A Review of Large Diameter Sanitary Sewer Rehabilitation Technologies

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Pipe Rehabilitation Options

Slip Lining
- FRP
- PVC
- HDPE

Cured-in-Place Pipe (Insituform)

Composite Grout-in-Place Pipe (Spiral Wound)
- Danby, Inc.
- Sekisui SPR
A new pipe of smaller diameter is inserted into the old pipe and grouted into place.

Oldest of pipe rehabilitation methods having been in use since the 1940s.

Pipe materials:
- Fiberglass Reinforced Polymer (FRP)
- Polyvinyl Chloride (PVC)
- High Density Polyethylene (HDPE)
Cured-in-Place Pipe Rehabilitation (CIPP)

- A resin-soaked tube is pulled into the host pipe and cured with steam or hot water
- CIPP was invented in England in 1971
- Commercialized by Insituform Technologies in 1994.
A PVC liner is unwound into the pipe. The pipe is then grouted in place.

First developed by Ribloc in Australia in 1980.
Advantages

- No Bypass Required
- Long stretches of pipe can be jacked from one pit
- Structural solution
- Time efficient
Sliplining

Disadvantages

- Large installation pit required
- Liner pipe thickness reduces flow capacity of pipe
- Cannot line curves without costly fittings
FRP Pipe Manufacturers

- Hobas (centrifugally cast)
- Ameron International (filament wound)
- Flow-tite (filament wound)
Cured in Place Pipe (CIPP)

Advantages

- Access pits not required
- Can install long stretches of pipe from a single location
- Can maintain inside diameter and flow capacity
- Usually a structural solution
- Slips through curves
Cured in Place Pipe (CIPP)

Disadvantages

- Requires Bypass Pumping
- Quality Control is Critical
Composite Grout-in-Place (Spiral Wound) Rehabilitation

Advantages
- No Access Pit Required
- Can line any shape or size sewer
- Can be installed with a couple of inches of sewer flow
- Can rehab curves
Composite Grout-in-Place (Spiral Wound) Rehabilitation

Disadvantages

- Pipe Entry Required
- Time Intensive
- Usually requires bypass
- Not a structural solution
- Not much Track Record in U.S.
## Summary

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<th>CIPP</th>
<th>Spiral Wound</th>
<th>Slip Lining</th>
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<td>Bypass Not Required</td>
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<td>Structural Stability</td>
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<td>Proven Technology in the U.S.</td>
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<tr>
<td>Minimal Reduction in Flow Capacity</td>
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<td>No Fittings on Curves/Bends</td>
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<tr>
<td>No Installation Pit Required</td>
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<td>Time Efficient Operation</td>
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