at 717-840-1795 or e-mail mailroom@frankgroupinc.com. Please be sure to reference the Good Connections Newsletter in your request.

Receive Good Connections via e-mail

Is paper piling up all around you? Good news for those of you that are interested in a paperless world. The Good Connections Newsletter will be available via e-mail starting in June. It's simple. Go to our new website, www.watertightstormsewers.com to sign up online.

How Many Pizzas Did Engineers Eat Last Year? Brown Bag Results.

The Stormwater Sewer Group's brown bag lunch-time seminars were very successful this last year. First and foremost, every single one of the 399 total attendees at the 20 seminars thought the 185 free pizzas provided tasted great!



The 182 exit survey results provided "just the facts" of what the attending engineers thought about our promotion of watertight storm sewers. Eighty-two percent agreed the program was what they expected and the same number responded that it was a valuable learning experience. Under the "Things We Learned" category 323 total facts were listed. Number one, going away was "It's amazing how much money can be saved installing and maintaining flexible connectors rather than mortared or grouted joints because of time saved and long term durability." The second most noted fact was, "EPA guidelines are met by using flexible connectors," and third was, "It is very important to control infiltration and exfiltration in storm sewers." With these thoughts in mind sixty-eight percent said they would recommend this presentation to their fellow engineers. So give us a call to set up your brown bag in 2002 while the pizza is still hot! If you are an Engineering Firm, D.O.T., City or Town, please fax mailroom at 717-840-1795 e-mail mailroom@frankgroupinc.com in care of the Watertight Storm Sewer Group or go to our website, www.watertightstormsewers.com to sign up.

New Website: www.watertightstormsewers.com

Many of the Agencies responsible for environmental protection and regulation of water quality are proposing new and more stringent requirements for managing stormwater run-off. Separation of point sources, restriction of ground water infiltration, and treatment requirements are moving rapidly from discussion to specifications. Engineers, designers, inspectors and contractors need to understand the reasons for these changes and the best methods for adapting their processes and specifications.

Coming in June, 2002, you can find a wide array of information 24/7. Accessing up-to-date information on the benefits and advantages of watertight storm sewers has never been easier. The new site contains the latest technical information about flexible connectors, specifications, library of industry articles, back issues of Good Connections Newsletters, gallery of photographs and more. Since the site will be updated regularly, you will want to add us to your favorites list.

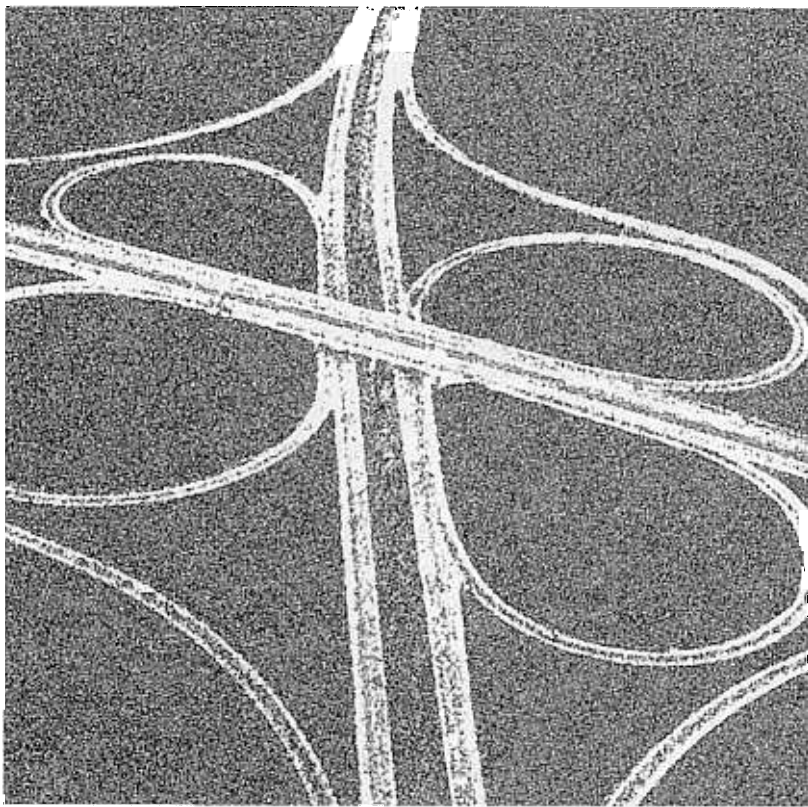


The Storm Drainage Highway

Have you ever looked at a pipe emptying into a river or stream and wondered where the water came from? You may not have given it much thought, but looking at an outlet pipe for a storm drainage system is similar to a major exit ramp on a highway. Both are outlets for a much larger collection area.

What do storm drainage systems and highways have in common? To answer this question, one has to first understand the simple but primary functioning of a storm drainage system. A storm drainage system is an underground collection system for consolidating and funneling watershed run-off to a major body of water. A highway essentially provides the same function above ground for commuters.

In a community, highways, and especially interstate highways, have restricted access and few traffic control devices such as stop signs, to slow the movement of vehicles from their point of origin to their desired exit. Storm drainage systems operate in the same fashion. The curb inlets and drains act as entrance ramps taking the flow discharge to its destination, which can be a stream, river, lake or other larger waterway. Like highways, major storm drainage pipelines are restricted, having few lateral connections.



Yes, highways and storm drainage systems are very similar in their design, function and purpose. There is, however, one major difference between the two systems. One vigorously enforces its right-of-way restrictions, the other does not

How many times have you seen a local landowner or developer connect their driveway or access road to an interstate highway? Never. The Federal Highway Administration does not permit it because it is dangerous and slows the flow of traffic. Yet we will routinely allow non-watertight

joints at pipe-to-structure and pipe-to-pipe connections. Ironically, these “joint driveways” have the same consequences as those for highways.

This “unauthorized” inflow creates many problems. The turbulence caused by inflows with joints every 8 to 20 feet decreases flow velocity. The joints allow for the piping of backfill fines into the pipeline undermining the structural soil envelope around the pipe and accumulating sediment in the pipe, further restricting its flow capacity. Infiltration and exfiltration of contaminants from farm fields, industrial sites and leaching roadway chemicals pollute groundwater, streams and rivers, endangering our drinking water and us.

It does seem that our storm drainage systems have a lot in common with our highway systems. Maybe it's time to duplicate the design success of our highway system underneath the roadway as well as on top of it.

PHOTO GALLERY

Wanted: Road Damage Pictures Reward: \$100.00

Congratulations to John Nelson of Patrick Engineering Inc., of Lisle, IL. John submitted the winning photograph to Photo Gallery and collected the \$100.00 reward. We would like to thank those who submitted pictures, and encourage you to try again for our next reward.

Many potholes, subsidence, pavement distress and other road degradation around manhole covers, catch basins and curb inlets are due to using an outdated and old-fashioned method using brick and mortaring storm sewer connections. Every issue, we will publish a picture highlighting road damage associated with not using resilient flexible connectors or pipe gaskets. If you have an interesting picture and we use it in our issue of Good Connections you earn a \$100.00 reward. Please e-mail your pictures to mailroom@frankgroupinc.com or mail to Frank Group, Inc., 2555 Kingston Road, Suite 230, York, PA 17402. Please be sure to reference the Watertight Storm Sewer Group.



Let's hope people have extra money saved for a new front end alignment on their car if they hit this pothole and subsidence around a manhole when driving on 130th Street near Stony Island Avenue in Chicago, IL.



Watertight Storm Sewer Group

c/o Frank Group, Inc., 2555 Kingston Rd., Suite 230, York, PA 17402

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DETAILS INSIDE