The Art and Science of Geotechnical Engineering

At the Dawn of the Twenty-First Century

A Volume Honoring

RALPH B. PECK

On Being a Geotechnical Engineer

I am very proud to be a graduate in geotechnical engineering from the University of Illinois. Dr. Peck taught me "the art of problem solving". This training has made a profound difference in my career.

Deal with One Problem at a Time

Whenever my desk is covered with stacks of paper and I have a long list of problems, all requiring my immediate attention, ***I appraise the situation using one of Dr. Peck's simplest but most useful tips: I can only deal with one problem at a time.*** When I remember this and begin with one deserving the highest priority and continue on through the list, my efficiency improves, and soon all the work is done.

Defining the Problem

In order to solve the problem, you must first be able to define what the problem is. Dr. Peck has told me many times that if you can't write the problem on one 8 1/2 by 11-inch sheet of paper, you really don't understand the situation, and to solve a problem you must understand it.

Avoiding Problems

I have made my greatest engineering contributions not by solving difficult problems but by avoiding them. I find the real challenge in avoiding problems is getting the people charged with the overall design to disclose the basis of their approach and then convincing them that they should alter their design. I consider Dale Carnegie's book ***How to Win Friends and Influence People*** as equally powerful as resource in avoiding problems as a good library of geotechnical books and papers.

Do not Create Incorrect Data

Do not create incorrect data. If after creating data you will have to explain why they are not valid, do not create them!

Too many times I have read geotechnical reports that expended much effort explaining that the soil strengths measured were much lower than actual in situ values, and then choosing significantly higher values for design. Two options are available. One would be to obtain better samples of the soil, measure the correct strengths and accept the data. Another would be to pick the design values on the basis of experience and not do any testing.

Identifying the Appropriate Problems to Solve

What I have enjoyed most about geotechnical engineering is being in the field, roaming around the site with drawings of the conceptual designs in hand and with my mind open to all possibilities, and working to identify whatever might appear in my search. This is what I categorise as identifying the appropriate problems that need to be solved.

The tools and skills that I need to identify and solve geotechnical problems included: a thorough knowledge of the geology and engineering properties of soil and rock; an understancding of the "usual" mechanisms that can cause failure of the design; and reportoire of design treatments suited to the combination of my design and the particular geologic conditions of the specific site.

Do Not Ask a Question If You Cannot Accept All Possible Responses

In our world today, engineering data are presented to governmental agencies. Our reports are evaluated in the press, reported by the media, and are open to the review of special interest groups.

Engineering problems must be solved with the designs that are both politically and technically acceptable. If we ask questions in our communications with a special interest group or govenment agency and receive an unfavorable response, we may force that group to adopt a position that is subsequently inflexible.

Before an engineering report is created, we need to anticipate all possible implications. We should proceed only when a decision is made that reporting is the best course of action.

Comparing Alternate Designs

Every engineer is familiar with the process of comparing costs of alternate designs. This is an essential practice in the selection of the least-cost alternative. Cost should not be only factor in selecting among alternatives. Environmental compatibility, political acceptability, and many other factors are very important. As much as possible, the mitigations necessary to make all alternatives equally acceptable should be refelected in the design and in the cost.

Respect Old Civil Engineering Structures

Perhaps the most important lesson I have learned in my career is a respect for old civil engineering structures and the designs on which they are based.

Communications

Dale Carnegie has observed that nontechnical people spend 95 opercent of their time dealing with people and 5 percent of their time on technical matters. Technical people on the other hand spend only 15 percent of their time on technical matters and a surprising 85 percent working directly with people.

Most engineering failures occur due to a breakdown in communications rather than lack of available technical knowledge. Breakdown result when the message sent is not understood, and there is insufficient feedbdack to ensure that the message has been correctly received.

One of Dr. Pecks' greatest attributes is his power to communicate effectively orally and in writing. This ability and his patience for painstaking detail caused Karl Terzaghi to choose him to coauthor *Soil Mechanics in Engineering Practice.*

Often Dr. Peck's colleagues have chosen him as the scribe on consulting boards for preparing their reports. ***They have selected him for his clarity in thinking and reporting. In all of his writing there is a profound logic.*** As scribe for many boards, he has mediated their differences and found the worlds of compromise without comprimising technical need. He has politically sold the products of the boards' joint deliberations.

There is a tremendous power in being able to speak for others. However, Dr. Peck has never abused that power. He has conveyed the essence of the boards' positions as accurately as he is able, and participants trust his reporting skills.

Closing Thought

Ralph Peck is a man whom I have always proudly attempted to emulate. Thank you, Dr. Peck, for the privilege of being associated with you.