

Indiana's Plans for Recruitment and Retention of Engineering Personnel

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INTRODUCTION

The most critical problem facing the Indiana State Highway Commission today, is the lack of adequate personnel. Since any highway department is largely an engineering organization, engineers are the life blood, and a deficiency in this area can only result in weakening the organization. When such a condition exists it should also be a vital concern of the people of Indiana. As Indiana continues to grow, the demands for better and safer highways from industry, education and the general traveling public will also continue to grow.

Indiana has a balanced economy—equal to that of any other state in the Union. Indiana ranks eighth in manufacturing and seventh in agriculture. Its transportation facilities are superior to those of many states and provide a base for Indiana's economic strength. Highway improvements have been key factors in contributing to increased production and highways are absolutely essential for every phase of life in the State. Indiana ranks 38th among the 50 states in land area but ranks 13th in miles of roads and streets. Indiana's geographic location makes the state a major crossroad of interstate traffic fostering the official state slogan—"Crossroads of America." Next to educating our children, building and maintaining our 11,000 mile state highway system is Indiana's biggest public business.

The expanding need for highway improvements in coming years has been thoroughly studied and adequately documented. The Indiana Highway Needs Study projected a growth in population of 6.3 million or 31 percent in the next 20 years and an increase in vehicle registration of 61 percent, twice the growth of the population. State highways will require over 8,500 miles of improvements in the next 20 years and 40 percent of this mileage requires improvement now.

After one of the best jobs ever of educating the people of the state and the members of the legislature of the needs for additional financing; and with the guidance through the legislature by Commission Chairman Ruel W. Steele, a large part of the additional funds required for the projected needs were provided by the 1969 legislature. However the legislature did not consider the personnel requirements for this expanded program. Congress will begin this year to consider the needs nation-wide for a highway program to follow the soon to be completed interstate system. Without question the Congress will settle on a new program using the present gas tax income under a new formula and new areas of concentration. Thus the future for highways in the State of Indiana is on the rise and is going to demand an increasing number of engineering personnel.

HOW MANY ENGINEERS

The question is raised as to how many engineers the commission needs now or will need in the future. As the expenditures by the Indiana State Highway Commission have doubled in the last ten years to a figure close to \$300 million a year, the number of engineers has steadily decreased to where it is now over 30 percent less than the number ten years ago. Indiana has had a net loss of over 135 engineers since 1965. It was obvious that a shortage existed then and with the retirement's due in the next few years, it is apparent that over 150 additional engineers are required.

The exact number that can be efficiently used in the future is highly questionable and uncertain. This points out the need for a detailed study of the question, taking several factors into consideration. A policy needs to be established as to the amount of work to be accomplished by consultants and contractor engineering. It is generally recognized in all industries that the normal day-to-day work to accomplish the companies objectives can be done most efficiently and economically by inhouse forces. This has been proven true for consultant design work and contractor engineering in Indiana. Therefore, although it would be foolish to staff for peak work loads, it is just as unwise not to staff for the minimum work load.

Another important factor in the consideration of how many engineers are needed is the question as to whether all engineers are doing engineering work. This is not only important in determining the number of engineers required but is also a factor in retaining engineers by providing work that is challenging and opportunity for using engineering knowledge. The Michigan Highway Department has made

such a study and found that, for instance, in their road design section they actually had one engineer for every 1.4 technicians; whereas if engineers were doing engineering work the ratio should have been one engineer for 13 technicians. Thus by increasing their number of engineers and even more increasing the number of technicians, Michigan was able to take over 100 percent of their minimum design load. Another consideration in such a study, would be the quality of engineering service to be provided. Due to the shortage of engineers, Indiana had considerably lowered the standard for what is considered adequate supervision of construction contracts. On the other hand we need not go back to the old days when registered engineers with several years experience spent considerable time in setting constructions stakes or detailing plans.

Whatever the exact number required in the future, the immediate need for a substantially larger engineering force is obvious. The highway commission is big business and like G.M., Standard Oil or any major corporation, proper stress must be placed on retaining an adequate engineering staff. With the shortage of engineering and technical personnel throughout industry, people are the most valuable resource and deserve such consideration. Employees, unlike materials and equipment, continue to grow in worth to the organization. It has been shown in many studies, such as that for a volunteer army, that it is more economical, more efficient and will result in a better organization if every effort is made to retain the present experienced personnel. Therefore first priority must be placed on policies to retain the present and future engineering staff of the highway commission.

At the July 1969 meeting of the Midwestern Governors Conference in Kansas, Governor Whitcomb stated that there is a tendency to make policies as a reaction to a crisis, not to prevent one. It is apparent that new policies are necessary to stop the net loss of engineers that has been occurring for several years and has grown to critical proportions. It is the stated objective of the Governor, the chairman and the executive director of the commission to make this one of the finest highway organizations in the country. Many hours of thoughtful study and discussion, both within and outside of the department, have occurred in the last year to determine what is needed and what can be accomplished in striving for this goal.

INCREASED RECRUITMENT

For several years the highway commission has failed to hire as many new graduate engineers each year as it lost in normal attrition

from retirement, not even considering the even higher losses from resignations for other employment. Thus with the best possible retention of present engineers, the department would still not be able to increase in total number of engineers. To reverse this trend, a greatly expanded program of recruitment for graduate engineers is necessary. The first step in this new program was to raise the starting salary by \$95 per month to \$785. Although still not as high as might be desirable, this starting salary is high enough to be competitive with other highway departments. In the future, consideration must be given to raising the starting salary at more frequent intervals to maintain a continuous flow of new graduates, and raised to a higher relative position so we can compete for graduates in the upper levels of the graduating class.

The second step in an increased recruitment program was the decision to initiate a rotational in-service training program for the new graduate coming to work for the commission. This type of program was proposed to the commission in November of 1969 due to the success by other states with similar programs, in hiring substantial numbers of graduates. For several years Kansas has averaged over 35 graduates per year and gives the credit to its rotational training program. Many other states such as Ohio, Pennsylvania, Michigan, Connecticut, and Georgia claim their in-service training program is very attractive to the graduate and a big help in recruitment. Many of these states are hiring substantial numbers of graduates with starting salaries lower than that of Indiana. Pennsylvania claims its intern training programs as a major factor in Pennsylvania's leadership in the highway industry and one of the most significant developments in the history of the department.

After the go ahead from Chairman Steele in November, the programs of several states were studied, and a program to fit the needs and organization in Indiana was designed. The division heads and district engineers were asked for comments on the preliminary plan and almost all returned written comments in favor of such a program. Minor revisions were made to the program as requested in their comments and the final format of the program was submitted to the commission. On January 22, 1970 the commission approved for implementation the Indiana State Highway Commission Graduate Engineer Development Program. It was added encouragement when we became aware in January, of Professor Karrer's survey of Ohio State seniors, which might be considered typical nationwide, and which indicated 82 percent preferred to start their career in an in-service training program.

THE GRADUATE ENGINEER DEVELOPMENT PROGRAM

Webster says development means a gradual growth or advancement, or a gradual rise from one level to the next. The Indiana Graduate Engineer Development Program will provide a period of transition after college to supplement the academic training and translate formal education into practical working knowledge of engineering. The 66-week development period will be spent in on-the-job training, orientation, and indoctrination in all of the engineering divisions of the commission, giving the graduate a broad background of knowledge and an understanding of the various functions of the organization that would otherwise take several years to accomplish.

One purpose of the development program is to help the graduate engineer determine the area of highway engineering that is of most interest to himself, as he becomes aware of the responsibilities of, and inter-relationships between, the various divisions. Even if he has decided that highway engineering is his chosen field, often the senior civil student has not determined where his special interest lies—whether construction, design, materials, traffic or research. This program will afford him an opportunity to see all of the different phases in operation and at the end of the program, with a more clear cut idea of the area of work this is most desirable to him, the graduate will be placed in the division of his choice if an opening is available.

Building highways is a coordinated team effort and the graduate in the program will observe how the team works together. The development schedule of 66 weeks is a combination of field, office and laboratory assignments in one of the six districts and in the central office. The schedule will be administered on a flexible basis, adjusted to fit the needs of the individual engineer and the commission. The order of assignment in the separate divisions and locations will be made on an individual basis.

I want to forego any detailed description of the development schedule other than to say it will include 34 weeks in one of the six districts, 2 weeks at the research and training center, one of the finest in the country, and 30 weeks in the central office including four weeks at one of the finest materials testing laboratories in the country.

But I want to stress the importance of the immediate supervisor in the program. Every organization has its share of employees interested only in the monthly pay check, always ready to criticize, but never willing to contribute their part to the betterment of the organization. This is not the type of employee that should be the immediate

supervisor of a new graduate in the development program. The immediate supervisor should be an employee interested in the organization he works for, willing to take an interest in the graduate, and willing to take the time required for instruction. It is vital that these immediate supervisors realize they are contributing to a stronger organization, and not just to the betterment of an individual engineer. The final success of the development program will depend in a large part on the effectiveness of these immediate supervisors.

The third step in the increased effort to attract more graduate engineers was a series of meetings with civil engineering juniors and seniors from six colleges and universities in Indiana offering a civil engineering curriculum. Financed by people in the materials and construction industry who are also vitally interested in building a strong highway department, these dinner meetings afforded an opportunity for commission engineers to explain the new development program and emphasize the opportunities for engineers in the Indiana State Highway Commission. These meetings gained a very favorable response from students and faculty alike.

FIRST PRIORITY—RETENTION

There is every confidence within the commission that the number of new graduate engineers is going to greatly increase during the next few years. The personnel division has been authorized and encouraged to look beyond the borders of the State to see that the required number of engineers are hired. The increased number of new engineers also increases the obligation to establish policies to accomplish the first priority of retaining present engineering personnel. The first graduate should not be started through the development program unless the commission also makes every effort to establish an atmosphere designed to retain the new graduate. Such an atmosphere is an organization reflecting manpower planning designed to motivate personnel to high productivity and to encourage them to remain in the organization.

Professor Karrer's Ohio State study on recruitment and retention, documents the logical assumption that the factors given for leaving highway department employment are related to the factors given by the graduate in looking for his first job. In other words, policies designed to retain present employees, will also serve to attract new engineers.

THE SALARY FACTOR

As we consider the factors important in retention of engineers, perhaps the most often mentioned in Indiana is salary. Salary is

usually quoted as the main reason for an engineer's resignation, although this is often not the case. Salary considerations are complicated for the department due to the need for approval from outside agencies and the relationship to salaries in other state government departments. Dissatisfaction with salaries has been due to several factors. The most apparent is the inequality compared to salaries in industry. It has often been said that government servants must expect to be paid less than industry. Yet in 1967 Congress ordered federal salaries brought up to those in private industry. Raises of eight to fourteen percent a year have been common for federal engineers in recent years. The Unigov Department of Transportation and surrounding state highway departments also have salaries much closer to those in industry. The taxpaying public expects efficient government operation and it has been shown that they are willing to pay the price.

Just as important as specific salaries is the administration of salary increases. The rapid increases in the cost of living have practically eliminated any advancement by merit raises. There is an urgent need for recognition of cost of living increases so that a merit raise is strictly for merit and outstanding work can be recognized. Another troublesome factor is the practice for several years of raising the starting engineer salary considerably more than those at the top. The farther up we go in the salary scale the more difference there is with surrounding states and industry. The practice of decreasing separation from the bottom to the top causes severe overlap in the salary scales and greatly reduces motivation for advancement. It is actually possible for a promotion to result in a reduction in pay.

The Indiana State Highway Commission has submitted, for approval by the state budget agency, new salary schedules which will help in correcting many of these salary problems. The personnel Division of the Department of Administration is formulating plans for establishment of a team this year to survey the various state agencies including the highway commission. This survey will include a study of state salaries in comparison to industry as well as other factors involved, such as cost of living increases. Hopefully this review will result in the information necessary to correct many of the problems in this field.

POLITICAL CONSIDERATIONS

Another factor to be considered in retention of engineers is the effect of politics. Politics affects the engineer in two ways—in relation to his subordinate subprofessional help and in relation to future advancement. The morale of an engineer can only be lowered by the periodic

political turnover of his trained technical subordinates on whom he has learned to depend. Such practice is not compatible with an efficient organization. The only positive means for establishment of a permanent program for retention of technical subprofessional personnel is by legislation. A bill will be introduced into the next legislature to establish such protection. Governor Whitcomb and Chairman Steele have stated their willingness to back a properly drawn bill for this purpose. The Indiana Legislative Council, the between-sessions, policy making arm of the General Assembly has been considering some type of merit system to increase personnel stability. Therefore the next legislature will be sure to give consideration to a merit plan—whether bi-partisan or whatever type—for technical sub-professional employees of the commission.

In regard to politics affecting advancement and promotion, I am convinced that the image in Indiana is worse than the facts would substantiate. The problem is often magnified because just one case is compounded by the assumption that many more promotions are based on the same motives. For a large part, the commission engineering staff has no one to blame but itself for allowing political considerations in advancement. State law provides the necessary protection for graduate and professional engineers and any abuse can only occur because it is allowed or encouraged to exist. At a French Lick meeting of commission engineers in November 1969, Governor Whitcomb stated that he did not ask for loyalty to the party, only loyalty to the State and to their profession. If the engineers of the commission make a steadfast stand that the opportunity for advancement should not be influenced by politics, the image can be greatly improved. Lest we expect perfection perhaps we should remember that in any large business, politics by whatever name, often has its affect on promotions at higher levels. However, any professional engineer can be satisfied with no less than a policy for systematic advancement based on ability.

OPPORTUNITY FOR CHALLENGING WORK

The third factor affecting retention of engineering personnel is the opportunity for challenging work and use of engineering judgment. This factor, perhaps just as important as salary, is not determined by law or outside agencies, but is determined by policies within the organization. One of the fundamental methods to increase opportunity for challenging work and use of engineering judgment is to see that engineering personnel are doing engineering work and not subprofessional duties. This again points out the desirability for establishing the proper ratio between engineers and technicians, thereby improving

retention of engineers and also improving economic operation. Another area included in the Department of Administration review to be started this year is a study of job classifications and whether employees are doing the type of work called for by their classification. Hopefully this will include a detailed review of whether highway engineers are doing engineering work and the steps necessary to correct the deficiencies in this area.

Another method of increasing opportunity for challenging work and use of engineering knowledge is to make proper use of delegation. A top administrator of one of the more stable highway departments in the country recently said if they could keep an engineer for five years they no longer had to worry about losing him. This has not been true in Indiana and losses are high even among very experienced engineers. There is no doubt that many of the losses of experienced engineers has been due to reluctance of management to delegate, and thereby the feeling is spread that engineering knowledge is being harnessed. Whatever field is considered, from the moon program to air pollution, advancements have been made only by willingness to try new ideas and new methods.

Indiana can well be proud of the accomplishments in the largest construction program in state history. However the near end of the Interstate program finds a highway department considerably weaker than when the program began, giving rise to the question of whether the most efficient organization may lead to not having any organization left. The written statement of commission policy carried in the Management Guide since 1964 has stated that "managers at each level will practice delegation of responsibility and authority to their subordinates to permit decisions to be made at the lowest practicable level in each organizational unit." A sincere effort needs to be made to practice this fundamental management policy as closely as possible. With such a policy must come the willingness to accept occasional mistakes, but many of *tomorrow's* mistakes are caused by the lack of experience in decision making today.

THE NEED FOR COMMUNICATION

We have discussed several of the factors pertaining to retention of engineering personnel in Indiana. The solution to these problems cannot come overnight and they will never come without one necessary ingredient—communication. Lack of progress in the past in improving the organization and the image of the department has in a large part been due to a lack of communication in vertical directions. We have always had good communication on horizontal levels telling each other

what is wrong and what needs to be done. It has been said that we are our own worst enemy and much of the morale problem can be laid to continually running down the department in idle talk. Effective communication must go upward with accurate presentation of the problems, positive suggestions and concrete recommendations for correction of the problem. Communication must also flow downward, as ignorance of what is being done or why things cannot be done can also lower morale.

Other organizations have shown that effective communication reaps dividends. Effective communication was demonstrated prior to the last legislature in informing the public and legislature of the need for additional gas taxes. The Indiana State Police are regarded as one of the finest in the country and no one would accuse them of hesitating to state their need. Other States and the federal government have shown the taxpayer is willing to pay for the service it demands and deserves. Those who have the final say in making the changes which we, in our own mind, feel are necessary and just, are responsive to logical demonstration of the needs. The responsibility for selling our needs are our own and we must not wait for outside organizations to do our selling for us. If we have the strength of our convictions, our story must change from—"These things can't be done" to—"These things must be done."

The expanding highway program in Indiana requires immediate action to retain and increase the engineering personnel employed by the highway commission. As stated before, the Indiana State Highway Commission desires to make this one of the finest departments in the country. Recommended adjustments in the engineers salary scales and the Graduate Engineer Development Program are the first steps in accomplishing this goal. The commission will be giving serious consideration to the other steps necessary in the coming months.