NEW ALIGNMENT

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

1. SUMMARY

Replacement on new alignment basically involves new culvert installations and is not a subject of this study, so it is only briefly covered in this section. When a new culvert replacing a deteriorated or hydraulically inadequate culvert is installed on a new alignment, the existing culvert can either be abandoned or repaired to remain in service. An abandoned culvert should be filled with concrete or another structural fill to ensure stability of the road surface in the face of continuing culvert deterioration.

Knoyle (2007) described a case study of replacement with new concrete culvert (Hwy 274 Culvert Replacement in Ottawa, ON, Canada). A corrugated metal culvert, 265 ft long and 60 in. in diameter, which consisted of two sections (190 ft and 75 ft, laid at 15° horizontal angle) was abandoned and a concrete culvert 70 in. in diameter was installed with jack and bore tunneling. Stearable shielded TBM was used.

Staheli et al. (1998) provided guidelines for installation of pipelines beneath levees using directional drilling. Notable guidelines for HDD installations are, for example, CALTRANS (2003) and HDD Good Practices Guidelines (Bennett et al., 2008).

One important issue associated with trenchless new installations is settlements that generally can be characterized as either large settlements or systematic settlements. Large settlements occur primarily as a result of loss of ground due to over-excavation and can lead to creation of voids or sinkholes above the bore. This risk is minimized through a comprehensive geotechnical investigation, selection of proper means and methods, use of ground improvement measures and good workmanship by the contractor. Systematic settlements associated with trenchless construction are primarily caused by the collapse of the overcut or annular space between the new pipe and excavation, and to a lesser extent by elastic deformations of the soil ahead of the advancing bore. Systematic settlements can be controlled by selecting an appropriate depth for the installation, maintaining a reasonable radial overcut, keeping the annulus filled with drilling fluids and by grouting the annulus after pipe installation (Bennett, 2009).

2. REFERENCES

Bennett, D., 2009. "Design Issues for HDD Projects Part 2," *Trenchless Technology*, Mar 2009

Knoyle, J., 2007. “Canadian Culvert Set to Last Another 100 Years,” Trenchless World, Dec 2007, pp. 8-9

Staheli, K., D. Bennett, H.W. O'Donnel, and T.J. Hurley, 1998. *Installation of Pipelines Beneath Levees Using Directional Drilling*, Technical Report CPAR-GL-98-1, April 1998, 201p, Waterways Experiment Station (WES), Vicksburg, MS.

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