

# S.U.E. helps transportation projects stay on track

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Planning, engineering, constructing, and maintaining transportation networks with inaccurate utility information can be a daunting task. When it comes to utility conflicts, one small mistake can have a big impact on a transportation project, and it's usually not for the best.

But a new approach is transforming the nature of planning and preparing for transportation projects—Subsurface Utility Engineering, now available through the Denver office of Carter & Burgess, Inc., a leading transportation planning and design firm. The new service complements the firm's survey and photogrammetry units with utility design, location, permitting, coordination, inspection, cost analysis and inventory.

S.U.E.—as it's best known in the transportation field—is a risk management program that uses utility mapping, locating, condition assessment, design standard, coordination process, and surveying to communicate utility information to all parties involved in planning, designing, constructing and maintaining highway projects. S.U.E. is used effectively in both design/bid/build and design/build projects.

S.U.E. enhances the traditional utility locating research discipline by taking underground utility information gathered at the onset of a project, recording it in a database, and then creating a detailed depiction of the subsurface engineering. While implementing S.U.E. adds a little more to a project's cost, the overall long-term savings are worthwhile because the information created through the process can be used repeatedly, eliminating the need for multiple surveys.

In fact, the Federal Highway Administration indicates that, nationally, S.U.E. programs reduce cost in the planning and engineering phases by five percent and in the total project cost, including construction, by about a half percent. (The use of S.U.E. in local city and county Departments of Transportation maintenance programs is currently under evaluation for ratios and savings.)

The agency maintains that if each state and local government using federal aid develops an active S.U.E. program, the savings to the federal transportation budget would total more than \$1 billion per year.

The FHWA also cites such additional benefits as lower project bids, contingency fees, design fees, and project risks; higher quality of design and construction; a reduction in duplicate utility

location and survey efforts; lower right-of-way and negotiations costs; and, the aforementioned ability to maintain permanent records.

Project and program managers at Carter & Burgess have seen firsthand the benefits of a well managed S.U.E. program. These include the reduction of unexpected utility conflicts and relocation, redesigns from unforeseen utility conflicts, utility-caused project delays, change orders and contractor delay claims, as well as increased safety to workers and the public and a decrease in overall project costs in planning, design, and construction.

More importantly, though, the approach has the backing of several industry heavy hitters. In addition to the FHWA, S.U.E. is endorsed by the American Society of Civil Engineers and the American Association of State Highway Transportation. All have lauded S.U.E. as an important program for accurate location and collection of utility information.

Over a four-year period, FHWA and AASHTO tracked 350 highway projects with and without S.U.E. in eleven states. They found that qualified S.U.E. programs almost always had an impact on money spent. The cost savings were significant—they were particularly evident in Ohio, Texas, Virginia, and Pennsylvania, where a combined total of \$177 million was saved.

Some examples from Carter & Burgess and FHWA of the cost benefits experienced by states with active S.U.E. programs are:

- New Mexico Department of Transportation—NMDOT budgets about \$2 million per year for S.U.E. in the planning and design phases of highway projects. They have been using S.U.E. for three years and advertise a savings of 3-to-1 in project costs to expense.
- Florida Department of Transportation—FDOT, an early proponent of S.U.E. and original FHWA pilot project for S.U.E., realized a \$6 million cost savings in contractor construction delay claims in the Tallahassee and Miami regions over a six-month period, on about \$2 million in S.U.E. investment. S.U.E. was performed in the initial planning and design stages of highway projects.
- Virginia Department of Transportation—During a three-year period, VDOT followed planning, design, and construction phases of fifteen design/bid and design/build/bid high-profile

# S.U.E.

highway improvement projects. Half of the projects used traditional DOT standards for utility locating and accommodation. The other half followed the newest guides of FHWA, ASCE, and AASHTO programs for S.U.E.

Approximately 45,000 utility crossings and laterals were tracked under the comparison, with 3,875 test holes required for the S.U.E. program at a cost of about \$1.4 million. The projects following traditional DOT standards for utility locating also required test holes but with less precision, information exchange and submittal detail.

VDOT determined that approximately \$2.4 million was saved in utility adjustment avoidance on those projects using S.U.E. Of this savings, \$475,000 was in utility redesign and \$765,000 was in construction claims. VDOT also credits S.U.E. with reducing highway design time on many projects from five to four years, or a 20 percent reduction.

VDOT spends about \$12 million in S.U.E. programs each year. The S.U.E. procedures were started in 1984 within nine districts, and the program now uses three utility mapping consulting firms, two utility coordination firms, four utility relocation design firms, and seven test hole companies.

The FHWA also published cost summaries of six states—Virginia, North Carolina, Ohio, Wyoming, Oregon and Texas—using advanced S.U.E. programs during 2003, and accounting for 98 highway projects valued at \$1.8 billion in total highway expenditure. Studies included interstate, arterial and collector roads in urban, suburban and rural settings.

Seventy one of the projects showed a savings of 4.6-to-1 spent on S.U.E. and represented 0.5 percent of each project total cost; 25 were 2-to-1 or higher, and three showed negative returns on S.U.E. investment. Virginia showed an 18-to-1 ratio of savings and Maryland showed 10-to-1, while North Carolina logged an impressive 206-to-1 ratio on one project—a \$560,000 return on its S.U.E. investment.

In Colorado, the use of S.U.E. isn't as widespread as in Virginia, North Carolina, or Texas, but the approach is gaining ground. Carter & Burgess hopes to help change this situation with its new 10-person S.U.E. team in place in Denver.