

# Michigan Engineering Inventory Trend Study

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● IN beginning, let me state that the subject of this paper is not designed as a cure-all for the critical situation in which the Michigan State Highway Department finds itself, along with other states. Rather, it is a history of the attempts that have been made within the department to meet the large construction programs we are now facing, with the critical shortage of engineers which is common throughout this country. The paper is set up as a report on what we have done in the past, what we are doing at the present time, and our plans which are at present being stepped up to help meet the situation in the future.

As early as 1946, it became apparent to the Michigan State Highway Department that road construction would have to be stepped up in the next twenty years in order to meet increasing traffic demands. Road construction programs in Michigan, as in other states, were severely curtailed during the war years and although a strong effort was made to maintain and hold our present highway system, funds available for construction work from 1934 to 1945 ranged from ten to twenty million dollars per year and in 1945 the low ebb was reached with expenditures under ten million dollars on actual construction work.

Little thought was given during these years, because of lack of large construction programs, to the recruiting of engineering personnel on a broad scale. However, an analysis of the situation early in 1946 indicated that our organization of engineers in the Michigan Highway Department was growing old and that we were not obtaining through concentrated programs enough new engineers to carry out major programs in the event of expansion which appeared to be just around the corner.

Climatic conditions in Michigan make it necessary to perform the major portion of construction work during summer months. This seasonal expansion seemed to lend itself to the use of college engineering students during summer months when they were on vacation. It was felt advisable in the department to attract these students with the hope that upon graduation many of them would consider permanent employment on a career basis. A first step for developing future engineers was put into effect, with the cooperation of the major engineering colleges in Michigan and the State Civil Service Commission, by establishing the student engineer summer program in 1946.

The first year we employed approximately 35 college engineering students and since 1946, the program has grown to the point where an average of 70 engineering students are employed each summer. These students are paid in proportion to the level of their year in college and at the end of each summer's work they are granted a leave of absence to continue their education.

This program has provided a two-fold purpose. It enabled the highway department to supplement its field forces during the heavy part of the construction season with young, intelligent and semi-qualified personnel in the sub-professional engineer classes. At the same time, it provided the student with an intimate insight into highway work, giving him practical experience along the line of his college major at an attractive salary during his vacation periods.

In 1947, the Michigan State Highway Department went even further and in conjunction with the University of Detroit, inaugurated a work-study program, generally known as "The Cincinnati Plan," whereby engineering students during their junior, pre-senior, and senior years in civil engineering alternately are employed by the highway department in regular engineering positions at the lower levels and attend classes at the university for three month periods. Many of these students, upon completion of their college work, have been attracted to permanent employment with the highway department.

In 1949, a study of the engineering enrollment in various colleges in the United States against anticipated stepped-up construction programs in the various highway departments, as well as in private industry which would utilize the services of these engineers, indicated that there would be a severe shortage of engineers for future construction programs. In that year the highway department inaugurated a graduate program known as the Engineer Trainee Program. In this program, engineering graduates from accredited colleges are offered the opportunity to continue their training in practical work assignments

TABLE 1  
 TRAINEE AND FORMER TRAINEE DISPOSITIONS  
 December 1, 1955

Year	Trainees enrolled	Presently active	Trainees resigned	Leave Mil	Ed	Trainee I	Trainee II	Engineer II	Engineer III	Engineer IIIA
1949	40	22	18					2	13	7
1950	22	10	12					1	7	2
1951	18	9	7	2				4	5	
1952	31	18	8	5	1			16	2	
1953	25	18	4	3		5		11	2	
1954	34	17	6	11		5	9	3		
1955	21	12	2	5	2	11		1		
<b>Totals</b>	<b>191</b>	<b>106</b>	<b>57</b>	<b>26</b>	<b>3</b>	<b>21</b>	<b>9</b>	<b>38</b>	<b>29</b>	<b>9</b>

COMPARATIVE SALARY RANGES<sup>a</sup>  
 December 1, 1955

(Note: Salary rates effective February 5, 1956)

	Class levels	Bi-weekly			Class levels	Bi-weekly	
		Minimum	Maximum			Minimum	Maximum
	I	\$174.40	\$215.20		I	\$151.20	\$192.00
	Tr. I	176.00	186.40	All			
All Highway Engineer Classifications	Ia			Other Professional and Regular Civil Service Classifications	Ia	163.20	207.20
	II	198.40	242.40		II	177.60	222.40
	IIa				IIa	194.40	241.60
	III	235.20	293.60		III	211.20	271.20
	IIIa	252.80	313.60		IIIa	228.80	291.20
	IV	277.60	350.40		IV	252.80	325.60
	IVa	300.80	373.60		IVa	277.60	350.40
	V	336.00	424.00		V	309.60	397.60
	Va				Va	343.20	432.00
	VI	408.00	496.00		VI	381.60	471.20
VIa	445.60	536.80		VIa	419.20	510.40	
VII	479.20	576.00		VII	452.80	549.60	

<sup>a</sup> In addition to the salary, Michigan State Highway Department pays a \$4.00 per diem subsistence allowance while on field assignments.

for a period of 12 to 18 months. These trainees are rotated within the department filling regular jobs on various types of engineering work in the several divisions.

The success of the Engineer Trainee Program has been highly recognized. It has been adopted by both Missouri and Wisconsin in practically its original form, and a number of other states have accepted comparable features of our program in setting up graduate trainee programs of their own. It also compares favorably to similar plans in private industry.

The Engineer Trainee Program consists of one year of extensive rotational, on-the-job, practical work; and up to six months of specialized training in the field of final assignment. The trainee is working and producing at the same time that he is in training.

Special salary rates were also instituted for the engineering classifications of work as shown on Table 1 of the attached charts. These salaries average about \$50.00 a month higher than all other professional and regular Civil Service classifications in the highway Department and also apply to the engineer trainees.

After completion of the formality of enrollment, including the passing of a Civil Service examination for the position of Engineer Trainee I, the trainee is given a short period of orientation on highway procedure in general and the Trainee Program in particular. It is emphasized to the trainee that he already has the ability and knowledge of the graduate engineer and needs only to obtain practical work experience and fundamentals of highway organization and operation in order to become qualified as a capable highway engineer.

To accomplish this, he is assigned to eight separate functional sections of the department during his first thirteen months. Each cycle lasts seven weeks, and the trainee performs the same duties as are expected of other employees of the squad or party.

These duties are varied or rotated as much as possible by his immediate supervisor to determine his outstanding characteristics and abilities. In most instances, he actually occupies a position which would otherwise be filled by a regular employee. There is a minimum loss of over-all production due to extra supervision. Briefly, the program in each section is operated as follows:

**Bridge Construction.** The trainee is assigned to an active bridge project under immediate supervision of a bridge project engineer. Usually larger type projects are selected and, without hindering party progress, the trainee is given an opportunity to perform the various duties or jobs encountered. Practical experience gained on the job plus close observation of the individual abilities and capabilities are the determining factors in grading his seven week service rating.

**Bridge Design.** Each trainee is assigned to a separate bridge design squad under the immediate supervision of that squad leader. He is usually given a third or fourth priority structure which he handles from beginning to end. Each phase of design is processed as usual for approval so that plans completed in seven weeks are usually final. Trainees do not participate in squad work on the board. The seven weeks allows them just about sufficient time to complete their job if it has been reasonably simple without too many changes.

**Road Construction.** An Engineer Trainee is generally assigned to a road construction project and works under the direct supervision of the project engineer. In this assignment, he has the opportunity to observe the varied problems that arise. During this cycle, whenever possible, the trainee is rotated to road construction projects handling different forms of construction material such as concrete, bituminous, gravel, etc.

**Road Design.** Trainees are interviewed and assigned to separate squads. Under the immediate supervision of the squad leader, they participate in work on the board. During the seven weeks, an attempt is made to give them varied experience in all types of problems related to the development of a set of road plans. This includes reducing field notes, plotting cross sections, inking topography, computing vertical curves and working grade sheets, determining quantities and assisting with estimates. They become acquainted with standard designs and procedures. When possible they even participate in field checks on grade inspection, and observe procedures in the Route Location Section.

**Road Surveys.** An assignment on surveys is generally with a party that can make practical use of the trainee's services. Under the supervision of the survey chief, he is given the opportunity to gain experience as rodman, chainman, levelman, notekeeper and transitman. He is also trained to run the party during temporary absences of the survey chief.

**Maintenance.** The purpose of the Engineer Trainee program in the Maintenance Division is to acquaint and train engineers in administrative procedures. The trainee is first assigned to the division office in Lansing, for one week, where he is given an over-all picture of maintenance operations. Instruction is given by the division administrative personnel and the section heads, so that the trainee is familiar with department policies and the plan of operation. Study of specifications and the Maintenance "Manual of Standard Procedures," with field trips conducted by section heads to emphasize any special work is also included in the first assignment. After the first week the trainee is assigned to a district maintenance engineer in an agricultural area of the state for a three-week period, and in an urban or industrial area for the last three weeks to acquaint him with the various conditions and factors which affect highway maintenance.

**Planning and Traffic.** Since the number of functions performed by the Planning and Traffic Division are too numerous to be effectively covered in a seven week cycle, the trainees are given a general outline of the functions of the division and then assigned to the work activity best suited to their training and the work load in the various sections.

The normal activities covered in the training cycle are trunkline system planning, traffic planning and design, traffic control, and traffic surveys. The training cycle often includes two to five weeks with the district traffic engineer covering field activities which are principally traffic control.

**Testing and Research (Soils).** In this section the Engineer Trainee is assigned for seven weeks to one of our districts under the supervision of the district soils engineer.

An effort is made to acquaint the trainee in the procedure of the following operations: Identification of soil profiles, making soil maps, swamp and peat sounding, borrow surveys, and soil survey reports, grade check of plans for soil and drainage design and problems, subgrade inspection and check during construction, bridge borings and studies, office reports, files, organization and administration. By assisting the district soils engineer, the trainee is given as much practical work as possible.

A performance rating is given in each assignment. This covers job intelligence, which includes a variable number of items that are applicable to the individual work phases concerned. It also includes job aptitude ratings which cover work quantity, work quality, work attitudes and work habits.

Of all the graduate engineers who have entered the program, approximately 25 percent have resigned from our employment since the beginning of the program in 1949. A number, however, have entered military service on military leave of absence. We believe our records speak for themselves as to the success we have had in recruiting and obtaining the young engineer graduate.

Following the completion of the rotation portion of the Trainee Program, the young engineers are in a position to receive permanent classifications in the department in a specialized field of work. Interviews with division heads are arranged whereby the trainees are interviewed individually by the group of engineering division heads and collectively by the Commissioner and Chief Deputy Commissioner. A Civil Service examination is given for the classification of Engineer Trainee II, which if passed, places the trainee in a higher salary range. Future promotions then depend on individual ability, initiative, and attitude toward work.

Experience shows that when trainees are being placed on final assignment, at least 90 percent are assigned to the field of highway work indicated by them to be their first preference. The only exception to this percentage figure is in the construction field which is advisedly preceded by a year of experience in the design section.

The various training opportunities offered the engineer student and graduate were moulded into one over-all interrelated program known as the "Highway Career Plan." To present and publicize the various programs encompassed in this plan, we made it a point to contact high schools and attend student functions at various colleges to discuss these opportunities with both the student and the faculty.

We have found that these engineer trainee and student engineering programs have been very beneficial to the department. Many of the graduates who went through our Engineer Trainee Program in its first two years have already advanced to the III and IIIa level positions which represent project engineer positions in the field in charge of construction, and squad leader positions in our design rooms in charge of design squads. Some have now advanced to the IV level positions which represent engineering executive positions in our Lansing headquarters.

It is to be noted on Table 1 that the major portion of resignations in our program occurred in 1949 and 1950 when we first started the program. Our losses have been lower in the last four years. We attribute this to several factors which may be listed under the heading of fringe benefits.

1. Special rates were set up for the engineering classifications in 1951.
2. The Civil Service Commission in Michigan permits liberal annual and sick leave benefits; annual leave at the rate of 13 days per year after one year of service, 15 days per year after five years of service, 17 days per year after ten years of service, and 19 days per year after fifteen years of service. Sick leave accumulates with no ceiling at the rate of 13 days per year and in the event of retirement or death, one-half of this accumulated total is paid in a lump sum to either the employee or his estate.
3. Liberal retirement programs which permit an employee with 30 years of service and at age 65, regardless of salary range, to retire at approximately one-half his yearly salary. This guarantees a graduate engineer, who starts with the department at the I level and advances to the IV level or above in his total service with the highway department, retirement at a greater salary than his starting salary.
4. A Civil Service and Department program which gives job security comparable to that found in private industry, or better.

We believe that these features, along with the fact that the engineers entering the

service of the department are given every opportunity to expand their knowledge during the first year and are encouraged by the division heads to develop themselves for rapid promotion, have resulted in our high retention of these engineers.

At the present time the prospect of longevity pay to be installed next July by the Civil Service Commission in Michigan is another attractive feature.

In 1953, however, a review of the engineering situation indicated that even with the summer student and engineering programs the induction of engineers into the department was not sufficient to handle the construction programs which were anticipated. Analysis indicated that we would lose approximately 70 of our engineers in the top level through forced retirement at age 70 in the next ten years; and it was felt that there was a strong possibility of the loss of at least 60 more from age 60 to 70 through voluntary retirement, and that the opportunities for the graduate engineers were so great that within the next ten years they would be occupying the higher positions in the department. It appeared necessary to establish a type of training which would fill the gap at the I and II levels, namely our instrumentman and inspection levels.

Steps were taken to supply the additional technical personnel needed to fill these gaps. One was the high school graduate program adopted to interest high school graduates in following engineering as a career with the hope that they would be attracted to highway work either immediately or after college graduation. It is a long range program worked out with George M. Foster, Chief Deputy Commissioner, Michigan Highway Department, C. J. Carroll, Executive Secretary of the Michigan Road Builders' Association, and Professor Earnest Boyce, Chairman, Department of Civil Engineering at the University of Michigan, and resulted in giving all qualified students an 8-week course of study in highway surveying.

The University of Michigan's Department of Engineering operates a summer camp for engineering students called Camp Davis located near Jackson, Wyoming. The camp facilities, because of changes in university operations, recently became adequate to accommodate up to 50 students, in addition to university requirements at the camp.

The total cost to attend this camp is about \$300 per student. The Michigan Road Builders' Association is also very much concerned about the shortage of engineering personnel. In order to insure the success of this new plan and to attract the interest of the qualified high school graduate, the Road Builders' Association agreed to underwrite approximately one-half (\$150) of the cost per student.

To qualify for the program, it is necessary for high school graduates to have completed a high school course in trigonometry; to have satisfactorily met entrance requirements of the University of Michigan's Department of Civil Engineering; and to have passed successfully the Michigan Civil Service examination for Engineering Aide B.

Students who completed the course at camp were offered jobs as Engineering Aids B with the State Highway Department at a starting salary of \$124 bi-weekly, plus per diem expenses while in the field, rather than the normal initial salary of \$116 bi-weekly. Top pay for Engineering Aides B, at the present time, is \$3,445 annually (this was raised 10 percent on February 5, 1956) and is attained in six step raises. Thus, students completing the course were permitted to start at the third bracket and, with satisfactory work, advance to top pay within three years, provided nothing further was done to improve their status.

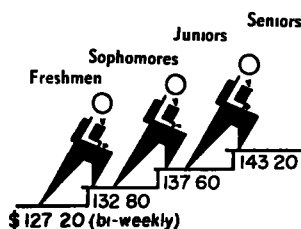
Of the first 30 high school graduates who entered the course (Table 2) 22 students

TABLE 2  
DISPOSITION OF HIGH SCHOOL STUDENTS WHO ATTENDED CAMP DAVIS, JACKSON, WYOMING  
Status as of December 15, 1955

Summer at Camp Davis	Total Attend.	No. Separated	No. on Mil. L/A	No. on Ed. L/A	No. now employed	Ed. L/A enr.	Students non-enr.	Classification of those employed		
								Engr. Aide B	Engr. Aide A	Engr. Aide I
1953	30	9	1	8	12	8	0	4	7	1
1954	46	9	3	25	9	23	2	9	0	0
1955	48	0	0	29	19	25	4	19	0	0
<b>Totals</b>	<b>124</b>	<b>18</b>	<b>4</b>	<b>62</b>	<b>40</b>	<b>56</b>	<b>6</b>	<b>33</b>	<b>7</b>	<b>1</b>

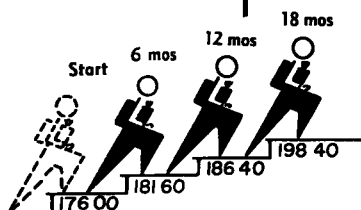
## Student Programs

### Student Engineering Aide B



## Graduate Program

### Engineer Trainee I | Engineer Trainee II



## Engineer Assignments

### Engineer II to Engineer VII in Specialized Fields



Permanent assignments are directed into various phases of engineering

- \* field work in
  - Bridge Construction
  - Planning & Traffic
  - Road Construction
  - Road Surveys
  - Testing & Research
- \* office work in
  - Road Design
  - Bridge Design
  - Planning & Traffic

- \* employment during school vacation periods
- \* leave of absence to return to school
- \* Permanent Civil Service status after six months on the job
- \* \$4 00 per diem additional expense allowance on assignments away from home.

- \* Intensive Rotational "On-the-Job" training throughout the state in the following fields
  - Bridge Construction
  - Bridge Design
  - Maintenance
  - Planning & Traffic
  - Road Construction
  - Road Design
  - Road Surveys
  - Testing & Research (soils)

- \* Six to twelve months' specialized training in field of final assignment
- \* Consideration given to individual preference for final assignment
- \* \$4 00 per diem additional expense allowance when away from home on trainee assignments

CLASSIFICATION—

	BI-WEEKLY SALARY RANGE
Engr II	198 40 to 242 40
Engr III	235 20 to 293 60
Engr IIIA	252 80 to 313 60
Engr IV	277 60 to 350 40
Engr IVA	300 80 to 373 60
Engr V	336 00 to 424 00
Engr VI	408 00 to 496 00
Engr VII	479 20 to 576 00

- \* Promotions largely depend on individual ability, initiative and attitude toward work
- \* Employment with the Michigan State Highway Department offers a future—
  - with maximum security
  - at attractive salary ranges
  - in a MAN'S Field

### BASIC REQUIREMENTS

1 Enrollment in College Engineering	1 Engineer graduate of an accredited college	1 Successfully complete Tr I Program	1 Satisfactory progress during 6 mos probationary period as Engineer Trainee II
2 Juniors & Seniors must be civil engineer majors	2 Pass Civil Service Engineer Trainee I examination	2 Pass Civil Service Engr Tr II exam	2 C S Examinations for Higher Classifications
3 Pass Civil Service Aide B examination	3 Satisfactory progress in Training Program		3 Registration for Engr IV and above
4 Satisfactory work performance			

Figure 1.

availed themselves of the opportunity to begin employment with the department. Six of these later joined the other eight and entered the five engineering colleges and universities of the state to continue their education in engineering, with an understanding that they would spend their summer vacations in the department's employment. One of these has since resigned and the other 16 who went to work are continuing their employment with the highway department on a permanent basis.

This program was continued in 1954, and 46 high school graduates entered the program. In 1955, 48 entered the program and availed themselves of this opportunity. The attached Table 2, on the high school graduate program shows the number of students who elected to stay with the highway department on a permanent basis, the number who went on to college to take engineering courses and who no doubt will enter our summer student program, and the number who, after trying the program, resigned to enter other activities. In connection with this high school student program the Highway Department has made it a point to contact high schools to discuss these opportunities with both the student and faculty. Some of these high school graduates who entered this program in 1953

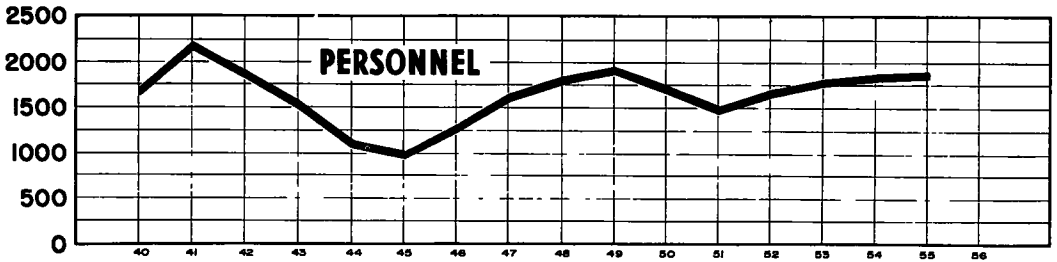
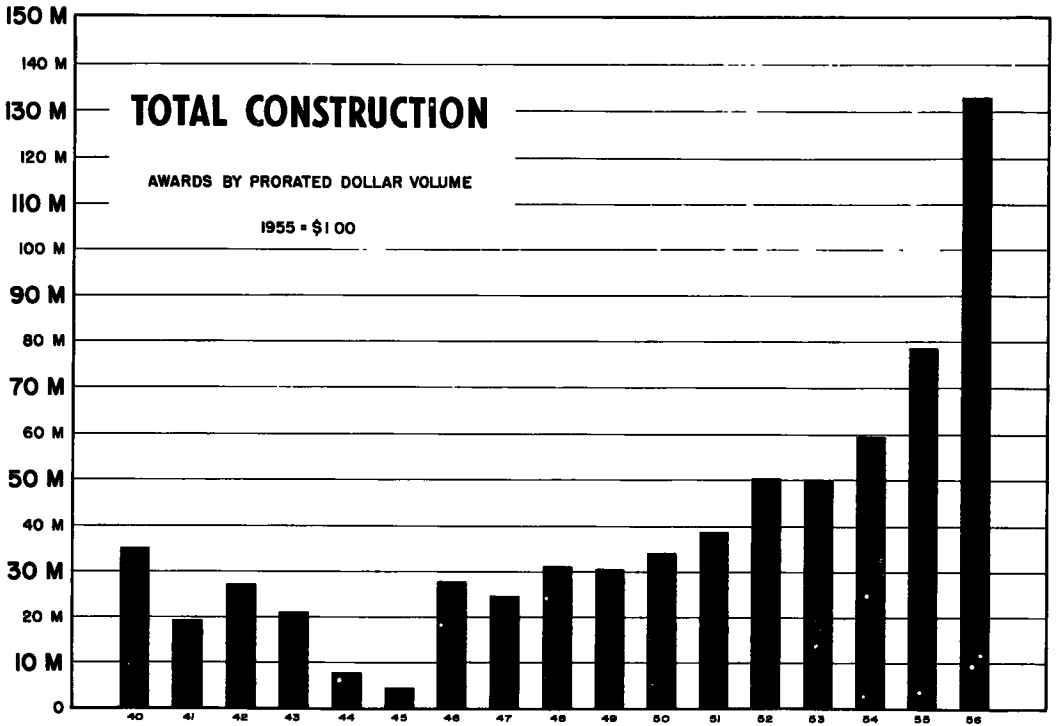


Figure 2.

have now advanced to the I level technical positions.

We now enter the third phase of our study of the engineering inventory trend situation. Recent studies still indicate that we will have great difficulty in staffing the programs which will face us in the next five years.

Our programs at the present time indicate 150 million dollars in actual construction in 1956 and increasing amounts through 1960. We are now turning to the problem of staffing this work.

Figure 2 shows the amount of construction completed by years from 1940 to 1955 with the number of personnel in the engineering divisions who handled this work year by year. This chart is based on the 1955 dollar and prorated back to 1940 on the basis of information prepared for the Michigan Legislative Study Committee by the Automotive Safety Foundation. In other words, in 1940 we accomplished approximately 20 million dollars worth of construction work, which shows on the chart as 33 million due to the difference in the dollar value, with approximately 1,750 employees in the highway department, excluding our Maintenance and State Ferry organizations. In 1955 we accomplished 78 million dollars worth of construction work with nearly the same number of employees, indicating an increase of approximately 45 million dollars. This would indicate that more than twice the amount of work was done in 1955 with about the same number of employees as in 1940. We believe there are three reasons for this:

1. Our design rooms and field forces have been on overtime schedules for the last five years. The employees in the design rooms are paid for this overtime and our inspectors in the field have been paid overtime for the past year.

2. Our project engineers in 1940 may have handled one project whereas they are now handling several. Inspectors have increased their responsibilities so that we have coverage over more phases of work from one inspector than in the past.

3. A much greater work load has been assumed by all of the employees engaged in the various activities of these divisions, and greater efficiency has been developed in the employee groups in our engineering divisions through training.

Figure 3 shows the dollar value of plan programs completed by year from 1940 to 1955 and programmed work for 1956. This chart is also based on the 1955 dollar and also shows that we have had to turn to consultants for a great deal of our plan work. In

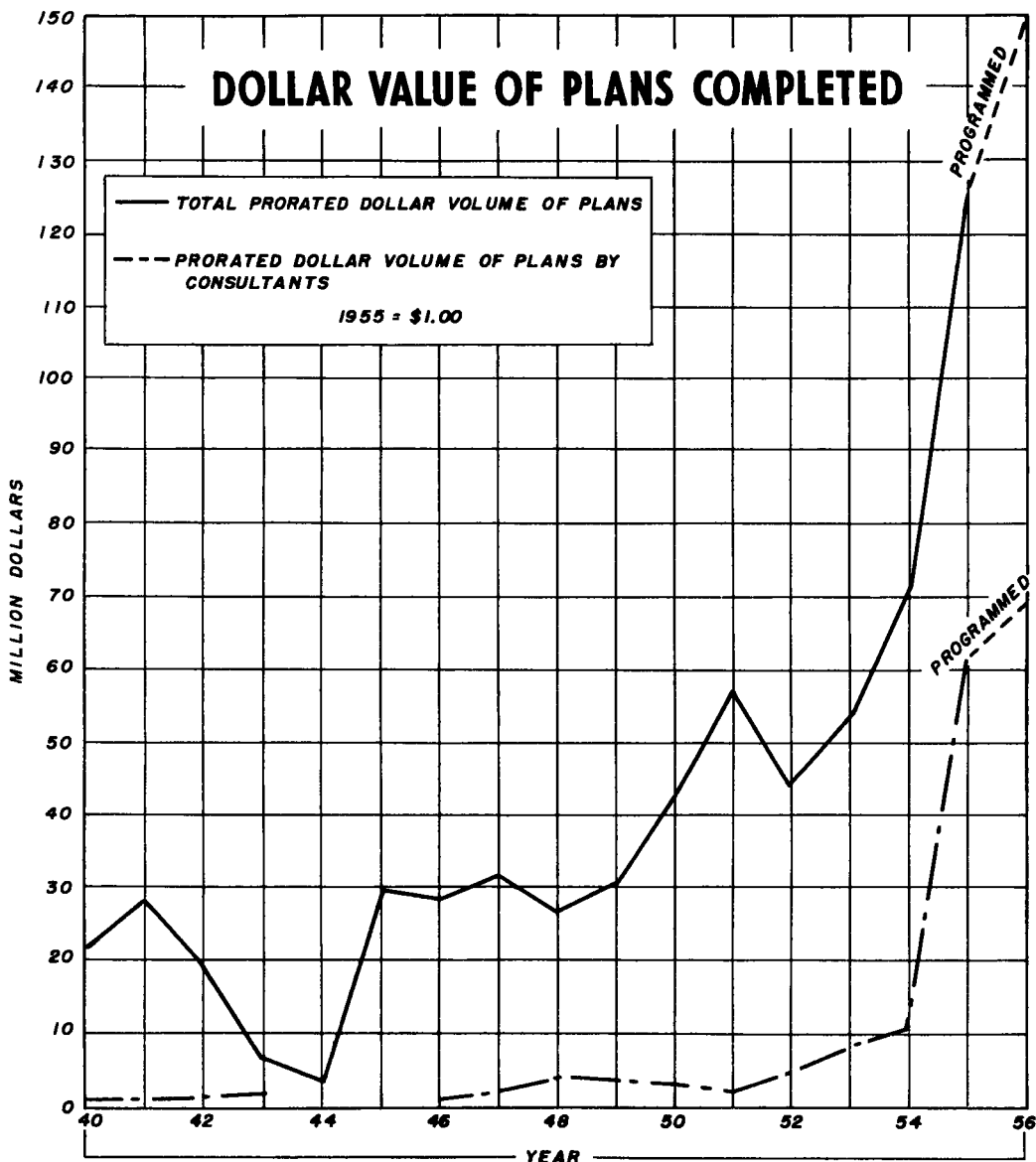


Figure 3.



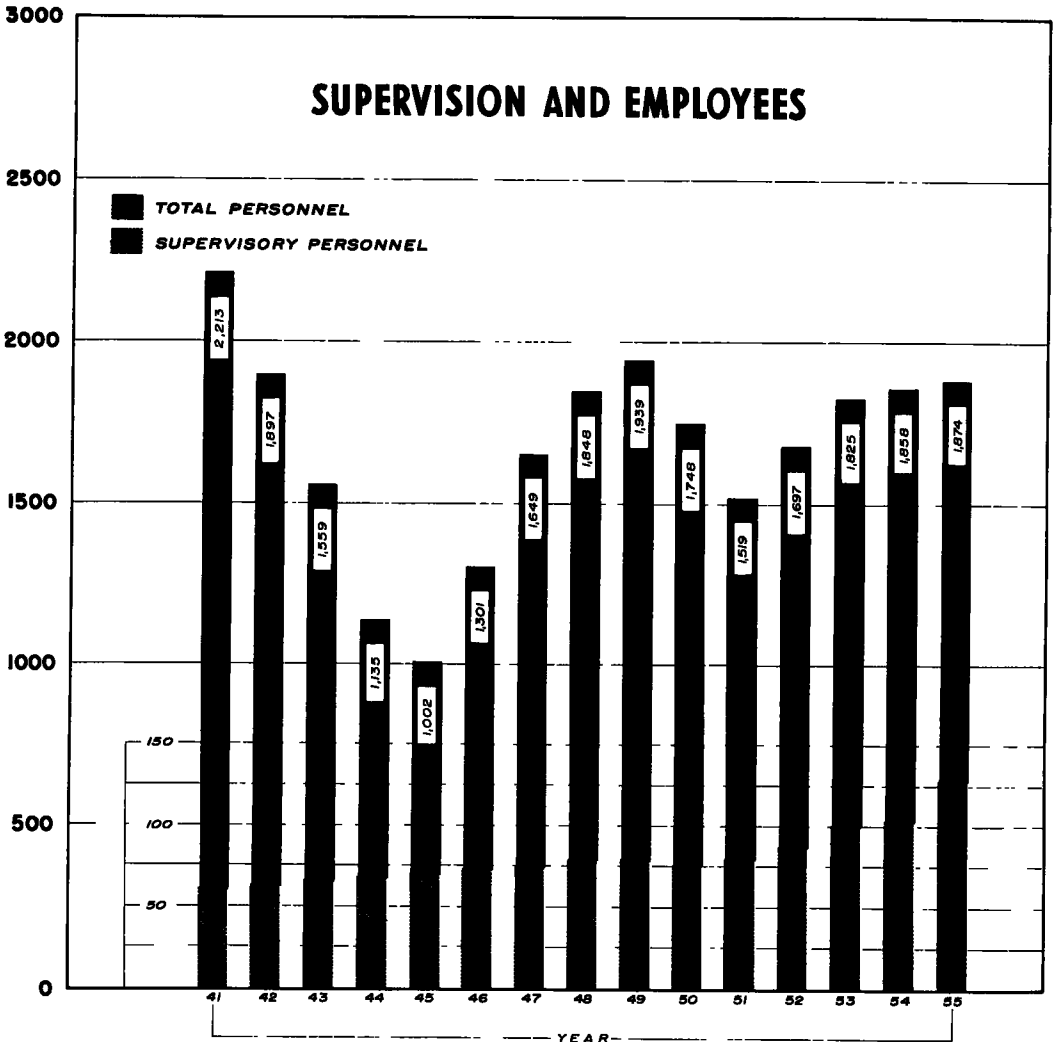


Figure 4.

1954, we had 10 million dollars in plan work assigned to consulting engineers whereas in 1955 consultants handled a little over 60 million dollars of plan work. It is estimated that in 1956 they will handle approximately 70 million dollars worth of plan work. This chart also shows that a little more than 20 million dollars of plan work was handled by the employees in the department in 1940 whereas approximately 65 million dollars worth of plan work was handled by practically the same number of employees in 1955.

Figure 4 shows the total personnel, again excluding Maintenance and State Ferry organizations, as against the supervisory personnel from 1941 through 1955. It is interesting to note that with a greater number of employees in 1941 the supervisory group is much lower than with fewer employees in 1955. The supervisory group represents the IV level classification and above or engineering administrative positions in the Michigan Highway Department.

In order to meet this increased work load in the department several steps are being taken at the present time. The Highway Department in cooperation with the Civil Service Commission is setting up a technical series of classifications in three of our major engineering functions; route planning, construction and drafting. The technical series will tap a group of approximately 150 employees in the department who have had a number of years of experience from the II to IIIa levels but have never been able to qualify

for the special engineering rates due to the fact that they have not become registered or are not college graduates. By setting up these technical series an outlet will be provided for these men to advance and at any time they can pass the college level engineering test they can be reallocated to the engineering classifications with the special engineering salaries; or at any time they pass the state registration examination they can be reallocated to the IV level and above, or the higher level engineering classifications (see Figure 5).

## Graphic Presentation of ENGINEER AND TECHNICIAN SALARY RANGES For Training and Regular Classifications

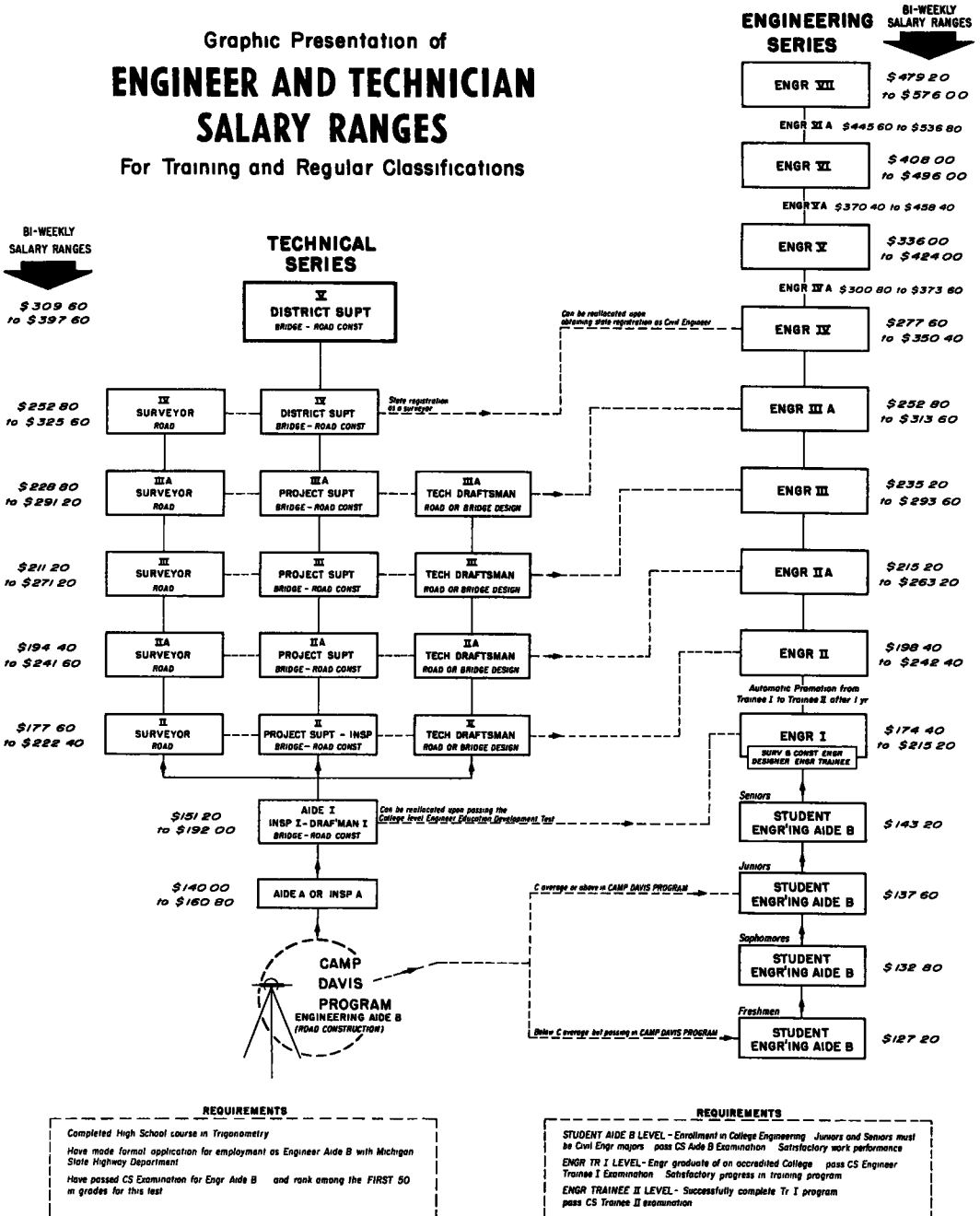


Figure 5.

We feel that this program will augment our engineering manpower at the higher levels in the department by utilizing the services of these technicians.

An analysis of our Construction Division indicates that even with larger projects being placed under construction we will need 28 additional project engineers for the coming construction season in order to staff the extra work. It also indicates that in order to staff these projects we will need about 50 additional instrumentmen or engineers and technicians at the I and II levels and about 70 additional inspectors. We are setting up in-service on-the-job training courses in which we are selecting 50 of our high school graduates at the Engineering Aide B level, both from the Camp Davis program and from other Engineering Aide B employees, and by placing them on actual instrument work through the winter months they will gain actual on-the-job training and be available for construction work next summer. These employees will be under close supervision this winter.

In the inspection group, we are picking an equal number of our older employees at the lower level and placing them on jobs where they will be subjected to actual inspection work in the hope that we can train enough of them to obtain coverage. In addition, we plan on holding schools in district areas for potential inspectors. In the instrumentman group, we are planning, if possible, to enlist the assistance of one of the engineering professors at the University of Michigan to add to our on-the-job training program with certain technical phases that the employee should have as a background to do instrument work.

In the past we have confined our recruiting to Michigan engineering colleges and have now taken steps to contact all of the engineering colleges in the central United States and plan, as other states are doing, to arrange either group or individual meetings with the graduates in order to extend information on our programs and fringe benefits to them with the hope that we may step up our present training program as far as recruitment is concerned.

Although we in Michigan have tried to keep abreast of the expanding construction programs by constantly studying salary schedules in effect in private industry and other states and by recruiting, training and developing our non-engineering employees, the problem of staffing the various phases of our work with engineers and technicians is difficult and becomes more difficult as time goes on. With increased construction programs, contractors are turning more and more to engineers to handle many phases of their work and although the services of these engineers are not lost to the highway industry, when they go to the contractors it does create a problem in the Highway Department to replace them.

We are also in the process of making a survey as to the possibility of use of electronic equipment in the field of contract programming and contract computations. Material of this nature might release engineers who are doing this work manually at the present time for other phases of engineering work. This is only in the preliminary study stage at this time.

As time goes on the problems of staffing our state highway departments' increased plan work and expanding construction work will become more difficult and many problems will arise. Knowing that highway construction will expand through necessity, we believe our biggest job will be proper and efficient staffing.

We must interest young people in highway engineering and help them through in-service training and education. The interest and cooperation of civil engineers and educators in our major colleges will go a long way toward accomplishing this goal.