

# SPECIFICATION GUIDELINE FOR CROSS BORE PREVENTION & DETECTION



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## **1. GENERAL**

### 1.1. Introduction

The NASSCO Cross Bore Workgroup, which is part of NASSCO's Infrastructure Assessment Committee, has created this specification guideline to support the prevention of further damage to gravity pipeline infrastructure and to locate existing cross bores. Utility infrastructure is now commonly installed using trenchless technology practices and can sometimes penetrate gravity wastewater mains and service laterals. If these penetrations remain undetected they can be accidentally cut during maintenance practices and result in damage to life and property.

### 1.2. Definition of Cross Bore

The intersection of an existing underground utility or underground structure by a second utility, resulting in direct contact between the utilities that compromises the integrity of either utility or underground structure.

### 1.3. Prevention Program

A program or process utilizing robotic inspection cameras equipped with locating transmitters to identify location and approximate depth of all subsurface gravity pipelines at the intended crossing points of the horizontal bore path. Prevention programs should include both pre-construction and post-construction inspection for both new utility installations and replacement of existing utilities.

### 1.4. Legacy Program

A program or process to inspect gravity pipeline infrastructure that was historically subject to damage due to trenchless technology practices without a formal or adequate preventative program.

### 1.5. Pre-Construction Inspection

Inspecting gravity pipeline infrastructure prior to a utility install via robotic trenchless camera equipment, or similar, for the purposes of locating potential crossing points.

### 1.6. Post-Construction Inspection

Inspecting gravity pipeline infrastructure after a utility has been installed via trenchless CCTV inspection equipment for the purpose of confirming the existing infrastructure was not compromised during the trenchless pipeline construction.

## **2. PRE-CONSTRUCTION PROCESS**

### 2.1. Overview

Damage from trenchless technology can be minimized by implementing a thorough pre-construction inspection program. The primary purpose of a pre-construction inspection is to document the location and depth of all existing utilities in the area trenchless technology construction will be utilized. This task is accomplished via use of robotic cameras equipped with signal transmitters.

The location of all gravity mainlines and service lines should be documented. Locations of manholes, cleanouts, roof vents, curb drains and catch basins should be included in drawings.

Per the Pipeline Assessment Certification Program (PACP®), all depths of mainlines should be physically measured in the field and not taken from as-built drawings. Special care should be given to approximating the depth of lateral lines. Depths should be marked and AML (Access Mainline), ACO (Access Clean Out) and at regular intervals along the service lateral.

Proposed utility installation area and installation process documents should be provided to the crew before starting the project.

## 2.2. Trenchless Technology Pre-Construction Considerations

### 2.2.1.Planning

Most likely, the CCTV contractor will have to obtain permission from the owner of the sewer utility to gain access through the municipality/city water department, including the acquisition of:

- Utility prints to establish where utility will be/was installed
- Utility maps (sanitary, storm and combination sewers)
- All permits/GIS mapping (sewer owner) to aid the CCTV contractor in identifying sewer locations, sizes, and material types

While this is essential to minimize any guess work, there are times when mapping is incorrect and all sanitary and storm sewer structures that may be affected by utility module or legacy project may not be identified. Identify access pipe size flows of all structures (i.e. cleanouts, catch basins and manholes) involved in project.

### 2.2.2.Water/hydrant permits or meters

In many cases, sewer pipes will require some degree of cleaning in order to fully traverse the pipes. In such cases, CCTV contractors will need to contact the local water authority to arrange use of potable water for use in cleaning the pipe. Often, local water authorities will issue meters to track the volume of water used by the contractor. There may be deposits required to obtain meters and contractors may have to pay for water used.

### 2.2.3.Dumping resources

An area to dispose of material that is cleaned from the sewers (approved by sewer owner). Inquire as to whether a waste hauler permit is required.

### 2.2.4.Customer awareness / Door hangers

Communication with the public is an important component of any utility work. There may be instances where CCTV contractors must access private property to complete inspections. Contractors should place door hangers (provided by drilling contractor or an energy company) at each residence where sewer laterals will be inspected at least one to two weeks prior to work in the area. Also, door hangers are necessary for each residence that will require further investigation (via "house out" to complete video that was not obtained from the mainline inspection).

### 2.2.5.Traffic Permits

- Provide traffic control with flaggers and/or arrow boards.
- Check with local agencies to determine what and how proper approval is required.

#### 2.2.6.QA/QC

Contractors should have a program in place to verify data. QA/QC should be performed by individuals who are not only PACP® and LACP® certified, but who also understand the practices and procedures of trenchless technologies. QA/QC staff should review maps, videos and bore cards to ensure that data collected in the field is complete, correct and accurate.

#### 2.2.7.Getting Started

Determine access/entry point, the location, depth, and clearance of facilities (sewers) to be crossed; determined at the point where the proposed installation path crosses the existing sewer.

Protect working area with traffic control signs, cones and PPE at all times.

All CCTV inspections should be completed using NASSCO's PACP and LACP Standards.

#### 2.3. Utilization of CCTV Cameras

A lateral launching inspection camera with electronic locating technology shall be used initially to confirm and locate all sewer laterals crossed by trenchless technology. This equipment will allow contractors to account for laterals that do not currently attach to a building and for buildings with multiple laterals because these types of laterals cannot be accounted for from the surface. The pre-construction inspection is of utmost importance as it will provide documentation of pre-existing structural defects. Once the utility has been installed, the contractor can compare the pre- and post-inspection videos to make sure no damages have occurred. All pre- and post-video work should include all structures and pipe leads, from property line to property line, to include ten feet past construction zone.

If lateral cannot be inspected from mainline via robotic CCTV lateral launcher, a push camera inspection will need to be scheduled "house-out" with the property owner. Any existing damage or irregular finding identified during the inspection should be documented and reported to the utility owner and utility contractor or agency. Cameras equipped with sondes can also be used to determine the location of a sewer.

This equipment should be inspected and calibrated prior to beginning of work, and as often as required by manufacturer or system owner. Ensure the sewer videos are clear, free of static and of high quality so possible cross bores and pipe defects can be easily identified and coded by a PACP and LACP certified operator.

#### 2.4. Pipeline Cleaning/Blockages

If a blockage in the sewer line cannot be removed by cleaning, flushing, or vacuuming, and is found to impede the progress of the video recording, then the contractor shall attempt to complete that section by televising from the next manhole, or other access, in the opposite direction, to complete this section. The reversal in the camera's direction must immediately follow the previously impeded direction of the inspection. Some lateral inspection equipment is also equipped with lateral jetting equipment that can remove debris, grease and/or roots from the mainline (up into the laterals as much as 100 linear feet) and this equipment should be used if obtaining entry into a private property is not easy, or permission is not obtained, or if property owners are not able to be contacted. The contractor must also determine the ownership of the lateral upstream of the mainline.

If for any reason a contractor cannot traverse their inspection equipment thru the mainline, a cleaning truck with appropriate nozzles, cutters, chains, etc. will need to be scheduled to clean the sewer so a CCTV camera/launcher can finish locating mains and laterals that affect the utility project.

If the CCTV contractor cannot verify location and depth of main or lateral, there may be a need for a hydro excavator—or “pot holing”—to locate where the sewer and utility intersect.

Cleaning sewers and laterals if location is near (within 10 feet) of the drilling line:

- The cleaning of the mainline and lateral is very important to a successful cross bore prevention or detection program. The sewers and laterals need to be clean to access the entire length of the mainline and/or lateral. It is also important for the CCTV operator to be able to see the walls of the pipe to determine the presence of a cross bore or a near miss that will be a problem in the future. Cracks, fractures and broken pipe indicate that a near miss may have occurred, and the pipe deterioration process has begun. As the pipe deteriorates, the cross bore that is outside the pipe may become a blockage in the pipe.

### **3. POST-CONSTRUCTION PROCESS**

#### **3.1. Overview**

Post-construction sewer inspection is a crucial step to ensure no sewer pipe was damaged during the installation of utility lines or the installation of other utilities using trenchless technologies.

Combining post-construction inspection with a pre-inspection allows for operators to compare documentation and ensure no pipe condition changed, including cross bore created, collapsed pipe, new blockages, etc. The post-construction video is the final evidence for auditing and resolving customer inquiries.

Completing pre-construction and post-construction inspections are vital to the success of a cross bore program. Post-construction inspections should not be done as a standalone solution, but should be the “continuation” of video documentation completed on the pre-construction inspections. Programs that only utilize post-construction inspections are open to several risks. Without proper pre-construction inspections, preventable damage can often occur when companies “blind bore”, as well as the risk of backing up, leading to possible explosion before the post-inspection is conducted.

It is also common for utility companies to use trenchless methods in areas where sewer inspections cannot be performed. This is an added risk of rework on the company’s part, as well as risk of leaving a cross bore unidentified. If only pre-construction inspection is completed, customers will have no evidence damage did not occur during the construction process. The post-inspection is the only way to ensure that no damage occurred during the installation process. Post-installation video is the final evidence for auditing and customer inquiries. Records of pre-inspection, gas installation area and the installation process should be provided to the crew before starting the project

All procedures from the pre-construction inspection should be followed on the post-construction inspection. This includes planning, safety, QA/QC and dealing with other challenges that may occur.

### 3.2. Leading Practices

Utility installation method and placements should be either drawn on either the locate card or map so the sewer crew understands what needs to be inspected, and areas where damage may have occurred.

Post-construction inspections should be highlighted on the locate card or map so that all parties know exactly what pipe was inspected along with areas of concern. It serves as both a checklist for the crew as well as a method to look up documented information later.

All pipes should be inspected after construction is completed, unless otherwise stated.

Exceptions could include a proximity zone (utility installation compared to nearest sewer pipe, typically 10 feet) or sewer utilities leading to the back right-of-way, with all other utilities leading to the front right-of-way.

- In these cases, a “waiver form” should be considered to “clear” the sewer, which was not inspected.

Not all cross bore conflicts are apparent; operators should be able to recognize changes in pipe condition (mud, cracks, etc.) that were not apparent on the pre-construction inspection and/or refer back to pre-construction documentation.

Areas that cannot be inspected due to blockage or lack of access on the post-construction inspection or legacy work need to be pot holed or cleaned, without using cutters, where the utility crosses sewer pipes to make sure a cross bore has not occurred.

If damage is found, it should be clearly marked on the locate card and on the ground as described in the pre-construction inspection process

Pre- and post-construction inspection reports should be compared to indicate changes in pipe condition, which may indicate a cross bore or near miss that could worsen in the future.

### 3.3. QA / QC

Sewer contractors should have a program in place to collect all final locate cards and QA/QC'ed videos. A disciplined approach of watching all videos prevents errors that could result in the field. Locate cards or maps must be updated after each step. All videos are stored for later use.

### 3.4. Locate Cards

Most utility operations require a locate card for pre-construction inspection work. This report is the documentation that serves as communication between trenchless technology contractors and sewer CCTV contractors.

This also serves as documentation for “all-clear” status, and should be stored for future viewing. All sewer inspections shall also be documented on a paper sewer locate card. Sewer locate cards shall show a sketch of all sewers that were inspected (main lines, laterals, manholes) and the utility facility that was installed. The sketch should note the length, size, and content type of each sewer and the main line manhole number. The depths of the sewers shall be noted on the sewer locate card as well as location measurements relative to house corners, curb lines, utility facilities, and other sewers. A sewer locate card shall be filled out for each residence and business along the area where a utility main was installed using trenchless technology, and every residence and

business where any portion of the utility service was renewed using trenchless technology. The sum of the sewer locate cards shall cover the entire length of trenchless technology used on a given project. If the locate is unattainable, other procedures need to take place such as pot holing.

#### Filling out Sewer Locate Cards:

Cards need to be presented to drilling foreman or their superiors. Bore cards need to be filed out daily for every sewer and building. Sewer locate cards should be filled out in a three-step process for projects involving utility facility installation by trenchless technology.

- Step 1 – Sewer inspection contractor locates all sewers and draws their locations on the sewer locate card(s). The sewer contractor then gives the sewer locate card(s) to the utility contractor or energy group.
- Step 2 - The utility contractor installs the utility facility and then draws the utility facility onto the sewer locate card(s). Measurements from the sewer lines should be noted on the sewer locate card(s). The sewer locate card(s) are then given back to the sewer inspection contractor.
- Step 3 – Sewer inspection contractor performs post-construction sewer inspection and highlights sewer lines on sewer locate card(s) as inspections are completed. The post-construction inspection for a utility service may be waived if the surface markings for the sewer lateral, drains and downspouts are 10-ft or greater away from the installed utility service. Documentation of cleaning of the sewer should be included on the sewer locate card.

### 3.5. Geographic Information Systems

Recently, paper sewer locate cards have been replaced with GIS (geographic information system) mapping technology. Sketches should be created by collecting GPS data of all utilities in the trenchless construction area. GPS points for manholes, cleanouts, service lines, main lines and cross bores should be collected by trained technicians in the field. By using GIS aerial imagery structures and other items such as fences, landscaping and trees can be identified and documented. GIS Information can then be delivered to the utility company and integrated into their existing GIS system. GIS data collection can be very useful for both pre- and post-construction inspections.

### 3.6. Sewer Tags

Sewer tags provide a simple reminder of the actions a plumber or anyone else should take in determining the cause of a sewer blockage outside the premises (building/house), in an area where the utility may have used trenchless technology in the past but has not affirmatively determined that cross bores do not exist. A sewer tag would be placed at one or more of the locations in the home where access would be gained to sewer system, such as a basement clean out, or under the kitchen sink. The tag provides contact information and serves as a notification that the utility will respond to analyze the situation. If a blockage is determined to be outside the premise, the blockage may be the result of a utility line being installed through the sewer line. Sewer tags should be placed by company employees or contractors at the time the inspection, and the importance of the tag should be communicated with property owner.

### 3.7. Cross Bore (Breach) Found

If a sewer line breach is discovered from the utility main or service job during pre- or post-construction sewer inspection, or legacy sewer inspection, the utility inspector and sewer agency must be immediately notified so the breach can be confirmed.

- It is recommended that the sewer inspection contractor shall mark with a red "X" on the sewer locate card the location of the utility line breach. The sewer inspection contractor must show all cross bore locations on the sewer locate card. The type of utility that created the cross bore should also be noted on the sewer locate card if it can be determined.
- If GIS technology is being utilized, a GPS point of the cross bore should be taken.

### 3.8. Legacy Inspections

For most utilities, trenchless technology began in the mid-1970s, while cross bore inspection did not gain prominence until the late 2000s. Without fully inspecting all sewer systems, the actual number of cross bores that currently exist will remain unknown.

Legacy cross bore prevention is critical for the removal of breaches caused before post-construction inspection was instituted. Generally, cleaning has not been performed and there is no pre-construction video for reference. These challenges must be overcome for a successful legacy inspection.

Post-construction cleaning can only be performed with nozzles. Any type of cutter, mechanical or hydraulic should never be used, as they can damage the cross bore utility and create a dangerous situation.

If the entire sewer system cannot be cleared from the main up past the determined bore path, there are four choices for the next step:

1. With the homeowner's permission, attempt to push camera from the inside/outside cleanout or the roof vent.
2. Install a clean out on the sewer lateral so a push camera may be utilized to inspect the lateral.
3. Pot hole the intersection of the sewer and other utility in order to visually inspect the utility crossing. See section 3.10.
4. Open cut the entire property along the bore path (main and service) to verify no cross bore exists.

### 3.9. Pot Holing

If a line cannot be inspected via CCTV in the area of the potential cross bore, the area should be pot holed to verify that a cross bore has not occurred or that a repair is needed to remove a cross bore. For safety, the sewer or lateral must be either inspected via CCTV or by pot hole in the area of possible intersection.

Pot holing can be accomplished by either traditional excavation or hydro-excavation. Remember to always call 811 prior to digging and follow all established safety procedures for digging around underground utilities.