NEWS
CIRCULAR
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Elmo Dibiagio: Exceptional Instrumentalist my Boss at NGI with Ove Eide and Dr. Banks at AIT

This News Circular deals with Examples of One Page Instrumentations as compiled by Dr Elmo Dibiagio. Some background informations are given how Bala ran into NGI, Elmo, Bjerrum et al.

Elmo at AIT in 1977: Photo Right with Ove Eide and Dr. Banks

My association with NGI (Bala):

Laurits Bjerrum more than an engineer

It was in 1967, Bjerrum came to UK to give the seventh Rankine Lecture at the Institution of Civil Engineers, London. Ken Roscoe invited him to Cambridge. As usual Roscoe was touring the Labs with Bjerrum and came to the location where I was doing the triaxial tests. As it was a year or so before I finish my thesis, I was looking around for some jobs in Sri Lanka and for some reason, I could not find a suitable one. Ken Roscoe was a bit annoyed by this as he wrote letter of recommendations on my behalf and once jokingly said, you are the first guy who never got a job even after my recommendations. Then he asked me, will you go to Oslo, if I recommend you to Bjerrum; he indeed did.

It was perhaps a headache for NGI to accommodate me as NGI was fully cramped with post-Doctorate fellows--- Bjerrum was very kind-hearted in having me at NGI. At NGI, I worked with Elmo, the most modest but also the most genius instrumentalist. Bjerrum was more than an Engineer, Elmo was more than an Instrumentalist as well to have taken the burden to have me in his group; I was perhaps the most illiterate one in that group as far as electronics and instrumentation goes.

In the year I spent at NGI, I always saw Bjerrum walking rather relaxed, full of enthusiasm and a most confident and generous appearance. The Office door was always opened, except on a few occasions. A man with innovative vision, Bjerrum saw how things in Geotechnics will develop a decade or two more than the best predictions of the Hindu and Buddhist Astrologers. Soil Mechanics to Engineering Geology to Rock Mechanics to Offshore to Snow Mechanics--- you name it what the future held in Geotechnics, for decades after his untimely death. Andrew Schofield always says “Young Bjerrum”

He knows how to pick and mould the talents (or to develop and mature the talents)--- Eide, the NGI Kissinger to the East: Bjorn Kjaernsli who looked more like a pirate than a Dam (I mean, earth and rock fill dams) Engineer; Elmo--- the computerized instrumentalist. A perfect “Gang of Four” and the touchable –untouchables. Also the Golden Triangle--- Oslo-London-Illinois or more correctly the Golden Quadrangle adding Boston. Prof. Ralph Peck, the living legend in Geotechnical Civil Engineering describes, Bjerrum as a superb selector and organizer of talents; a great showman with a keen sense of the dramatic---typically Bjerrum not only played the game- he made the rules and sparked the competition; he was a fighter for progress and indeed irrepressible

The one page compilations are attached

These case histories were selected from the files of the Norwegian Geotechnical Institute (NGI) to illustrate the importance and diversity of field instrumentation projects. The examples include retaining structures, braced excavations, slurry trench excavations, large scale tests, dams, glaciers, avalanches and offshore structures. For each case cited the principal scientific, practical, and economic benefits of the monitoring program are pointed out. They are arranged chronologically and reflect, to a degree, the evolution in applications, technology and complexity that has occurred in geotechnical instrumentation projects in the past 60 years at NGI.

The 24 case history examples can be divided into 4 main categories, namely,

- *Construction control (5)*
- *Large scale or full scale tests (10)*
- *Structural monitoring/Performance monitoring (5)*
- *Research to advance the state-of-the-art (4)*

The numbers in parentheses indicate how many case histories belong to each category. For each example, a brief description is given of the relevant design or construction problems for each project, and the function of the instrumentation in relation to these problems is pointed out. The types of measurements made are given, and an attempt is made to show how instrumentation was used to solve or provide a better understanding of the problems.

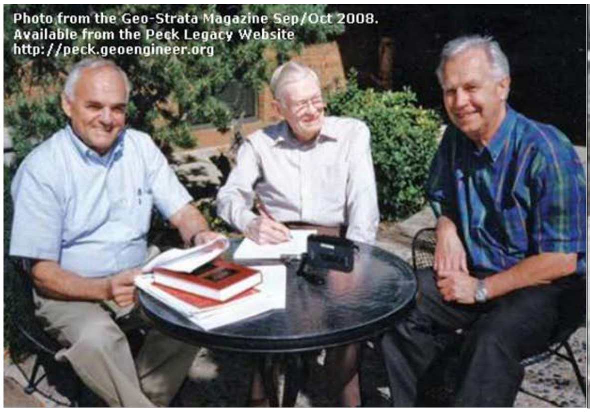
The manner in which the case histories are presented can be attributed to Ralph B. Peck who was a true master in the art of communication. He was himself a great communicator. His communication style was always clear-cut, concise and to the point. The need for simplicity in communication is a philosophy that he passed on to, and demanded of, his students. For example, in his course on Case Histories, CE 484, at the University of Illinois, Professor Peck required that the summary reports prepared by his students not be more than one page long. He justified this requirement by saying, “If you cannot reduce a difficult engineering problem to just one sheet of 8-1/2 x 11-inch paper, you will probably never understand it”! Since the author of this paper was one of his students, the examples printed in this paper will be presented in exactly that form: One-page Summaries.

Each case history was intentionally limited to Ralph B. Peck’s One-page Summary. It was no *easier for the author to do that now than when he was one of Peck's students at University of Illinois! Some of the case studies are so extensive and complicated that even Professor Peck probably would have had trouble presenting them as One-page Summaries! Obviously, the summaries do not contain all the details that are important to instrumentation projects. However, complementary information can be found in the references provided. The case histories are listed in the table below.*

LIST OF INSTRUMENTATION CASE HISTORIES

Quotations from Dibiagio & Flaate

Below is a number of quotes from Dr. Peck's lectures and publications. The majority are from the publication by Elmo DiBiagio &, Kaare Flaate (2000) as well as feedback from our website visitors or other sources



On the Importance of Engineering

Our personal, individual attitudes toward engineering and toward society have potential impact on our country's future. However small that impact, each of us should try to make it for good. Engineering is indeed a noble sport, and the legacy of good engineers is a better physical world for those who follow them. Hence, we need never fear that our profession will become routine or dull. If it should, we can rest assured that we would not be practicing in properly.

On Communication

If it's important, say why! If you can't reduce a difficult engineering problem to just one 8 1/2 x 11-inch sheet of paper, you will probably never understand it. (Advise to his students).

Unhappily, far too much we write is not worth reading. The prestige presumed to be associated with authorship results in great pressure to publish. We should write with more discrimination.

On Education

Perhaps engineers trained in geology have an advantage. They are more likely to accept mother nature as she exists, rather than as created in the mind of the engineer. Sent by Scott A. Barnhill, P.E.

Our practice falls short of our knowledge.

It would be a serious mistake to permit the subject of soil mechanics to be taught by individuals who do not possess an adequate background of field experience. Why should there be such a discrepancy between our knowledge and our general practice? To some extent, I fear, because of too much specialization and too little appreciation of the interrelation of the various branches of civil engineering. It is the opinion of the writer that the proper growth of soil mechanics has been seriously misdirected by the injection of an academic conception into the subject.

Unfortunately, with the present trend many students are led to believe that theory and laboratory testing constitute the whole of soil mechanics. We should not neglect the aspects for which we have no theory while we over emphasize the significance of those for which we do.

On Research

The most fruitful research grows out of practical problems. No theory can be considered satisfactory until it has been adequately checked by actual observations. Professors and their protégés are often the worst offenders in devotion to research of minor consequence. The academic climate ncourages finding a subject for investigation that can be pursued at the desk or in the laboratory until all aspects have been exhausted. The subject is likely to be chosen more for convenience than for significance. I see no reason to be ashamed of attempting to solve problems of importance to practitioners and I am convinced that the serious investigation of questions arising out of these problems will continue to promote studies of major consequence. In soil mechanics, no evidence can be considered reasonably adequate until there is sufficient field experience to determine whether the phenomena observed in the laboratory are indeed the same as those that operate in the field.

In short, engineering science and engineering practice are not identical. Advances in science may temporarily appear to run counter to good practice. When this occurs, the implications should be evaluated carefully, but it should by no means be assumed that the latest scientific advancement is always in the right direction. If something is discovered that does not agree with the hypothesis, rejoice! You can than really learn something new, You are on your way to an understanding of the problem.

Translating the findings of our research into simple concepts and procedures for the guidance of the practicing engineer is, in my opinion, a duty and worthy activity of our profession.

On Design

Simple calculations based on a range of variables are better than elaborate ones based on limited input. We should be on guard not to ascribe to elaborate analytical routines a reliability they do not possess. Construction deserves more attention in design. Our permanent structures are too often designed as if they come into existence without the necessity for being constructed. Those who try to force Nature into the pattern by simplifying assumptions of theory will be courting disaster.

Designers and regulatory bodies tend to place increasingly reliance on analytical procedures of growing complexity and to discount judgment as a nonquantitive, undependable contributor to design. The most successful practitioners of the art (-of engineering-) will maintain a healthy respect for the ability of Nature to produce surprises. Sophisticated calculation is too often substituted for painstaking subsurface investigation. The ease or the fascination of carrying out calculations taking into account complex loadings, geometrics, and soil conditions leads many of us to believe that realistic results will somehow emerge even if vital subsurface characteristics are undetected, ignored or oversimplified.

On Construction

A man who has been trained only in theory and in laboratory testing may be incapable of recognizing the significant problems in the field, and even if he recognizes them, may have no idea on how to cope with them. I doubt if guidelines, regulations, or even the best of specifications can take the place of personal interaction between designers and field forces at this stage. In my view, nobody can be a good designer, a good researcher, a leader in the civil engineering profession unless he understands the methods and the problems of the builder.

Reliance of precedent as a basis for extrapolation may certainly be dangerous, because significant differences among the precedents may not be appreciated.

On Observation and Instrumentation

Instrumentation is no substitute for adequate design. What is often forgotten is that the observational method is an adjunct to design, not a substitute for it. Indeed, in my judgment, the simplest measurements are always the best because they have the least possibility for error and the greatest likelihood of survival. An instrument too often overlooked in our technical world is a human eye connected to the brain of an intelligent human being. We need to carry out a vast amount of observational work, but what we do should be done for a purpose and done well. Most of the shortcomings, in the writer's opinion, originate in the attitudes and actions of the persons most intimately concerned with the creation and completion of the project: the owner, designer, constructor and technical consultant. The observational method, surely one of the most powerful weapons in our arsenal, is becoming discredited by misuse. Too often it is invoked by name but not by deed.

Unhappily, there are far too many instances in which poor design is disguised as the state of the art merely by characterizing it as an application of the observational method.

Instrumentation, vital for obtaining quantitative answers to significant questions, is too often misused, especially in earth and rockfill dams.

There is a danger that instrumentation may be discredited because of indiscriminate use.

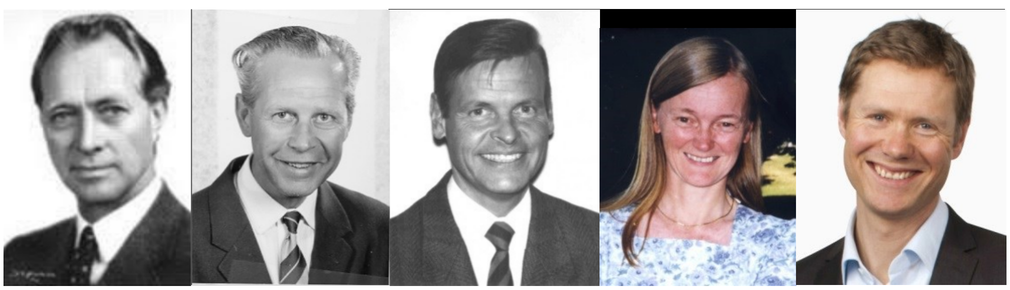
On Engineering Judgment

The successful practice of engineering requires a high degree of engineering judgment. There is actually such a thing as engineering judgment and it is indispensable to the successful practice of engineering. Yet a sense of proportion is one of the main facets of engineering judgment. Without it, an engineer cannot test the results of a calculation against reasonableness. Unreasonable and unrealistic criteria grow out of lack of judgment, a lack of perspective as to the relative importance of things. Unfortunately, such criteria are not uncommon. A good engineer has a feel for the appropriateness of his solution from the narrowest technical details to the broadest concepts of planning. His judgment tells him if each step is sound and if the whole enterprise is sound. Theory and calculation are not substitute for judgment, but are the basis for sounder judgment.

Your real security will lie in your ability as engineers, which in turn will depend on the quality of your judgment. Employment selected for experience, and the self-discipline of private study and cultivation of your powers of observation, must necessarily improve your judgment. Finally, the writer would suggest that the consultant should be wary of making non-technical judgments. He is not a lawyer. He is often not called into a controversy until the battle lines are drawn. If he ventures out of his technical specialty, he may become unwillingly a pawn in the struggle. As long as the myth persists that only what can be calculated constitutes engineering, engineers will lack incentive or opportunity to apply the best judgment to the crucial problems that cannot be solved by calculation.

Where has all the judgment gone? It has gone where the rewards of professional recognition and advancement are greatest - to the design office where the sheer beauty of analysis is often separated from reality. It has gone to the research institutions, into the fascinating effort to idealize the properties of real materials for purpose of analysis and into the solution of intricate problems of stress distribution and deformation of idealized materials. The incentive to make a professional reputation leads the best people in these directions. This small selection of quotations listed above does not give full justice to neither the engineer, nor the professor nor the consultant that Ralph is. Thus, we would like to add to the list and additional few words of wisdom, written by another engineer, that do indeed portray the philosophy and image of Dr. Peck so very well.

History of NGI Directors:



Bjerrum 1950: Laurits Bjerrum from Denmark is headhunted from ETH in Switzerland, where he was head of the soil mechanics laboratory, and becomes the director of what is to become NGI.

1973: Laurits Bjerrum dies - NGI's chief engineer **Ove Eide** becomes the new temporary director.

1974: Kaare Høeg becomes the new managing director at NGI. Prior to the appointment he was a professor at Stanford University, CA, USA.

1991: Suzanne Lacasse takes over the position as managing director at NGI after Kaare Høeg.

2012: Lars Andresen takes over the position as Managing Director at NGI after Suzanne Lacasse.