Preventing and Eliminating Cross Bores – Increasing Safety and Reducing Risk

Cross bore, unintended intersections of utilities, are a threat to the safety of industry workers and the general public. In the case of gas lines intersecting sanitary or storm sewers, explosions, injury and death have resulted. Energized utilities, such as natural gas and electric distribution lines, have potential immediate and long term danger. Communications lines are essential for contacting emergency services.

Trenchless installation techniques are widely used. These methods provides minimal disruption to the surface, minimal disruption to traffic and often potential economic efficiencies. However, use of plowing, percussive moles and horizontal directional drills do not provide visual confirmation of the location of the new utility.

In 1999, one of the earliest records of the significance of cross bores was recognized in a Kentucky Utilities Commission ruling. In this case, a sewer utility complained that the gas distribution utility had and was continuing to damage their sewer infrastructure. The gas utility countered that sewers locations were not marked. The commission ruled, simplified here, that the gas utility must avoid damaging the sewers and the sewer owner is required to locate its sewers.

Surprisingly, where intersections of sewers has been created by installation of natural gas lines, the risk is often latent and undiscovered until a drain cleaner is called to open a plugged sewer line. In this scenario, the drain cleaner most often uses a rotating root cutting device to clean the line. Unfortunately, since the line is full of water and debris, the drain cleaner is working in the blind. If a gas line has intersected the sewer, the root cutter can cut the plastic gas line, the pressurized gas is then forced towards and into the building or home and is subject to explosion from pilot lights or flipping of a wall switch.

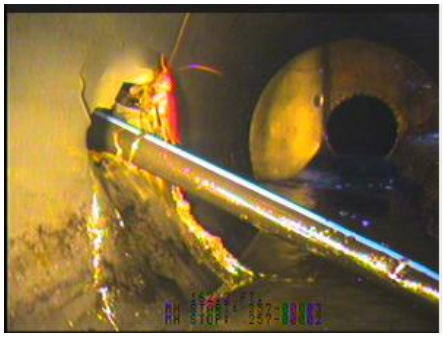
Unfortunately, this is not a remote possibility. Reports from hundreds of miles of inspection projects to eliminate gas line cross bores from sewers has found a range of between 2 to 3 per mile of sewer and sewer laterals inspected. Each one is a "ticking time bomb" waiting to be energized when the home or business owner has a plugged sewer. In addition to homes, hospitals and schools have had natural gas cross bores in their sewer lines. If a home explosion does not get your attention, the catastrophic magnitude of a school or hospital cross bore explosion should.

Now for the positive. Cross bores can be prevented. In the case of existing gas cross bores of sewers they can be found and eliminated.

Many gas utilities are requiring an increasing level of prevention during new construction activities. The process usually requires entering the existing sewer lines with cameras attached to sondes. The sondes transmit a radio frequency that can be received at ground elevation and report the horizontal position and approximate depth.

The cameras have differing levels of sophistication. Simplest is the “push rod” style cameras that are often standard equipment for drain cleaning services. These are pushed into any accessible opening, preferably a sewer lateral clean-out on the exterior of a building, or through another access point such as a toilet on the interior. More sophisticated cameras can be launched through sewer manholes from robotic CCTV camera trucks. These types of cameras are an evolutionary step up from the standard CCTV camera systems used for inspecting conditions of main line sewers. The significant change is a separate lateral launched camera that piggy backs from the main line camera which can travel lateral sewers towards the structure for distances of 80 ft or more. Paint markings on the surface are made of the sewer location. The results can be integrated with GIS mapping for permanent records and easy access.

New construction crews use the information to design the installation of new utilities to avoid the existing sewer. Accuracy of the sonde and receiving equipment must be recognized. Depth of the locate is only approximate and cannot be assumed to be accurate at all times. Soils, obstructions, rebar in concrete and other utilities can distort signals. Check with the equipment manufacturers for detailed information. It is important to note that with good locates and accurate depths new construction often can still create a cross bore. This can be a human error or over reliance on the trenchless installation techniques accuracy.



Post inspection is an alternative that is gaining favor in new construction of gas distribution lines. When the topographical elevations are consistent and existing sewer lines have consistency of installation, post installation may be a better solution than pre-location of every sewer lateral. Locating of laterals may be done every several structures, every block or as changes to existing condition are evident. After installation of the new line, 100% of all laterals are inspected, following essentially the same procedures for legacy projects, discussed later in this article. The advantage to post installation inspection is efficiencies may be improved plus 100% of the new installation is verified to be cross bore free. It is somewhat contrary to the “damage prevention” concept, but has real advantages at times.

Where the existing sewers are being inspected for cross bores from earlier construction activities (legacy cross bores), identifying that a sewer is free from a cross bore is the goal. The equipment maybe the same as used in pre-construction locates. With camera equipment the camera operator is viewing the camera picture in real time. A utility intersecting the sewer is easily seen and recorded.

If cameras are not able to gain access or the camera is blocked by roots, offset sewer joints or other reasons a physical dig up is necessary. This can be accomplished with minimal potential for damage using vacuum excavation equipment or traditional excavation methods combined with hand digging.

Legacy projects usually require immediate notification to the utility when a cross bore is found so an immediate repair can be made. Often the locating crew is required to stay in place until the repair crew arrives.

The degree of record keeping is highly variable. The best is using GPS coupled with GIS mapping. It is a new combination of existing technologies that is state of the art. Hand drawn maps are being required in many cases. QA/QC procedures have been observed to vary between none and very good. Legacy work should have a percentage of reruns by separate crews as part of a well designed legacy project. In office QA/QC of video recordings should be used to verify that field crews have traversed the areas that are designated and match the existing structures' number of sewer connections, etc. The need is for a very high level of confidence that the legacy project has identified all cross bores. Good records, QA/QC and a thorough scope of the project is required. Competently designed and run legacy programs provide a shelter from punitive damages while providing public safety.

To review, we recognize that new installation techniques minimize disruption to the public and can provide economical alternatives to digging open trenches. We also recognize a higher level of verification either pre-construction or post construction is needed to reduce risk.

The question becomes: Who should be responsible for these safety precautions and risk reduction measures? Is it the new utility installer? Is it the sewer utility? Is it the home owner that owns the connection to the main line sewer? Is it fair to pass these costs to the end user of a utility? There are competing views of who owns the responsibility and the costs to eliminate cross bores. We will save that discussion for later.

For more details please go to www.crossboresafety.org.

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