

What Can be Done to Train the Traffic Engineer?

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The need for traffic engineering training has been ably presented at this meeting by Carl McMonagle, President of the Institute of Traffic Engineers. Carlton Robinson, of the Automotive Safety Foundation, has outlined the functions which traffic engineers must be prepared to perform for city, county, state, and federal agencies. It is my job to discuss how men can be trained to adequately perform these functions.

In beginning my discussion of education and training, I propose to examine first the knowledge and skills which are required. Then, I will discuss the education and training of men for beginning professional positions in traffic engineering. This will be followed by discussion of in-service training programs. Next will be a brief discussion of how to get the material across to the men—techniques of teaching. Finally, I will discuss the difficult problem of getting the men who need the training to attend courses when they are made available.

What Knowledge and Skills are Required?

The purposes of engineering education are set forth in the 1955 report of the Committee on Engineering Education of the American Society of Engineering Education. A graduating engineer should possess the following attributes, as the result of his engineering education: (1) mastery of the fundamental scientific principles and a command of the basic knowledge of the branch of engineering which the student is pursuing, (2) thorough understanding of the engineering method and elementary competence in its application, (3) ability to select significant results from an engineering study and to present them clearly and concisely, and (4) a continuing interest in further professional development.

Professional traffic engineers should most certainly possess these attributes. They should also possess some specialized knowledge

and skills in traffic engineering. According to the ITE definition of traffic engineering, a professional traffic engineer should be qualified to "deal with the planning and geometric design of streets and highways and abutting lands, and with traffic operation thereon, as their use is related to the safe, convenient and economic transportation of persons and goods."

Persons in responsible charge of traffic engineering functions should be well grounded through training and experience in the specialized principles and techniques of traffic engineering. There is some question, however, whether graduating engineers, just beginning in traffic engineering under the guidance of an experienced traffic engineer, need a comprehensive knowledge of traffic engineering principles and techniques if they possess the attributes recommended by the Committee on Engineering Education.

An attribute especially needed by traffic engineers is the ability to sell their product. Unless a traffic engineer can sell his recommendations to the public and to the authorities, he has little chance of doing an effective job.

Education for Beginning Professional Positions

Education for beginning professional positions is provided primarily by engineering colleges. Undergraduate students looking forward to a career in traffic engineering should follow the accepted curriculum in civil engineering, and when possible, take elective courses in traffic engineering, public administration, public speaking, psychology and economics.

The teaching of traffic engineering at the undergraduate level was recently surveyed by the Institute of Traffic Engineers. Replies were received from 113 of the 127 accredited civil engineering departments—an 89 per cent return. About half (51) of the schools offer undergraduate courses in highway engineering, which include some traffic engineering. Thirteen colleges offered an undergraduate course devoted entirely to traffic engineering.

This survey also revealed that 30 of the accredited civil engineering departments taught one or more graduate courses which included highway and traffic engineering. In the academic year 1954-1955, there were 294 students enrolled in such courses.

The midwest is especially fortunate in having several Universities which offer sufficient graduate courses so that a man (or woman) can major in traffic engineering for his master's degree (MSCE). These include Purdue University, the University of Illinois, University of Michigan, and Michigan State University.

As a matter of fact, one problem today in this midwest area, is that some of these schools do not have enough students for their traffic engineering courses.

Purdue Courses

The course offerings in highway and traffic engineering at Purdue have been revised during the past year, so as to provide more attention to traffic and planning phases of highway engineering. Shown below are listings of courses now available, which contain traffic engineering subject matter:

Courses Relating to Traffic Engineering Offered by Purdue University 1957-1958

<i>For Undergraduates:</i>	<i>Hours Credit</i>
Transportation Engineering I	3 (Required Course)
Transportation Engineering II	3 (Required Course)
Advanced Highway Engineering	3 (Elective Course)
Traffic Engineering	3 (Elective Course)
<i>For Graduates:</i>	<i>Hours Credit</i>
Traffic Engineering:	
Operations	4 (Includes lab)
Traffic Engineering:	
Urban Planning	3 (Includes field projects)
Geometric Design	3 (Includes lab)
Highway Planning and Economics	3
Comparative Analysis of Transportation or Engineering uses of Aerial Photography	3

Students working for an MSCE degree with a major in traffic engineering usually take the graduate courses listed above, plus a course in pavement design, and two courses in statistics. Each student also undertakes a thesis research project in traffic engineering. Currently, there are 12 graduate students majoring in traffic engineering at Purdue. (Cooper, Weckesser, Kask, Perron, Gilet, MacNaughton, Suwato, Pellegrini, Howe, Schenler, Cribbins, Covault). Four of these are from foreign countries. Four are working for their Ph.D.

The Yale Program

The Yale Bureau of Highway Traffic has an excellent program which provides nine months of graduate traffic engineering training to men already working in traffic engineering. This program, which now provides training for almost 50 men a year, should answer much of the need for comprehensive training. Men who have some experience and who complete this training are able to assume positions of considerable responsibility immediately. The program does not lead to an advanced degree at Yale.

Fellowships for attendance at this Yale program are available to qualified men in governmental positions. Two men in the Traffic Engineering Department of the City of Indianapolis have completed the program.

In-Service Training

Mr. McMonagle stressed the need for training the personnel now performing traffic engineering functions in the smaller cities and counties. This training need can be filled best by short courses organized by universities, such as the one-week short course held last August at Purdue. Such a course is useful also for state employees and for employees of consulting firms.

In Michigan, a 3½ day short course was held last October, with engineering officials from 15 cities and eight counties in attendance. In May, a two-day conference on parking will be held for city personnel. A two-day conference on county traffic problems has just been completed in Michigan.

Experienced traffic engineering personnel should be provided training of a somewhat different level than provided in the short course on fundamentals of traffic Engineering. Half-day or one-day conferences can be scheduled to provide up-to-date information on topics of current interest. For example, the geometric design standards as contained in the new AASHO policy on Geometric Design of Urban Arterial Highways would be a topic of current interest for a half-day conference right now.

Training on departmental policies, standards, and procedures in a state highway department can be provided for district and headquarters traffic personnel by the highway department itself through periodic meetings arranged for the purpose. Such meetings are held regularly here in Indiana. In-service training programs could also be conducted in the traffic engineering divisions of the larger cities, such as Indianapolis, Fort Wayne, and Evansville.

One advantage of university-sponsored training conferences and courses is that city, county, and state people can meet together

and discuss mutual problems. This aids in improving city-county-state relationships.

Conferences such as the Purdue Road School can aid in this training job, provided the topics are selected with this in mind, and the people needing the training are scheduled to attend the sessions which contain the subject matter on traffic engineering.

Techniques of Teaching

Teaching is a specialized job requiring the proper organizing of subject matter, preparing assignments, problems and examinations, and developing effective techniques of presentation.

Visual aids can help in conducting in-service training courses. I personally favor the overhead projector as a technique for presenting examples without need for darkening the room.

Problems, projects, and laboratory sessions are helpful in teaching traffic engineering. For example, a student can learn more about traffic assignment if he works out a problem in assigning traffic to an expressway. Our graduate students at Purdue work such a problem using both the normal travel-time-ratio techniques, and the time-distance saving curves as developed in Detroit. This provides an opportunity to identify differences in assignments for short vs. long trips.

Getting Men to Train

The final topic is the most difficult—that of getting the men, who need the training, to attend the courses.

Last August, a one-week course on fundamentals of traffic engineering was arranged at Purdue, intended primarily for city and county officials in Indiana. Letters were sent out, and considerable publicity was issued, in an attempt to encourage attendance by engineering personnel of cities and counties in Indiana. The attendance roster showed only three engineers enrolled from the smaller cities in Indiana. There was no one from an Indiana county. Obviously, the course did not meet the need for training personnel in the smaller cities and the counties of Indiana.

What can we do about it? Should we plan another short course for this next summer, or for a year from this summer? What are your opinions?

Part of the solution is a long-term solution, and may involve a broadening of the functions of city and county engineering in Indiana. Perhaps changes are needed in procedures for selection and retention of civil engineers.

Other solutions may include the taking of in-service training programs to the field. Perhaps both the State Highway Department and Purdue University can help by stepping up their field service programs in the traffic engineering area. Such field assistance can provide training for city personnel who have traffic engineering responsibility. We might also provide interesting speakers for meetings which are usually attended by city and county officials.

In conclusion, I urge that all of us keep in mind the need for traffic engineers, and that we do everything we can do to encourage attendance at available traffic engineering courses and conferences by those who could profit from such training.