Vol. 1 Issue 2

Good Connections

Information on Watertight Storm Sewers

Water Facts

Test your water knowledge by guessing the answers to these water facts.

(Answers inside)

1. Amount of water contaminated by 1 quart of oil=
   - A. 5 gallons
   - B. 100 gallons
   - C. 100,000 gallons
   - D. 250,000 gallons

2. How much of the Earth's water supply is:
   - A. Saltwater?
   - B. Freshwater?
   - C. Groundwater?
   - D. Lakes & streams?
   - E. Glaciers & Icecaps?
   - F. Water Vapor?

3. How much water does it take to produce one serving of
   - A. Tomatoes (4.3 oz.)
   - B. Oranges (4.6 oz.)
   - C. Pasta (2 oz.)
   - D. Milk (8 fl. oz.)
   - E. Chicken (8 oz.)

FACT: One acre-foot equals approximately 325,900 gallons, enough to fill a football field to a depth of one foot or to supply the water needs of a household of up to five for a year.

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

INSIDE

Non-Gasketed Pipe Creates Hazardous Conditions

R & R Visual was able to determine where leaked fuel infiltrated a stormwater collection system with a Pearpoint video inspection system.

When 300 gallons of gas accidentally spilled at a small Midwestern fuel depot, it almost immediately found its way into the local storm sewer creating an extremely hazardous situation.

From the point of the spill at an above-ground pipe connection, the fuel flowed across a frozen gravel driveway and down into a snow-covered roadside ditch. The gasoline soaked into the ground immediately. Because of the speed at which the fuel disappeared, no one could be sure of the location on the surface where it soaked into the ground and definitively claim "this is the exact place."

Within an hour after the spill, residents of two near-by homes noticed fumes coming in through basement sump pumps that were connected to the town storm sewer system. In one house, the fumes were ignited by the water heater pilot light and resulted in a small flash fire. The local fire department responded to the spill by dumping 4,000 gallons of water in the ditch and around the area where the gasoline had disappeared. Surprisingly, the water soaked in as quickly as the gasoline, and no one knew why.

An emergency response contractor was brought onto the scene to begin tracing sewer and drainage lines in the area to determine the path of migration of the gasoline. The emergency response contractor began the migration search by locating and excavating pipes in the known storm drainage system, breaking into them and flushing them with additional water, and then examining the effluent for gasoline in the water. One of the pipes clearly showed signs of gasoline on the water surface. The contractor understood immediately that the situation was complicated and requested a Closed Circuit TV (CCTV) camera service so that the system could be explored more quickly and thoroughly.

Gasoline can be seen mixing with water in the storm sewer.

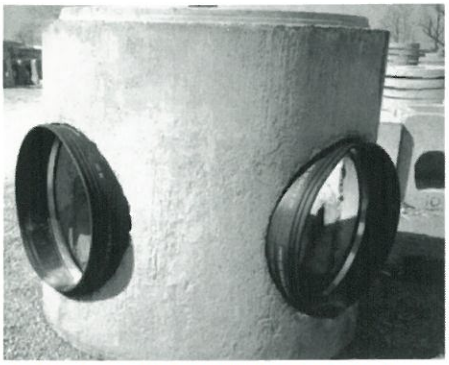
R & R Visual of Rochester, Indiana, responded and started at a basin excavated by the emergency response contractor about 300 feet south of the spill site which showed signs of gasoline contamination. This basin was connected to the storm system for an area on the east side of the town. The basin became their starting point and their point of connection. Using a Pearpoint P494 Pan & Tilt Camera on a P400 series tractor, they entered the line and traveled approximately 20 feet in the direction of the fuel spill to the first service lateral. The water exiting that lateral contained gasoline.

During this inspection of the point where the gasoline had entered the system, a field tile was discovered. The field tile crossed under a gravel driveway within 10 feet of the fuel tanks

(Continued Inside)

Non-Gasketed Pipe Creates Hazardous Conditions *(Continued from cover)*

and their piping connections. Additional inspections found that the spill was isolated to that one path of migration through the tile. By using a CCTV camera, R & R was able to pinpoint the source of the infiltration and determine its cause: non-gasketed joints in the field tile. This serious situation created by gasoline infiltrating a drainage system could have had a worse outcome – much worse. It helps to demonstrate dramatically another important reason to design storm sewer and drainage systems that are watertight. In addition to point-source pollution as in this example, storm and drainage systems can serve to collect all forms of non-point-source pollution if these systems are not sealed properly. Non-gasketed or compromised pipe joints, pipe cracks at structure penetrations, and poorly sealed catch basins all serve to gather, transmit and disperse whatever fluids find their way into the system. Sealing the system gives control over what gets in, where it travels, and into what watershed it is deposited. The American Society of Civil Engineers (ASCE) states in its 2001 Report Card for America's Infrastructure that "Non-point-source pollution remains the most significant threat to water quality" under the drinking water section. (See inside cover for report details).



Rubber pipe gaskets and flexible pipe-to-structure connectors pictured here, eliminate infiltration into storm sewer collection systems.

Damage caused by unsealed collection systems extends well beyond the environment. Soil subsidence under roadways is one of the most common and expensive losses to street and highway departments. This is caused by erosion of fines around inadequately sealed pipes and structures into the drainage system, resulting in loss of soil support to the roadway. The unsupported roadway then sags and /or cracks, creating continuing safety, maintenance, and replacement issues.

The solution is simple – storm sewers and drainage systems should be sealed watertight with flexible rubber connectors and pipe gaskets. For a small additional expense during construction, a sealed surface water collection system gives superior control of influent/effluent streams and a stable long-term foundation for streets and highways.

Brown Bag Seminars Prove to be Popular

The response to the Watertight Storm Sewer Group's offer for Brown Bag Seminars has been excellent and the seminars well received by attendees. The 265 attendees to our conferences and seminars have given us an average rating of four out of a high of five in value received. We would like to thank the following for inviting us to discuss the benefits and advantages of using watertight flexible connectors in storm sewers.

- James R. Hill, Inc.- Burnsville, MN
- Minnesota Dept. of Transportation - MN
- Sullivan Engineering - Brentwood, TN
- Brentwood Public Works - Brentwood, TN
- Maguire Group, Inc.- Foxboro, MA
- ASCE Baltimore Chapter - Baltimore, MD
- Louisiana Tri-State Engineering Society - LA
- IIW Engineers & Surveyors, P.C.- Dubuque, IA
- John Meyer Consulting - Armonk, NY
- Clark County Public Works - Las Vegas, NV
- University of Virginia - Charlottesville, VA
- Pinellas County Public Works - Clearwater, FL
- Patrick Engineering, Inc.- Lisle, IL
- TSI Engineering - St. Louis, MO

Illinois engineering firm and Watertight Storm Sewer group representatives discuss cost savings enjoyed by users of flexible connectors.

Are you interested in learning about the latest watertight technologies for storm sewers? How your municipality can reduce its road maintenance budget as others have? Or, how flexible connectors assist in reducing non-point source pollution—part of the EPA's new Phase II Rules and Regulations, and what ASCE reports in its 2001 Report Card as the most significant threat still remaining to water quality? The Watertight Storm Sewer Group will be pleased to provide lunch and a one-hour educational seminar at no charge. If you are an Engineering Firm, D.O.T., City or Town, please fax Joyce at 717-840-1795 or e-mail joyce@frankgroupinc.com in care of the Watertight Storm Sewer Group.

There's No Room in This Joint

Manhole joints between adjoining risers and base sections have a no vacancy sign posted. Anytime we place a cutout, cored hole or opening within 6-inches of this mating surface, we may weaken both the structural integrity of the joint as well as its watertight capacity. The effect of physically entering into a joint with an opening of any type is easy to see.

The integrity of the sealing surface has been compromised, because it no longer exists. The structural continuity of the section has also been weakened since parts must now act as columns with minimum lateral support. Everyone can easily agree that this condition is undesirable and, in many jurisdictions, unacceptable.

But why must we be concerned about being within 6-inches of a concrete structure's joint mating surface? Some concrete roadway pavements and pipe are only 4-inches thick and they seem to work fine. But we are not talking about a flat uniformly supported structure or a structure with a uniformly applied or radially resisted load.

The issue with the minimum distance relates to providing a section, which is not just a support, but an uncracked structural bridge over an opening. Any crack, no matter how minor, may result in a leak at the joint by providing water with a path around the gasket or through the wall.

Concrete manholes are typically not designed with a great deal of reinforcement. This fact makes these sections very cost effective but not very strong for resisting vertical loads over cutouts or preformed openings. The insertion of a pipe into an opening below a joint can apply additional loads which can exceed the tensile capacity of any thin, lightly reinforced section. Either of these conditions can result in cracking of the section and joint leakage.

Lifting and positioning of risers and bases, which do not have an adequate section between the joint and an opening, may run the risk of impact damage. Safety issues may also arise if the openings or holes are used for lifting. Such practices can not only damage the product but also result in serious injuries.

A 6-inch joint clearance provides an adequate section to resist most vertical bearing loads and forces applied by pipe or expansion bands in any of the openings, cutouts or cored holes. This section also has a cross-sectional area sufficient in size to permit a detailed structural design with supplemental reinforcement, if necessary.

Bottom line, if you want to do a good job, stay out of this joint!

WANTED

Storm Sewer Job Profile Using Flexible Connectors

Do you know of a 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 Joyce at 717-840-1795 or e-mail joyce@frankgroupinc.com.

BENEFITS

Watertight Storm Sewers help prevent...

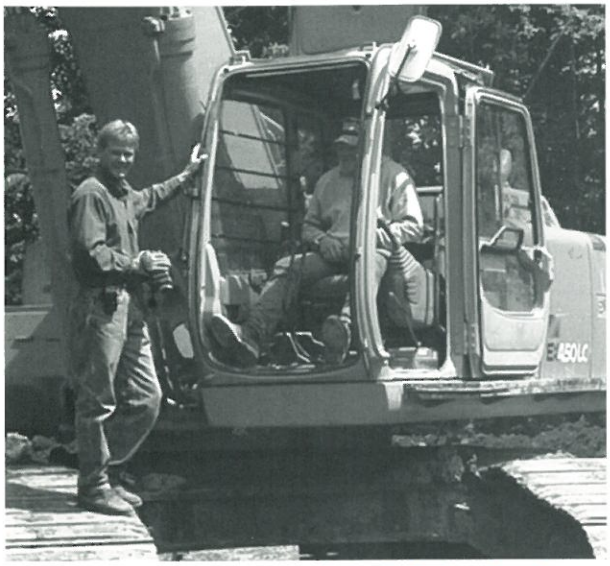
- **Structural Failures**
- **Non-Point Stream Pollution**
- **Groundwater Contamination**
- **De-Watering of Wetlands**

Watertight Storm Sewers provide you and your customers...

- **Faster & Lower Cost Construction**
- **High Product Quality**
- **Exceptional Value**

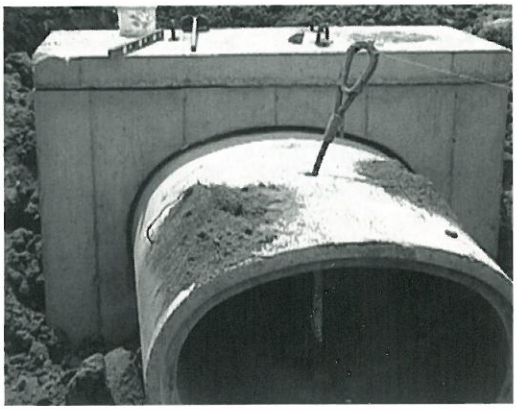
World's Largest Elliptical Flexible Pipe-To-Manhole Connector Installed in Michigan City, Indiana

Just as " Demonstrated Performance" is the proof of individual achievement, it is also the true test of state of the art materials and construction methods. When John Pavy, owner of Lakeside Construction, was low bidder on the recently completed Michigan City High School Drainage Project in Northern Indiana, he didn't realize that his quest for the best materials and construction methods would lead to the installation of the largest flexible elliptical pipe connector in the world. This was also the biggest job his growing company had taken on. "My companies performance on this particular job was very important to me."



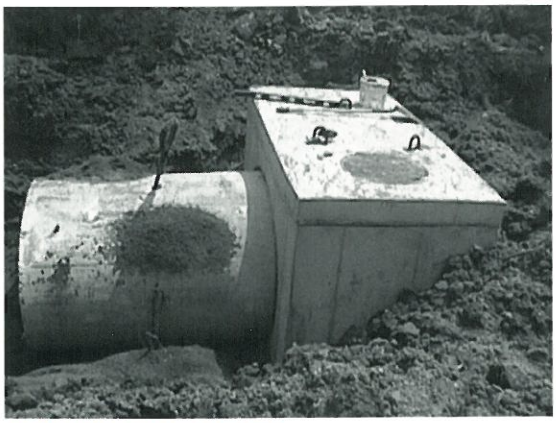
John Pavy (left), and Allen Zeedyk of Lakeside Construction discuss flexible connectors.

Tim Haas of Haas & Associates of Michigan City, Indiana designed the Project. The pipe was manufactured by Independent Concrete Pipe Company at their Mishawaka facility and consisted of 78", 72", 66" and 54" round concrete pipe and 54" equivalent elliptical concrete pipe. According to Independent Pipe Company manager Jeff Swan, "John Pavy did an excellent planning job scheduling pipe delivery and placement."



54" equivalent elliptical concrete pipe.

The location and terrain as well as elevation changes and equipment constraints made the structure weight and installation method critical to a timely and quality installation. "It was important that my equipment could handle both the pipe and structures in difficult terrain and pipe to structure connections be made quickly and backfilled immediately" said Pavy. Working in conjunction with Dyer Vault Co. of Dyer, Indiana, Lakeside Construction proposed box structures with flexible connectors in lieu of larger, heavier, round structures with mortar connections to the pipe. The flexible connectors provided the necessary watertight connection as well as promoting a fast installation. Each of the structures, manufactured by Dyer Vault Company, weighed between 22,000 and 25,000 pounds. In order to get a structurally sound unit in the regular round manhole configuration, each structure would weigh in excess of 34,000 lbs or be made in segments significantly increasing transportation and installation costs.

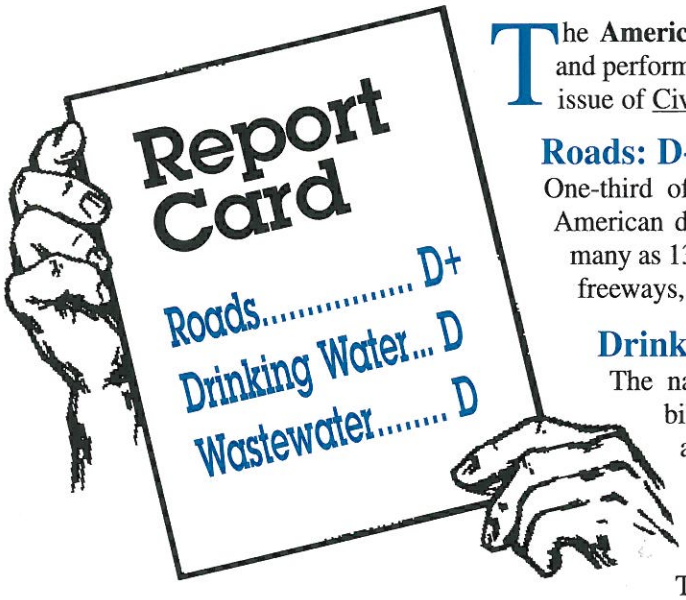


Eliptical pipe and box structure.

Because of timing, one structure required one side to be mortared while the other side contained a flexible connector. According to Field Superintendent Allen Zeedyk, "The side-by-side comparison of installing a pipe using the traditional mortar joint and a flexible connector really highlighted the advantages of pipe to manhole gaskets in storm structures. Installing the 54" equivalent elliptical pipe was so easy that it was hard to believe it was a first." Tim Haas commented "It is an extremely clean looking joint and easy to inspect."

Throughout the country, contractors using flexible connectors to connect pipe-to-structures report both quality and productivity improvements. Flexible connectors allow the contractor to run the pipe to a location, set the structure and backfill immediately. As we all know, contractors work under the formula Time = Money. Using flexible connectors save both time and money.

ASCE Passes out Failing Grades on Infrastructure



The **American Society of Civil Engineers** recently released its infrastructure needs and performance report for 2001. The complete report was published in the April, 2001 issue of Civil Engineering.

Roads: D+

One-third of the nation's major roads are in poor or mediocre condition, costing American drivers an estimated $5.8 billion a year. Road conditions contribute to as many as 13,800 highway fatalities annually. Twenty-seven percent of America's urban freeways, which account for 61 percent of all miles driven, are congested.

Drinking Water: D

The nation's 54,000 drinking water systems face an annual shortfall of $11 billion needed to replace facilities that are nearing the end of their useful life and to comply with federal water regulations. Non-point-source pollution remains the most significant threat to water quality.

Wastewater: D

The nation's 16,000 wastewater systems face enormous needs. Some sewer systems are 100 years old. Currently, there is a $12 billion annual shortfall in funding infrastructure needs in this category, while federal funding has remained flat for a decade. More than one-third of U.S. surface water does not meet water quality standards.

Water Facts Quiz

Answers

1. D: 250,000 gallons
2. A: 97.2%, B: 2.8%, C: 0.6%, D: 0.01%, E: 2.2%, F: 0.001%
3. A: 8, B: 14, C: 36, D: 48, E: 330

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 Joyce at 717-840-1795 or e-mail joyce@frankgroupinc.com. Please be sure to reference the Good Connections Newsletter in your request.

New ASTM Standard for Storm Drainage Systems

The American Society for Testing and Materials (ASTM) has just published a new standard, ASTM C 1478, "Standard Specification for Storm Drain Resilient Connectors Between Reinforced Concrete Storm Sewer Structures, Pipes, and Laterals." This Standard covers resilient (rubber) connectors used for preventing soil migration between the pipe and storm sewer structures or between the pipe and lateral.

The material and design requirements for the rubber connector under this new standard are identical to those contained in the wastewater specification ASTM C 923, "Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals."

The main difference between the two standards is the number of tests required and the reduction in the testing pressure. Storm drain connector C 1478 will be tested to the same criteria as those under C 923, except the test pressure is reduced from 13 psi to 6 psi (14 feet of hydrostatic head) in the straight alignment test, and from 10 psi to 6 psi in the axial and shear tests.

This new standard provides engineers and municipalities with the capability of specifying a higher quality storm drainage installation without upgrading to a full sanitary sewer performance requirement. The use of resilient rubber connectors on storm drainage structures is intended to address the problem of pavement settlement and structural deterioration around manholes by minimizing subsidence around the structure. Resilient rubber connectors under C 1478 are used in lieu of open cutouts and mortar joints for pipe-to-structure and pipe-to-lateral connectors.

PHOTO GALLERY

Wanted: Road Damage Pictures
Reward: $100.00

Congratulations to Scott Moncrief of Honolulu, Hawaii. Scott 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 caused by outdated and old-fashion methods using brick and mortar connections. Every issue we will publish a picture highlighting road damage associated with unsealed systems. 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 joyce@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.

What a safety hazard! What do you think it will cost to repair this major intersection in Honolulu, Hawaii where a roadway collapsed around a storm drain?