The Civil Engineer Must Broaden His Outlook

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Two improvements in the civil engineering profession are needed: greater environmental sensitivity and greater awareness of managerial techniques.

Civil engineers can improve the projects they design, construct, and maintain by understanding that their actions have social, economic, and environmental effects as well as technical ones. Too often, engineers decry delays caused by those whose prime concern is the environment. Too often, engineers cause delays themselves by only paying lip service to environmental requirements rather than moving steadily forward in resolving all the issues (environmental, ethical, economic, and so forth) that revolve around any project.

How can such environmental sensitivity be nurtured? By improving the quality of the environmental education of civil engineers. By making sure this education includes field experience with professionals who have an environmental perspective rather than a purely engineering point of view.

Such an education would create real enthusiasm for public involvement and environmental concerns. The trend toward greater awareness of our ecology as a whole, of the "spaceship earth" concept, is probably irreversible. Few serious thinkers would want to reverse it.

An example of a transportation engineering project in which strong environmental sensibility was essential was the recently constructed I-95 through Philadelphia.

Noise abatement measures were in order to protect the quality of life for adjacent agencies. One section of the sound wall was constructed in an unusual manner (made of prefabricated, cruciform-shaped panels, reinforcing strips, fastenings, and joints) and is of technical interest.

It's of much wider interest that the Pennsylvania Department of Transportation held countless meetings with citizens' groups before everyone agreed on the best method of muffling the noise of the new Interstate. And a design decision to fill in an embankment in front of the sound wall created five new acres of usable land for parking and a neighborhood park. Finally, the aesthetic sensibilities of the neighborhood were respected by constructing a 1600-ft, multicolored mural on part of the sound wall, depicting the past, present, and future of that part of the city.

There is simply more to being a good civil engineer than narrow preoccupation with technical specifications. Accepting this breadth concept from the outset can help civil works to move forward more expeditiously. In this case, a small investment opened an expressway costing hundreds of millions and provided improved mobility for millions of people.

A second way of improving the design, construction, and maintenance of civil engineering projects is for engineers to have more influence in the political and corporate entities that employ them. Once again, this is a process of adding breadth to what is too often a shallow role.

How can this widening of horizons be accomplished? In part by ensuring that the civil engineer is capable of being a manager.

The distinction between the technical details of planning, designing, and constructing and the large managerial overview of operations is very real. Some argue that the best manager is an MBA who gains technical know-how on the job. The reverse is probably true. A civil engineer with some education in business administration or public administration often makes an ideal manager.

For too long, civil engineering students have not known the fundamentals of accounting and modern management techniques (i.e., management by objectives, matrix management). The top managerial spots have traditionally been filled by noncivil engineers, lawyers, business administration graduates, and others. That civil engineers have not been trained or trained themselves as managers is a loss to society as well as to the profession.

The effective civil engineer knows about computer analysis as applied to managerial problems. He is comfortable dealing with persons possessing a wide variety of managerial skills and is willing to graft these skills onto his own.

In short, the civil engineer must become more aware of where he fits in the larger context. He must be sensitive to the effect of his actions on the environment. He must know how his projects fit into the overall mission of the institution or organization he works for.

A more flexible, adaptable frame of mind must be fostered. If we do nothing differently, such a change of mind will come about—inevitably but gradually. Swift and aggressive action will shorten the time necessary to reeducate both students and current practitioners. Both the civil engineering profession and society as a whole would benefit.

Larson is Secretary, Pennsylvania Department of Transportation, and Chairman of the 1981 Executive Committee of the Transportation Research Board. He was one of four second-prize winners in an essay contest sponsored recently by Civil Engineering Magazine on the future of the profession. His essay, reprinted here with permission of the American Society of Civil Engineers, appeared in the March 1981 issue of Civil Engineering.