

AFTERNOON SESSION
Thursday, March 19, 1987

CONSTRUCTION MANAGEMENT AND ENGINEERING WORK SESSION

Moderator: GAREY WHITE, Associate Professor, UK Civil Engineering Department, received his BSCE degree from UK in 1951. He is a registered professional engineer in the states of Kentucky and Illinois and a registered land surveyor in Kentucky. Mr. White, a private construction consultant, serves on the Construction Management Advisory Committee for the UK College of Engineering.



CE305, Introduction to Construction and Engineering, is now being taught for the sixth time in six semesters at the University of Kentucky. Beginning this school year, this is a required course for all Civil Engineering graduates. If they are taking structures or have a transportation water related field major in Civil Engineering, they still must take this one class. The object of this class is to introduce them to the construction process and to the different types of construction. Some students may take more courses in construction management. For those students who go into design, or work for an owner, we want them to thoroughly get involved in how contractors are organized, how they work, and how they relate to the documents legally and practically, and how they price their work. It's an introduction.

The next course is construction methodology, which was not offered when I went through school, because most of us had some hands-on experience with construction materials. It's an extension of materials engineering. It's an extension of how to handle concrete, how to detail fabrications in a structural field. We go through all the basic engineering materials in a how-to manner. We get involved with some quantification, how we price, and we go through the pricing of worksheets, and recapping. They don't give us enough time in civil engineering to cover these topics. The project planning and scheduling is taking the detail estimates and putting them to work. We introduce them to the planning tools of CPM's, and so forth. We set up a process for procurement, for executing, and for monitoring the cost.

We continue next with project administration. Here, we get more into keeping the logs, and keeping them in compliance with specification plus of project planning and scheduling -- of getting ready to do the work. The project administration is what I call taking care of the work. Thus, we have these three courses: Construction Estimating, Project Planning and Scheduling, and Project Administration, which last year were covered in one course. This fall we will be splitting these three subjects into two courses. A year from this fall we expect to have the three courses.

Finally, in our plans, which are subject to change when we bring a new department head on board, and also to current trends in construction, we will for the first time split heavy highway construction into two courses. I call it equipment management. It might cover some coring, blasting, plus equipment management, or it may evolve

into two courses. We don't know at this time. Basically it would be a course directed toward the heavy highway contract for the people expected to fall into heavy highway construction work. Anybody who is going to administer building construction is going to need to get caught up on how to schedule and monitor that work.

Then finally, to cap it off, we're into the general area of what is a big subject today. That subject is the legal concerns. I am talking claim prevention, because the best way to win a claim is to prevent a claim. This is being integrated in some of these other subjects. This will not replace the construction law courses. We still will have them.

Students must have some accounting, and another course out of the English Department in technical communications or in technical writing or speech. Then, they'll still have their basic major in Civil Engineering in this department.

I think that the scholarship program for the Highway Department is one of the greatest things that has happened to the University of Kentucky's Civil Engineering Department. Those who went out into the industry have contributed greatly to the economy. On the subject of graduate work, they say the first four courses are designed basically for undergraduates.

In Civil Engineering you really can't expect anybody to complete a degree in four years. I don't know if any of the four year graduates are left or not. They tell me it's a 4.8 year average in Civil Engineering. The 4.8 year student might get into the estimating and project planning or scheduling course, but basically we've got to direct this course towards a Masters in Civil Engineering. It's the only way we can get it into the program. It's the only place we can do a decent job. We also have got to direct it towards an extension service for the industry.

We are not yet into a full blown management program. The mature program will have to incorporate some of the skills of accounting and general business management, some skills of people motivation, and some psychology. I've said this many many times. We all use a technical training background to get our toe hold in an industry, or into a job, or into a career. We launch our career with a technical education of some kind.

After our careers are launched, it doesn't take long to realize that technical training becomes second, behind our ability to motivate and lead and manage people. We need skills in speaking, writing, motivating people, and selling. For Civil Engineer majors, I draw a sketch up for all of the students when they are talking about careers. I like to have one session every semester, and let them ask questions about career possibilities. Being out of industry, that's one thing that I can contribute in addition to the professor's descriptive information on what is expected of them in the industry.

I draw a half circle spectrum. Over in the left side you start as an individual contributor as an engineer. An individual contributor is always calculating the drawing board, and he is designing something. He is doing it alone. He is taking a problem and he's trying to solve that problem. If you take that arrow and plop it over to the zenith of most peoples' careers, you find that supervising has seldom anything to do with their engineering abilities.

Engineers require a little more on the personal contributor side and a little more experience toward the administrator's side. We want to balance out our curriculum. The Advisory Committee must try to provide these people with the things they will need later in life to become more of an administrator and less of an individual solving one problem at a time. For the welfare of civil engineering students, universities need to establish undergraduate courses that will provide them help no matter what role they play. We must provide the best qualified teaching staff which we can collect. That's tough in the Construction Management field.

Another way of managing is letting a professional management contract, but we're talking about managers of construction, or managers of engineered projects. Teachers are unfortunately not that readily available. We've gotten some from the Corps of Engineers who've acquired PhDs and are now heading some of the programs. Robert McDowell who graduated in 1935, Founder of RCM Engineering, three years ago left funds that will mature in 1989 to \$800,000, to fund a chair in construction management. That's when someone gave me a call and asked if we could get an advisory group together. We're building on that because there was no program here to chair. The immediate goal is to upgrade the three courses started, the courses coming this fall, and then to add the four or five graduate level courses. We will provide interaction of the other fields: accounting, economics, law, English, math, and science.

Soon the University will be producing cassettes and the various TV programs for students living outside the Lexington area, enabling them to take engineering courses. It is a valid way of teaching, and with the graphics up to the standards that we have them now, we can put computerized graphics up and you can read them on the screen. We also have dialogue with the University of Louisville to set up cooperative classes there. We don't expect to confine this to the campus of the University of Kentucky.

We also need to enhance the image and the ethical standards of the industry. We need to improve our image and we need to get rid of that song, "Mammas, don't let your babies grow up to be contractors or engineers." I think we can come up with a program that will enhance the image of the University of Kentucky.

Finally, we have got to enhance the competitiveness of USA contractors, and our international balance of trade. Two of the most important exports that we've had since World War II are construction and engineering. We've sent engineers abroad for dams, steel mills, power plants, aluminum plants, ship building plants, etc. Presently, we're not dominating like we did, but we're still the leading exporter of engineering and construction services. When it's engineered in the USA, they buy a lot of products from USA, helping tremendously in our balance of trade. "Engineer's News Record" a few months ago had a synopsis on international trade explaining that the USA had in the past overwhelmed the second, the third, and the fourth international competitions all summed together. In what we're exporting now, we're just barely leading. Nations like Korea, Italy, and Japan are moving in. To achieve these things, I think we need to concentrate on our master's program. With the master's program, we're going to have to get into some research. I'm not a believer in concentrating on research first. I think the student is first. However, to serve the student, our faculty has to be involved in looking ahead on what is coming in the industry. I think in the next ten years we'll find more changes than in the last thirty-six years, and this last ten years of that thirty-six years produced an awful lot of changes. We've got new materials. We've got new equipment. A good construction library is needed to provide reference materials for civil engineering students. I'm attempting to get some space and some contributions from the contractors on everything from forms to different kinds of systems in use. This is very important to our basic goals. We are also going to get more computer time into the classroom. Instructions for some hands-on critical path methods and also hands-on with actually setting up and running model coast ports will be provided for civil engineering students.

Panelist: Paul Faulkner, President
Highway Structures, Inc.

I was president of the ATC of Kentucky, and Garey White called me one day and said, "I think we have a tremendous need for a curriculum in Construction Management, particularly at the University of Kentucky, and any of the other schools that we think can teach that course. I wish you would appoint a committee to study this problem, and see if we can't come up with something." I formed the Committee, and appointed Garey as Chairman.

When talking about Construction Management, I want to reverse the words, and call it Management of Construction. I would like to discuss people management. I hope that in this curriculum we'll get into it somehow. I couldn't teach it, and I don't know who can. However, we need to have management of people somehow, because, after all, our industry is made up of people. People do things. The thing I want to mention is the word partner. I want to mention it in relation to people management. The word partner is very unusual with our industry. Most of the construction companies that you find are corporations. They don't have partners today. I refer to my people as partners. I call the people partners and really feel that way about them. This is something you can teach -- that people have to be aware of people, and be able to motivate them, and get them to work.

When we had one of the original discussions about this curriculum, I said, "We need a course in Common Sense Engineering." I would like to see the graduates come out with their technical abilities and still have common sense for solving all of the problems that we have. I've got to say a word about profit for all of those within the contracting business. I don't think that's the number one word that motivates contractors. I think the contractor likes to do his job. I think the people we have and the people who work for contractors like to do what they do. I hope that the engineering education that they are getting is a little bit more personal than just a technical education. Construction is a people business which develops from this.

Panelist: R.R. Dawson, Jr. Partner
R.R. Dawson Bridge Company

Our company is Kentucky-based, however, we are working in Kentucky, West Virginia, Tennessee, South Carolina, Georgia, and Alabama. My job as partner in that company is to put together management systems that work. I'm in the marketing and operations ends of the Dawson Bridge Company. I primarily cover the states of Georgia and Alabama, where most of our work is concentrated at this time. We do projects ranging from a \$100,000 up to a \$150 million urban complex job in Atlanta. We're always out there in the market trying to see what we can put into our team, into our management system, that will make it work more efficiently.

As we move from rural jobs to downtown urban rebuild-type things, we find that our engineering emphasis has really increased. We have a staff of about eight to twelve engineers in the Atlanta Project. Two engineers take care of CPM type of work. There are two hundred and eighty people on the payroll down there. It amazed us that we've taken twice as many people with engineering type backgrounds than we thought we would need.

What we're looking for in engineering students is good business management skills. We get most of our people from the state highway departments. The highway departments take them through school and give them jobs in the summer. When they come out of school they work for the highway departments or go into private industry.

A number of our people come from the University of Kentucky. They already know a little bit about what they're going to be working on and the kind of people that they are going to be working with. This helps give us some continuity. What we're mainly looking for are team concepts and the building of team concepts. We're looking for maturity in engineering students. They don't come straight out of school with maturity, but develop maturity with experience. We have in the company now older people who are starting to retire. These people grew up as carpenters and crane operators. They took over operations and they became managers. They weren't trained in management. They just evolved into managers.

We are having to hire project engineers, because today you can't go out there with the skills acquired from the past and build these complex projects. We're looking for the engineering student who is a well-rounded student. He's going to get into management within the first five years after he goes to work for us. He's going to be working with the management. The more well-rounded and the more logical he is in his approach, the better manager he will be. He has to have the engineering skills and be able to deal with logic if he's going to make a good member of our team.

I am interested in the program, and hearing some more about the program. I'm here to give some input on what we're looking for out there in the real world. We're looking for the type of people that we think will help us. The people we have hired have been more successful than others due to their training background.

Panelist: Robert A. Walsburger
Assistant State Highway Engineer for Construction
Kentucky Transportation Cabinet

I note the title in the program, Construction Management and Engineering. When I first saw the program, it came out as just Construction Management. I'm glad it does include the word Engineering. Construction Management and Engineering is going to be directed toward not only engineers but towards the contracting segment, and also the students who are going towards the public sector.

Today industries must have changes in at least their highway contracting procedures. We have seen more of the past type of operations change to a type of operation that has to be high technology. We think in the department that these very sophisticated operations involve a lot more engineering than in the past. The highway industry in the past had the type of operation in which they knew how to do the job. They knew the physical parts to do, and it was relatively simple. They had good operators; they had skillful craftsmen. They would go in there and work the job out. That was management back when things were not so complicated.

Now we have to have people who are not only geared in engineering but who are geared with coping, with communicating the processes. They're going to have to be able to train people. They're also going to have to be able to recruit people. I was a design engineer early in my career. If you could work a set of plans, and if the boss thought that you could work a set of plans, then the boss would put you in charge. Well, I knew how to work a set of plans, but I sure didn't know how to cope with people. Back in my Civil Engineering days at the University, I didn't study many courses within communications. Today, students study interpersonal relations, claim dealing, and legal procedures, etc. I'm glad to see this coming up. There is an old saying in the Highway Department: "We're the engineers; we design the projects, whether it's bridges or highways, and anybody in construction can take those plans and build them."

I don't share that opinion. I don't believe that. I think that that fellow out there on the job, whether it be in the public sector or in the private sector, has to know

something about engineering to get the job done. That's why I'm glad to see in the contractors area that we have people who are going to be trained to actually be construction engineers.

I ask the University to exercise some caution to include people who are likely to have their careers go into the public sector. As well as the private sector. I'd like for the curriculum to be presented and be taught from the standpoint of looking through two windows. One window is a construction engineer who is going to be working for an owner or an agency, and the other is an engineer who is going to be working for a contractor.

Bringing them together to even make them interchangeable is a challenging goal. To cite you an example of what I'm talking about, I think that some of our best employees in the department have contracting experience. I have been to people who have worked for a contractor and are now working for the state. We have another situation. Another man spent fifteen years with the Department of Highways, and he is now one of the most successful contractors up in the Louisville area. He truly can find a better way to do a job. I think a lot of that has to do with the fact that he worked for both entities. If we can develop that in school, I'm all for this curriculum.

I only want to make one other comment, and that is that I strongly endorse this curriculum of Construction Management and Engineering. I think we can use these individuals immediately upon their graduation from college, with the first degree and also with the graduate degree. There's one thing both of them have in common, and that is construction. They want to be construction engineers.