

The Highway Career Plan in Michigan

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The Michigan State Highway Department has since 1949 carried on an engineering training program called "The Highway Career Plan," which we feel has been very successful in recruiting and retaining engineers for our increasing highway program. A total of 111 graduate engineers have entered this program up to January 1, 1953 with 87 of this total still with the department. Most of those who did not stay with the department were from the first class in 1949. Of those entering the program since August 1, 1950, only two have resigned from our employment.

We experienced the same problem and difficulty in recruiting and holding engineers that most all highway departments were faced with after the war, and especially in 1949 and 1950, in the face of competition from industry and other sources. All personnel in state employment in Michigan is under the jurisdiction of the Civil Service Commission which was established by constitutional amendment. Classification of positions and salaries are under their control. The Civil Service Commission has been very cooperative in reviewing engineering salaries and there have been a number of increases which have helped the situation, but salaries paid by industry are still generally higher than our established rates.

ENGINEERING STUDENT PLAN

In order to attract graduates from engineering schools in Michigan, the State Highway Department, in cooperation with the Civil Service Commission, worked out the highway career plan or trainee program. This program begins with a student plan, under which engineering students may obtain engineering work with the State Highway Department during their summer vacations. Freshmen enter this plan at \$218 per month, sophomores at \$224, juniors at \$240. They are required to pass a Highway Engineering Aid B civil service examination and are placed in bridge or road construction crews, road survey parties or assist in aggregate inspection under the Testing and Research Division. If their assignments take them away from

home, they are allowed an additional four dollars per diem expense. This student plan has been helpful in encouraging engineering students to become interested in highway engineering, to complete their college courses and later obtain employment with the State Highway Department, county road commissions or municipalities.

GRADUATE ENGINEER PLAN

The graduate engineer plan under the trainee program begins after the engineer has completed his engineering course. He is required to pass a civil service Engineer Trainee I examination and his starting salary is \$334 per month plus the four dollars per diem additional expense allowance when away from home on assignments. The trainee program consists of one year of extensive rotational on-the-job practical work. It is emphasized to the trainee that he already has the ability and capabilities of the graduate engineer and needs only obtain practical work experience and knowledge of highway organization and operation. To accomplish this he is assigned in seven separate functional sections of the department during his first year. Each cycle lasts seven weeks and the trainee performs the same duties as is expected of other employees of the squad or party. These duties are varied or rotated as much as possible by his immediate supervisor thus broadening his experience. It also enables his supervisor to determine his outstanding characteristics and abilities. A performance rating is given in each assignment. This covers job intelligence which includes a variable number of work items that are applicable to the individual section concerned. It also includes job aptitude ratings which cover work quantity, work quality, work attitude and work habits.

GENERAL SCHEDULE OF ASSIGNMENTS

There is no standard procedure for handling the trainee in the different operating sections. Each has devised its own method in utilizing the services of the trainee during the seven weeks of his assignment. In general the following practices are observed.

Bridge Construction. 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 progress, the trainee is given an opportunity to perform the various duties or jobs encountered. No set plan is followed and the 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 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 and without too many changes.

Road Construction. Similar to the set-up in bridge construction.

Road Design. Trainees are assigned to a squad of their own under the immediate supervision of an experienced squad leader. A third or fourth priority job is developed from beginning to end, allowing approximately one plan sheet per man. A progress schedule is maintained covering all common items in the complete production of a set of road plans. Seven weeks is just sufficient time to complete the above layout satisfactorily.

Road Surveys. An all trainee survey party functions on survey assignments under the immediate supervision of a regular survey chief. An effort is made to keep job assignments typical, and members of the party rotate performing the various duties. The only special consideration given this party over other survey parties is that job progress schedules are more elastic.

Maintenance. A trainee is transferred to maintenance and assigned to two different type districts during his seven week period. In each district he gains experience by working in a garage as helper on varied operations such as equipment repair, servicing, material inspection, checking and reports. He then works with a field crew on tree trimming, gravel re-surfacing, ditching, patching, crack filling, snow and ice removal blading and other maintenance crew activities. In the sign shop he becomes familiar with size, shape and type of signs and paint material used. He spends some time with county maintenance superintendents on general organization and administration. About one week is spent in one of the district offices to get the overall picture of maintenance operations.

Planning and Traffic. A combination of group schooling, special problems and individual practical training in the various sections of this division, constitute the course in the Planning and Traffic Division. Two weeks are spent in the field with a district Planning and Traffic Engineer.

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 soundings, borrow surveys, soil survey reports, grade check of plans for soil and drainage design and problems, sub-grade 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. Thus there are eight classifications of work assignments, which allows some flexibility in assigning the trainee for the seven cycles of his one year training period.

At the end of the year covering the seven cycles of various departmental assignments the trainee is eligible for an Engineer Trainee II rating which begins at \$355 per month and by step increases over an eighteen month period rises to \$379 per month. He must pass the civil service Engineer Trainee II examination. Depending upon his aptitudes, his interest and personal desires he is placed in one of the department divisions on regular assignment.

The salary range for the regular Engineer Class II is from \$379 per month with step increases over a four year period, automatically received for satisfactory work performance, to \$443 per month. Future promotions of course are dependent on the individual's ability, his initiative and his attitude toward his work. Table I illustrates various engineering classifications up to and including Class VII.

RESULTS

As pointed out in the beginning of this discussion, the department up to January 1, 1953, has gained 87 engineers, as a result of this program. The bulk of these men have expressed a preference for road and bridge design or construction, although 15 of them are working in other divisions such as planning and traffic, maintenance, testing and research and on special assignments. The largest number of resignations from the trainee program were from the first class and occurred mostly in 1950 and 1951 when there was such a rapid increase in salaries offered by industry and others, and our Civil Service salary rates had not been raised.

The Michigan State Highway Department has also over a period of many years with the cooperation of our engineering schools, sent representatives to meet with the various classes to explain the highway engineering work and possibilities of a career in that field. The establishment of the trainee program has been very helpful in interesting the young men in engineering schools in a highway engineering career.

PLAN FOR HIGH SCHOOL GRADUATES

A further step in this direction was taken this year as a result of an offer from the University of Michigan to set aside one eight week period at its Camp Davis Surveying summer school at Jackson, Wyoming, for qualified high school graduates. The Michigan State Highway Department and the Michigan Road Builders Association cooperated with the University of Michigan in working out this plan. High school graduates who have completed a course in trigonometry and are able to meet entrance requirements at the University of Michigan Department of Civil Engineering, are required to pass a Michigan Civil Service Examination for Engineering Aide B, to qualify for the summer school.

The Michigan Road Builders Association is providing a grant in the amount of \$100 for each applicant accepted for this summer surveying camp, which represents approximately one-half of the minimum cost for eight weeks maintenance, tuition and transportation to and from the camp at Jackson, Wyoming. There has been an excellent response and it is anticipated that the enrollment will be filled for the first school this coming summer. Enrollment and completion of this summer surveying course will enable the student to start work with the Michigan State Highway Department under the student plan during summer months at a salary of \$240 per month rather than the normal beginning student plan salary of \$218 per month. Students who complete this summer surveying camp program and then decide to continue the study of civil engineering at the University of Michigan, when admitted, will be given credit for work successfully completed at the camp. Other engineering schools in Michigan are displaying interest in this summer surveying camp plan. We feel that this plan will interest many young men in following through with a highway engineering course in college and a future career.

EXPANDED HIGHWAY PROGRAM

In 1951, the legislature of the State of Michigan increased the gasoline taxes from three cents to four and one-half cents per gallon and increased the license fees and weight tax on certain classes of commercial trucks bringing in additional revenue for highway purposes. Together with the increases in revenues the legislature in Act 51, provided for the distribution of this motor vehicle highway fund to the State Highway Department, county road commissions and incorporated cities and villages. It also provided for the administration and expenditure of the revenues under the direction of the state highway commissioner. This legislation is one of the most outstanding in the country for the administration and control of state collected

revenues and the coordination of state highway department with the local agencies. This entire program was developed as a result of an intense engineering study of highway needs in Michigan under the auspices of the Good Roads Federation. The State Highway Department, county road commissions, municipalities, Bureau of Public Roads, user groups and legislative representatives cooperated in carrying out this study and rendering the final report. All of this provided for an increased program of road and street construction in the state which required an increase in the engineering personnel of all agencies. Under conditions prevailing for the past several years with the extreme shortage of engineers and higher rates of pay offered by industry, we would not be able to carry out our stepped up highway programs without the help of the trainee program we have instituted. We feel we have developed a group of young engineers in our trainee program who will be capable of advancing in the department and provide us with future leaders in this field.

TABLE I
Former and New*
Monthly Salary Rates for Engineering Classes in the
Michigan State Classified Service

<i>Class Level</i>	<i>Rate</i>	<i>Beginning</i>	<i>End of 1 year</i>	<i>End of 18 Mos.</i>	<i>End of 2 yrs.</i>	<i>End of 3 yrs.</i>	<i>End of 4 yrs.</i>
I.	Old	300	320	330	340	350	360
	New	334	355	366	377	387	398
II	Old	345	365	375	385	395	405
	New	379	401	411	422	433	443
IIa	Old	375	395	405	415	425	435
	New	411	433	443	454	465	475
III	Old	415	445	460	475	490	505
	New	452	484	500	516	532	548
IIIa	Old	450	480	495	510	525	540
	New	486	519	535	551	567	583
IV	Old	500	530	545	560	575	590
	New	540	572	588	604	620	636
IVa	Old	545	575	590	605	620	635
	New	588	620	636	652	668	684
V	Old	605	655	680	705	730	755
	New	652	706	733	759	786	813
Va	Old	670	720	745	770	795	820
	New	722	775	802	829	856	882
VI	Old	740	790	815	840	865	890
	New	797	850	877	904	931	957
VII	Old	875	925	950	975	1000	1025
	New	941	995	1021	1048	1075	1102

* Adopted by Civil Service Commission December 13, 1951. Effective January 13, 1952.