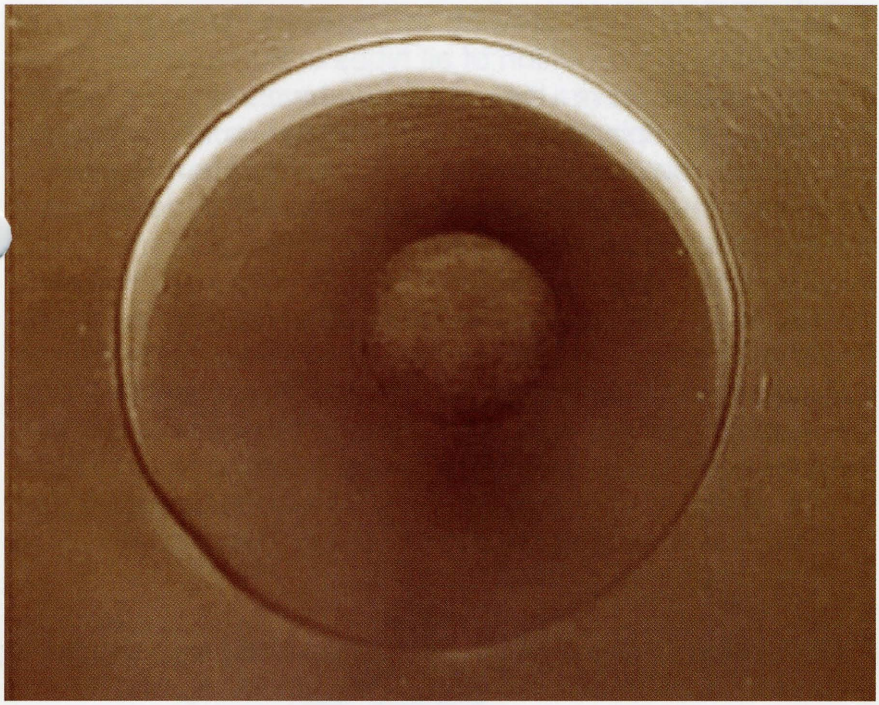
KNOW YOUR LIMITATIONS

A Guide to Analyzing Televised Inspection



NATIONAL CLAY PIPE INSTITUTE

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INTRODUCTION

Television has been growing in popularity as a means of investigating the condition of all types of buried sewer lines. As an investigative tool, it is unmatched in enabling operators to pinpoint many differing conditions and provides a record of construction results. Many agencies have begun requiring television as a means of determining the acceptability of newly constructed lines.

Assumptions regarding structural damage are, in some instances, made erroneously. Operators of television equipment are ***looking for problems***. These unintentional errors of judgement have frequently led to conclusions that become difficult to resolve. There have been instances where dig-ups have shown the problem described in the log to be either non-existent or of significantly less magnitude than originally indicated.

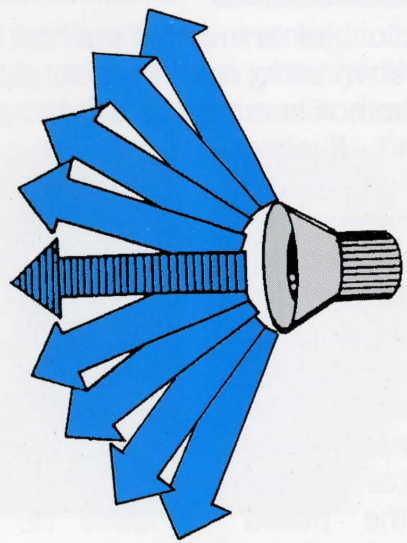
The National Clay Pipe Institute and the National Association of Sewer Services Contractors agreed to co-sponsor a project to explore the actual versus perceived affects of television inspection. The goal was to identify several conditions that were subjected to evaluation. It is by no means all-inclusive as many other conditions may be discovered in television inspection.

Cover illustration depicts illusion of an offset joint when in reality the pipe is in straight alignment and there is no offset.

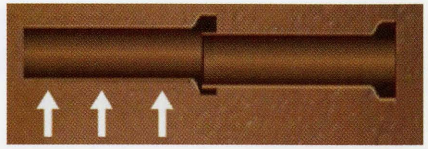
THINGS TO KNOW BEFORE AND DURING TELEVISION INSPECTION

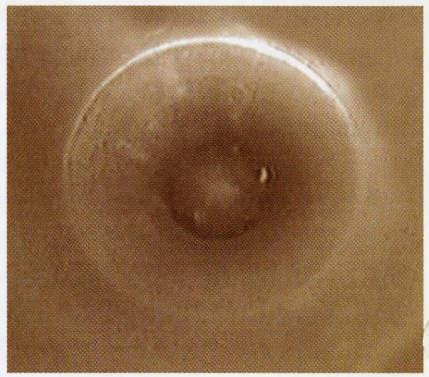
Be **professional** in the methods used and be **accurate** in what is recorded by voice and entered into the written log. Extraneous conversation, background noise and speculation should be avoided.

Before the first observation is made, it is necessary that the operator fully understand the operation and capabilities of the equipment. Today's television equipment offers high resolution and the flexibility to view conditions at all angles. The camera must be placed as near the centerline of the pipe and in as straight alignment as possible. This reduces distortion caused by the wide-angle lens. The observations are distorted by the camera lens and light intensity. Keep in mind that what you see is greatly exaggerated. The camera, while looking down the length of the pipe, is also looking at the sides of the pipe or into the joint at a steep angle because of the wide angle lens.



PARALLEL OFFSETS

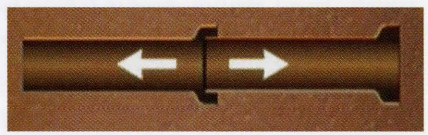




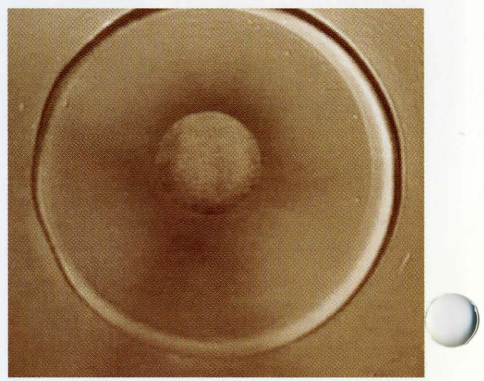
8-inch diameter pipe with ¼" offset

Joint offsets during construction must be kept within allowable tolerances. Joint end trim may give the illusion of a parallel offset. Note the distortion of these minor offsets as they may appear much larger than actual. Observe the camera as it moves over the joint. If the camera tilts up or down this gives some indication of the magnitude of the offset.

PULLED JOINTS

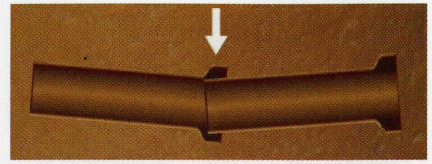


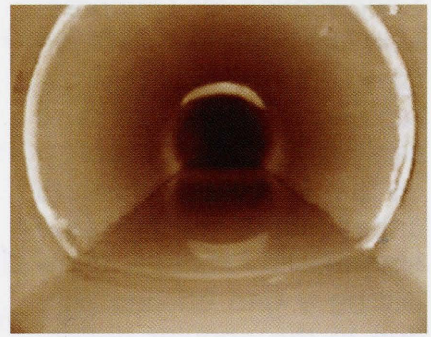
During construction, joints must be pushed home to assure joint integrity. When using a trench box, pipe must be held in place when the box is moved forward to prevent the joint from pulling apart. If joints have been pulled, a gap will result between the pipe ends. The joint design for clay pipe provides an allowance for joint gap without sacrificing integrity. Consult the manufacturer or local standards for gap allowances. Note the appearance of the pulled joint.



8-inch diameter pipe with joint pulled 3/8"

SAGS IN THE LINE

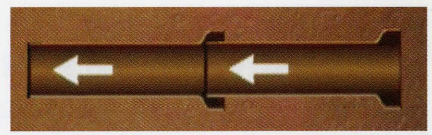




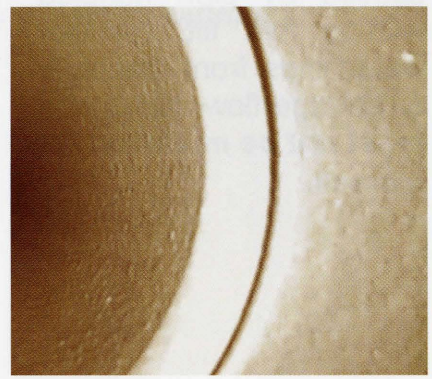
8-inch diameter pipe with 1½" depth of water.

All pipelines experience some settlement under load which is due to the pipe bedding not the pipe itself. After cleaning or testing, water may remain in the line for a lengthy period where the line is at a very flat grade. It may take a day or more for the water to completely drain from the line to accurately expose low points. Estimating the depth of the water is very difficult. If viewing video with no dimensional reference point, scale the necessary dimensions from the screen and apply basic geometry. This method has limited accuracy.

STRAIGHT ALIGNMENT

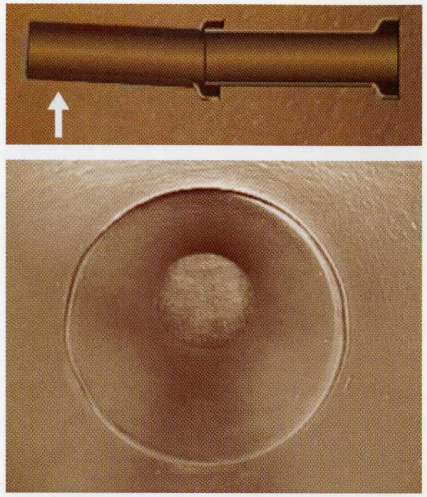


The camera is not looking at the end of the pipe as it appears but at the trimmed edge of the pipe giving a "halo" effect. The pipe in the photo are in straight alignment. However, because the camera is looking ***into*** the joint (remember the wide-angle lens), the illusion of an offset, deflected or pulled joint may appear. Also, the factory trimmed ends of the pipe may not be perfectly concentric with the pipe presenting the illusion of an offset joint.



8-inch diameter pipe with no offset showing "halo" effect.

ANGULAR DEFLECTION

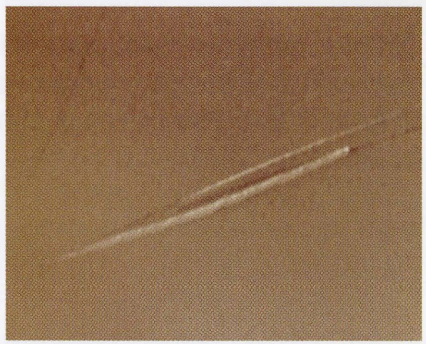


8-inch diameter pipe with angular deflection.

ASTM C 425, Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings, requires clay pipe joints to seal in angular deflection up to a specified maximum depending upon the pipe diameter. Although there will be a gap on one side due to the angular deflection, the other side is completely tight. Note the appearance of this condition.

BREAKS, CRACKS

Be very careful in identifying breaks or cracks. Marks on the inside of the pipe may only be cosmetic caused by pipe handled with a fork lift, residual water lines from cleaning, or sewage flow marks and ***must not be mistaken for a crack.***

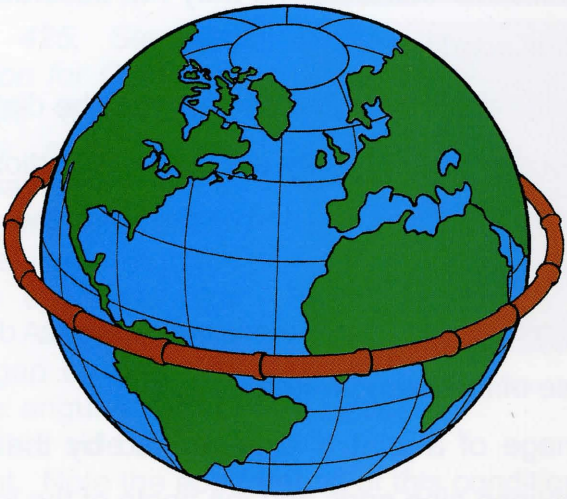


8-inch diameter pipe with harmless surface marks.

SUMMARY

- The operator's observations may not accurately portray the actual condition.
- The image as seen by the camera may be distorted.
- The camera position may affect the distortion. Center the camera in the pipe and make sure the camera is level with the pipe.
- It is very difficult to determine specific dimensions because of the exaggerated view.
- The image of a joint is exaggerated by the pipe trim, gap between pipe ends and the angle of the joint.
- Manufacturing and handling marks may be interpreted to be breaks or cracks.
- Television inspection is a good tool. Let's not diminish its effectiveness by exceeding its capabilities. Simply stated,

You've got to ***Know Your Limitations.***



AROUND THE WORLD:

IF IT HAS TO LAST IT BETTER BE CLAY

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