SECTIONAL CURED IN PLACE LINERS

Metal Culvert Overview Flowchart
Structural Defects Flowchart (Metal)
Bedding Deficiencies Flowchart (Metal)
Hydraulic Capacity Flowchart (Metal)

1. OVERVIEW

Sectional cured-in-place liners are short CIP liners (CIP sleeves) that can be installed by the following methods (Flanery and Kiest, 2004):

- Inversion method – The liner tube, contained within the inversion bladder and vacuum impregnated with resin, is loaded into a flexible launching device. After positioning at the beginning of the damaged pipe section, the liner is inverted inside out forcing the resin against the pipe wall. After resin cure, the bladder is re-inverted, and is thus peeled away from the cured liner.
- Packer wrapping method – The liner flat sheet is manually impregnated with resin and wrapped tightly around a standard sewer plug overlapping the ends to produce the full circle tube. The liner/plug assembly is pulled through the pipe until the assembly reaches the point of repair. The packer method is not contained and a significant resin loss occurs during the pull. The plug is inflated and held in place during the resin cure. The apparatus is deflated relieving the air pressure and removed from the pipe.
- Pull in and inflate method – The liner tube with a protective coating on the outside and a bladder hose inverted inside it, is resin impregnated and pulled through the pipe until the assembly reaches the point of repair. The bladder is inflated and held in place during the resin cure, and thereafter re-inverted so it peels away from the cured liner. The protective coating on the outside prevents resin migration and bonding with the host pipe.

The final product can stop infiltration, eliminate root intrusion, is chemically resistant, and can provide a full structural repair (it can bridge missing pipe sections).

2. MATERIALS USED

Sectional CIP liners use the same materials as full length CIP liners. Tube material can be one or more layers of flexible needled felt or an equivalent non-woven material, and resin is polyester or vinyl ester with proper catalysts as designed for the specific application.

One system utilizes a tube consisting of an inner liner (non-woven flexible needled felt), a protective coating (PU/PVC), and a fiberglass/felt mat reinforcement (an additional layer of chopped fiberglass and felt). An epoxy resin is formulated and applied to the inner liner, as well as to the fiberglass/felt mat. The inner liner and fiberglass/felt mat become one with the impregnation of the epoxy resin (Cole Perkins, Perma-Liner Inc, personal communication).

3. APPLICABILITY

The sectional CIP sleeves typically repair short sections of pipe between 2 ft and 30 ft and are installed in pipes ranging in diameter from 6 in. to 54 in.

4. STANDARDS

ASTM F2599 covers requirements and test methods for the sectional cured-in-place lining (SCIPL) repair of a pipe line (4 in. through 60 in.) by the installation of a continuous resin-impregnated-textile tube into an existing pipe by means of air or water inversion and inflation. The tube is pressed against

the host pipe by air or water pressure and held in place until the thermoset resins have cured (Installation standard).

5. ADVANTAGES AND LIMITATIONS

The main advantage of sectional CIP relining is the ability to provide a structural repair of a CIP liner with reduced cost. No flow isolation or by-pass is required in many cases (the bladders have a 2 in. flow-through running through them to alleviate upstream head pressure). The installation is relatively quick (approximately 3.5 hours per repair section) and no digging is required.

The main limitation is that the method is not applicable in pipes with severe mineral buildup, severe offset joints, or sags.

6. REFERENCES

Flanery, S.M. and L.W. Kiest, 2004. "CIPP Sectional/Point Repairs: Critical Factors - Finally Explained," *Pipelines 2004 Intl Conf.*, San Diego, CA, Aug 1-4, 2004

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