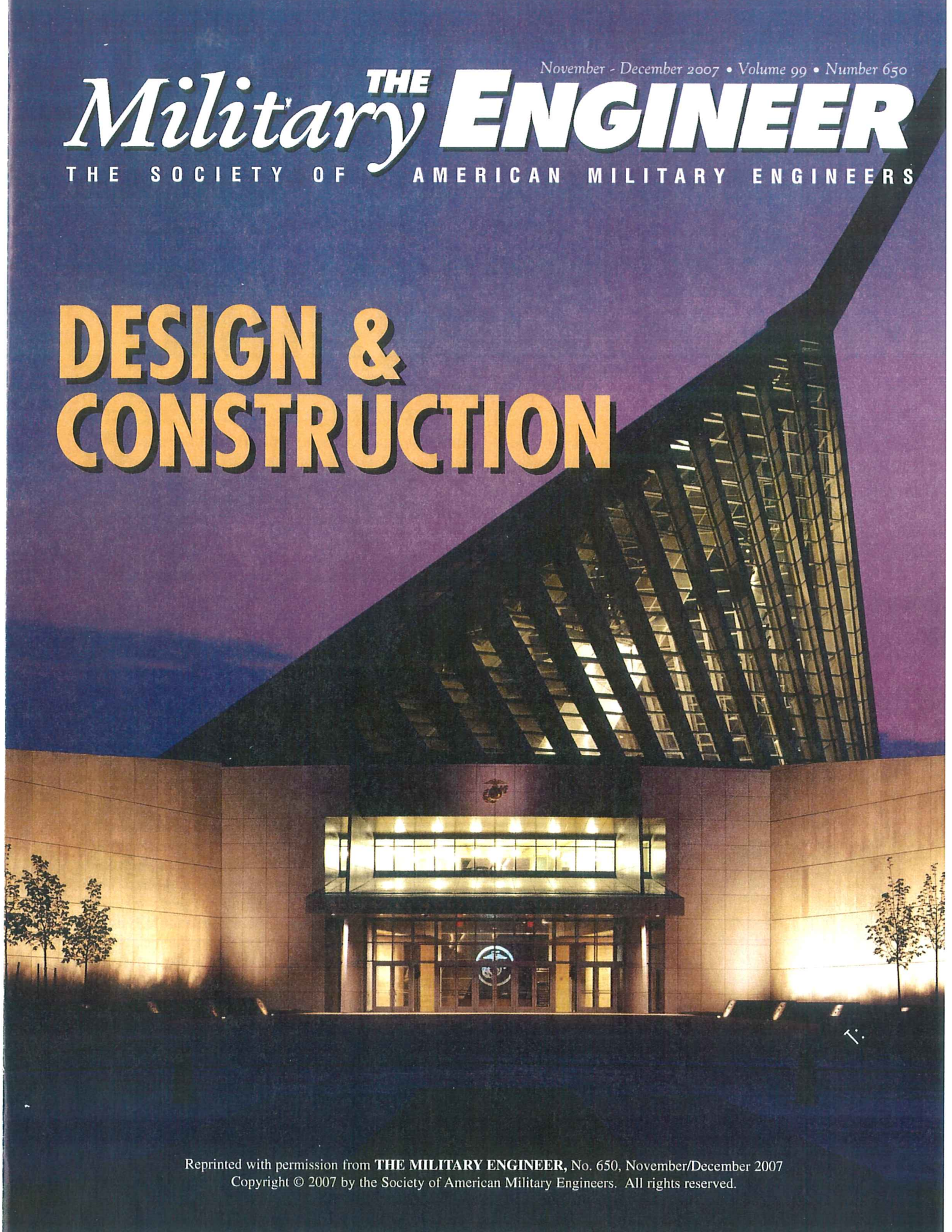


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Using subsurface utility engineering to locate and identify underground utilities before construction is a cost-effective engineering process.

Avoiding Underground Utility Conflicts

By Capt. James R. Allen, PE., CEC, M.SAME, USN (Ret.)

Picture this: A military base begins the construction of a new storage facility building. Records fail to show a fiber optic cable (FOC) installed by the information technology department. A backhoe hits and cuts the FOC, causing work stoppage at the construction site, major communications shutdown on the base and a costly construction delay while the FOC is repaired.

What if it had been a water main, cutting off water to the base? Or a gas line, resulting in a dangerous explosion?

Experience has shown that relying on information from old plans and records regarding the location of underground utilities may not be the wisest decision. Often, these subsurface facilities are not where the records say they are. Once construction begins, the inaccurate information can result in costly conflicts, damage, delays, service disruptions, redesigns, claims and possible injuries and lost lives.

Subsurface Utility Engineering

Subsurface utility engineering (SUE) is an engineering process that incorporates civil engineering, surface geophysics, surveying and mapping, nondestructive vacuum excavation and asset management technologies to identify and classify quality levels of existing subsurface utility data. The data allow for developing strategies and informed design decisions to manage risks and avoid conflicts and delays. If a utility conflict does exist, viable alternatives can be found to resolve the conflict before any damage is done.

While the SUE process itself is tailored to each project, it typically includes three major field activities:

- **Designating.** This includes using geophysical prospecting techniques to determine the existence and mark the horizontal position of underground utilities.
- **Locating.** This entails using nondestructive digging equipment, such as vacuum excavation, at critical points along an underground utility's path to determine the precise

horizontal and vertical position, size and material composition of the underground utility line.

- **Data management.** This includes surveying utility information obtained by designating and locating and entering it into a computer-aided design system, allowing designers to examine project options and plan ahead to eliminate utility conflicts.

Demonstrating Success

The Federal Highway Administration (FHWA) has already demonstrated that the relatively inexpensive SUE process yields a high return on investment for roadway construction. In a study completed in January 2000, FHWA found that for every dollar spent on SUE by a state highway department, the department realized an average savings of \$4.62. FHWA and many other governmental transportation agencies now strongly advocate the use of SUE on highway construction projects.

TBE employees demonstrate SUE equipment at Hurlburt Field Air Force Base, Fla.



Photo courtesy TBE Group

SUE makes good engineering and design sense for any type of construction project that requires excavation around existing underground utilities, including construction projects at military bases.

Naval Station Mayport

Naval Station Mayport, Jacksonville, Fla., is the third-largest naval facility in the continental United States. It is host to more than 70 tenant commands, including the aircraft carrier *USS John F. Kennedy*, one of the last remaining conventionally powered carriers.

Mayport wanted to upgrade its underground utility facilities, including its electrical system, in order to service visiting nuclear-powered aircraft carriers.

Carrier Wharf C2, located at the far end of horseshoe-shaped Mayport Basin, was designated for the upgrade. MIL-CON Construction Corp., the prime contractor on this design-build project, decided to directional bore from the base side of the horseshoe out to Wharf C2, running the new electrical power lines under the basin. This was a much shorter, less costly solution.

To work, numerous underground utility lines—both active and inactive—needed to be located and identified on both sides of the basin.

Speed was especially important on this project. The job was awarded to MIL-CON immediately following the terrorist attacks of Sept. 11, 2001. *USC John F. Kennedy* was deployed soon after, and MIL-CON had to complete the utility upgrade before the carrier came home.

MIL-CON called on TBE Group, internationally recognized SUE experts, to find those lines. TBE identified, located and mapped all existing lines in just a few weeks. By the time the MIL-CON team was ready to excavate, it knew where every underground utility was located.

“Because of the war on terror, we weren’t told when the carrier was returning,” said Kerry Bentley, CEO, MIL-CON. “We just knew we had to finish the job before it [the carrier] came back. We did, with a few days to spare. Because of the confidence we had in the underground utility location information provided by the SUE process, we were able to work at a faster pace and complete the project on time.”

Hurlburt Field Air Force Base

Located just west of Fort Walton Beach, Fla., Hurlburt Field is home of U.S. Air Force Special Operations. The base planned significant improvements to its main entrance to improve traffic flow, stormwater drainage and security.

Based on available records, which showed a 4-in underground water line, improvement plans focused on replacing that line with a 6-in line for improved service to the surrounding facilities.

Nondestructive vacuum excavation was conducted. This revealed that the existing line already was a 6-in PVC line, thereby eliminating the need for replacement and saving thousands of dollars.

According to O.M. “Chuck” Spangler Jr., RA, Chief of Military Design and Construction, Hurlburt Field, the 6-inch line was not the only underground utility identified through the SUE process. “We also found underground lines that we didn’t know were there because they were not recorded on our drawings,” he said.

“The SUE process provided us with a more accurate picture of what’s located underground before we began construction,” Spangler explained. “It also gave us the opportunity to develop better cost estimates on our construction projects.”

Hurlburt Field, 505th CCW Air Operations Center

The Air Force was looking to turn an 8-acre parcel of Hurlburt Field into an Air Operations Center Training campus for the 505th Command and Control Wing, a unit of the Air Combat Command. Bullock Tice Assoc., a Pensacola, Fla., architectural firm, was commissioned by the Mobile, Ala., District of the U.S. Army Corps of Engineers to design the first two facilities, which represented the first phase of a two-phase project.

While the design included new underground utility lines, designers knew it was important to locate existing underground lines to avoid conflicts. This was especially important because there were numerous underground communication lines. Damaging or completely incapacitating any one of the lines would require several days of work to restore vital base communications infrastructure.

Bullock Tice called in TBE Group to find and identify the existing underground utility lines. Using the SUE process, TBE identified numerous old, uncharted underground utility lines, many of which had been previously abandoned or not maintained.

“At potential conflict sites, TBE’s vacuum excavation process provided us with the horizontal and vertical locations, as well as sizes, of these lines,” said Jon Molloy, AIA, VP and Project Manager, Bullock Tice.

Phase two of the project is not yet funded. However, TBE Group has already designated all existing underground utilities for the entire 8-acre site. This data will aid the future design process.

Setting the Standard

In 2003, the American Society of Civil Engineers (ASCE) published its *Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data*. The standard formally defines the SUE process and establishes guidelines for collecting and depicting SUE information.

The ASCE standard is an emerging guideline among a growing number of engineering and construction professionals, and the SUE process is being incorporated in an increasing number of military construction projects. **TBE**

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