Managing Risk

for Trenchless Projects for New Installations

By Dennis J Doherty, P.E., F.ASCE

Underground construction work has inherent risk, no matter what construction method is employed. Trenchless installation methods have additional risk because of limited access to the equipment while being deployed. For example, limited face access to microtunneling machines or no access to drill heads on long waterway crossings.

These risks include lost production or even lost equipment caused by unforeseen conditions, damage to other utilities and nearby structures due to ground movement, or worse, property damage and or lost of life. In addition to the subsurface risk, there are risks with construction impacts to surface activities caused by inappropriate work zone locations.

There are several methods for minimizing and managing risks associated with the installation of new pipes using a trenchless technology method. These are best addressed during the planning and design process. Experience has shown that contract documents should be written so that the major risks for a project are identified with a method describing how the risks will be allocated between the owner/sponsor of a project and the contractor. The Construction Industry Institute states that: "The ideal contract — the one that will be most cost-effective — is the one that assigns each risk to the party that is best equipped to manage and minimize that risk, recognizing the unique circumstances of the project."

As with any underground construction work, a thorough understanding of the subsurface conditions is essential for managing the risk associated with the chosen construction method. A Geotechnical Baseline Report (GBR) possibly combined with an Environmental Baseline Report (EBR) should be prepared as part of the contract documents if microtunneling, horizontal directional drilling (HDD), or open-cut excavation is to be used on a project. The GBR and EBR should address the project design team's interpretation of the subsurface conditions that the contractor will likely encounter. The GBR will present the basis for design decisions made by the project team to address the expected sub-surface conditions. The GBR should also suggest to the contractor general approaches or requirements for handling the expected subsurface conditions.

The general intent of the GBR and EBR is to reduce contingency costs associated with risk in the contractor's bid price for doing the work and to assist in properly estimating the time required for constructing the project. Without this interpretation, disputes may arise on interpretation of the contract document technical sections.

There are several methods that could be used for dispute resolution should a dispute between the owner/sponsor and the contractor occur during a project. These methods are based on industry-accepted practices for handling construction disputes throughout the United States. These methods have been used with varying degrees of success. Contract documents should include provisions for a dispute review board. Many agencies including the Massachusetts Highway Department, the State of Maine DOT, the Washington, D.C. Metropolitan Area Transit Authority (WMATA) and CalTrans have frequently used dispute review boards. Dispute review boards have been found to be cost-effective for multi-million dollar projects. The boards tend to foster an environment that encourages cooperation by all parties and disputes become resolved. However, the specifics of the contractual language should be determined during the final design process and after discussions with legal counsel, contractors and other experts in the field of trenchless technology.

Another method for managing risk is to utilized experienced construction inspectors in the field who have experience with the particular trenchless method being deployed. For example, microtunneling, like standard tunnel excavation work, requires the removal of soil from the face of the excavating head. Support of the tunnel walls and face is required to control movement of adjacent soil masses that could result in subsidence or heave at the ground surface and the movement of nearby structures, including other utilities.

The response of structures, utilities and other points of concern to the construction operations can be monitored by establishing a baseline pre-construction survey of critical locations, structures, and utilities using settlement markers and then monitoring their movement during microtunnel operations using well established geotechnical instrumentation methods.

Besides subsurface monitoring, planning surface land use during construction and identifying sensitive surface activities including traffic patterns and property access during design will assist the contractor in laying out surface support equipment. This will also identify for the inspectors critical issues that need to be monitored in order to minimize impact of the construction work on the public. A good field-monitoring program establishes methods for controlling risk on trenchless projects and provides for good public relations for the owner and the contractor, as well as good cost control.

Successful projects, both economically and politically, are good for the trenchless industry as a whole and will help grow the industry. However, without proven risk management tools, owners will shy away from complex trenchless installation projects if the projects prove to bear unforeseen additional cost or are not accepted by the public. My experience has shown that both the owners and the public are demanding trenchless projects and I believe it is because we in the industry are doing a good job controlling risk.

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