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A Comprehensive Understanding of ASTM F3097-15 "Standard Practice for Installation of an Outside Sewer Service Cleanout through a Minimally Invasive Small Bore Vacuum Excavation"

Rick Gage, Vice President, Sales, LMK Technologies, Ottawa, IL
Amana Arayan, Marketing Manager, LMK Technologies, Ottawa, IL

1. ABSTRACT

ASTM Standards are a very important tool widely used by specifying engineers through North America. The ASTM standard provides guidelines to ensure the optimum results for a given product or procedure.

ASTM F3097-15 is a standard practice for installation of an outside sewer service cleanout through a minimally invasive small bore vacuum excavation. The process begins with locating the sewer service lateral. This is accomplished by use of a CCTV outfitted with a locatable sonde and vacuum excavating a small borehole. Once the lateral sewer service pipe has been exposed, a self-clamping saddle is prepared. The saddle is lowered into the small diameter bore hole until it contacts the lateral sewer service pipe; a downward force is applied to the riser pipe causing the side walls of the saddle to spread and encompass more than 50-percent of the host pipe. The utilization of this practice greatly reduces disruption to the general public and requires minimal restoration.

2. INTRODUCTION

ASTM F3097-15 is an American Standard issued and printed by ASTM International. It is a standard practice for installation of an outside sewer service cleanout through a minimally invasive small bore vacuum excavation. This paper will discuss technical installation methods, test methods and required materials for the installation of an outside sewer service clean out, by means of a small vacuum excavated borehole. This practice is for use by designers and specifiers, regulatory agencies, owners, and inspection organizations who are involved in the installation of a sewer service cleanout.

3. TERMINOLOGY

The terminology section includes definitions and terms that are specific to ASTM F3097. The terms listed are utilized throughout the standard, more specifically in the materials, design considerations and installation sections. Definitions to terms specific to this standard:

- Adhesive/sealant—an elastomeric bonding agent designed to provide a water activated, leak resistant flexible bond between a PVC pipe saddle and a lateral sewer service pipe.
- Borehole —a small diameter vacuum excavated hole.
- Cleanout—a fitting located on a lateral sewer service pipe having a vertical riser pipe extending therefrom to the surface providing access to the lateral sewer service pipe.

- Cleanout riser pipe—a section of pipe that is connected to the boss of a saddle and extends from the saddle to the surface.

- Coring—the process of remotely cutting a hole through the crown of a sewer service pipe such that the coupon is retrieved to establish communication from a cleanout riser pipe and a lateral sewer service pipe.

- Coupon—a disc shaped piece of the lateral sewer service pipe produced by coring.

- Lateral sewer service pipe—a sewer pipe that connects a building to a municipal, main sewer pipe in a lateral direction and collects sanitary waste or storm water.

- Saddle—a PVC saddle that encompasses more than 50% of a lateral sewer service pipe where the side walls of the saddle extend beyond the spring line of the host pipe. The saddle includes setoff tabs that allow for uniform distribution of the adhesive/sealant.

- Setoff tabs—Protruding tabs located on the underside of the saddle one located on each side of the saddle boss for the purpose of insuring a specific annulus between the host pipe and the saddle and a specific layer thickness of adhesive/sealant.

- Sonde—a device outfitted in a closed circuit video inspection camera that emits a signal in subterranean pipelines that is traceable by use of a locating receiver at surface.

4. SIGNIFIGANCE AND USE

This standard practice allows construction crews to create an outside cleanout without conventional means of excavation which allows access to the lateral pipe for cleaning, inspection and cured-in-place lateral lining.

5. COMPONENTS

The components consist of a specifically sized PVC saddle, adhesive and PVC riser pipe. The PVC saddle is engineered to snap over the host lateral pipe and by use of water activated adhesive create a water-tight seal to the pipe's exterior. The saddle has an inner diameter that is equal to the outer diameter of the host pipe. The host lateral pipes may differ from clay, cast iron, ductile iron, PVC and concrete. Lateral pipe diameters may also differ but are mostly four and six inch. Therefore, it is very important that the technicians know the ID of the pipe and know pipe type. The inner diameter of these different pipes may be exactly the same but due to the varying thicknesses of the pipe wall; the outside dimensions will be very different. The one-part adhesive/sealant is dispensed out of a tube with a caulk gun is applied to the underside of the saddle. It has been specially formulated for applications where water is present. Therefore, the adhesive begins to activate in the presence of water. The riser pipe is standard SDR 26 or Schedule 35 PVC pipe which is solvent welded to the boss of the saddle and cured prior to below surface installation.

Figure 1: Outside Sewer Service Cleanout through a Minimally Invasive Small Bore Vacuum Excavation

6. TOOLS REQUIRED FOR INSTALLATION

The following tools are essential for a proper installation;

- Lateral sewer camera with sonde and locator – The camera and sonde are introduced from the main sewer and travel up the lateral pipe to the optimum location for installation. Or the camera and sonde are pushed down the pipe from an access located inside the dwelling. A locator is used to accurately identify the installation location through frequency waves.

- Potholing unit – This is a mobile truck or trailer that can create a vertical bore hole by either vacuum or hydro excavation.

- Coring equipment – this consists of varying coring bits specific to pipe diameter and pipe type and various sized extension rods that can be interchanged depending on depth to installation.

- Auger power head – This is a one-person operated power device that connects to the rods and coring bits. It provides the rotating cutting power.

Figure 2: Coring equipment and power head

7. PROCEDURE

The first step in installing a trenchless sewer service cleanout begins with accessing the lateral pipe and locating the point of installation above ground. A method utilized and associated with this installation process consists of inserting a video camera with an internal sonde into the lateral service line remotely from the mainline pipe, or from the interior building cleanout. A technician at the surface uses a compatible receiver to locate the signal from the camera/sonde to mark the specific location for the new cleanout as dictated by the utility owner. However, this is not always possible due to right of way regulations and what might be sitting at that particular location, such as a

sidewalk, curb or a tree as example. Therefore, there needs to be some plan in place or flexibility should the predetermined location not be suitable.

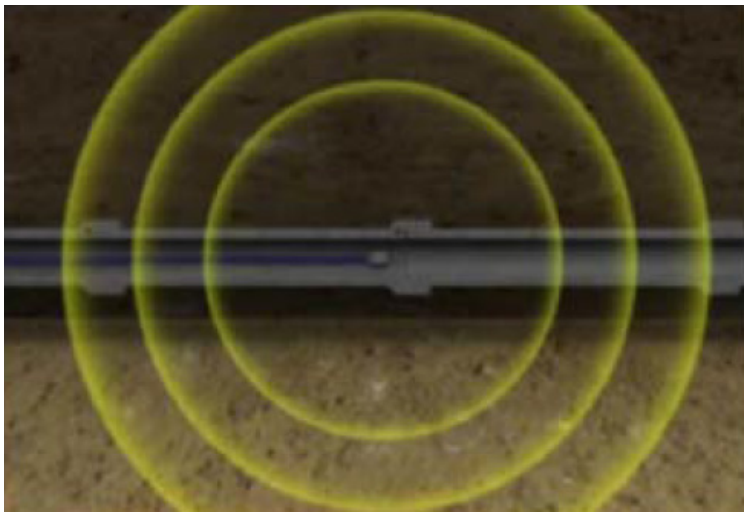

Figure 3: The sonde is transmitting a frequency to be picked up by the locating device.

The identified location shall be marked by driving a steel pin in the soil when possible, or identifying the surface with marking paint. The video camera operator shall determine if the condition of the lateral pipe is suitable for the saddle placement.

A borehole approximately 16 to 24 inches in diameter is created by vacuum or hydro excavation. This is accomplished by cutting the soil, by use of compressed air or by water jetting. The loosened soil is simultaneously drawn under a controlled vacuum through suction tubing and discharged into a mobile debris tank.

Figure 4: Vacuum excavation equipment

This process continues until the lateral pipe is exposed. Be aware this can be a difficult task. In previous history the drain layer has buried a large rock over the pipe before closing up the trench. Depending on the size a jackhammer a new location may have to be utilized. Sometimes the locate may be wrong by 6 to 18 inches in any direction but easily resolvable. Once the lateral pipe is exposed, the pipe is cleaned off and any debris on the pipe is removed. The cleaning process is typically accomplished by using a garden hose and spraying water over the exposed lateral

pipe. A depth measurement is taken and PVC riser pipe is cut that length. Then the saddle is affixed to one end of the PVC riser pipe using solvent cement. Once cured, the specifically formulated adhesive/sealant is applied to the underside of the cleanout saddle. The adhesive is sufficiently supplied based on size of saddle and is spread evenly throughout. The pipe and saddle are lowered down into the hole and the saddle is snapped over the pipe by manual downward force. The side walls of the saddle spread and the lower most portion of the saddle extends a short distance beyond the spring line of the pipe causing the saddle to be drawn down onto the pipe producing a clamping affect.

Once the saddle has been installed and held in position for 30 seconds, approximately 4 oz. of water is introduced into the riser pipe. The water helps to activate the curing process of the adhesive.

Figure 5: Hydro excavated borehole

Now the borehole is backfilled with two feet of sand and then approved backfill material. After the adhesive cures, minimum twelve hours, a hydrostatic pressure test is performed. Water is introduced into riser pipe and the water level shall be measured from the top of the riser pipe for a five minute period. No drop in water elevation is allowed. The coupon is not cored until a verifiable non-leaking connection has been confirmed. Should the leak test fail or not pass, a repair is made by pouring a low viscosity, fast cure epoxy resin system down the riser pipe to the crown of the pipe. The epoxy resin leaches out through any breach in the seal, sealing the breach. Once the epoxy resin has cured the leak test is performed again. Once the connection to the saddle has passed the pressure test, the crown of the lateral pipe is cored. The water that was left in the riser pipe offers the technician two key benefits; the first benefit is that the water will cool the coring bit and the second, the drop in water level becomes the technician's indicator that they have begun to cut through the crown the lateral pipe. At this point the technician will back off the downward pressure that is being applied to the auger to ensure that they don't drop down and cut through the bottom of the lateral pipe. Once the coring bit penetrates through the crown of the pipe the water flushes down lateral pipe and the coupon is stuck inside of the bit. The equipment is removed and now the technician has access into the lateral pipe and can go downstream towards the main or upstream towards the house.

8. PURPOSE OF STANDARD

The ASTM F3097-15 covers the all necessary aspects, including design and materials, to successfully install an outside sewer service cleanout that is equal to a traditional dig and replace but without the need for large, very disruptive excavation. This minimally invasive process keeps surrounding areas of landscaping, green space and buried utilities to its original form. This standard practice when followed will produce an effective sewer service cleanout that benefits the municipality and the owner of the dwelling.

7. REFERENCES

ASTM F3097-15, Standard Practice for Installation of an Outside Sewer Service Cleanout through a Minimally Invasive Small Bore Vacuum Excavation, ASTM International, West Conshohocken, PA, 2015, www.astm.org.

ASTM C920-14, Standard Specification for Elastomeric Joint Sealants, ASTM International, West Conshohocken, PA, 2014, www.astm.org.

ASTM D1600-14, Standard Terminology for Abbreviated Terms Relating to Plastics, ASTM International, West Conshohocken, PA, 2014, www.astm.org.

ASTM D2855-96(2010), Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings, ASTM International, West Conshohocken, PA, 2010, www.astm.org.

ASTM D3034-15, Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings, ASTM International, West Conshohocken, PA, 2015, www.astm.org.

ASTM F412-15, Standard Terminology Relating to Plastic Piping Systems, ASTM International, West Conshohocken, PA, 2015, www.astm.org.