Subsurface Asset Development (SSAD)

Theme Note

Introduction

One of the primary roles of the Subsurface Utility Manager is to develop the underground utility networks and the process is Sub Surface Asset Development. Under the second module of Subsurface Utility Manager's Program various issues pertaining to this process are addressed.

Structure

This module is structured into eight sections as under:

1. **Subsurface networks introduction;**
2. **Open cut construction process;**
3. **Trenchless construction process;**
4. **Subsurface pipeline design;**
5. **Subsurface construction methods;**
6. **Method selection issues;**
7. **Economic factors related to subsurface; and**
8. **Life Cycle Analysis for subsurface Networks.**

Coverage

Primary issues related to the development of subsurface networks, which should be known by the subsurface utility managers, are dealt in this module. Following is the brief description of the program coverage:

Section 1

The section deals with the overview of the various types of subsurface networks, the duties desired from them and the duties actually performed including the deficiencies and thereby the need of development. The section also discusses the options of rehabilitating in contrast with new developments.

Section 2

This section deals the generic open cut construction methods. Topics covered herein are the surface as well as subsurface investigation methods, data collection and assimilation methods, excavated soil behaviour, issues of safety and shifting of exposed services within the excavated space, and safety of workmen and the environ. Section also touches issues of good practices related to backfilling and reinstatement of openings in roads or other excavated surfaces.

Section 3

The next section deals with the issues of trenchless construction methods in a similar fashion. Topics dealt here are the Subsurface Utility Engineering (Data acquisition and assimilation), Trenchless process (Entry & exit shafts/pits design and construction, existing services in the excavated space, safety of workmen and the environs), Safety in working process, storage, use & disposal of excavated materials, and finally Project completion procedures like data collections, as built drawing, GPS, methods of location and integrity verifications like online pigging, CCTV Survey etc.

Section 4

This section deals with the basics of subsurface pipeline design. Majority of the subsurface networks are the piped ones and the failure of any part leads to the failure of that particular line location. It is important that the pipe and construction method selection should be based on the sound engineering practices. This section deals with the basics of such pipeline design matters. It includes design and material standards, materials and manufacturing processes, testing of pipes, structural design of the pipelines, performance requirements, and construction and field testing procedures.

Section 5

This section deals various methods for developing subsurface networks. As discussed in previous sections one can execute these works either by open cut methods or by trenchless methods. This section is structured into two parts viz. open cut and trenchless. Under open cut portion methods discussed are micro trench, narrow trenching, deep trenching, and deep excavations. Under trenchless portion methods discussed are moling, pipe ramming, directional drilling, thrust boring, auger boring, microtunnelling, and pipe jacking.

Section 6

This section deals with the issues impacting the construction methods as discussed in the previous section. In addition it provides guidelines for consideration for making a technique selection.

Section 7

This section deals with the economic factors related to the use of subsurface space as it plays the most vital role in the holistic approach in techniques selection mechanism. The issues dealt here are easements, comparative space valuations, effects of depth over the value of space, and finally the subsurface space use optimization.

Section 8

This is the last section of this module and shall have its links to the next two modules [Sub Surface Asset Management (SSAM), and Sub Surface Asset Termination (SSAT)] as this analysis utilizes systems and guidelines of these sections. Acceptability or applicability of any particular construction method or combinations thereof depends upon the life cycle analysis for the entire subsurface network. Through this analysis the designer or the decision maker is able to compare the economic and social returns from the project executed through various methods and is able to take a decision accordingly. Topics covered herein are basics of life cycle analysis, discounted cash flows, route planning and system selection, model evaluation and related interference analysis and database development and management.

Expected Module Outcome

In this module various issues related to subsurface asset development methods are explained. It is expected that module participant shall be able to use this knowledge in their utility development activities to produce optimum solutions for the subsurface asset development requirements.