

architects who never saw the site, all details had to be shown. Observations had to be taken on Polaris to tie in the boundary lines.

Although at times we hear some adverse comment on public officials doing private work, so long as the salary of the county surveyor remains at the present level, especially in counties with a population class such as Ripley County, I believe everyone of us is entitled to as much private work as he can get, so long as it does not interfere with our official duties as county surveyors or engineers.

ENGINEERING SERVICES TO TOWNS, CITIES, AND INDIVIDUALS

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As county engineers, your first allegiance is to the people of your county, and you can do much to raise the standards of the engineering profession by being the most obliging and serviceable engineer ever to hold that office. You can make and keep up-to-date maps of your county, including drainage maps, property maps, and soil maps, if they are available. You can have up-to-date maps of all the towns in your county, and you can set up standards for your construction work which are at your finger tips when needed.

When you are retained by a town or city, do not let it embark upon a project which it cannot afford. Do a little investigating yourself, and see if it is overshooting its mark when it tells you what it wants done. If it wants a sewage disposal plant, and all it needs for a few years to come is an Imhoff tank, don't design an activated sludge plant. If it wants a street improved, and the traffic does not warrant a high-type pavement, don't design one, but construct the very best pavement for the money that will carry the traffic put upon it. If you are designing a structure, give the best that will fulfill the purpose intended. You may say, "If the city wants to spend the money, why not let it spend it?" Well and good, if that is really the case; but if a lot of opposition to the project develops after the job is started, the blame for the excess expenditure of money can quickly be shifted to your shoulders.

Engineering jobs are not so plentiful that you can afford to let any community mistrust your judgment. Never tackle a job that is beyond your knowledge or experience, just because you don't want to pay out the money to get an opinion from another engineer. That very easily can ruin you once and for all. Always remember that no matter how good a thing looks on paper, or how nice it looks after it has been built, if it does not do the job for which it was intended, it is absolutely worthless.

Don't ever encourage a city or town to build an antiquated structure just because it doesn't have the money to build a modern one. You will often find town boards that want to do something to satisfy their constituents, but suddenly find that the treasury is short of cash. Yet they want to do something, and they will sacrifice quality and serviceability so that they can say, "We did it!" Your reputation is at stake, if you step into something like that. If the money is not available, you should acquaint yourself with some bonding company, and get its opinion as to whether bonds for such a project will sell. If they say "No," get out of it.

I had a job sometime ago that called for a concrete street; the cost was twice the valuation of the lots alongside, and the city wanted to sell Barrett Law Bonds and build the street. I advised that the bonds would not sell. The city consulted a banker and an attorney and the answer was the same. It still wanted a street; so one of the property owners hit on the idea of building it out of pit-run gravel. I inspected the gravel and found that it was very inferior, and the town board turned the project down. I got the blame for the street's not being built. However, I would probably have been hung if the street had been built, as it would surely have gone to pieces in a very few years. Cases of that kind often happen, and you will have to "take the rap" for doing what you think is right.

There is a big field for an engineer as consultant for manufacturers. I will venture to say that there is not a month passes in which every factory in your community does not need the services of a civil engineer. The usual procedure when it needs something built is to call in a contractor and tell him what is needed. He does not want to lose any money on the job, and he fixes the price accordingly. He does not want the structure to fall down, so he builds it plenty strong. You can save that manufacturer money, if he will hire you to do the designing and superintending of construction. A few of the things you can handle for him are concrete structures of all kinds, including floors, retaining walls, buildings, etc.; steel structures, including buildings and elevated tanks; sewerage systems where the location does not permit emptying sewage into city sewers; the drilling of wells; and the setting of pumps. The manufacturer needs your services, and it is up to you to sell them to him.

You can be of service to individuals by making surveys of property. There is good money in making an accurate survey of a farm and then making a drawing of it. Most people like to admire their holdings, and the best way for them to do so is from a blue-print, particularly if their farm is large.

On small jobs, you cannot expect to have a signed contract; but on larger jobs, you can expect a contract and should have one. The contract should set out fully what you are to do, and should set out very clearly when and how you are to

receive your money for the services rendered. One of the most common contracts should call for a certain amount for plans and specifications and a certain amount for superintending the work, and this amount should depend on the amount of work that is to be done. For instance, if you were to make plans and specifications for a structure costing \$50.00, you could not afford to charge 5 per cent for the plans, specifications, and superintendence. You might spend three or four days making the plans and getting it built. It is not very often wise to take a job for a straight percentage fee, unless you are sure the project will go through to completion. There might be quite an argument when you try to charge part of the fee for your plans and specifications. You may have a considerable amount of money tied up in collecting the data for the plans and specifications, having the plans printed, and the specifications typed. Unless your contract specifically states that you are to be paid for these services, it may be hard to collect anything, because most people do not realize the amount of work necessary to prepare a set of plans and specifications. On medium-sized jobs, the fee should be 3 per cent for the plans and specifications and 3 per cent for superintendence. On large jobs, the fee should be $2\frac{1}{2}$ per cent for the plans and specifications, and $2\frac{1}{2}$ per cent for superintending construction. These percentages may vary according to each specific job, but in my opinion, 5 and 6 per cent is about the right amount in fees. When you are working by the hour and furnishing two men, \$3.00 per hour does not seem out of the way for anything up to one-half of a day. For one-half day, I think you should get \$10.00, and for a whole day \$20.00. These figures are based on a three-man party. For a five-man party, when you are hiring an instrument man, the amount per day should be correspondingly larger. For a lot survey in accessible locations, you should have \$5.00, and charge accordingly when the going gets tougher.

I know you all admire a contractor that does not whine when he takes a job too low or has tough luck. You will find that is true with your employers. When you take a job too low, finish it, and finish it as though you were making plenty of money. The old law of averages will take care of you, and in the long run, you will come out on top. No one likes a poor loser. Give dollar for dollar value, and that will mean repeat business.

You should standardize your charges and standardize your services, and you should never cut below them just to get a job. If someone bids below you, let him have it—don't quibble, you may get the next job. I know two engineers who kept bidding against each other, until the one who got the job worked for \$5.00 per day and furnished his help.

Honesty, integrity, and fairness should be your guiding motives. Win in the respect of your fellowmen for what you can do and the way you do it, and success will be yours.