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RESEARCH UPDATE

U96-1

INSITUFORM PIPE LINING PROCESS

REFERENCE:

Work Plan 91-R-9

PURPOSE:

To evaluate the performance of the INSITUFORM pipe lining process for the in-place rehabilitation of failing culverts of all sizes, without requirement for excavation and/or removal the existing pipe. The chief advantages claimed by the manufacturer are economy and elimination of the need for road closures and detours.

THE PROCESS:

The INSITUFORM process begins with the manufacture of a fabric tube which is custom fitted to the pipe which is in need of rehabilitation. The fabric is impregnated with thermo setting resin and installed by fastening it to the lower end of an inversion tube, which is in turn fastened to the inlet of the culvert. The tube is then forced through the culvert and inverted, pressing the Insituform material against the inside of the culvert utilizing hydrostatic pressure. The water is then heated, effecting a cure of the thermosetting resin.

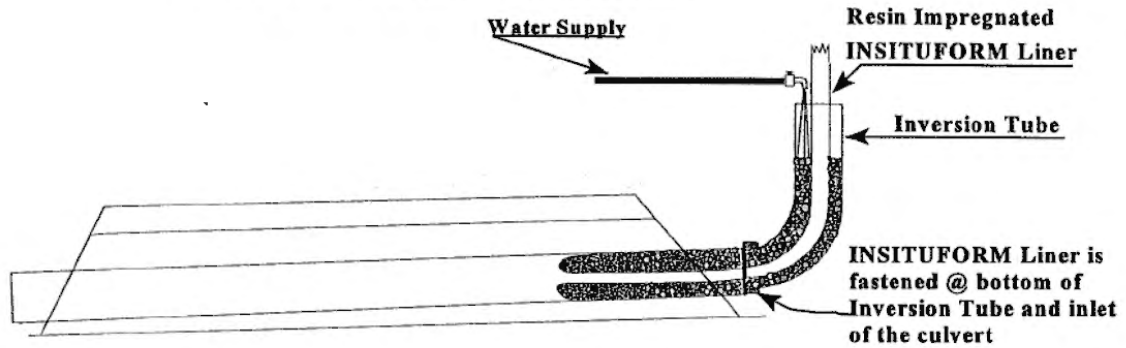
THE PROJECT

The INSITUFORM culvert liners were installed at three locations:

- On I 89, in the town of Richmond at MM 73.57, a 1830 mm x 116 m culvert (BR #52-1) was relined with INSITUFORM in conjunction with project IR 089-2(15). This installation was completed during early November of 1992.

All units in metric. Exceptions: milemarkers/mileage references for project location; supplier's costs presented in dual English/Metric units.)

INSTALLATION SCHEMATIC



- INSITUFORM liners were utilized to repair two 1830 mm culverts in conjunction with the Bridport-Addison project, F017-1(11) on VT 22A. The first was installed in the town of Bridport at MM 4.65 and the second was installed at MM 0.23 in Addison. The pipes were 51 m and 40 m in length. This construction was completed during late October of 1992.

COST:

The cost for the Richmond installation was \$2995/m (\$913/lf). This cost was compared with other installation types on the same project, i.e. relining with a new pipe and replacement with a concrete box. The INSITUFORM liner was significantly more expensive in both cases (approximately double). The additional cost of the INSITUFORM liner was acceptable for several reasons. The most notable being the disruption of traffic (or a very lengthy detour) that would have been necessary to replace the pipe with a box. Another disincentive associated with replacing the pipe with a concrete box was the excavation near the abutments of structure # 52N that would have been required. It was not possible to repair the pipe with a plastic insert, since the inside pipe diameter would have been reduced to an unacceptable level.

The average cost of the two installations in Addison and Bridport was \$3136/m (\$956/lf) and similar reasons for justifying the additional expense associated with the INSITUFORM applied at these two locations was well.

INSPECTION/CONDITION:

The repaired culvert at Richmond was initially inspected during mid August of 1993. The lining appeared satisfactory at that time except for a narrow band of irregular texture which occurs for several millimeters, extending around the top half of the pipe diameter. This apparent fault begins approximately 15 m from the pipe inlet. In this area, the liner surface appears to be scab-like. Also, a crack was detected, beginning in the scab area and extending down the left side of the culvert for approximately 600 mm. Subsequently, this culvert has been inspected on an annual basis, and no further significant deterioration has been noted.

The two facilities at Addison and Bridport have been inspected annually. Each of the two installations showed some minor deterioration in the form of some discoloration, wrinkling and blistering at the top of the culvert. Overall the condition of these pipes seems stable.

FOLLOW-UP:

All three of the INSITUFORM installations will continue to be inspected on an annual basis until supportable conclusions can be offered as to the service life of the product.