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THE YOUNG CIVIL ENGINEER

By O. N. ESSEX, '29

EDITOR'S NOTE.—Mr. Essex is now with the Pennsylvania Railroad.

A small minority of the people, except the engineers themselves, realize just what an engineer is, what he does, and what is expected of him. And because of the many branches which the civil may choose to follow, he is the most obscure member of the engineering profession.

Everybody knows, or can easily figure out, what an electrical engineer does. You can tell from his title that he deals with electricity in all its applications and forms; you can tell from a mechanical engineer's title that he deals with machinery in all its forms; you can tell from a chemical engineer's title that he is interested in chemistry—in fact, you can tell what any branch of the engineering profession deals with from its name, except the civil.

If somebody should say that Mr. Smith, for example, was a very good electrical engineer, anybody who heard that statement would think back to see if he could remember whether or not this Mr. Smith knew anything about electricity. If he could remember any of Mr. Smith's work in the electrical line he would agree very promptly.

Now suppose we shift the scene, or rather the conversation, and have our mythical talker say that a certain Mr. Jones is a good civil engineer. Just about nine-tenths of the audience will then have blank looks and, if pinned down for their opinion, will probably look pleasant and mumble something that might, by a little effort, be interpreted as favorable or unfavorable to Mr. Jones. All the time this fellow may be wondering if Mr. Jones has taken up engineering to civilize people, and, if Mr. Jones did, just how does he go about it? For all he knows, Mr. Jones may be a lion-tamer in a circus, trying to civilize animals.

That guess of civilizing people would not be a bad one. In fact, that definition may be used as well as any other for civil engineering since it means almost the same thing as one of the accepted definitions, which is: "A civil engineer is one who directs the forces and materials of nature to the uses and conveniences of mankind." That definition, however, is too general to satisfy the engineers, who claim that according to it almost everybody is included in civil engineering. I personally asked ten men to give me a good technical definition of a civil engineer. All of these ten men were civil engineers. Except for quoting the definition which I have already given, not one out of the ten was able to do it. Since I could not get a good definition in that way, I did the best I could by copying one of which George Fitch is the author. It reads: "A civil engineer is a quiet man with a thick coat of sunburn, who spends his time revising the climate, editing the landscapes, and training up rivers into lives of usefulness."

In order to do this, the civil engineer does not tear the earth wide open with a hundred-ton spade or perform other feats of strength. He is usually a man of ordinary size with hands not strong enough to push around even a small creek, let

alone a river. A civil engineer does not rely on muscle. When he desires to move a mountain or wipe out a few hundred square miles of desert with a dam, he takes his logarithm book and retires to a spot where he fills an acre of brown paper full of figures. Logarithms and a square jaw working harmoniously can do almost anything."

All that, of course, is very flattering to the civils, but at the same time it gives you some idea as to the importance of the civil engineer in the progress of civilization. A much more intimate knowledge can be gained by studying, in a brief fashion, the different branches of work into which the civil engineer may enter. The following is one manner of making the divisions of the civil field. In all, I have noted eight different branches, as follows:

1. Structural engineer—Bridges, viaducts, tall buildings, dams, locks, docks, etc.
2. Railway engineer—Location, construction, terminals, and maintenance
3. Sanitary engineer—Sewer systems, treatment plants, waste disposal
4. Highway engineer—Highways, pavements, boulevards, parkways, etc.
5. Municipal engineer—City management, city planning, water works, subways, etc.
6. Hydraulic engineer—Water supply, water power, drainage, and irrigation
7. River and Harbor engineer—Flood control, channel improvement, canals, and sea terminals
8. Topographic engineer—Geodetic control, airplane topography, precise maps, etc.

Is it any wonder that the young engineer, just out of school and facing all that, wears a worried air and a long face? But don't get excited by that list, thinking that one man does all of them, for that is not the case. The general rule is for the young engineer to pick out the branch which he wishes to follow.

Now I will take up the preparation and the training which a man must have in order to become a member of the engineering profession. Starting from the time when a boy realizes that civil engineering is the field that he wishes to enter (and probably no young fellow knows why he picked it except that he might be fulfilling his boyhood ambition to become an engineer, preferably a locomotive engineer) I will take you through his college life and as far past his graduation as I am qualified to do.

When a young man starts in college studying civil engineering he has, most of the time, only a very faint knowledge of what his final work is going to be. I suppose from now on most of the young engineers will be aiming for the presidency of the United States. But as he goes on through his college course he very naturally gains an idea of what his work is to be and just how broad a field he is working in. My own experience in acquiring this knowledge led me, at one time, to wonder if the civil engineer had to work calculus problems and work out experiments in physics and chemistry for a living. I did not think so very highly of the civil game during this period.

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that I am out. This, of course, may not be a fair conclusion to draw for all students and young graduates, but I believe for the most part it will hold true.

But after the fundamental courses of his first two years, when he finally gets to the meaty part of the subject—then is the time when the young civil acquires his knowledge of his future work. It is during his last two years that he gets his training in the different branches of civil engineering which I have mentioned before. During the time when the young civil is studying structural or highway or sanitary or any of the other branches, he will take an interest in one or more of them while the other courses are, to him, just a necessary nuisance to be taken so that he may get his degree. Nine times out of ten, or perhaps in even a higher percentage of cases than that, the young civil will take for his life's work the branch or branches in which he is most interested.

I say this because it is exactly what I did when I was in school and what I am trying to do now



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