Municipal Sewer Grouting

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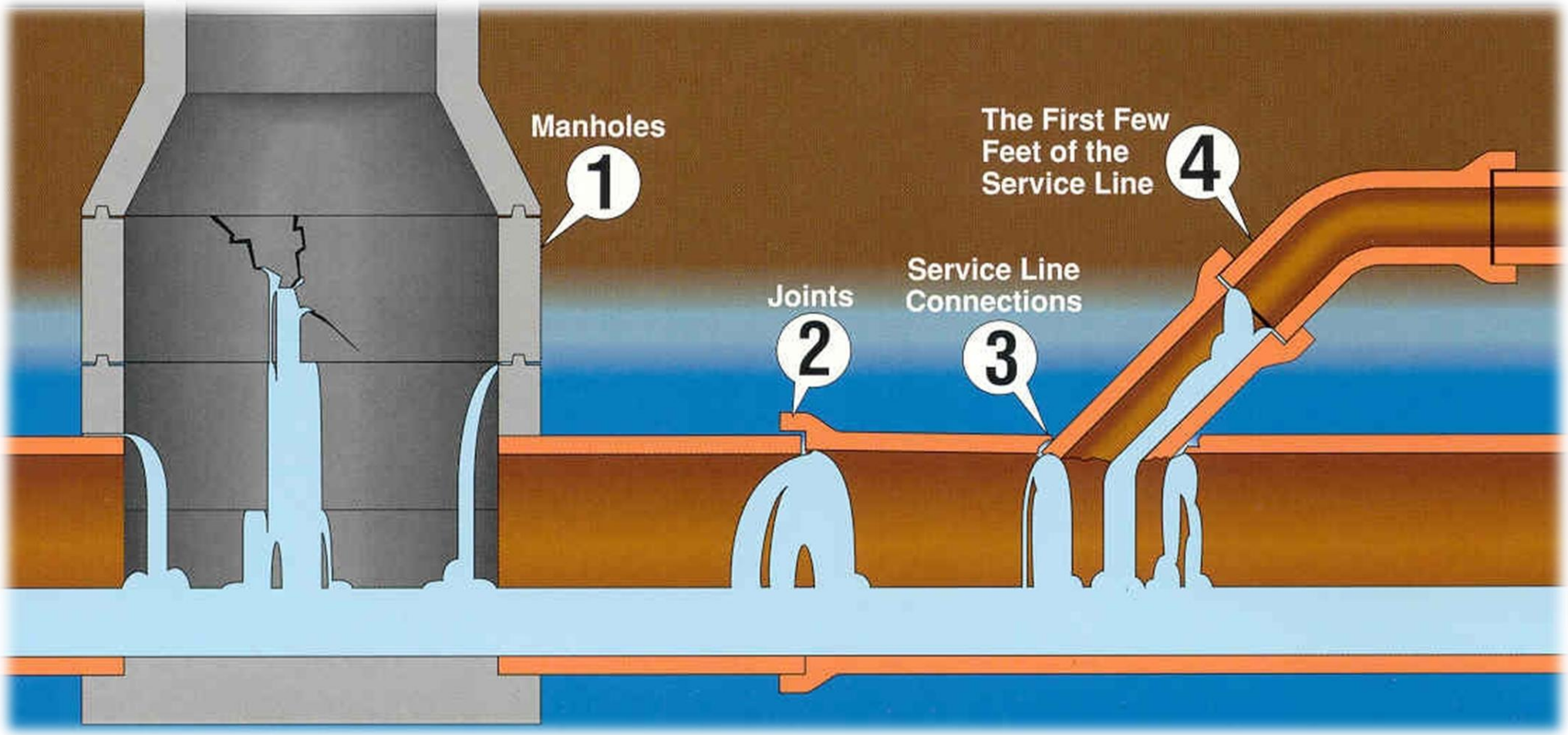
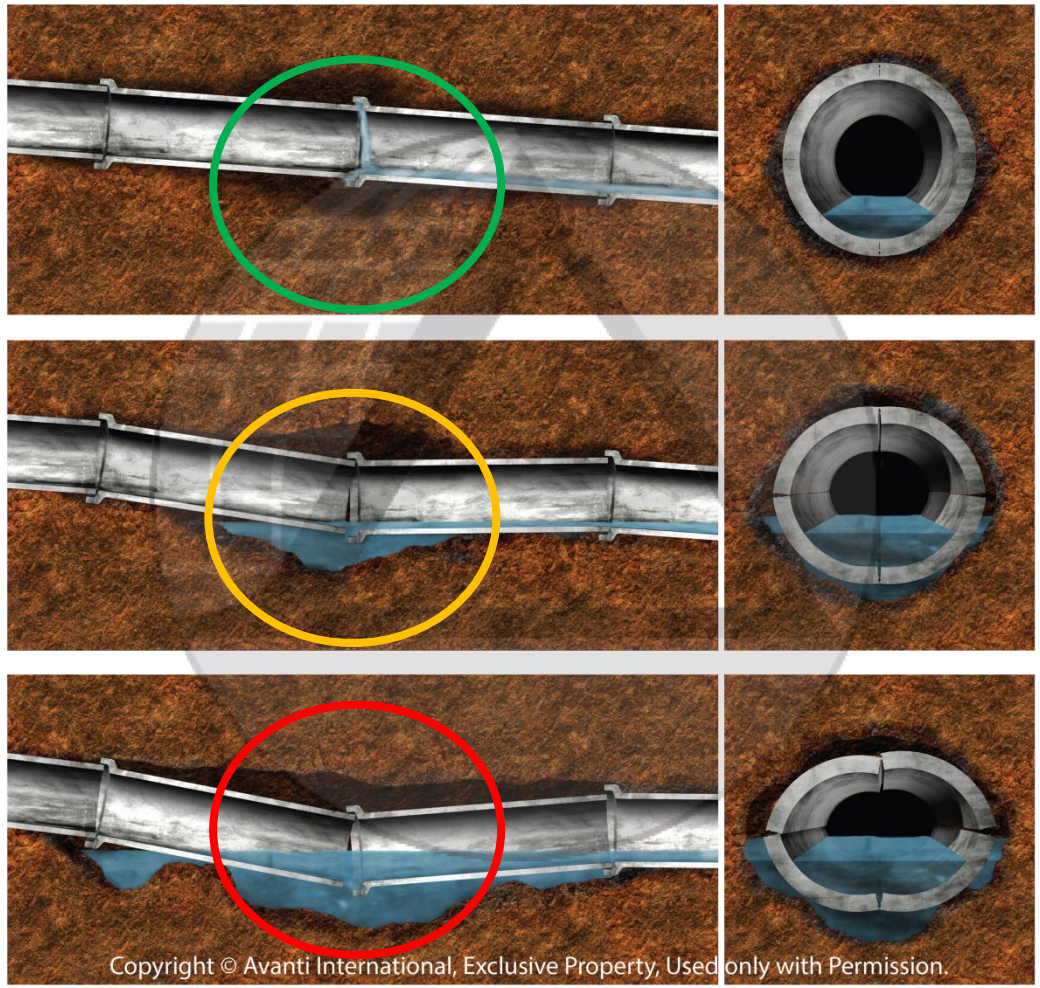
Most Common Sources of Infiltration in Collection Systems



The Process of Sewer Failure



Stage 1: Initial defect, but sewer remains held in position by the surrounding soil.

Stage 2: Development of zones of loose soils and voids caused by the loss of ground into the sewer.

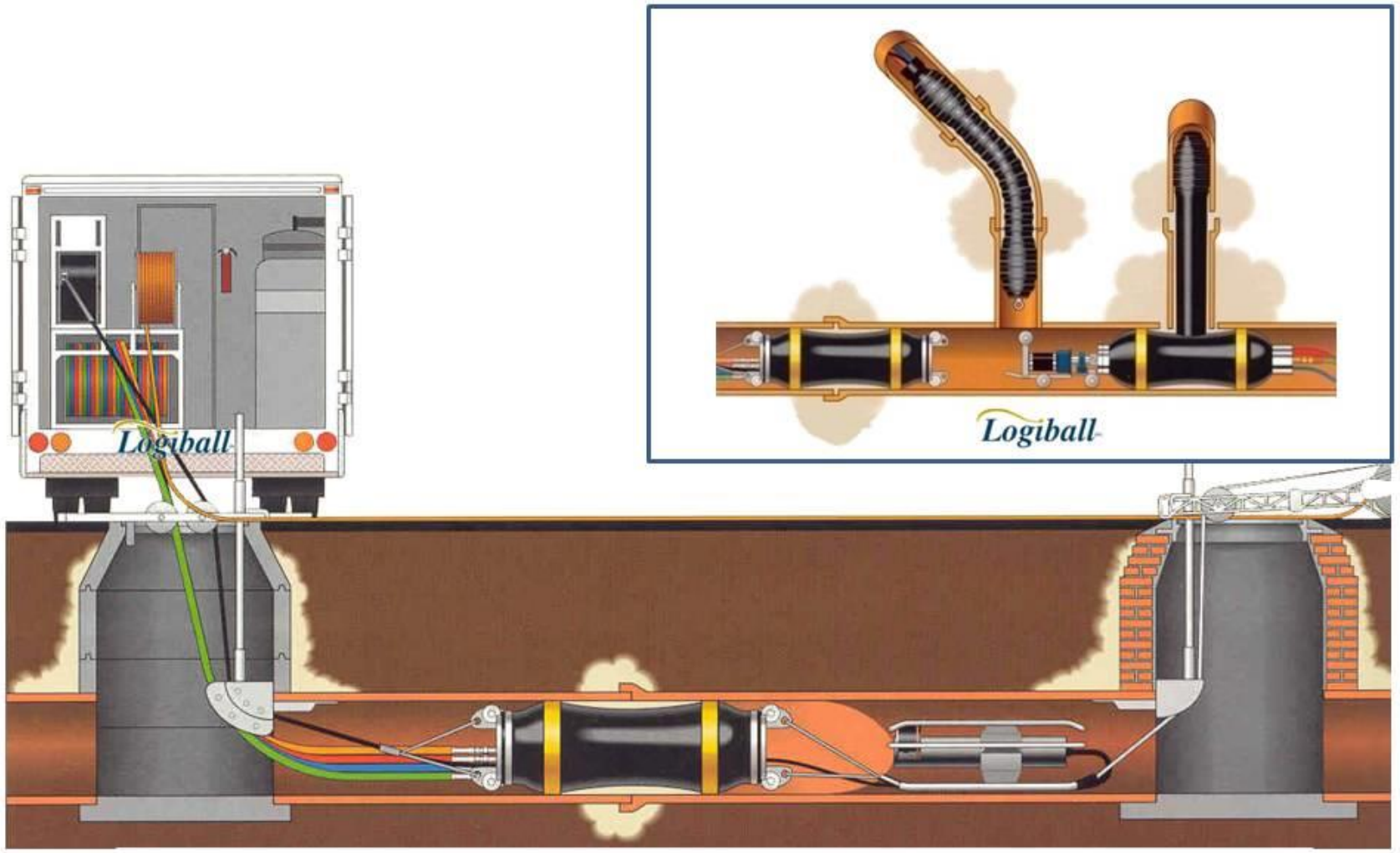
Stage 3 Failure of the sewer pipe.

As sewer pipes age, groundwater and the surrounding soil can enter into the sewer system through various defects on the pipe wall. Groundwater infiltration and soil erosion through cracked sewer pipes can result in increased sewage loading and cause sinkhole problems.

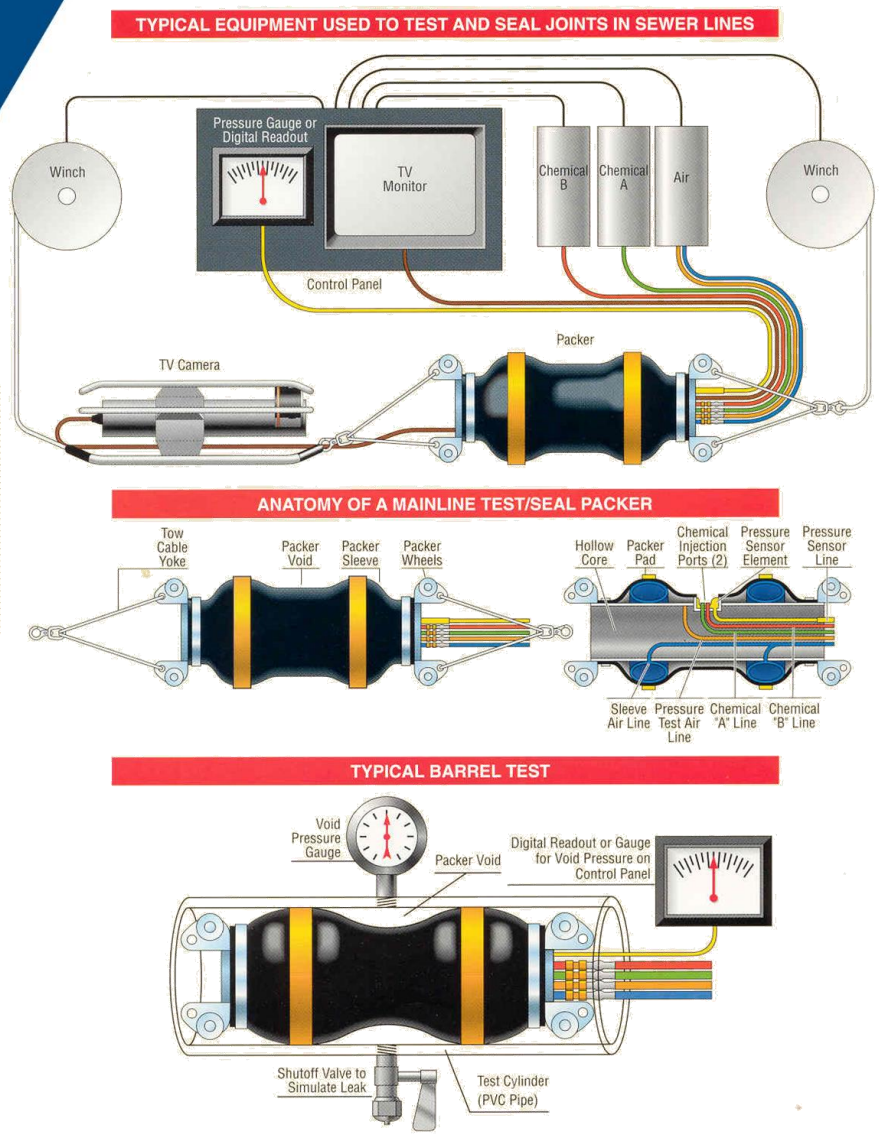
What is Injection Grouting

- The injection of a multi-component chemical grout into soil and voids around the pipe, liner and manhole structures to seal the leak, stabilize the ground and control infiltration.
- Significantly reduces ground water infiltration into sewer systems.
- Stabilizes sewer structure backfill and bedding material stopping erosion of backfill fines with resulting misalignment.
- Not a structural repair.
- Eliminates exfiltration and cross contamination from sewers into storm mains and ground water.
- Seals annulus infiltration in lined pipe systems at lateral cut-outs and manholes.
- Does not rely on any type of pipe surface preparation for bonding to be successful as the seals are achieved from the exterior of the structures.

Injection grouting setup for Joint & lateral testing & sealing

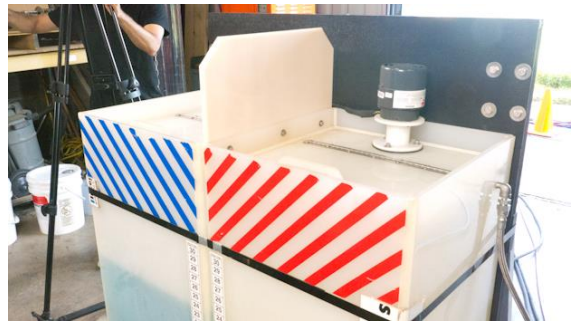


Test & Seal Tv Truck



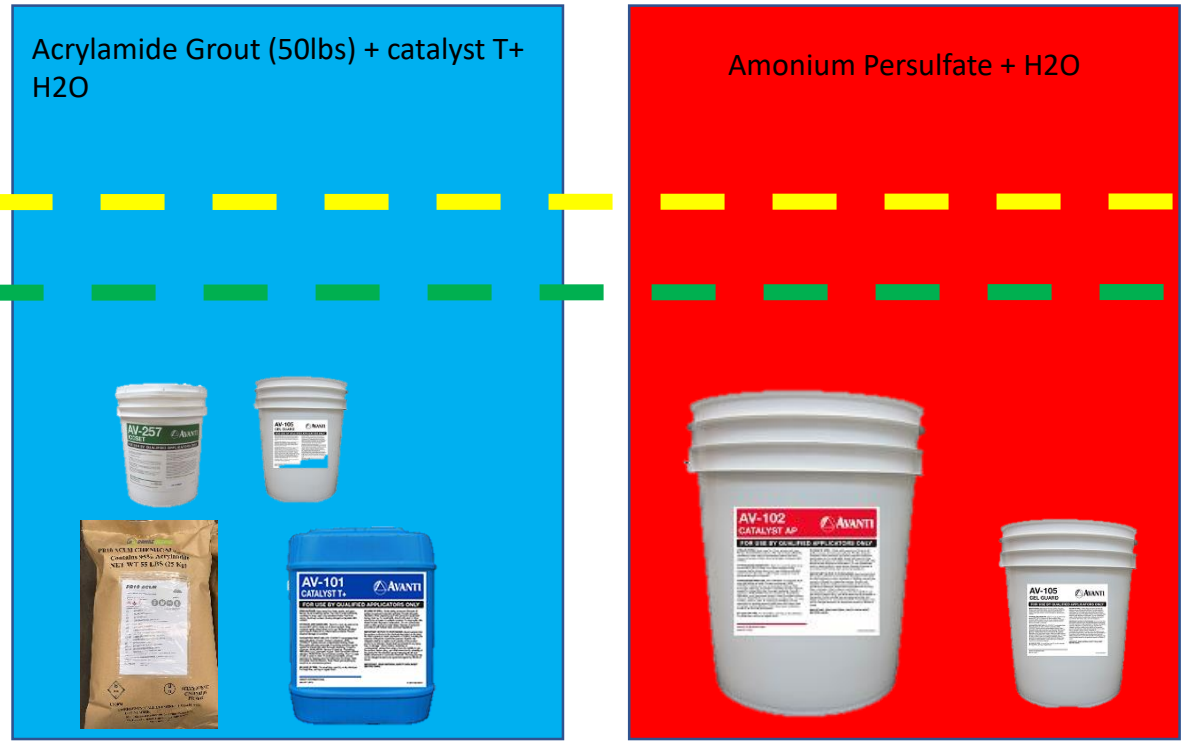
Solution Grout Mix

Most of the grouts being pumped through remotely operated packers are solution grouts (acrylamides, acrylates or acrylics) because of their low viscosities and history



Solids per weight concentration

10% mixed batch
12% mixed batch
15% mixed batch
20% mixed batch



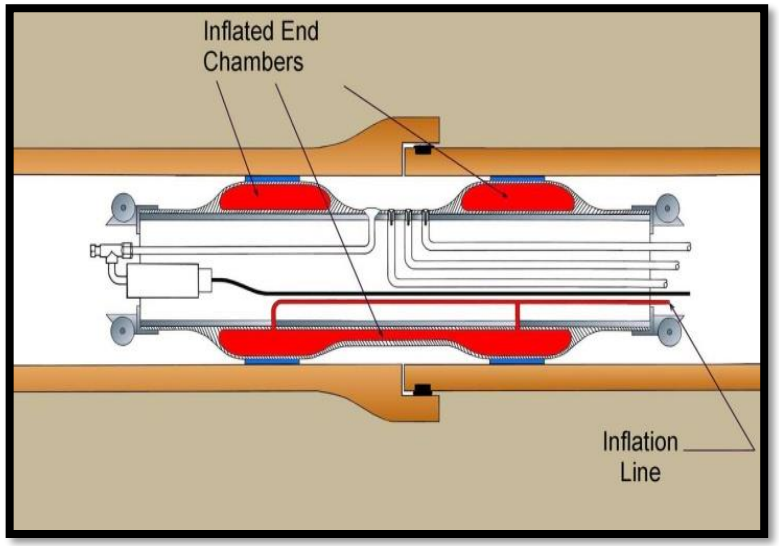
us gallons H2O

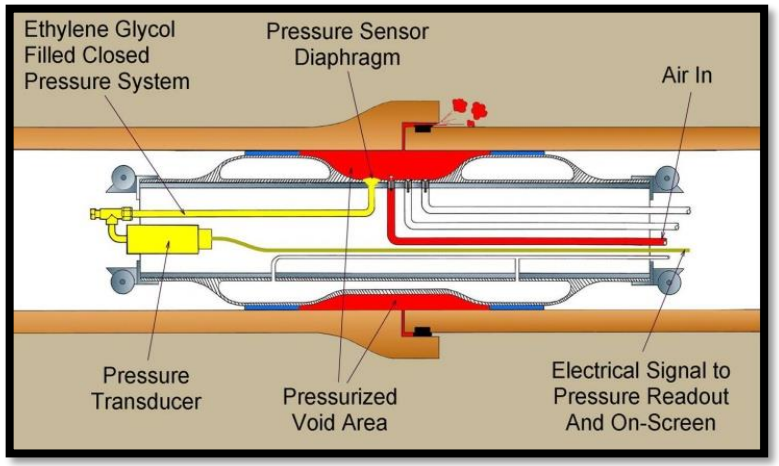
(Ex: Acrylamide Grout Solution)

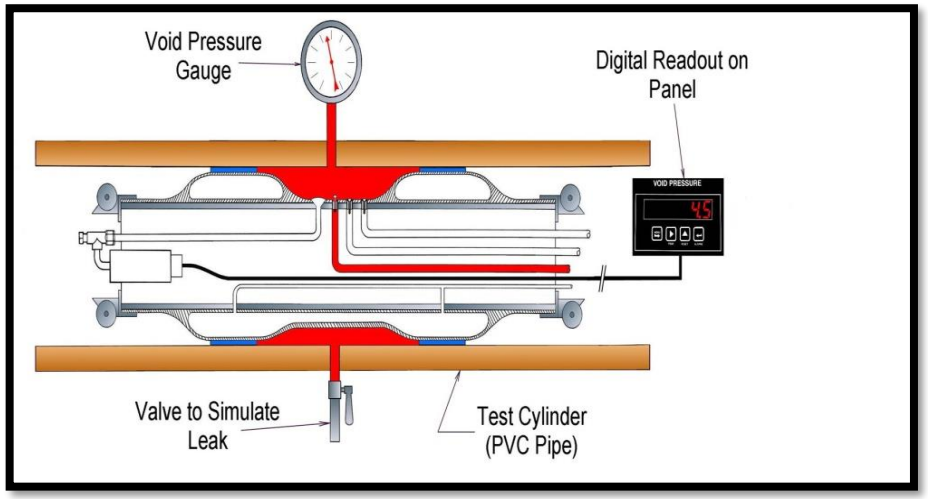
us gallons H2O

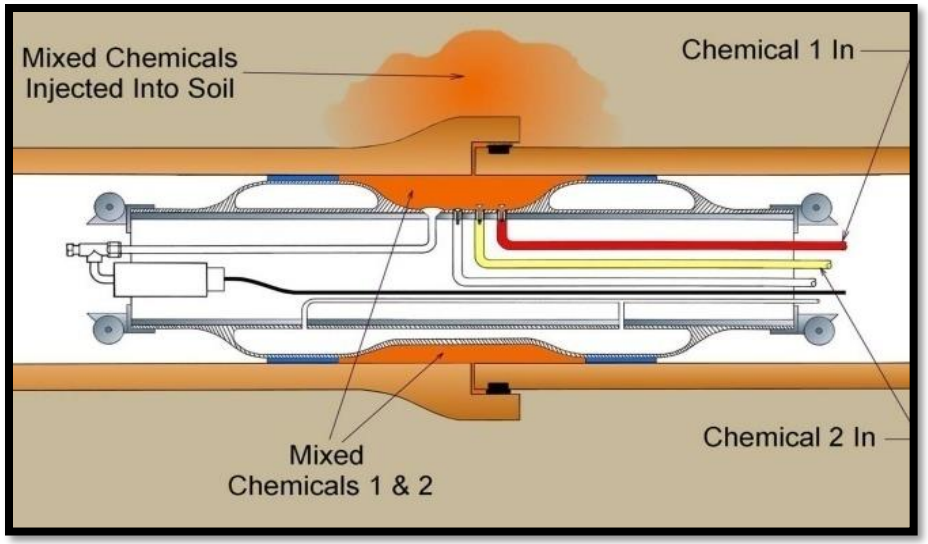
Us gallons of water	% of solution (50 lbs bag of acrylamide grout crystals)
70 gal = 584 lbs	8.5% (50 lbs/ 584lbs)
60 gal = 500 lbs	10% (50 lbs /500 lbs)
50 gal = 417 lbs	12% (50 lbs/417 lbs)
40 gal = 334 lbs	15% (50 lbs /334 lbs)

VOID PRESSURE (TEST& SEAL) MONITORING SYSTEM FROM THE PACKER VOID

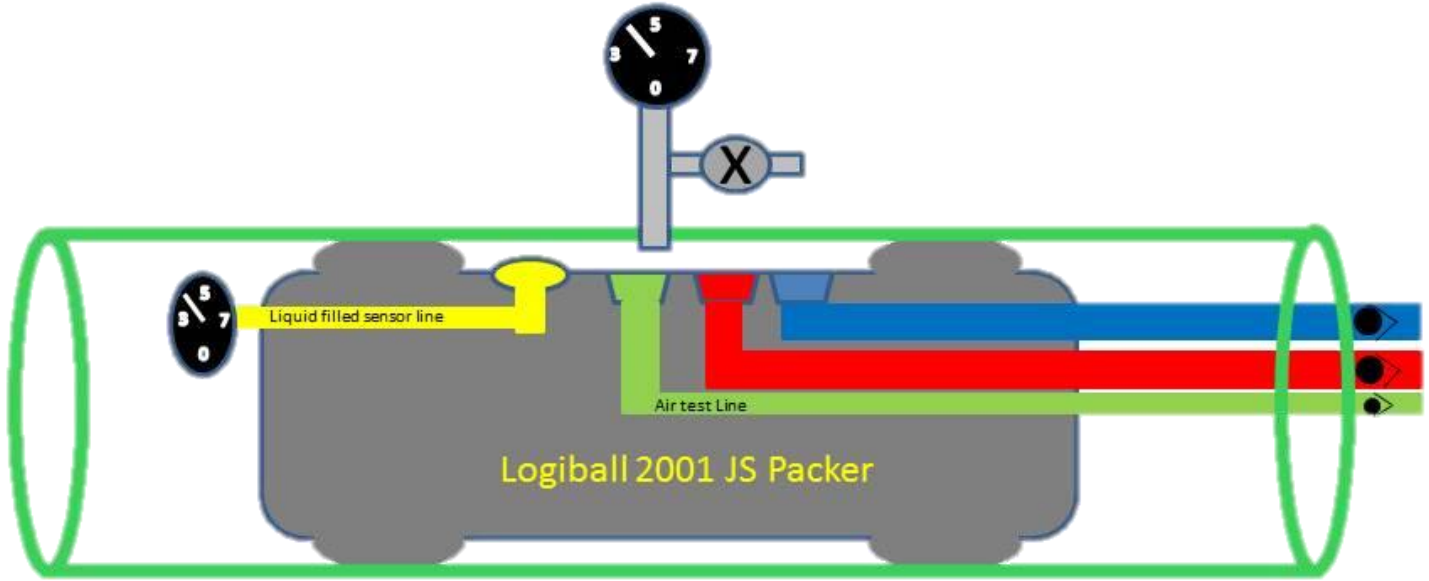








Mainline Packer Void Pressure Sensor System



Mainline Packer/Camera Setup

Grouting in Clay Soils

Grouting in sandy soils

Grouting in 57 stone

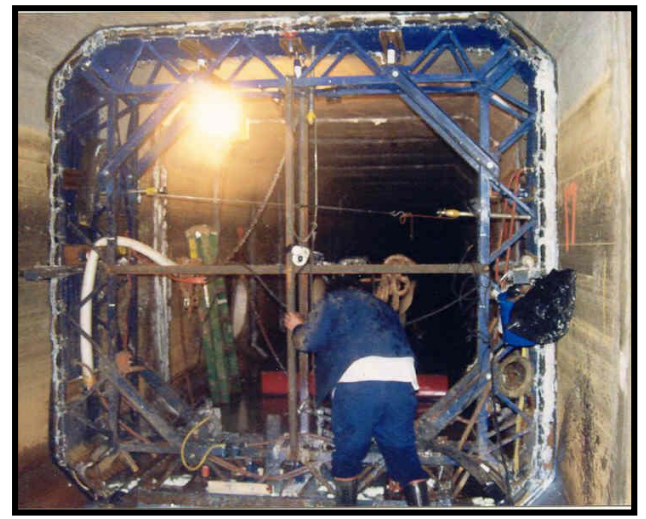
Mainline Sealing Capabilities

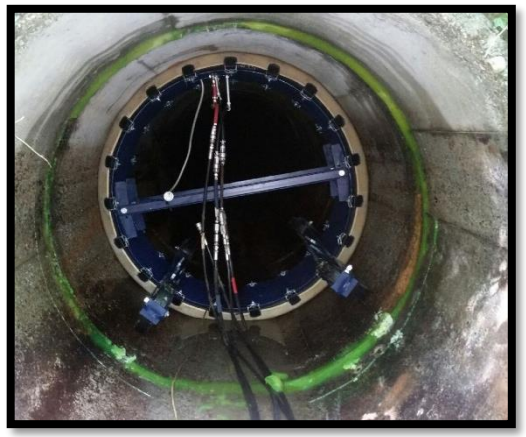
Grout Packers for elliptical pipes

Mainline Test & Seal Packers available for 6” through 144” pipes.

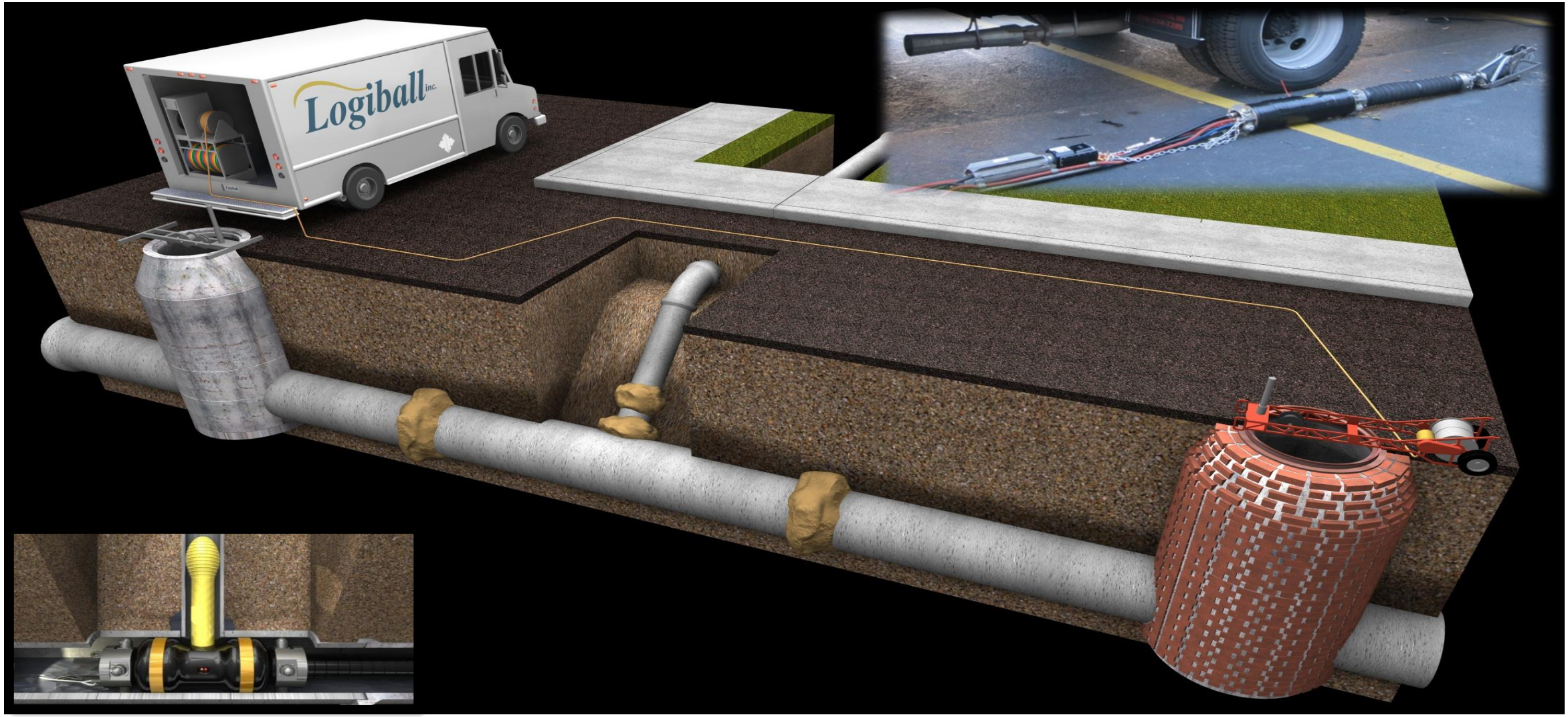
Grout Packers for longitudinal cracks

Grout Packers for Box Culverts





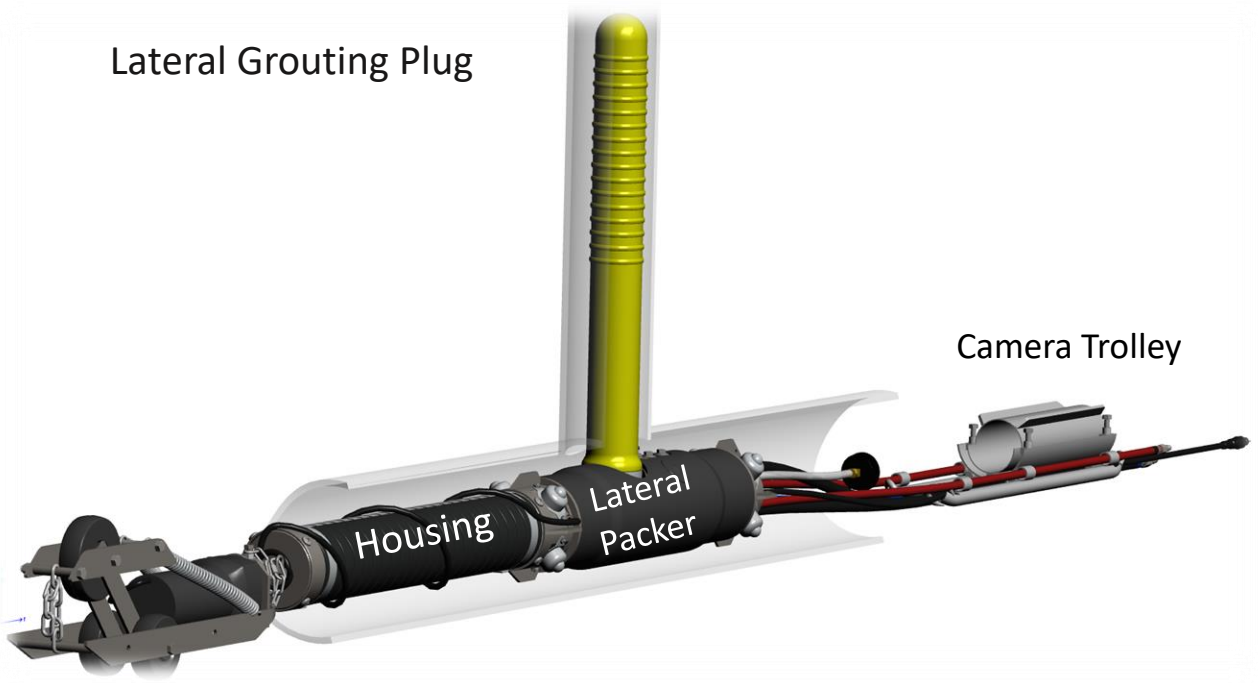
Chemical grouting setup for lateral testing & sealing from the mainline sewer



Lateral Connection Grouting Preparatory Procedures

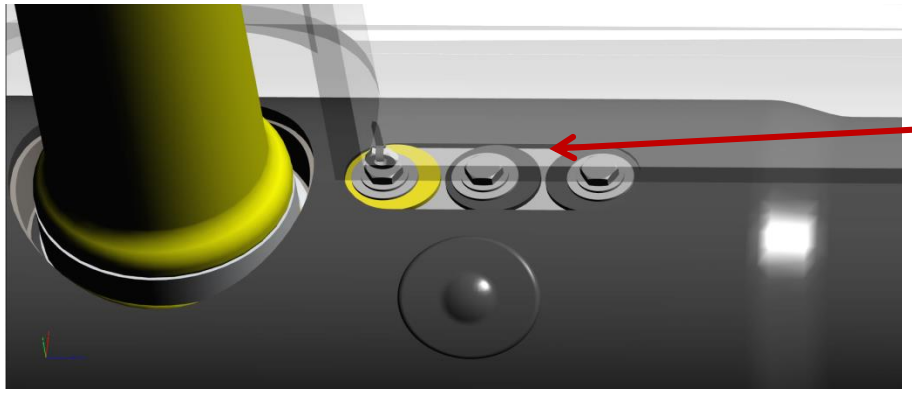
- Cleaning of the mainline sewer.
- Videotaped CCTV inspections of the mainline & pan & tilt of the lateral.
- When grouting long distances in the lateral, it is strongly recommended to inspect the laterals, either from the mainline or other above ground access.
- Cleaning of the lateral may be required depending on the findings of the lateral inspection
- Identification of the diameter of the laterals.
- Protruding taps of more than 5/8" into the 8``mainline must be cut back.
- Roots & grease and other debris that prevent the passage or seating of the packer or lateral bladder must be removed .
- Bypass pumping: normally not an issue as only inflated for a short period of time.
- Brushing out liner cutouts (reinstated services after mainline lining)

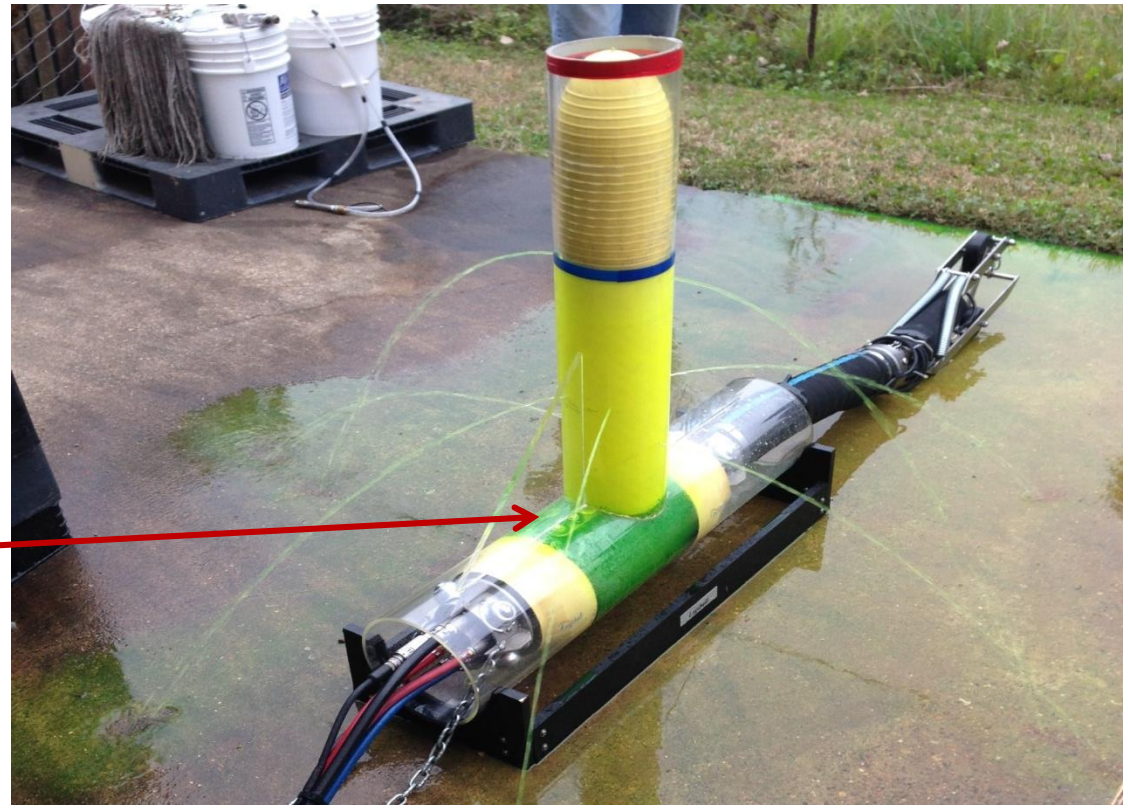
Logiball 2001 LS Lateral Test & Seal Packer



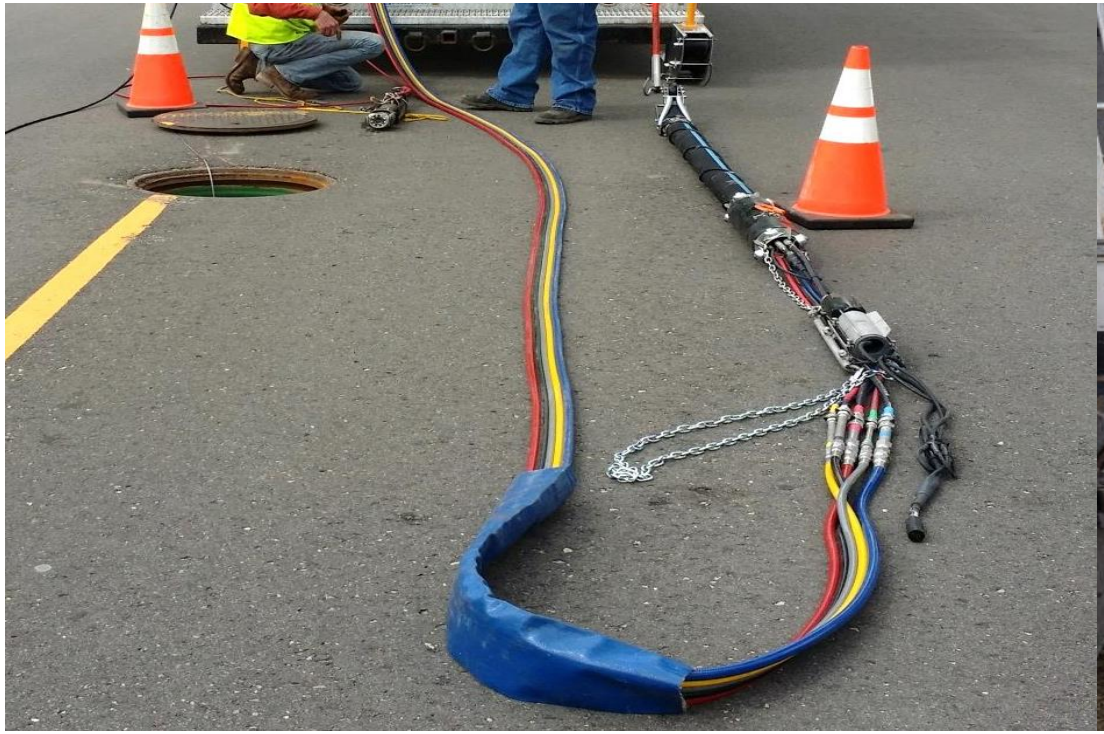
Lateral Injection Process

The grout is pumped through seperate hoses from the truck through the ports on the packer, travel along the annulus (inflated plug and lateral wall out through defects.

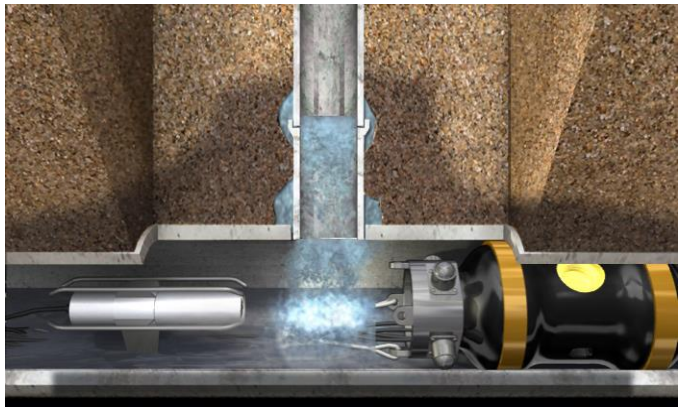


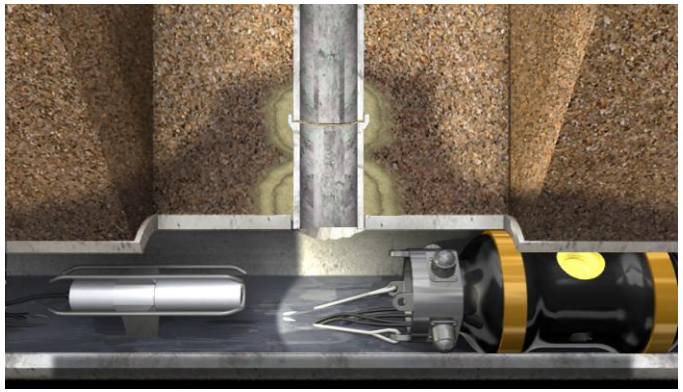


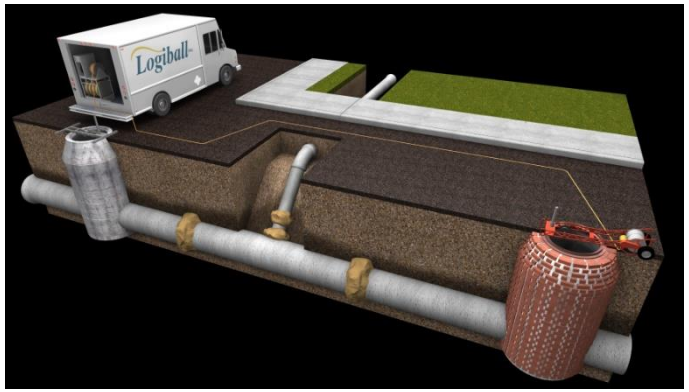
Lateral Grouting Setup



Lateral Injection Process

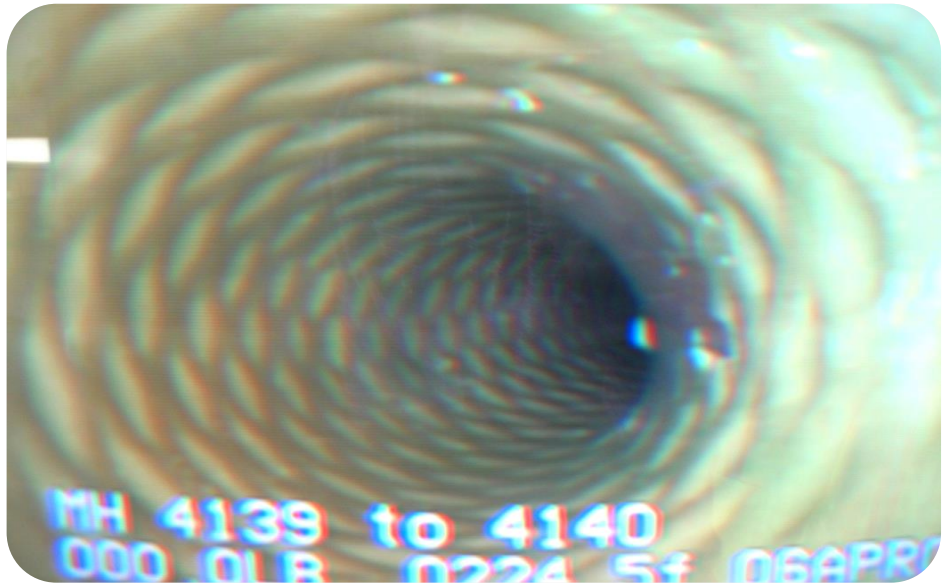






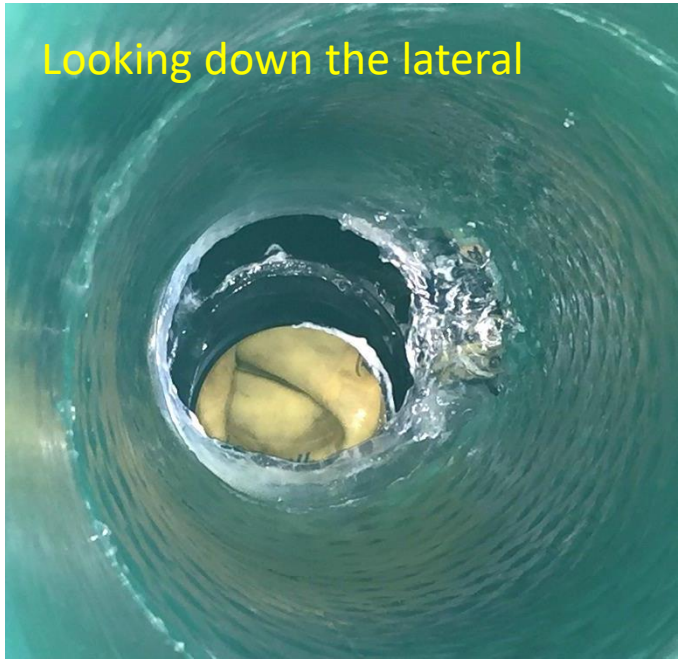
Inside view from mainline of sealed lateral connection

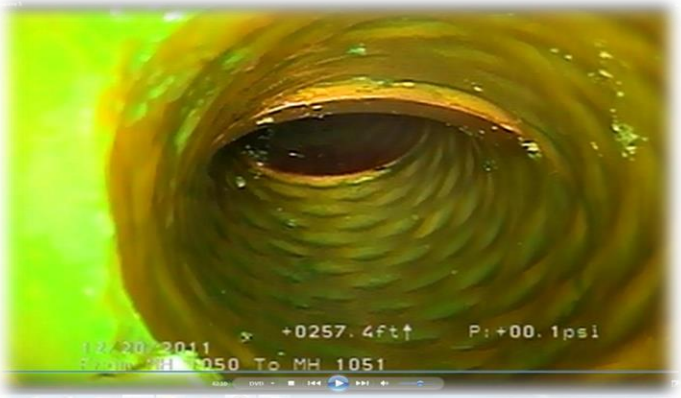
Post grouting mainline view of lateral connection.

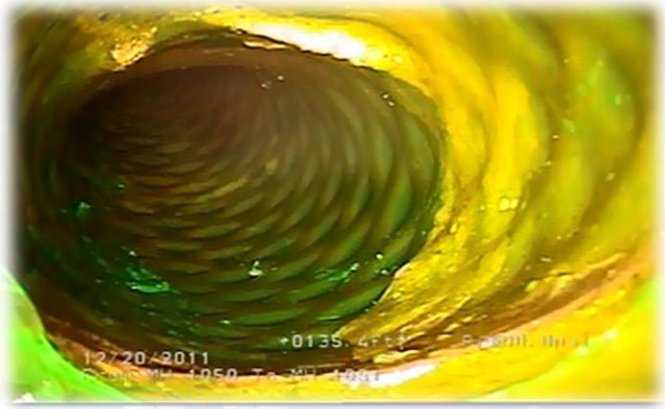


Post grouting view of lateral from pan & tilt camera in the mainline.

Pictures of residual grout as seen from the main and looking up the lateral. As the objective is to seal a predetermined portion of the lateral from the connection, chemical grout must travel between the lateral plug and lateral wall to achieve this distance. Residual grout, when using the right bladder and right procedures, should look somewhat like the pictures below.

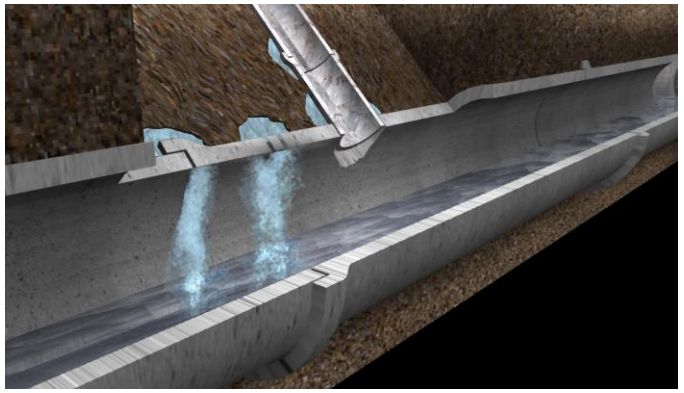
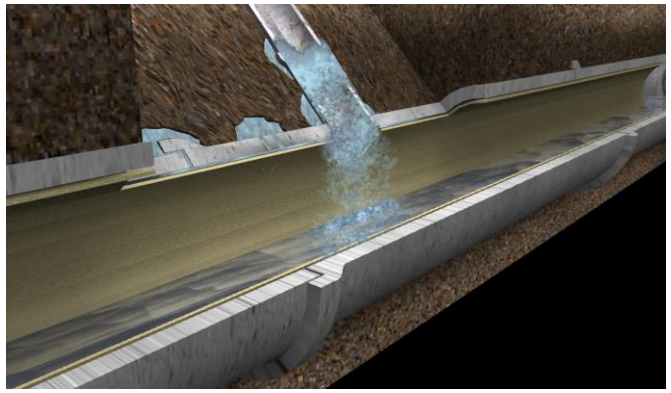


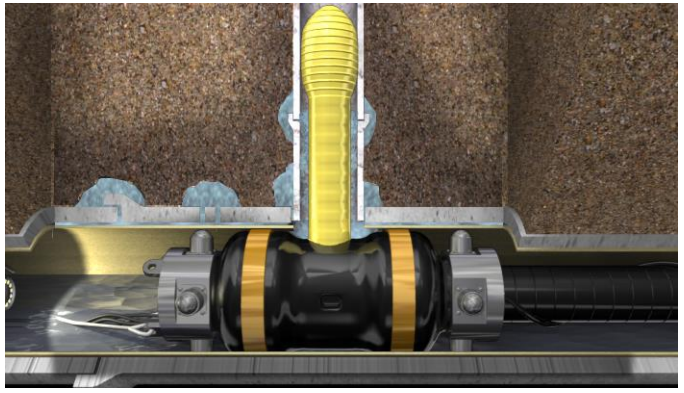
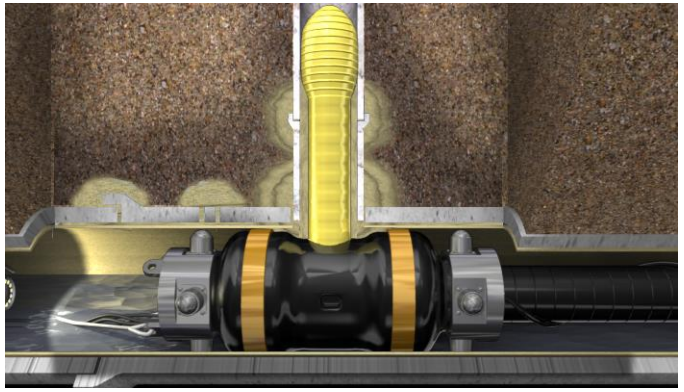
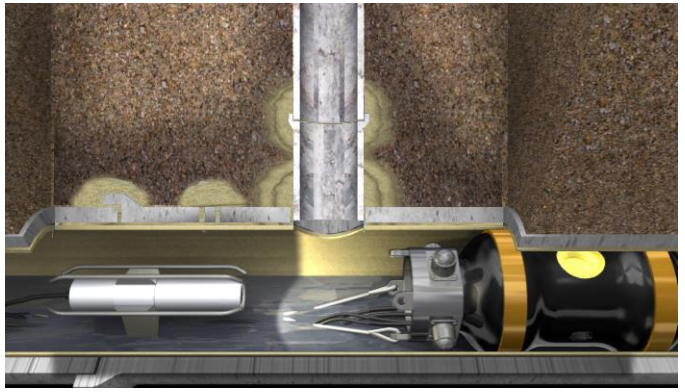




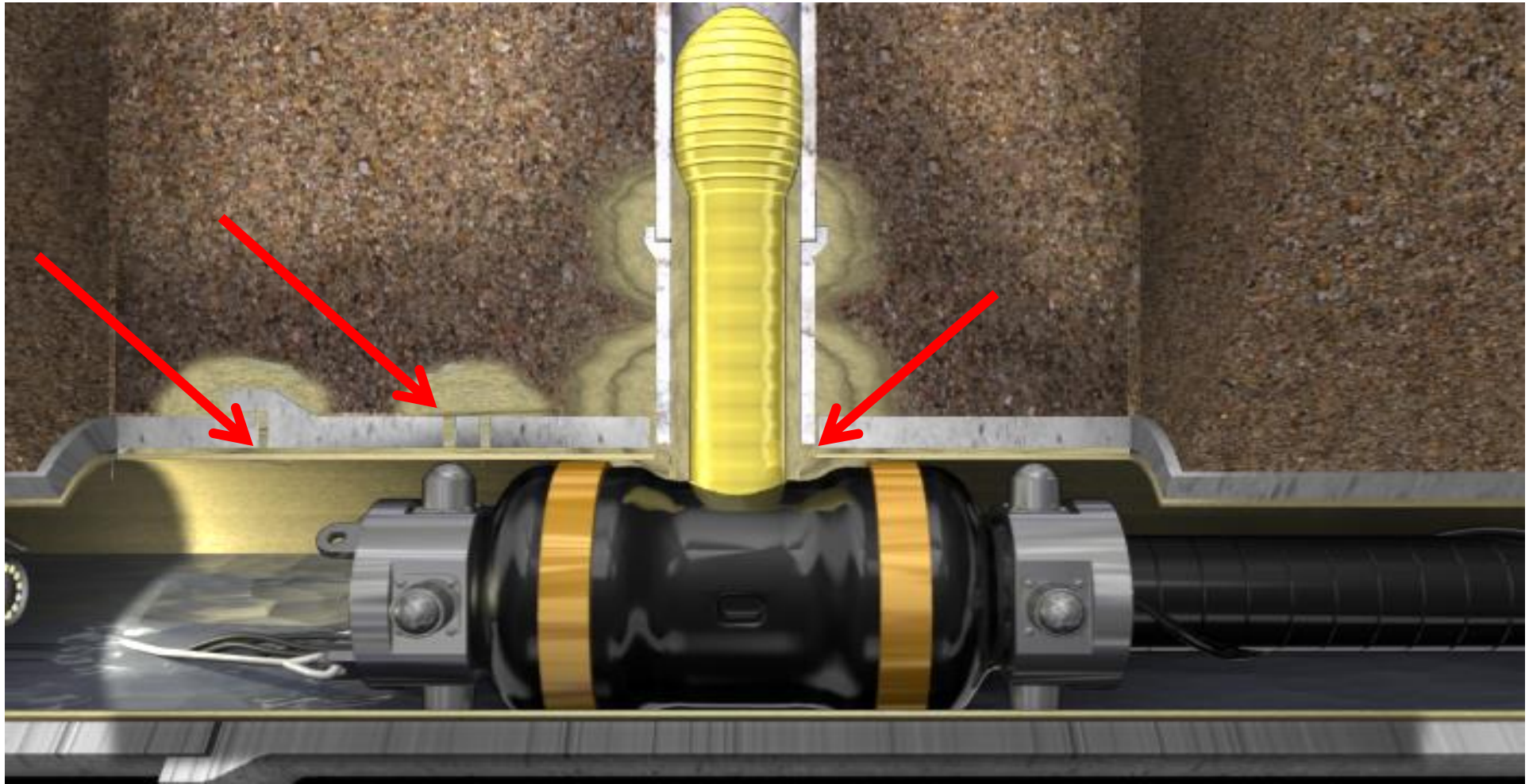
Infiltration at lateral reinstatements after mainline relining ?

Grouting Laterals & annular space in relined pipes

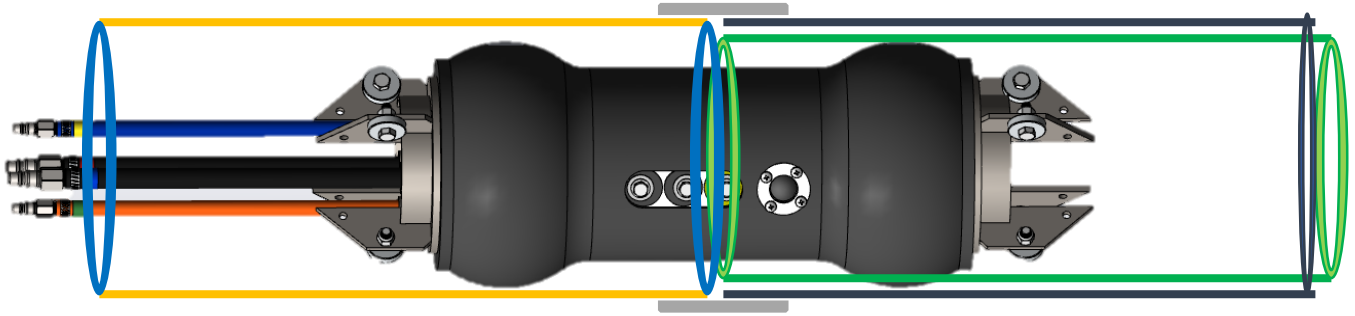



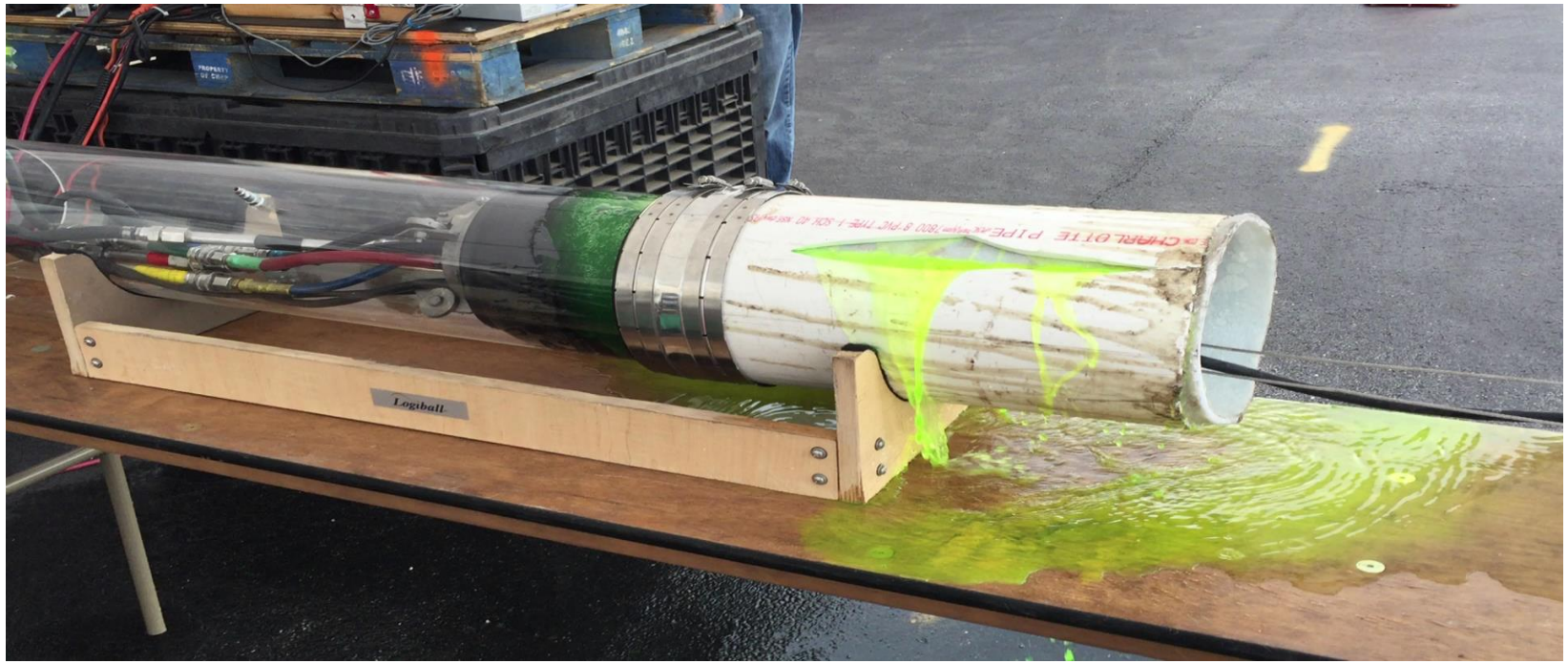





Lateral Grouting after Mainline Lining & Lateral reinstatements



Obtaining a double seal in lined pipes





Post Grouted Lateral Tap demo

Lateral Connection Test & Seal Capabilities

15`` Lateral Packer

24`` Lateral Packer

6`` Lateral Packer

Man Entry 36``Lateral Packer

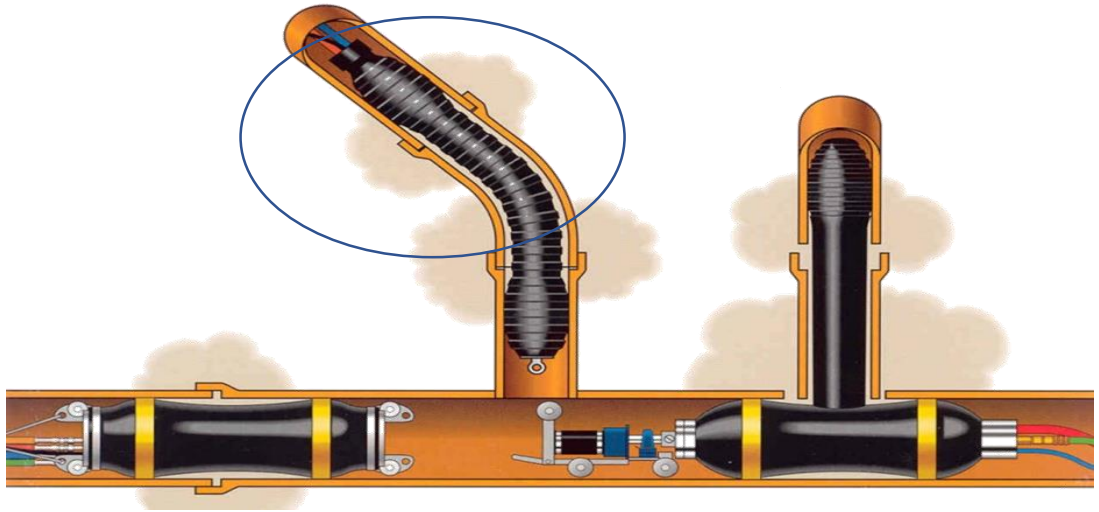
New for 2020

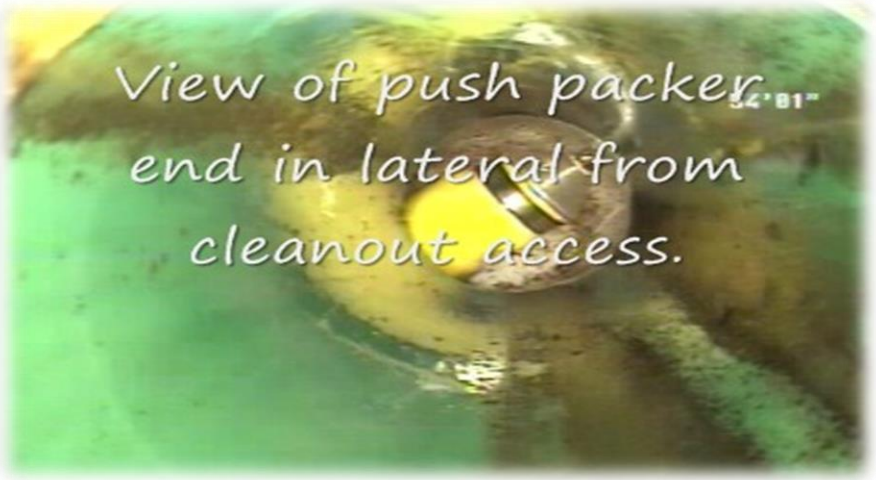
30``Lateral Packer

Lateral Connection Test & Seal Capabilities

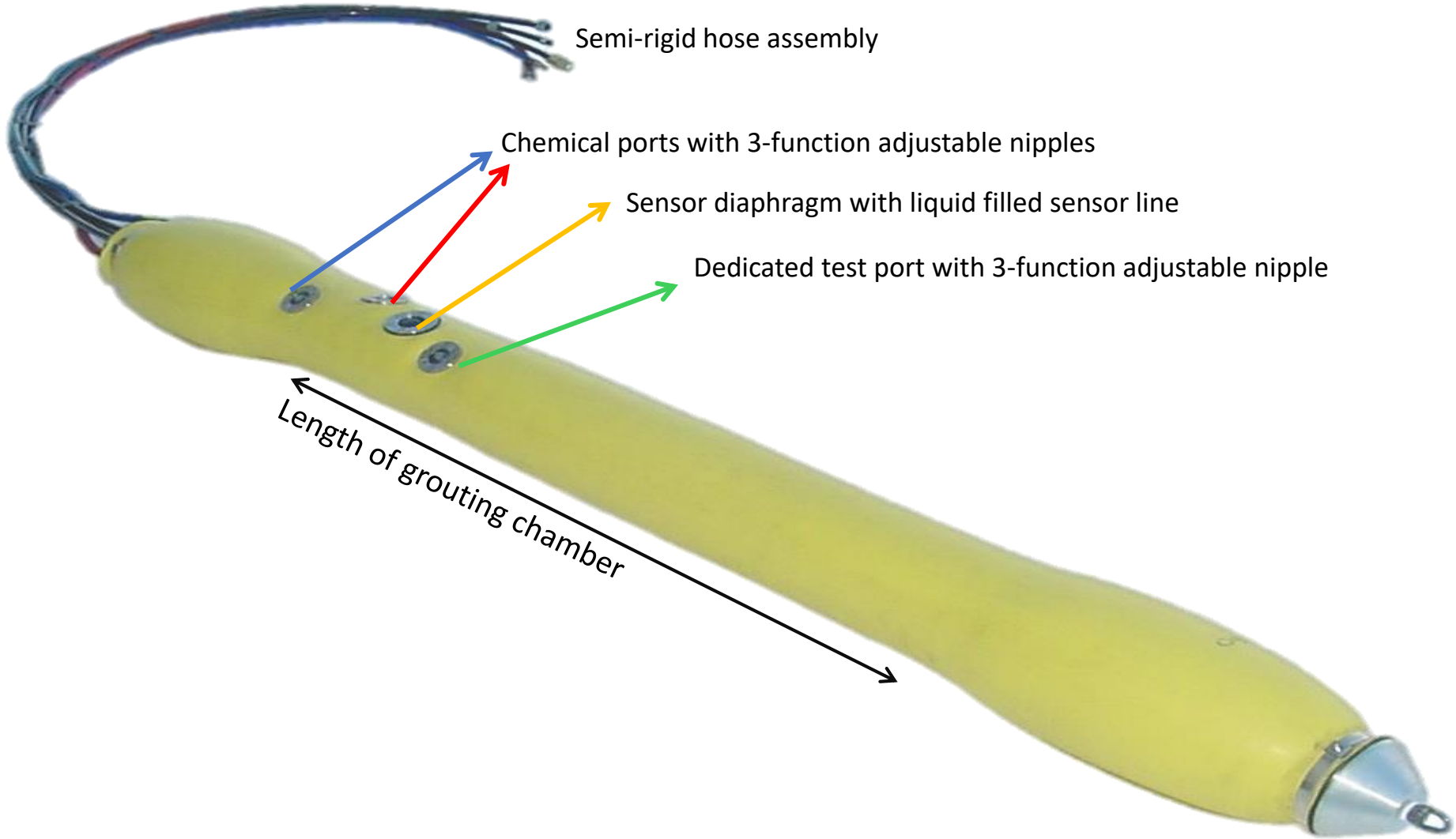
Mainline diameters from 6”-30” with effective sealing distances from 8” through 30 feet have been successfully performed in the field. Diameter of laterals 4”, 5” or 6”.

Flexible Push Type Grouting Packers

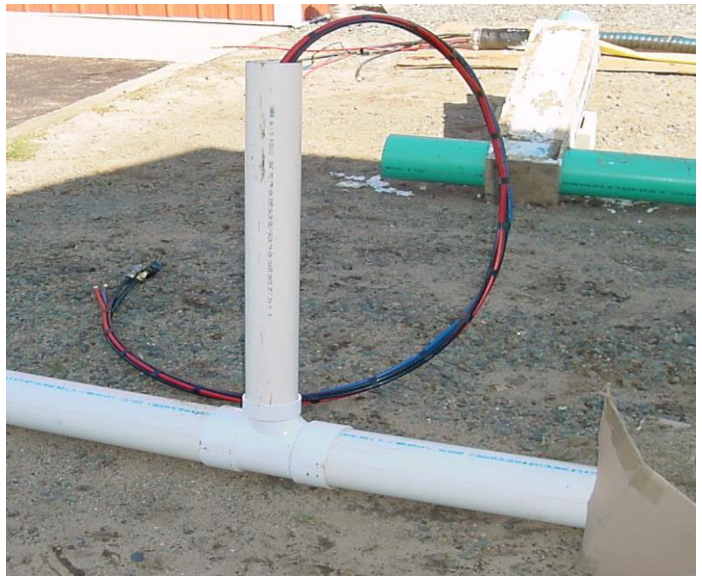




Logiball Flexible Push/Pull Test & Seal Packers



Flexible Push/Pull Packers Test & Seal Packers



Lateral from Cleanout Access(LCO)

Laterals connected to Manholes (LCM)

NASTT'S MUNICIPAL SEWER GROUTING GOOD PRACTICES COURSE

- **Description:** The cause for Municipal Grouting is clear: Sustainable solutions to control I&I, stabilize the sewer trench to mitigate structural decay, reduce flow to the WWTP for increased capacity and decrease cost to municipalities. This short course will introduce new scientific proof of performance, conveyance technologies and rules for execution. This training is ideal for specifying engineers, municipal stakeholders and specialty contractors.

ICGC

(Infiltration Control Grouting Committee)

ICGC is a committee of Nassco. More information can be found through the www.nassco.org website or directly at www.sewergrouting.com

Thank You, Questions ?

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