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UNITED NATIONS ECONOMIC COMMISSION FOR AFRICA



LEARNING HAS NO END

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Conference on Highway Engineering in Africa - Addis Ababa April 1974

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the Economic Commission for Africa
with the co-operation of
the British and French Governments

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by

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ABSTRACT

The Ministry of Works is the largest employer of engineers of all disciplines in Kenya and the paper outlines the practical post-graduate training, which covers a period of three years, required by civil engineers intending to join the Roads Department of the Ministry. The training includes attachment to a civil engineering contractor and a consulting firm, with shorter periods spent in the Design and Materials Sections of the Road Department.

To provide sufficient skilled technicians, the Ministry of Works sponsors courses in surveying, draughtsmanship and photogrammetry at the Kenya Polytechnic. The latter course includes periods at the Survey of Kenya and at the Swiss School of Photogrammetric Operators.

In-service training is provided for overseas, foremen, inspectors and superintendents. In addition, courses for inspectors and superintendents that concentrate on administration and supervision are organised at the Staff Training Centre of the Ministry, where training is also provided for plant operators and motor mechanics.

"Learning has no End"

Training of Engineers

The training of Engineers in Kenya came into full swing in 1956 when the then Royal College, Nairobi, started offering a five year Diploma Course in Engineering. Prior to that date there were hardly any Kenyans being trained overseas, mainly because the Government of the day was not very keen in sponsoring the training of Africans in the Engineering profession. The then colonial government relied on filling the Engineering posts with expatriates who were in the colonial civil service.

There were, however, a few adventurous Kenyans who went overseas in quest of Engineering Education. Some went to Britain, Canada and America. Others went to India and some to western and eastern countries of Europe. There is now a considerable number of these Kenyans who have been trickling back and joining the public service during the last six - seven years.

The Nairobi University was, until 1970, a constituent College of the University of East Africa and was the only College which was offering a three year course on Engineering Education up to B.Sc level in East Africa. The student population from Kenya was therefore relatively small. The student population from Kenya changed very favourably when Nairobi University College became a full University in 1970, when the majority of seats were taken by Kenyans. To date the student composition in the faculty of Engineering from Kenya is 125 Civils, 90 Electricals, 125 Mechanical and 27 Surveying and Photogrammetry.

The Ministry of Works is the biggest employer of Engineers of all disciplines. The majority of these Engineers are expatriates who are recruited through Technical Assistance from countries such as Britain, Norway, Holland and France. The Ministry is fully aware that to be in possession of a Degree or Diploma is like having a key which opens into the Engineering profession. To be able to practice and be accepted as a professional Engineer, the degree holder must of necessity acquire practical experience in whatever discipline he has been trained in. The Ministry therefore lays emphasis on post-University practical training as an essential pre-requisite before an individual can be entrusted with the use of the title of a professional Engineer.

It is important to bear in mind that Kenya is a relatively young country and has very few industries where young graduates can gather practical experience. The few established industries cannot absorb all the graduates for the purpose of training let alone the problem of having sufficient numbers of experienced Engineers who could give effective supervision to the young Engineers. To close this gap, however, the Ministry of Works has produced a practical training programme which goes a long way in meeting the needs of each discipline. In so far as Civil Engineers are concerned, the programme entails the following:-

- (a) Attachment to a Civil Engineering Contractor who is working for the Ministry of Works for a period of one year immediately after leaving the University. This is followed by
- (b) Attachment to the Design Section of the Roads Department of the Ministry for a period of twelve months;
- (c) Attachment to the Materials Branch of the Ministry for about six months and
- (d) Attachment to a consulting firm which is working for the Roads Department of the Ministry of Works for about six months.

As mentioned earlier the above programme is mainly for Civil Engineers who are expected to join the Roads Department after three years of post-graduate training. In order to facilitate proper training, the Department prepared a list of tasks which each young Engineer is expected to perform during his attachment and the Contractor or Consulting Engineer is expected to put or allocate the same to such a trainee. The Site Agent or the Supervisor of training is expected to submit his comments to the Ministry indicating whether the trainee managed to cover all or which tasks, and whether the trainee did apply himself as judiciously as is expected of a potential professional Engineer. The system is working very well.

The Ministry of works has also been lucky in having some of its Engineers attached to training programmes organised by the Confederation of British Industries through the British Council. Although the CDI programmes are not as varied as the ones obtaining in the Ministry, it is worth recording that they are taking the load off our shoulders in so far as training in Design is concerned and for which the Ministry is most grateful. The training of Electrical and Mechanical Engineers is also adequately organised. The Ministry has hitherto relied on attaching its Pupil Engineers to certain firms in Great Britain through the Assistance of the British Council.

It is hoped that as the number so trained gets bigger and bigger each year, the Ministry will have a sufficient number of Engineers who in turn will assist in training the younger generations that will follow later.

Training of Technicians

It is generally recognised that the effectiveness of a Professional Engineer cannot be appreciated unless he is adequately supported by a core of skilled technicians. The Ministry of Works has been live to this fact and has each year sponsored students to take courses in Surveying, Photogrammetry, Draughtsman and Civil Engineering that lead to technician grades which are obtaining at the Kenya Polytechnic.

The minimum academic requirement for acceptance for the above courses is Cambridge School Certificate (Division I & II) or its equivalent with credits in English, Mathematics and one approved Science subject (Physics, Chemistry or Physics with Chemistry). The training vacancies are advertised in the local newspapers, prior arrangements having been made with the Public Service Commission, the Kenya Polytechnic and occasionally with the Survey of Kenya. The training of Photogrammetrists which is of recent origin has consisted of short courses at the Survey of Kenya in cartography and elementary operating procedures. This is then followed by further training at the Swiss School of Photogrammetric Operators.

Surveyors

The training of Surveyors consists of a three year course including a period of 16 months of in-service training between the first and Final Year of the Technician Diploma Course for Land Surveyors at the Kenya Polytechnic.

At the end of the First Year an examination is held and success at this ensures his return to the Polytechnic for the Final Year.

Failures or referred candidates at this stage are not eligible for advancement and must obtain a clear pass in all or the referred subjects at the next examination before they are eligible to proceed with the Final Year.

The In-service training period is spent in the field as a member of a Survey Unit under the control of an experienced Surveyor and where he is expected to apply the technical skills he has already acquired.

Successful completion of the Course and passing of the Final Examination entitles the candidate to admittance to Technical Assistant (Survey) Grade II.

Draughtsmen

This is an eight terms Course at the Kenya Polytechnic leading to an Ordinary Diploma in Civil Engineering.

The eight terms are spread over a period of $2\frac{1}{2}$ to 3 years on a 'sandwich' basis and an Intermediate Examination is held at the appropriate time.

Successful completion of this course and passing the final Diploma Examination entitles the candidate to promotion to Draughtsman Grade.

Photogrammetrists

This training covers a period of 3 years and combines short courses at the Survey of Kenya and/or the Swiss School of Photogrammetric Operators with practical in-service training. Successful completion of the first year entitles the candidate to advancement in salary and grade and final completion of training and the passing of a departmental examination ensures promotion to Photogrammetrist Grade II.

It should be mentioned that the Diploma Course in Land Surveying at the Kenya Polytechnic was instituted in 1969/70. Prior to this date the Survey trainees gained advancement through Departmental Occupational Tests. Some of the earlier Draughtsmen trainees obtained advancement in a similar manner and made effective contribution in the Department.

Whilst the earlier years of training were somewhat ill-defined and some of the courses offered at the Kenya Polytechnic were not entirely suitable to the Roads Department, these anomalies have now largely been rectified through negotiations with all concerned in training. At the present time, the Courses which are attended by the Foreman Roads, Survey, Draughtsmen and Photogrammetrist Trainees are both suitable and adequate and the progression through the training period clearly defined.

The examination results at Intermediate level, covering the intakes of trainees from 1969 indicate a great improvement over the earlier period and this is also expected to be reflected in the Final Examinations, the first of which will be at the end of 1973.

From 1963 to 1973 the number of survey trainees engaged was 24 and the total number of possible passes to date, either through the route of Occupational Tests or the Diploma Course at the Polytechnic, is 12 out of which we have obtained 8 passes (67%). The number of Foremen trainees who have attended the modified Civil Engineering Course has now reached 29 and the first batch of intake is expected to join the public service at the end of this year.

For Draughtsmen the number are 16 trainees engaged with 11 passes (69%)

The main problem that has been facing the Ministry in so far as Draughtsmen and Surveyors are concerned is the high rate of loss of trained officers occasioned by better financial opportunities outside the public service.

Road Supervisors

The training of Civil Engineering Technicians has been carried out from two main approaches. There is one group that follows a three year Diploma Course at the Kenya Polytechnic which the entry qualifications are credit in Mathematics, English and one Science subject in East African Certificate of Education. The course consists of five full terms at the Kenya Polytechnic and three terms of related practical training in the Provinces. Until three years ago the course was based on City and Guilds Overseas syllabi. The course was considered more biased in favour of Building Technician and irrelevant in many cases to Roads but after hard bargaining with the Kenya Polytechnic authorities, it was agreed to organise a separate Civil Engineering course to suit Roads, Materials and Water Engineering needs. The Kenya Polytechnic agreed to issue its own certificate for this course and it is worth noting that the East African Examination Council has agreed to be the examining body for this course. During their field attachment, they are expected to work under the general supervision of Inspector or an officer of higher rank but their practical work is monitored by Instructors from Staff Training Department of the Ministry.

The other group consists of in-service training of overseers, foremen, Inspectors and Superintendents. It was originally intended to make the overseers and foremen courses promotional but this move has not yet been finalised. The courses offered cover basic gravel and bitumen Road Maintenance, Drainage, use of plant and simple calculation at Overseer level and soil mechanics, surveying, planning and programming and report writing at Foremen level. It is an unwritten practice to take cognisance of courses attended before consideration for promotion from Overseer to Foreman or from Foreman to Inspector is given. Satisfactory performance at these courses serves therefore as a carrot for future promotion.

It may also be noted that courses for Inspectors and Superintendents are also being organised at the Staff Training Centre of the Ministry. At this level of grades, emphasis is put on the administrative and supervisory aspect of the work rather than on the technical side.

There are other types of training associated with Roads that are also being conducted at the Staff Training Department. These include the training of Plant Operators in order to make them more proficient and also the training of Motor Vehicle Mechanics who are in possession of Trade Test Grade III and II from the Ministry of Labour. The participants in this exercise are recruited from within the establishment of the Ministry.

It may be said in conclusion that the Ministry of Works Roads Department, intends to press on with the training programmes of both professionals and sub-professionals so that a greater degree of proficiency can be attained.