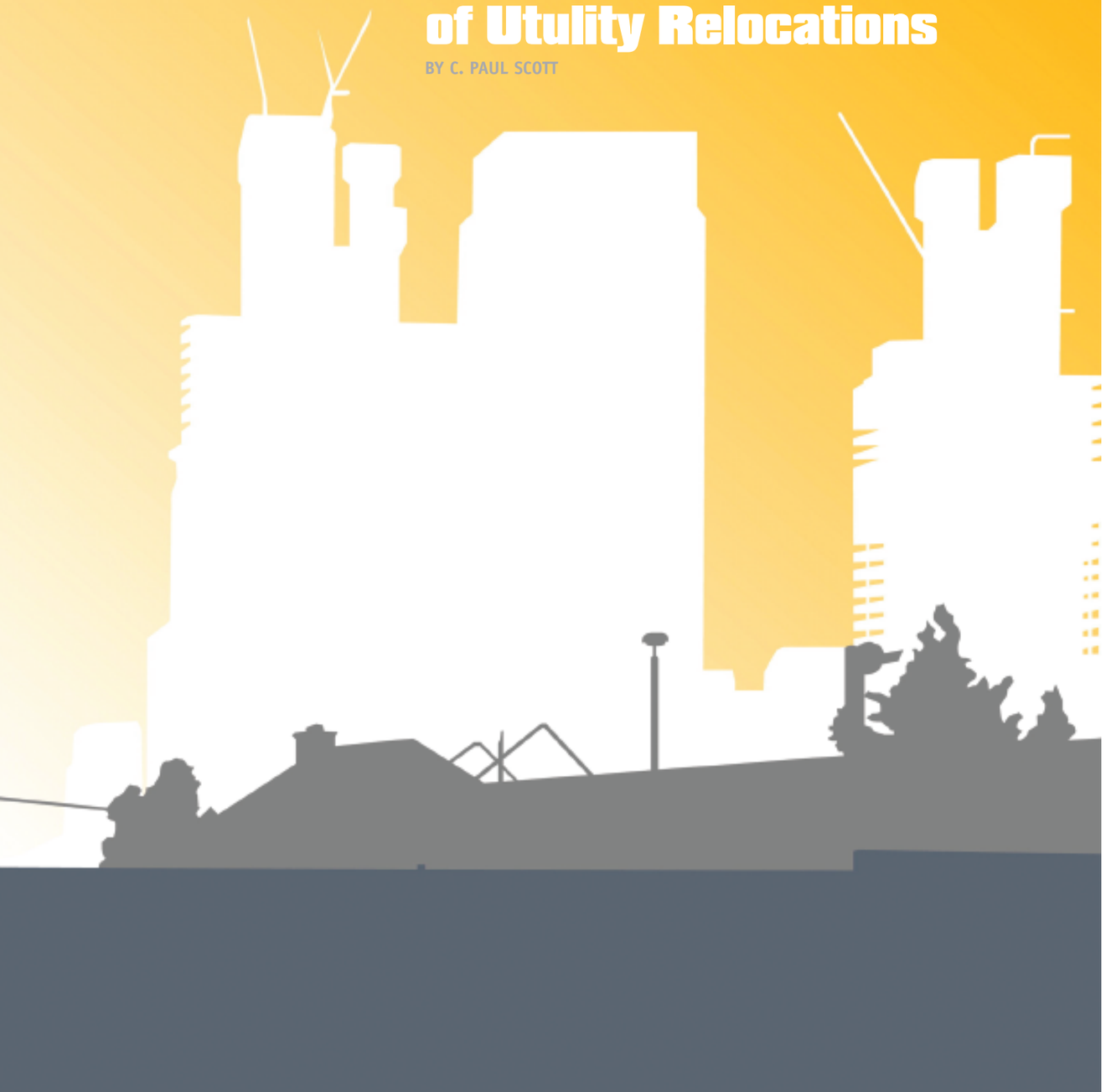
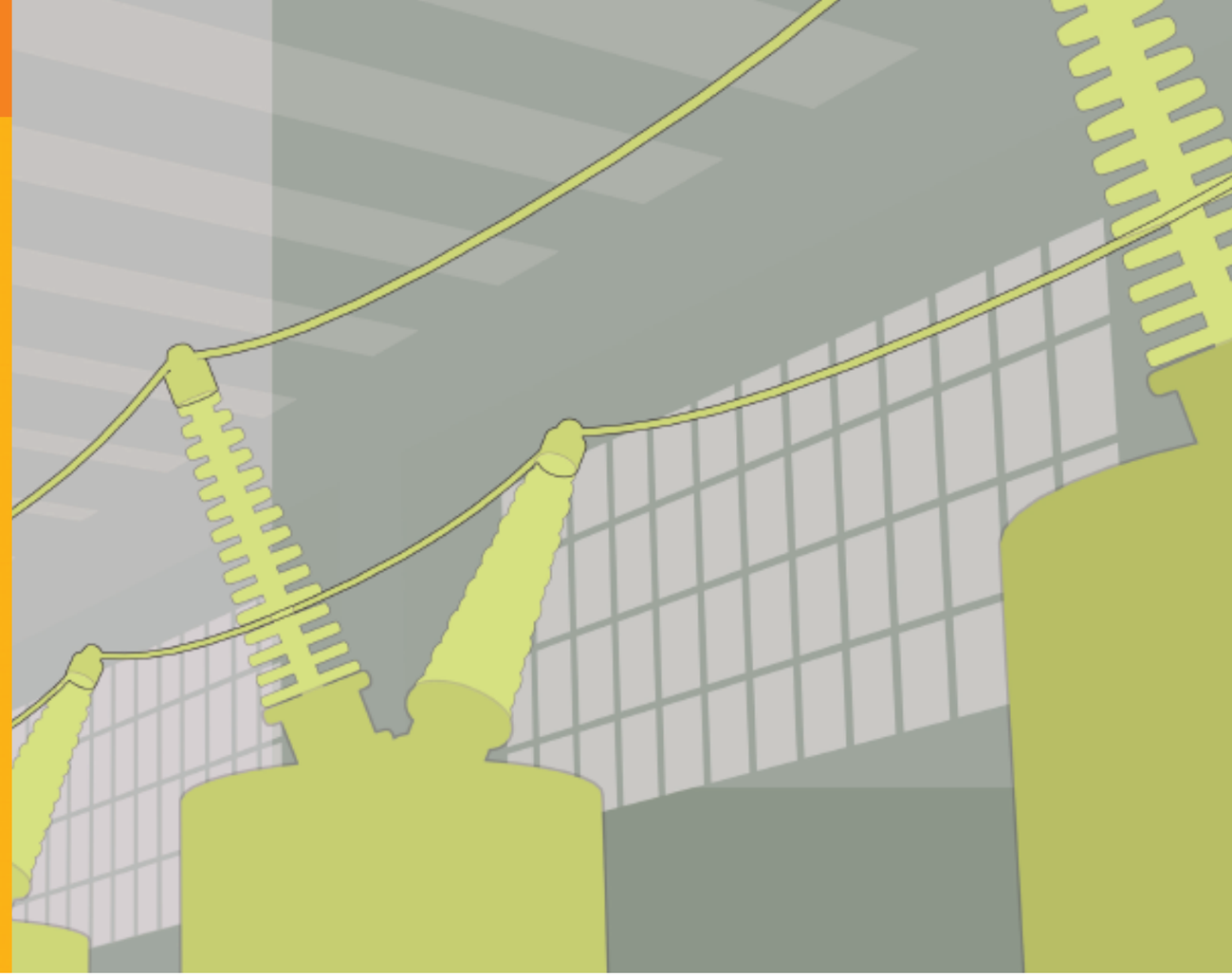
Avoiding the High Cost of Utulity Relocations

BY C. PAUL SCOTT



Many utilities are unnecessarily relocated each year to accommodate highway construction. This is because highway projects are often designed without consideration of underground utilities information. In such cases, upon or near completion of the design, available utilities information is added and any utilities that are in the way have to move. Utilities are often not even discovered until damaged during excavation activities. This no longer has to happen. Enhanced coordination, cooperation, and communication (CCC) between governmental transportation departments and utility companies, and utilization of accurate and comprehensive information provided using subsurface utility engineering (SUE) make it possible for designers to utilize a myriad of techniques to make relatively minor adjustments and "design around" many utilities that traditionally would have been relocated.



COORDINATION, COOPERATION, COMMUNICATION

Good CCC between governmental transportation departments and utility companies is essential throughout the development and construction of highway projects. Projects have typically been designed in the past without sufficient consideration of utilities, resulting in the need to unnecessarily relocate many conflicting utilities to accommodate highway construction. Consultation with utility companies early in the development of highway projects may facilitate minor plan changes to avoid utilities, thus eliminating the need to relocate them.

It has been common knowledge for many years that utility-related problems are a leading cause of delays to highway construction projects. Avoiding utility relocations would alleviate this problem. Early and frequent use of CCC can help.

Increased federal and state funding for highway projects, combined with utility company mergers and downsizing, result in more potential utility relocations and construction delays, and more of a need to avoid them if possible. A video prepared for and available from the Federal Highway Administration (FHWA) titled "CCC: Making the Effort Works!"[1] outlines ways in which transportation departments and utility companies can reduce utility-related disruptions, minimize costs and accelerate construction.[2]

A best practice developed by the American Association of State Highway and Transportation Officials (AASHTO) Highway Subcommittee on Right of Way and Utilities for the AASHTO Standing Committee on Highways[3] encourages transportation departments to coordinate and communicate frequently with utility companies to reduce delivery time, reduce costs, and improve quality in the utilities process.

The AASHTO best practice encourages transportation departments to:

- Provide utility companies with long-range highway construction schedules.
- Host meetings with utility companies to discuss future highway projects.
- Recognize the importance of long-range highway/utility coordination.
- Organize periodic (monthly, quarterly, annual) meetings with utility owners within a municipality, county, or geographic or highway planning region.
- Solicit similar information on utility owners' capital construction programs, particularly where a utility's planned expansion or reconstruction may encroach on and coincide with a planned highway project.
- Consider using the long range-planning meeting as a convenient forum to discuss other highway/utility issues, such as accommodation policies, reimbursement, etc.

The state of Wisconsin has passed legislation mandating CCC and setting up a timeframe for interaction. Other states are starting to pay more attention to the benefits of CCC.

It just makes good sense. If more information is made available early in the development of projects, if more transportation departments and utility companies are informed of each others needs, and if more stakeholders are talking to each other, then it is also more likely utility relocations can be avoided.

SUBSURFACE UTILITY ENGINEERING

Over the past few decades, a revolutionary engineering process has evolved in the United States. SUE allows highway designers to avoid utility relocations. Many governmental transportation agencies, utility companies and design consultants use these services to identify the quality of subsurface utility information needed for highway plans, and to acquire and manage that level of information during the development of projects.

The SUE process combines civil engineering, surveying, geophysics, nondestructive excavation and other technologies. It provides accurate mapping of existing underground utilities in three-dimensions, which not only makes it possible to avoid unnecessary utility relocations and related downtime, but also eliminates unexpected conflicts with utilities, and enhances safety during construction. The use of SUE has become a routine requirement on many highway projects, and is strongly advocated by the FHWA and many governmental transportation departments.

Purdue University studied the cost savings of four state transportation departments that routinely used SUE. Seventy-one projects were studied. The total construction costs of these projects were in excess of $1 billion. The projects involved a mix of freeway,

arterial, and collector roads in urban, suburban and rural settings. As a result, a total of $4.62 in savings was quantified for every $1 spent on SUE.[4]

> The highest level of accuracy and comprehensiveness is generally not needed at every point along a utility's path; only where conflicts with design features are most likely to occur.

A national standard developed by the American Society of Civil Engineers (CI/ASCE 38-02, *Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data*) defines SUE as a branch of engineering practice that involves managing certain risks associated with utility mapping at appropriate quality levels, utility coordination, utility relocation design and coordination, utility condition assessment, communication of utility data to concerned parties, utility relocation cost estimates, implementation of utility accommodation policies and utility design. These activities, combined with traditional records research and site surveys, and utilizing new technologies such as surface geophysical methods and nondestructive vacuum excavation, provide quality levels of information.

The ASCE standard recognizes four quality levels of subsurface utility information that should be depicted on highway plans. These quality levels range from Quality Level D (the lowest level) to Quality Level A (the highest level). The highest level of accuracy and comprehensiveness is generally not needed at every point along a utility's path; only where conflicts with design features are most likely to occur. Hence, lesser levels of information may be appropriate at points where fewer conflicts or no conflicts are expected.

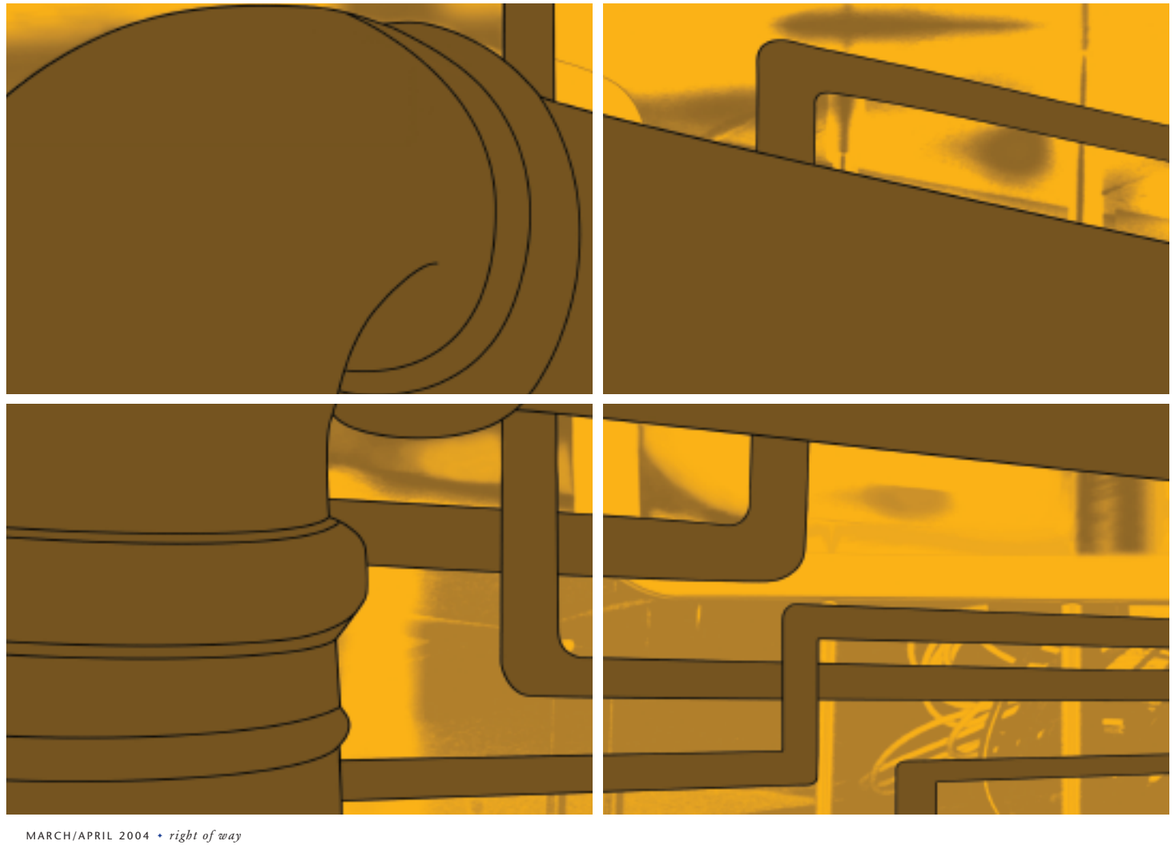
The four quality levels are as follows:

Quality Level D (QL-D) information comes solely from existing utility records.

Quality Level C (QL-C) involves surveying visible above-ground utility facilities, such as man-holes, valve boxes, posts, etc., and correlating this information with existing utility records.

Quality Level B (QL-B) involves the use of surface geophysical techniques to determine the existence and horizontal position of underground utilities.

Quality Level A (QL-A) involves the use of nondestructive digging equipment at critical points to determine the precise horizontal and vertical position of underground utilities, as well as the type, size, condition, material, and other characteristics.



The ASCE standard closely follows concepts already in place in the SUE profession.

"Many state and local highway agencies and/or their design consultants use [SUE] routinely in the early development of highway projects," said Nicholas Zembillas, a nationally recognized authority on SUE and a member of the ASCE committee that developed the standard. "They do so by employing the services of SUE consultants to identify the quality of subsurface utility information needed for highway plans and to acquire and manage that level of information during the development of projects."

SUE enables designers to prepare plans with thorough and comprehensive knowledge of the exact locations of underground utilities, and enables excavators to avoid damaging underground assets, historical/archaeological sites, and other underground items, Zembillas said.[6]

The bottom line is this – the use of SUE information enables designers to design around many utilities, and thus to avoid many costly and time consuming utility relocations.

DESIGN STRATEGIES

A manual prepared for and available from the FHWA titled "Avoiding Utility Relocations"[7] encourages highway designers to avoid unnecessary utility relocations in the designs for which they are responsible. This was accomplished by identifying both the value of avoiding utility relocations on highway construction projects and the techniques and technologies that can be used to achieve this goal. A compilation of design strategies used by highway designers to avoid utility relocations is outlined below:

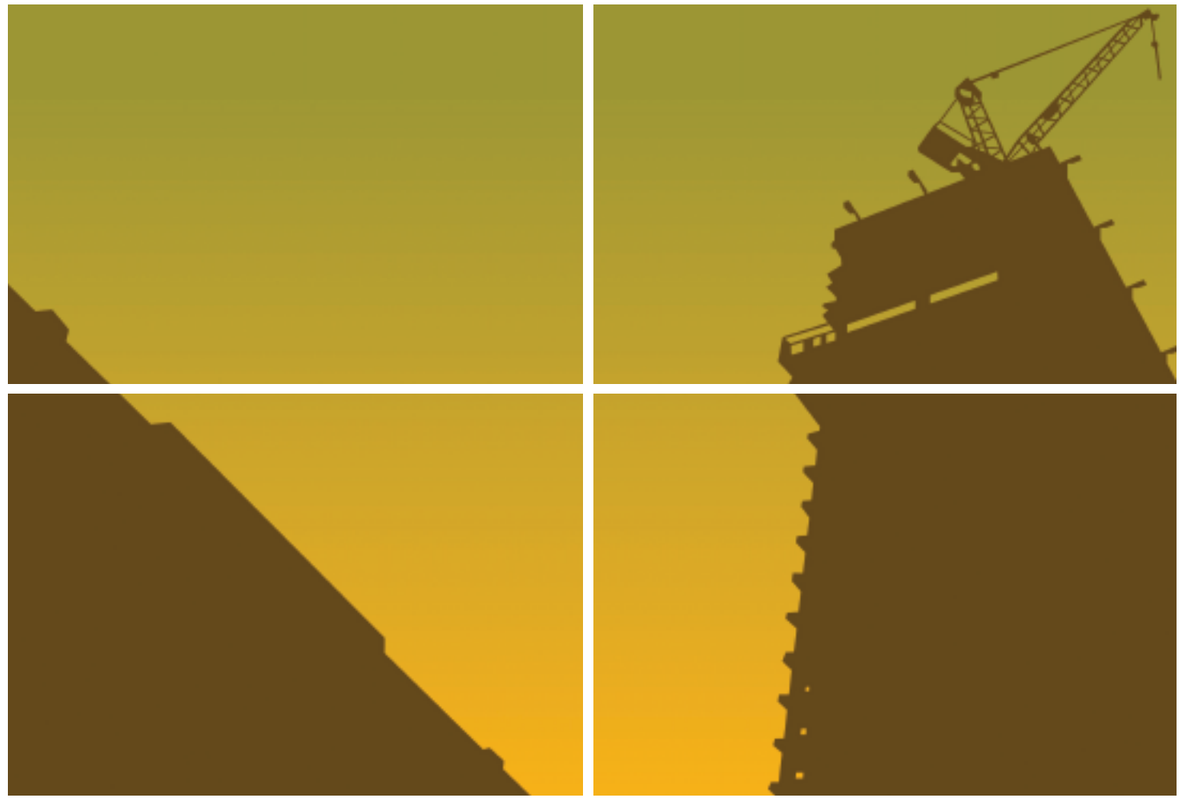
Geometric/Alignment Strategies: change grade; move alignment; widen one side of the highway as opposed to the other; offset location of centerline for short distances; and move ramps.

Drainage/Ditch/Culvert/Inlet/Curb Strategies: move storm drains; use alternative type inlets; use alternative storm drain (oval,

etc.); narrow the ditch widths; redesign ditches from flat bottom to "V" bottom; adjust flow lines; change ditch grade; use paved ditches; change from ditch cross section to curb and gutter; adjust manhole locations; extend storm pipe runs to avoid ditch cuts that impact utilities; place concrete slabs over utilities in ditch bottom; revise or eliminate portions of the drainage design; and use rip-rap on ditches.

Slope/Retaining Wall/Barrier Strategies: install barriers instead of moving poles; change backslope rate; add retaining walls to the design to reduce slope encroachment; remove slope rounding; change retaining wall types; and use impact attenuators on above ground appurtenances.

Structure/Bridge/Footing Strategies: use alternative foundations; move bridge ends; make structural box modifications; redesign structure footing; modification abutments to allow bridge occupancy; customize foundation designs; move bridge pilings; change bridge types; use protective casings; and pre-bore and batter pile driving to miss utilities.



CONCLUSION

Many utilities are unnecessarily relocated each year to accommodate highway construction. This is a costly, time consuming, wasteful activity, particularly in light of the fact that strategies are now available to alleviate the need to relocate many utilities.

The lack of adequate CCC between governmental transportation agencies and utility companies, and the inability to accurately and comprehensively identify the locations of underground utilities are measurable contributors to construction problems (cost overruns, delays, change orders, redesign costs, claims).

Good CCC between transportation departments and utility companies is essential throughout the development and construction of highway projects. It has been typical in the past to design projects without consideration of the utilities, and then to relocate conflicting utilities. Consultation with utilities early in the developmental stages may result in minor plan changes to avoid them, or even major plan changes that subsequently avoid costly, time-consuming, and unnecessary relocations.

SUE is a proven, cost-effective engineering process for accurately identifying the quality of subsurface utility information needed for highway plans, and for acquiring and managing that level of information during the development of a highway project. The efficient use of SUE information allows designers to avoid utility relocations and to certify on the plans that a certain level of accuracy and comprehensiveness has been provided.

Every effort should be made to design around as many utilities as possible. It is imperative to identify potential utility conflicts early in the development of highway projects and to incorporate the most efficient and cost-effective accommodation possible into the highway design.

Videos and manuals are available from the FHWA encouraging governmental transportation agencies to CCC early and often, to obtain and use SUE information in the development of highway projects, and to make every effort to avoid the need to relocate utilities. ❖

REFERENCES

[1] CCC: *Making the Effort Works*! U.S. Department of Transportation, Federal Highway Administration, and American Association of State Highway and Transportation Officials, 2002.

[2] Focus Magazine, *Avoiding Utility Delays*: *What Works*, U.S. Department of Transportation, Federal Highway Administration, June 2002.

[3] *Right of Way and Utilities Guidelines and Best Practices*, American Association of State Highway and Transportation Officials Highway Subcommittee on Right of Way and Utilities, January 21, 2000.

[4] Cost Savings on Highway Projects Utilizing Subsurface Utility Engineering, Publication No. FHWA-IF-00-014, Purdue University, 2000.

[5] Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, CI/ASCE 38-02, American Society of Civil Engineers, 2003.

[6] Georgia Engineer Magazine, Impact of New ASCE Utility Standard on Highway Agencies, April/May 2003.

[7] Avoiding Utility Relocations, U.S. Department of Transportation, Federal Highway Administration, July 2002.