GOVERNMENT OF MADRAS.

EDUCATIONAL DEPARTMENT.

Read—the following paper:—

From the Honourable Mr. D. DUNCAN, M.A., D.Sc., Director of Public Instruction, to the Chief Secretary to Government, dated Madras, 14th May 1895, No. 5715.

I have the honour to submit, for the information of Government, a copy of my Proceedings, No. 5670, dated 13th instant, reviewing the report on the College of Engineering for the calendar year 1894. The reports of the individual Examiners, a copy of Mr. Chatterton's explanation as to his omission to give instruction in "Roads and Railway construction," and the note relating to the recruitment and prospects of military students referred to by the Board of Examiners, are enclosed for reference and favour of return.

Enclosures.

Proceedings of the Director of Public Instruction, dated 13th May 1895, No. 5670.

From the Acting Principal, College of Engineering, Madras, to the Director of Public Instruction, dated 25th March 1895, No. 1250-C.

I have the honour to submit the following review of the working of the College of Engineering during the year 1894. A supplemental report will be forwarded in April next so as to complete the review for the official year. The matter contained in the supplemental report of April 1894 is included in the present report.

2. *Establishment.*—Mr. A. Chatterton, who was temporarily transferred to the Public Works Department for a period of two years, rejoined the College on the 15th January 1894. Mr. E. W. Middlemast having been appointed to act as Principal of the Kumbakónam College, was relieved by M.R.Ry. B. Hanumanta Row from that College on 15th February. Major H. D. Love, R.E., who proceeded on furlough to Europe, was succeeded by Lieutenant-Colonel A. W. Smart, R.E., from the Public Works Department, on 31st March. Mr. Chatterton having availed himself of two months' privilege leave to England from 10th May, was in addition permitted to spend an extra month there, on special duty, in inspecting important Workshops and Engineering Laboratories; he returned to duty on 8th August. M.R.Ry. A. Krishnama Chari, Assistant in Vernacular, who had been for about thirteen years Tamil and Telugu Munshi to the Military Probationers' class then stationed at Bangalore, retired on the 1st June on a superannuation pension, after a service of about 21 years, and was succeeded by M.R.Ry. M. Parthasarathi Aiyangar, B.A., from the Educational Department, who took up his appointment on the 1st July. Two new appointments were sanctioned in connection with the College Workshops, viz., an Instructor and Assistant Instructor. Mr. J. P. Perkins from the Perambúr Workshops was given the former post on probation, the salary for the time being fixed at

Rs. 100; T. N. Govindaswami Row, Instructor in Carpentry and Fitting, was promoted to the new post of Assistant Instructor, Workshops, R. Ramaswami Nayakar from the Perambúr Workshops taking his place as Instructor in Carpentry and Fitting. The dates of these appointments were as follows: Mr. J. P. Perkins, Instructor, from 18th August; Govindaswami Row, Assistant Instructor, from 16th October; Ramaswami Nayakar from 23rd October. A stoker on Rs. 10 was also appointed. The Acting Principal, Lieutenant-Colonel Smart, R.E., having gone home on furlough in November, I assumed charge of his duties from 6th of that month.

3. *Numbers.*—The numbers on the rolls at the end of the Session were :—

Class.	Practical Course.		In College.			Total.
	Second year.	First year.	First Division.	Second Division.	Third Division.	
Engineer classes	4	3	4	7	6	24
Engineer Subordinate class	10	25	31	23	22	111
Military probationers	..	..	..	..	..	3
Draftsman class	..	..	39	34	..	73
Surveyor class	..	..	32	25	..	57
Artisan class	..	..	..	..	..	39
Total ..	..	..	..	..	..	307

Excluding the students going through the practical courses in Workshops and on works, the total number actually in the College on the 31st December was 265. The corresponding totals for the four preceding years were—1893, 252; 1892, 217; 1891, 189; 1890, 136.

The numbers arranged by classes of the community were :—

Europeans and Eurasians	13
Brahmans	141
Other Hindus	87
Native Christians	15
Mussalmans	7
Others	2
Total ...	265

The following statement shows the distribution of the different sections of the community among the college classes :—

Class.	Europeans and Eurasians.	Brahmans.	Other Hindus.	Native Christians.	Mussalmans.	Others.	Total.
Engineer classes	1	13	2	1	..	..	17
Engineer Subordinate classes	8	53	11	2	..	2	76
Military probationers	3	..	..	..	..	..	3
Draftsman class	..	24	39	7	3	..	73
Surveyor class	1	44	10	..	2	..	57
Artisan class	..	7	25	5	2	..	39
Total ..	13	141	87	15	7	2	265

The numbers offering for admission were: Engineer class 16, of whom 8 passed the entrance examination of December 1894; Engineer Subordinate class 26, of whom 25 qualified in April 1894 for admission; Draftsman and Surveyor classes 62 and 43, of whom 38 and 30 qualified in December 1894; Artisan class, 135 for 40 vacancies. By the middle of 1895, when another batch of Engineer Subordinate students will join, the numbers in the college will probably reach 245.

Students of the Surveyor and Draftsman classes have been this year for the first time admitted by competitive examination, instead of by selection. It is hoped that the result of this fresh departure will be (1) the entry of students of higher intellectual

ability and (2) a noticeable increase in the number who obtain first and second class certificates.

4. The final and term examinations of all the classes were conducted in December 1894 by the Board of Examiners appointed by Government, Mr. F. W Ashpitel being President.

5. The results of these examinations are as follows :—

(*a*) *The Engineer classes.*—The first division contained only three students, of whom one who appeared as an independent candidate failed to pass; the other two both did well, S. A. Jagadisa Aiyar with 2,089 marks securing first place; Natesa Aiyar being only 165 marks behind; full marks obtainable, 3,000. Jagadisa Aiyar secures the gold medal and Narayana Oonythan prize, while Natesa Aiyar obtains a prize in Surveying.

The second and third divisions consisting of 7 and 6 students, respectively, passed the usual term examinations. P. V. Manicka Nayakar of the second division and S. Bhaskara Aiyar of the third division retain their scholarships, Rs. 30 each.

(*b*) *The Engineer Subordinate class.*—In the senior division of 31 students who competed, 19 were successful, and they have since joined the Public Works Workshops for their year's course there.

Two independent candidates presented themselves for the examination, and both were successful.

The second and third divisions consisting of 23 and 22 students, respectively, went through the usual term examinations, the results of which compare favourably with preceding years.

In the senior division, J. S. Muttayya gains the silver medal and Rogers' prize, and prizes in other subjects. The prize for Vernacular is won by A. Krishna Pillai, and prizes for Drawing and for workshop practice by Sergeant R. Cuthbert.

The two scholarships of Rs. 12–8–0 available for the second division are awarded to V. K. Kuppuswami Aiyar and S. Natesa Aiyar; and the two for the third division, to K. Panchanatha Aiyar and A. R. Subrahmanya Aiyar.

(*c*) *The Draftsman class.*—The senior division consisted of 34 students; of this number only 10 gained certificates, all in the third class. Of the 21 students who failed, 18 were disqualified in Estimating, a subject of the very greatest importance and yet out of which the entire class not excepting those who qualified showed themselves deplorably ignorant; two were disqualified by the Board of Examiners for unfair practices; and one was absent.

The student occupying the first place is A. Kuppuswami Aiyangar, who, with 66 per cent. of the total marks, gains the college bronze medal, and the prize for general proficiency. The second student A. V. Rajabathar Mudaliar secures 65 per cent. of the marks and receives a prize.

Twenty-seven independent candidates presented themselves for examination for certificates. One passed in the first class and three in the third class.

The second division of the Draftsman class contained 34 students, of whom two did not appear for the examination. S. Sandanam Pillai and V. M. Duraiswami Mudaliar secure the two scholarships of Rs. 8 each. Three of the students failed to obtain the requisite minimum in *Geometrical Drawing*.

(*d*) *Surveyor class.*—The senior division consisted of 25 students; of these 20 were successful at the examination held in December 1894,—six obtaining second-class and fourteen third-class certificates,—four failed, and one was disqualified by the Board of Examiners for unfair practices.

The senior student is R. Natesa Aiyar with 71 per cent. of the total marks. He gains the college bronze medal, and the prize for general proficiency. The second student with 70 per cent. of the total marks is also awarded a prize.

Eleven independent candidates presented themselves for examination, of whom three passed in the third class, and the rest failed.

The second division consisted of 25 students. V. Rangaswami Mudaliar and T. Venkoba Rau (of Periyár) gain the two scholarships of Rs. 8. Three students failed to obtain the requisite minimum in *Chain, Compass, and Plane Table Surveying.*

6. In the following table, a comparison is made of the marks gained in December 1894 by the senior division of each class with those gained in previous year; and these prove pretty clearly, so far as figures can prove it, that the Engineer, Engineer Subordinate and Surveyor classes are of very equal merit with the classes of preceding years. The Draftsman class shows a falling off, but this is due almost entirely to the very general failure in "Estimating," a subject of which the students as a body proved themselves hopelessly ignorant. The students who failed are of course eligible for examination next December, and it is to be hoped they will then, as independent candidates, secure certificates. It is not very easy to explain why there should have been so general a failure in this subject; it may be due in part to the sessions marks given in the college not being so high as usual. Estimating is, however, a subject, knowledge of which can be tested very satisfactorily by examination, and the results of the examination held by the Board merely confirm and support the correctness of the college marking.

Engineer class.	1894.	1893.	Average of four years previous to 1893.
Mathematics	70	75	55
Science	64	54	40
Engineering	68	71	55
Drawing	69	77	67
Surveying	75	68	67
Vernacular language	61	49	56
Drills and Exercises	69	84	80
Total	67	68	55
Engineer Subordinate Class.			
Mathematics	50	54	42
Engineering	53	55	46
Drawing	51	58	58
Surveying	54	49	61
Vernacular language	57	42	51
Drills and Exercises	66	75	81
Total	53	54	53
Draftsman Class.			
Practical Geometry	52	64	68
Freehand, Perspective and Model drawing	51	58	60
Building drawing	60	55	65
Machine drawing	44	68	55
Estimating	29	56	52
Topographical drawing	44	55	54
Gymnastics and drills	66	80	79
Total	48	60	60
Surveyor Class.			
Chain, Compass and Plane Table surveying	54	53	63
Levelling	66	64	63
Theodolite surveying	57	58	61
Topographical drawing	51	54	60
Gymnastics and drill	66	77	72
Total	57	58	62

7. Of the passed students of the college undergoing practical training, three out of the four who passed out of the Engineer class in December 1892 completed their full practical course; and the remaining student P. Ranganayakulu Nayudu will do so in May next, having been absent for about five months in the middle of his course through illness. The senior student G. S. Rama Aiyar secures the guaranteed appointment of Assistant Engineer. Of the thirteen Engineer subordinates who also passed out of the college in the year 1892, nine completed their full course, one died, and one being prevented by private reasons from joining the Public Works Workshops in January 1893 was specially permitted to join in January 1894. He is now undergoing practical training in a division. The remaining two and one independent candidates did not join for the practical course. Of the nine Engineer subordinates who secure the diploma, one military student has been appointed to the Public Works Department as an Overseer, first grade, six civil students, as Overseer, third grade, and two others as temporary Overseers. The three Engineer students (including one independent candidate) and 24 Engineer subordinates who qualified at the examinations of December 1893, together with the Engineer subordinate student of the batch of 1892 above mentioned, having successfully gone through the workshop course, have been posted to different divisions for practical instruction in actual work. All these students underwent for the first time in the history of the college a short course in riding at the Body Guard school. This training has been declared compulsory for all future Engineer and Engineer Subordinate students entering the Public Works Department.

8. *Military students.*—The total number of soldier students on 31st December 1894, was 13, viz., one on works, two in the Public Works Workshops, seven in the Engineer Subordinate classes, and three probationers. The question of abolishing the year of probation has again been raised by the Chief Engineer, Public Works Department, and it is now under the consideration of the Director of Public Instruction. It need not be dwelt on here.

9. *Artisan class.*—At the beginning of the year 40 out of 139 were admitted. The class at the close of the year consisted of 39 students; of whom 37 receive certificates. In November last 135 candidates applied for admission, 40 have been elected, and there are now 40 students in the class.

The applicants and those selected come from very much the same classes as those described in last year's report.

10. *Government Technical Examinations.*—Of the college regular students who voluntarily appeared for the Government Technical Examinations in Engineering subjects, twenty (20) passed the Intermediate examinations—nine in the first-class and eleven in the second. One of the old students of the college Artisan class passed the Elementary test in Mensuration in the second-class.

11. *Surveying.*—During February, the first and second divisions of the Engineer class, the first and second divisions of the Engineer Subordinate class and the senior division of the Surveyor class, comprising in all 98 students, were encamped at Guindy for a fortnight, engaged in surveying with the theodolite and on a railway project survey. In July the three divisions of the Engineer class, the second division of the Engineer Subordinate class, and the first division of the Survey class, in all 72 students, were encamped at Gúduvánchéri for one fortnight. The classes were divided into several parties and carried out a series of surveying and levelling operations. The cost of the two camps was Rs. 822.

I do not, as was done last year, give the total outturn of work, as this appears to me the very worst method of gauging the knowledge gained by the students. Given two qualified surveyors, the outturn of work within a fixed time might be a fair test of their qualifications, but with students who are virtually learning for the first time the use of the theodolite, the level, and the prismatic compass, it stands to reason the greater the outturn of work the greater the inaccuracy. In my opinion it is of the very first importance when teaching levelling or surveying to impress upon each student the absolute necessity of being accurate in his work, and this cannot be done unless time is available to do work carefully and consequently slowly. Rapidity in the manipulation of the several instruments can only come by practice; it cannot be

expected of students who are many of them handling their instruments for the first time. I cannot but think that the present custom of getting through in a fixed time a large amount of survey and levelling work, much of which work is very inaccurately done, leaves upon the minds of the majority of the students a general impression that "accuracy" is a very minor matter, rapidity being the first essential. Such men, in after-life, make inaccurate levellers and surveyors and thereby waste both the time and money of their employers. I have elsewhere reported as to the modifications I would recommend in the field work course.

12. *Inspection of works.*—The usual inspections of works were made during the year, and the students were given many opportunities of practically acquainting themselves with the manufactures of cement and of bricks, and with building work in general.

13. *College workshops and laboratory and experimental work.*—Early in the year Messrs. Massey and Co. completed the work of fitting up the steam-engine, the shafting and the machinery; and the shops were put under the Professor of Engineering.

A workshop instructor was not, however, appointed till September consequently the work done during the year was comparatively small. A new pattern of wood-working lathe was built, and a second one started, and a number of benches and miscellaneous fittings were made by the students assisted by the workshop staff. In June and July the Professor of Engineering was absent on special duty in England. In September the 100-ton testing machine arrived, but so far it has been of little benefit to any one, as its various parts still repose packed in their several cases. Much discussion has taken place about the most suitable site for this testing machine and the possible alterations which may be required in the workshops. I have recorded my views in this office letter No. 206 S., dated 18th December 1894, and need not therefore enter on the question here. Laboratory and experimental work was carried on as usual, but nothing requiring special mention was done.

14. *Students undergoing practical course.*—Mr. Ellis, the Superintendent of the workshops, reports as follows regarding the students attending those shops during the year under review:—

"On assuming charge of these shops, I stopped the students working at models and toys, such as small boxes, useless screw-cutting, nails, &c., and put them on to regular jobs to assist our workmen. In a very short time, I found how intelligence and education could compete with mere skilled labour. The students have all done good work; and I am glad to report that a laudable emulation came into force, and every work attempted was well done.

"2. In all the shops, the students readily undertook both light and heavy jobs, and there was no shirking.

"3. Their conduct, as far as came under my scrutiny, was generally good, and I had no insubordination; but on the contrary I always found a ready desire to give satisfaction and obedience to all orders."

The reports received through Superintending Engineers of the students undergoing practical work under Executive Engineers have been as usual satisfactory; details of the remarks made by the reporting officers are hardly necessary in this review, but these reports show that Executive Engineers are at much pains to give these students as varied an acquaintance with work as the character of the works in progress in the limits of the division will allow. In most divisions a course of levelling forms an important item of the instruction given.

15. The question of revising the rules and revising the syllabus is still under consideration. During the year under review a course of equitation has been introduced, and in future all students, while attending the workshops, will have in addition to go through a riding course at the Body Guard school; students failing to go through this course will not be eligible for the Public Works Department.

16. *College buildings.*—During the year, funds not being available, the several extensions and improvements contemplated were not carried out. The buildings were kept in repair, all works under this head being executed under the orders of the Consulting Architect.

17. *Physical training.*—Regular instruction was given in gymnastics and drill to all the students, except those of the Artisan class, the drills being conducted by the military students. Tennis was played as usual. Cricket and foot-ball seemed to be more in favour than in previous years, and this is evidenced by the fact that this year (1895) the students have unanimously agreed to pay a term subscription of Re. 1 per head for the support of these two games. The new cricket ground has been cleared of trees, but till money is allotted to meet the cost of levelling and making, the ground is of but little use for cricket, though it serves fairly well as a foot-ball field. The Director of Public Instruction has been separately addressed on this subject.

18. *Library and Reading-room.*—Since last year seventy volumes have been added; the total number of volumes now stands at 3,155. During the year 6,199 were issued —845 to the staff, and 5,354 to the students. The figures show that the library is well used.

A subscription of Re. 1 per term has now been laid down, and the management of the reading-room, as also of all games, has been placed in the hands of a committee of students with Mr. Hanumanta Row, Professor of Mathematics, as President, Mr. Goddard, Vice-President.

19. *Attendance and Conduct.*—The percentage of numbers present daily to numbers on the rolls was 94 for the Engineer and junior classes. The conduct of the students was generally very good throughout the year. The detection by the Board of Examiners of unfair practices on the part of two students of the Draftsman class and one of the Surveyor class has already been alluded to.

20. *B.C.E. Degree Examination.*—This examination in its old form and designation was held for the last time in January. The two students of the senior Engineer class in 1893 obtained second classes. One Mechanical Engineer student who had previously passed the B.C.E. (1892), appeared in Mechanical Engineering and obtained a second-class pass. Five independent candidates, former students, also presented themselves; three passed—one in the second class, and two in the third.

21. *Employment of passed students.*—Information in the great detail in which it was given last year is not at present available, but so far as can be ascertained, the large majority of passed students of the college appear to find little difficulty in getting employment. If the proposals for re-organizing the Conservancy department of the Public Works Department now under consideration are given effect to, there will be a very large demand for qualified surveyors, and also for men who have passed the Engineer Subordinate examination.

22. *Financial details.*—Detailed statements of the receipts and expenditure of the college during the calendar year 1894 are enclosed. The total expenditure of the year, including remuneration to Board of Examiners, exchange compensation allowance and scholarships, but excluding travelling allowance to Mr. Chatterton during deputation, capital cost of the new workshop machinery and cost of repairs to buildings, amounts to Rs. 67,407; and the income from fees, &c., to Rs. 13,817.

The net cost of educating each student, taking the total number of average attendances at 240 (viz., College department 16, School department 224), was therefore Rs. 223.

From the Board of Examiners, to the Director of Public Instruction, dated Madras, 20th January 1895.

We have the honour to forward, herewith, a list of marks obtained at the examinations recently held at the College of Engineering, with reports by the various Examiners which, for convenience, have been extracted to correspond with the divisions of subjects in the mark sheet. The general results, indicated by the reports received from Examiners, have also been tabulated, and, though the description given may possibly be open to question, in our opinion it indicates with tolerable accuracy the general impression regarding the examinations as a whole. You will notice that Mathematics are described as good, though it is necessary to observe that the military students do not show that they have profited much by the extra year's instruction

which they receive in this subject; Science and Engineering as fair; while the knowledge of Drawing and Survey, taking the College as a whole, appears to be indifferent. It may be said that the marks do not justify the word "bad" in so many cases, but we would point out the general failure in every class to make up a level book, the absolute want of accuracy in estimating, the untidy, inaccurate drawing, and are of opinion that when there is a general failure in the practical part of a subject, no other word than "bad" is applicable. In Estimating, for instance, with but few exceptions, there was a hopeless want of accuracy: paper after paper was examined in which the sub-heads were absolutely incorrect, and, as practical estimates, the answer papers submitted were worthless, though marks were obtained, as each sub-head was marked separately. In Levelling, again, a student could obtain a fair number of marks in spite of having failed to make up the extract from a field book correctly, but a Surveyor is not of much use if he does not know the A.B.C. of his work. The examination in Topographical Drawing was also very unsatisfactory, as it was perfectly evident that wholesale copying was the rule though only seven students were actually disqualified for this reason. The failure among Draftsmen is lamentable, but was unavoidable.

2. As each examination approaches a good deal is heard about setting papers common to several classes in order to reduce the expense, and the result appears to be that the efficiency of the test, which is the object of the examination, is in danger of being seriously impaired. Papers are set common to several large classes for whose examination there is not sufficient available space in the College, if each man is to be properly isolated. The result, especially in the drawing examinations, is wholesale copying which cannot be avoided so long as two men in the same class or working at the same paper, are seated at the same small table, and a student has only to look round to get a view of several other men's work. To remedy this state of affairs, either more space appears to be absolutely necessary or separate papers must be set for each class. Possibly the Senate House might be made available, but if the extra space cannot be provided, there seems to be no alternative but to set different papers. The tables in the examination room might also be numbered and allotted to students, instead of allowing men to sit where they please, as now appears to be the custom.

3. Orders have recently been issued for a general revision of the College syllabus and various suggestions for modifying the course of instruction for Draftsmen and Surveyors have already been made. For the other classes we would suggest that the entrance examination in Mathematics may be made a more severe test, and the study of the more elementary part of this subject omitted from the College course. The marks now given for what is called "Practical work" in Mathematics might also probably be omitted, but on this point the Board is unable to give an opinion in the absence of information regarding the nature and object of the examination. However we are of opinion that a student cannot avail himself fully of the instruction given in engineering subjects unless he has a good knowledge of Arithmetic, Algebra and Euclid before he enters the College, and these subjects might with advantage be omitted and the time spent on them devoted to other work such as Estimating and the practical part of survey for which extra time is evidently required.

4. The examinations clearly show that though students may have a theoretical knowledge of Surveying, they are unable to apply their knowledge and have not had sufficient instruction in practical work. The existing course of Practical Surveying in the field is said to be limited to a fortnight at the beginning of the course of instruction, and further practical work in the field is said to be impracticable owing to the batta which each student now receives. It is suggested that this system of giving batta might be abolished, as students should be able to afford the small extra expense entailed, and that the practical course of instruction in the field should be extended and deferred until the theoretical part of the subject and the handling of instruments has been mastered. It is not necessary to spend much time away from the College to learn the use of a theodolite or to handle a level, and it is believed that the Acting Principal has already issued orders that a part of the time now spent in the drawing room shall be devoted to practical work at the College. A few months of Surveying, Levelling and Estimating whilst on the practical course would also largely increase the value of newly passed men.

5. In Estimating, the failure both in the Board's examination and in College work is universal, and seeing that the subject is of the greatest importance and is a sure test whether a man properly understands a plan, merits special notice. The importance of this subject, especially with reference to Drawing, does not appear to have been fully realized by the College authorities, judging by the few marks awarded, and we would suggest that much more time should be devoted to Practical Estimating, and that the marks awarded should be considerably increased. There is, no doubt, a practical difficulty in teaching this subject for want of suitable materials, but the Chief Engineer for Irrigation would probably have no objection to place a number of tank restoration plans and estimates at the disposal of the Principal for completion and check. If this is done the students would be able to learn practical work in a way which is otherwise not possible. This question, as said before, merits special attention as the failures this year in the Draftsman class are excessive and are largely attributable to the total failure in the examinations in Estimating.

6. When revising the College syllabus it is suggested that the points raised in last year's report should not be lost sight of, as it may be that some of the suggestions made, especially in the direction of a general reduction of marks awarded by the College, may be found practicable. It is also suggested that the examination in drills and exercises might be transferred from the Board to the College and that the College examination in Estimating should be abandoned as superfluous.

7. A note regarding military students is appended, as it is believed that under the altered circumstances which now prevail some modification in the method of recruitment and length of College course is absolutely necessary.

8. The Board have to bring to notice that none of the Engineer class, Second Division, appeared for examination in Roads and Railways.

Results of examinations held in 1895 at the College of Engineering, Madras.

—	Mathematics.	Science.	Engineering.	Drawing.	Survey.
Engineer Class.					
E-i	Good	Fair	Good	Bad	Good.
E-ii	Do.	Do.	Bad	Do.	Bad.
E-iii	Do.	..	Good	Do.	Indifferent.
Engineer Subordinate Class.					
E.S.-i	Good	..	Good	Bad	Fair.
E.S.-ii	Do.	..	Fair	Do.	Bad.
E.S.-iii	Do.	..	Good	..	..

Draftsman Class.

—	Geometrical Drawing.	Freehand, &c.	Building Drawing.	Machine Drawing.	Estimating.	Topographical.
D-i	..	Fair	Bad	Bad	Bad	Bad.
D-ii	Good	..	Fair	..	..	..

Surveyor Class.

—	Chain, Compass, &c.	Levelling	Theodolite Survey.	Topographical.
S-i	..	Bad	Bad	Indifferent.
S-ii	Bad	..	..	..

No. 707.

Referred to the Principal, College of Engineering, Madras, for remarks and favour of return.

24*th January* 1895. (Signed) D. DUNCAN,
Director of Public Instruction.

Read the following letter from the Principal, College of Engineering, Madras, to the Director of Public Instruction, Madras, dated 25th February 1895, No. 1162-C. :—

I have the honour to return the papers which accompanied your No. 707, dated 24th January 1895, and to submit the following remarks on the report of the Board of Examiners.

2. Paragraph 1 calls for little remark from me ; it expresses the opinion of the Examiners based on results and may therefore be accepted as true. The explanation given with regard to the epithet "bad" makes it clear that the epithet in question has been used on very sufficient grounds. I saw very many of the replies to the Estimating Paper and am surprised that marks should have been obtained for answers which being utterly incorrect and wide of the mark, made these answers in the sense of being estimates of the "Plan and Specification" given as the question, absolutely valueless. In the case of the Draftsman's class the failure in Estimating was specially noticeable ; it is possible that, as up to the present year the admissions to this class have been merely by selection, the explanation may be want of education ; a qualifying entrance examination has now been introduced which it is hoped will raise the intellectual standard of the class. The advisability of abolishing the year of probation for military students has been separately reported on—*vide* this office No. 1129-C., dated 15th February 1895.

3. There is much truth in paragraph 2 ; it applies, however, solely I think to papers, the answering of which entails submission of large drawings. A comparison of the drawings sent in was ample proof that copying must have been indulged in ; when two or more original drawings, prepared as answers to questions set, are absolutely incorrect in their details, *i.e.*, the details are not those which would appear if the question were correctly answered and yet these details are themselves identical the natural inference is that two out of three men whose drawings show identical errors must have copied the third one, and the inference is strengthened when out of several such drawings one only is completed, the others all displaying various stages of progress. The Examiners' remarks are based on facts such as those above described ; they suggest in their report two remedies, viz., more space or different sets of papers ; the former certainly cannot be provided in the College, as all available space is fully utilized ; the second suggestion, different sets of papers, means additional expense, it would no doubt meet the difficulty, but I hardly like, with my limited experience, to recommend its adoption. The suggestion, with which this paragraph 2 of the report concludes, should certainly be adopted in future, this in itself would act as a deterrent, and closer supervision might do the rest.

4. The suggestions made in paragraph 3 will be considered during the revision of the syllabus, and I consider that their adoption *in toto* would be a distinct advantage.

5. Paragraph 4 of the report expresses very much my own opinion of the system which at present obtains, and I was contemplating bringing to your notice how greatly this system hampers the practical instruction in surveying and levelling. The various classes of students entered on their fortnight in camp on the 18th instant, in arranging for this camp the one thing of importance to which everything else is subordinated is the question of cost ; the students go on to camp ostensibly to get a practical knowledge of surveying and levelling in the field, but there appears to be an unwritten law that this practical knowledge must be obtained at a minimum of cost ;

Rs. 500 would appear to be the sum which Government is prepared to spend, consequently all the arrangements for this fortnight of practical work are made on the understanding that the outlay must be within Rs. 500. The Principal may consider that an extra week in camp would be most valuable to the students, but it is out of his power to go out of the beaten track ; as far as I can understand, a maximum of work has to be done in a minimum of time, because expenditure beyond a certain lump sum is not permissible, and this restriction is due to the fact that for some unexplained reason Government has undertaken to meet the cost to the student of this most necessary part of his College course by giving him while in camp daily batta, with the result that the necessity for keeping this batta within given limits governs the entire arrangements, and to a great extent vitiates the advantages the student might otherwise derive from his time in the field.

6. Some modification of the present system of paying batta is, I consider, most necessary. I find from the records that an additional fee of Rs. 8 paid by each student would enable the Principal to arrange for the two periods now spent in camp, without feeling himself absolutely bound to limit the time so spent to a specified number of days, and consequently the Instructor and Assistant Instructors would not feel themselves working against time, and would therefore be in a better position to really instruct the students.

7. My proposal is that an additional fee of Rs. 8 be levied from each student to meet the cost of his two periods in camp, that the sum so raised be paid out to the students in batta at a fixed rate of say As. 4 per day, that Government meet the cost as they now do of instruments, pegs, ropes, &c., and the pay of lascars ; that the two periods now regularly spent in camp be each limited by a minimum of 16 and a maximum of 28 days ; the cost to each student of the first sixteen days being borne by himself, of the days in excess of this limit by Government ; decision as to the duration of the camp within the maximum limit of 28 days to rest with the Principal. If the above proposals be adopted, the cost to Government of these camps would, under no circumstances, be greater than is now the case, while the Principal would have a free hand so far as sketching out and carrying through a scheme of work was concerned ; the work would be done more slowly and in consequence more carefully, the Instructors on the spots having time to make students re-do bad work, &c.

8. Paragraph 5 remarks on the very general failure in the subject of estimating, especially in the Draftsman class ; judged by the marks allotted to it in the syllabus, this subject would appear to be considered of the least importance of all those taught in the Draftsman class ; the student very naturally forms his opinion of the relative importance of the various subjects by a comparison of the marks given, and a not unnatural consequence of the low marks allotted to "Estimating" is neglect of this subject by the student. A good knowledge of "Estimating" is of the very greatest importance both to Draftsmen and to subordinates in the department. It is impossible for a Draftsman to draw a plan from a specification, or to check estimates of plans, unless he thoroughly understands this subject ; similarly a subordinate who is incapable of taking out the quantities from a plan, has still to learn the very A.B.C. of his work when he arrives in a division.

9. Knowledge of estimating can be tested with absolute accuracy by examination, and I would recommend that in future no marks be awarded in this subject except by the Examiners, in other words that College marks be abolished, and the student stand and fall by the knowledge he displays in examination The marks at present allotted should be considerably raised, and a qualifying minimum of at least 50 per cent. laid down. If this be done I am of opinion that this subject will receive the attention it deserves, not only at the hands of the Instructors, but what is of much greater importance, at the hands of the students themselves.

10. The offer of the Chief Engineer for Irrigation to place plans at the disposal of the College will be noted, and if the proposal is found feasible, will be taken advantage of.

11. I have referred to the last year's report by Board of Examiners, and am unable to find in it any distinct and definite proposal to reduce marks awarded by the

College, as stated in paragraph 6 of the report under reply. I am, however, of opinion that some modification of the present custom is necessary. My experience of the examinations held in December last has convinced me that the vast majority of the students of the College trust wholly and solely to their College marks to make good deficiencies in examination papers, and from numerous letters received by me they would appear to think that these marks are awarded for the one purpose of correcting the evil results of low marks obtained in examination. This, I submit, is not as it should be, whatever may be the use of so-called "Sessions marks" the very last object with which they should be given is that of minimising the evil results of an indifferent examination. The simplest way out of the difficulty, and one which would make it necessary for every student during his time in College to put his shoulder to the wheel would be to lay down a qualifying minimum, not in the combined total of Board and College marks, but in each separately. If it was understood that a qualifying minimum of say 30 per cent. of the marks given in each subject by the Board must be obtained to secure a pass, there would be no necessity to make any alteration in the totals of the marks as now awarded by the College.

12. Of the two suggestions with which this paragraph 6 concludes, the first I have already recommended (*vide* paragraph 9) for adoption, that is, I have recommended that knowledge of estimating be tested by examination alone; the second suggestion is a common sense one and might be adopted with advantage; the examination in drills and exercises as now carried out is a very tedious and lengthy business, the marks eventually awarded being very much the same as the College staff would have given.

13. The subject-matter of paragraph 7 will be separately remarked on; the point noticed in paragraph 8 has already been reported to you with explanation of the cause, and arrangements have been made in accordance with orders issued by you to give the Engineer Class, II Division, of last year lectures during the current year in Road and Railways.

14. I forward copy of note by Mr. Chatterton explanatory of the supposed failure in Practical Chemistry.

Enclosure.

From the Professor of Engineering, to the Principal, College of Engineering, dated 31st January 1895.

In returning the report of the Examiners on the examinations held last December, I have only one remark to make and that is in reference to Mr. Moffat's statement that in Practical Chemistry the Engineer students of the third year did very badly. This report is not, I think, justified by the facts of the case. The practical examination consisted of a qualitative examination of a simple salt and to that I take no exception; but the quantitative work asked of them was to determine the amount of sulphur in a sample of coal and the time allowed by Mr. Moffat was between two and three hours. The length of time allowed was simply absurd as to go through the necessary operations in this analysis would require at least eight hours and of course in three hours the students could show no result, and hence the Examiner considers they have done very badly. The marks in this subject do not in any way materially influence the general result of the examination, and I have only drawn attention to the fact in the hope that if the same Examiner is on the Board at the end of this year he will not repeat the same mistake and that he will arrange to be present throughout the whole of the practical examination and not leave in the middle of it as he did last year.

Staff.—Major H. D. Love, the Principal, proceeded on furlough on the 31st March, his place being filled by Lieutenant-Colonel A. W. Smart, R.E., up to 6th November when he went on leave, and by Mr. J. Davidson for the remaining portion of the year. In February Mr. Middlemast, Professor of Mathematics, was transferred to the

Kumbakónam College as Acting Principal, his place being taken by M.R.Ry. B. Hanumanta Rao. Mr. A. Chatterton, Professor of Engineering, after an absence of nearly two years in the Public Works Department, rejoined the college in the middle of January. He was on privilege leave for two months and on special duty for one month during the year under review. The completion of the college workshops necessitated the strengthening of the subordinate staff by the appointment of an instructor and an assistant instructor. There were also some minor changes which do not call for remarks.

2. *Strength.*—It is satisfactory to note that since 1889 the strength of the college has steadily increased. Excluding 42 students who were undergoing the practical courses the college numbered on the rolls 265 on 31st December 1894, as against 252 on the corresponding date of the previous year. The Engineer Subordinate class excepted, all the classes participated in the increase. In view of the reduced tuition fees to be introduced shortly and the additional scholarships to be awarded under G.O. No. 128, Educational, dated 28th February 1894, a satisfactory increase may be expected in the Engineer class. The number that sought admission into the Draftsman and Surveyor classes was less than in the previous year. This was probably due to the institution of an entrance test to determine the selection of candidates. This test should lead to better qualified men joining these classes, with the result that when the draftsmen and surveyors leave the college they will be better trained. The Artisan class was as strong as could be expected under existing arrangements. The proposals under consideration to convert it into a day class and to enlarge its scope will afford facilities for the training of a larger number of students. Among the students Brahmans, as usual, predominated, while Europeans and Eurasians showed a further fall. There was, however, a slight rise in the number of Native Christians and Muhammadans. The Principal would have done well to have distributed the students according to the occupation and wealth condition of their parents. This information should be furnished in future. It is also desirable to note how far each district is represented in the college.

3. *Examinations*—(i) *University Tests.*—The Acting Principal should have noted in the report the results of the First Examination in Engineering held for the first time in January 1894. It is, however, observed from the supplemental report for 1893–94 submitted by Lieutenant-Colonel Smart that two out of three students passed the above examination. In the B.C.E. Degree Examination again, which was held for the last time under its old form and designation in January 1894, both the students of the senior Engineer class of 1893 passed in the second class; besides these two, five independent candidates—former students of the college—appeared for the examination and three met with success; the results were so far satisfactory.

(ii) *College Board Examinations.*—From the report of the Board it has to be gathered that the results achieved at the several examinations were not encouraging, as is evident from the remarks of the individual Examiners. The report should have been signed by all the members.

Engineer class.—The results of the final examination of the first division were creditable, though it is reported to have fared badly in Practical Chemistry. Mr. Chatterton, who taught the subject, attributes the unsatisfactory results to the disproportionately short time allowed to the examinees. The second and third divisions acquitted themselves fairly at the term examinations. But the results obtained in Science, Geometrical drawing, Building drawing, Freehand, Perspective and Model drawing, Estimating, Machine drawing, and Levelling were not satisfactory. The last three subjects were characterized by want of accuracy. Several of these subjects had to be remarked upon unfavourably in the last review also. More attention should be paid to them.

Engineer Subordinate class.—Thirty students of the senior division were examined at the final examination and 19 passed, all in the second class. The results compare very unfavourably with those of the year previous when, as many as 24 passed out of 26 presented. From the percentages of marks obtained in the several subjects it is observed with regret that all the subjects except Surveying and Vernacular language

showed deterioration. More attention should be paid to Topographical drawing, Estimating, Hydraulics and Irrigation works, Building drawing, Bridges and Irrigation works. The students did not appear to understand the formulas, which they had simply got by rote. The results of the term examinations of the Second and Third divisions were very fair. Here, again, want of accuracy and neatness was noticeable in Building drawing. Mr. Ashpitel recommends that more attention should be paid to Practical levelling. In commenting on Building drawing (Buildings) by the students of the Second division, he remarks that they actually wasted hours together in doing what was incorrect or inaccurate, without knowing the value of time, and suggests the desirability of awarding a proportion of the college marks for work done within a fixed time. The suggestion is commended to the Principal's attention. Mr. Scovell remarks that students have not had sufficient practical training in "Earthwork and roads." It is much to be regretted that no instruction was given in "Roads and railways." The explanation of Mr. Chatterton as to this omission is not altogether satisfactory. He should have drawn the attention of the Acting Principal to the subject in time. Necessary arrangements have, however, been made for the instruction of these students in the current year.

Draftsman class.—Of the 39 students in the senior division, one was absent, five appeared as independent candidates and 33 as regular college students; ten of the latter passed, all in the third class. The percentage of failures was thus unprecedentedly large. Of the remaining 23 college students, two were disqualified for malpractices, and as many as 18 failed in Estimating. The large number of failures in this subject is much to be regretted in view of its great importance.

Major Love ascribes this deplorable result mainly to the novel method employed by the Professor of Engineering in awarding college marks. The latter, it would appear, assigned marks on the results of a single class examination held in December, instead of following the usual method of marking with reference to the estimating work done actually in class throughout the session; and the consequence was that the percentage of marks fell so low as 23 as against 66, the average for the previous three years. More time should be devoted to practical estimating. The recommendation of the Board to do away with the college examination in Estimating does not commend itself to the Director. Apart from this drawback, the students of the First division displayed a general ignorance of perspective drawing. The class, as a whole, did not seem to understand a plan. Mr. Ashpitel remarks that the topographical drawings executed by the students were mere scrawls, and attributes the neglect of the subject to the absence of a separate minimum. This point will be attended to in the redistribution of marks when revising the syllabuses. The results, taken as a whole, were far inferior to those of the year previous, the average percentage of marks obtained in the several subjects being 48 as against 60, which has been the proportion for the last five years. The class does not appear to have received sufficient attention. The Second division, however, fared better and does not call for any remarks.

Surveyor class.—Of the 32 students in the senior division, 25 were examined as college students and the remainder as independent candidates. It is gratifying to find that not less than 20 of the 25 regular students were successful—six in the second class and fourteen in the third class. These results compare favourably with those of the preceding year, but none obtained a first-class certificate. The students should have had more practical training in Levelling and Theodolite Survey in which they were found deficient. In the Second division more attention should be paid to the Chain compass and Plane table.

It will thus be observed that, on the whole, the work of the college during the year cannot be considered quite satisfactory. The practical knowledge of the students was much below the standard required. Mr. Davidson and Major Love consider it desirable to increase the period spent in camp. The latter recommends that the duration of stay might be limited to a minimum of 16 and a maximum of 28 days, except in the case of the Surveyor class; it being feared that any further extension would interfere with other branches of study. The subject will receive consideration. The wholesale copying in "Drawing" appears to have been facilitated by want of

sufficient accommodation and by the defective arrangements for conducting the examinations. Until additional accommodation is provided, the examination of some of the classes might be held in the Senate House with the permission of the Syndicate. The addition of Drawing as a subject of the entrance test for admission to the Draftsman and Surveyor classes will, it is believed, ensure the admission of such men as have already some knowledge of the subject. A qualifying minimum in Estimating in the marks awarded by the college seems desirable. The Board's recommendation as to the necessity of revising the course of study in Mathematics and of the students devoting more attention to the Engineering subjects will be duly considered.

(iii) *Government Technical Examinations.*—The Principal has not been able to furnish information as to the number of entrances for these examinations. The following statement gives the details of the success in the several subjects of the Intermediate examination:—

Subject.	First class.	Second class.	Total.
Building Materials and Construction	2	1	3
Building Drawing and Estimating	1	1	2
Earth-work and Road-making	1	..	1
Applied Mechanics	1	..	1
Practical Plane and Solid Geometry	2	3	5
Surveying and Levelling	2	5	7
Mensuration	..	1	1
Total	9	11	20

Excepting one Engineer student and one Draftsman student who passed in Geometry, and one *ex*-Draftsman student who passed in Surveying and Levelling, all the successful candidates belonged to the Engineer Subordinate class. It is satisfactory to note that an old student of the Artisan class passed the Elementary Examination in Mensuration in the second class.

4. *Independent candidates.*—The results of the final examination held by the Board of Examiners for the last two years are compared below:—

Final Examination.	1893.		1894.	
	Examined.	Passed.	Examined.	Passed.
Engineers	1	1	1	..
Engineer Subordinates	2	..	2	2
Draftsmen	10	7	27	13
Surveyors	2	..	11	3

The only candidate that appeared from the Engineer class failed. It is, however, gratifying to note that both the candidates from the Engineer Subordinate class met with success. As many as nine of the thirteen that passed from the Draftsman class already held third or second class certificates. They again appeared for the examination with a view to secure certificates of a higher class, but failed. The results, as a whole, cannot be considered satisfactory.

5. *Artisan class.*—The number stood at 39 against 38 in the previous year. With the exception of two, all secured certificates. This is satisfactory. The large numbers who resort to this class for admission point to the demand for the services of men trained on the present system, and the demand will probably increase as the training improves. The proportion of the students belonging to the genuine Artisan class continued to be low.

6. *Military students.*—The Military students were distributed as follows:—

Works course.	Workshop course.	Engineer subordinates.			Probationers.	Total.
		1st Division.	2nd Division.	3rd Division.		
1	2	3	2	2	3	13

The Government of India finally decided in July 1894 that five candidates should annually be admitted into the College and suggested the expediency of curtailing the period of training. Several suggestions have recently been thrown out as to the advisability of shortening the course of training undergone by the Military students and of bettering their prospects. To render the College more attractive and to make the penalty for failure to obtain a guaranteed appointment lighter owing to the very limited number of sanctioned appointments, viz., two, Mr. Ashpitel suggests the shortening of the College course by doing away with the year of probation and the re-arranging of the course of instruction in the College by the institution of a qualifying examination after a study of two years, so that those who fail in it may be remanded to their regiments. He also suggests the desirability of curtailing the practical course from two years to one year—six months to be spent in workshops and six months on works. The Board of Examiners point out that the Military students did not acquit themselves well in Mathematics, a fact indicating that they have not profited much by the extra year's instruction in this subject. The Chief Engineer, the Acting Principal and Major Love are all in favour of dispensing with the probationary course. The subject being still under correspondence, nothing can be definitely stated here. The question will be well sifted before final recommendations are made.

7. *Practical Courses.*—Three of the Engineer class and nine of the Engineer subordinate class students of December 1892 completed their full practical courses. The remaining Engineer student of that year will have completed his course during the current month. One Engineer subordinate died, and three, including an independent candidate, failed to join for the practical course. All the passed Engineers and Engineer subordinates of 1893, together with one Engineer subordinate of 1892, having gone through the workshop course, have been posted to different works. Students undergoing the practical course are now required to go through a short course of riding at the Body Guard school, those failing to comply with this requisition not being eligible for appointments in the Public Works Department. The Director is glad to note that the conduct of the students was, as usual, good. The practical survey work done by the College students at Guindy and Gúduvánchéri in February and July 1894, respectively, has been reported on favourably by Lieutenant-Colonel Smart though in point of quality it left much to be desired.

8. *Workshop.*—The College workshop was completed and thoroughly fitted up by the beginning of the year, but owing to a variety of causes very little work was done. The workshop instructors were not appointed till September. Mr. Chatterton while on special duty inspected important workshops and engineering laboratories in England. There has been a diversity of professional opinion with regard to the removal of the engine and to the location of the 100-ton testing machine in a separate room. Major Love's views as to the alterations required in the workshops are awaited.

9. *Accommodation.*—The increasing strength of the College requires improved accommodation. The remarks of the Board of Examiners as to the evils arising from insufficient space are noted. It has not been found possible on financial grounds to carry out the necessary extensions. Rupees 17,000 has been provided in the Public Works budget of the current official year under part I, class B works for the required additions. With reference to G.O., No 717, Educational, dated 26th September 1894, the sanction of Government will soon be obtained for the preparation of plans and estimates.

10. *Library and Reading-rooms.*—The library received an addition of 70 volumes during the year and good use seems to have been made of it both by the staff and the tudents. The steps taken to place the reading-room on an efficient footing are noted with satisfaction.

11. *Physical education.*—Physical exercises continued to be popular with the students. With a few exceptions, they passed a satisfactory examination in gymnastics and drill. Foot-ball and cricket appear to have particular attractions for them and their interest is evidenced by the subscriptions they have willingly undertaken to pay towards the support of the games. The recreation ground being found insufficient has since been added to and arrangements are being made for levelling the additional space. The Director has had to notice in connection with the bills of remuneration to the members of the Board of Examiners that a separate fee was claimed for the first time for examination in Drill and Gymnastics. In accordance with the recommendations of the Board this work will in future be entrusted to the Principal, who is a Military officer.

12. *Employment of passed students.*—A register of passed students and of their actual employments should have been regularly maintained. The prospects of the passed students seem to be brighter now than before. The nine Engineer subordinates of 1892 who completed their courses secured employment readily. Under G.O., No. 986, Educational, dated 22nd December 1894, the prospects of draftsmen also have improved. Such men as hold lower class certificates have been allowed to be promoted to higher grades when their work has been found satisfactory by the Chief Engineer. This concession will, it is believed, improve the status of these men, who have laboured hitherto under great disadvantages. With reference to paragraph 2 of its Order, No. 443, Educational, dated 16th June 1894, Government has been requested to reconsider its decision that the apprenticeship in the case of an Engineer student should date only from the completion of the two years' practical course, and, if that cannot be done, to allow him an initial salary of Rs. 250 a month as heretofore.

13. *Finance.*—The total expenditure rose from Rs. 67,070 to Rs. 67,407. Owing to the heavy fall in the fee-income from Rs. 15,957 to Rs. 13,817, the net cost of educating each student amounted to Rs. 223 as against Rs. 209 in the previous year and Rs. 238 in 1891–92. This is not satisfactory. For statistical purposes the Engineer subordinate class should in future be treated as part and parcel of the College department. The large decrease in the fee revenue should have been explained.

14. *Revision of rules.*—Among the important changes made during the year were the institution of an entrance examination for the draftsman and surveyor classes, the introduction of a short course of equitation for the students of the Engineer and Engineer subordinate classes at the Body Guard school, the fixing of a minimum proportion of marks to be secured by soldier students, and the addition of elementary drawing to the preliminary course of study. The fee for the Engineer class has been reduced from Rs. 16 to Rs. 12 and three scholarships of Rs. 15 in place of a single scholarship of Rs. 30 have been instituted. In the middle of 1894 the Government of India desired a reduction of the period of training of the Military students. This question, as well as the proposals for the re-organization of the artisan class, has yet to be settled. With reference to paragraph 2 of G.O., No. 710, Educational, dated 25th September 1894, the Board of Examiners pointed out the advisability of revising the College syllabuses so as to make them identical for those classes for which similar papers are considered to be permissible. A committee consisting of the gentlemen named in the margin was appointed to revise the syllabuses. The delay in the submission of the revised rules is due to the foregoing causes, as well as to the changes regarding the promotion and the prospects of employment of draftsmen. The committee's report was received a few weeks ago and it will be submitted to Government with necessary recommendations after consultation with Major Love.

Mr. J. P. Davidson.
„ H C. West.
„ R. E. Ellis.
„ Alfred Chatterton.
M.R.Ry. B. Hanumanta Rao.

15. *General.*—The absence of Major Love on furlough and the changes in the Principalship during the year under review have more or less interfered with the working of the institution. The instructors in surveying and drawing should exert themselves and get their students to work better. At the present time the demand for efficient draftsmen, surveyors and overseers is in excess of the supply. The syllabus for the surveyor class needs modification to meet the pressing demand in the Public Works Department for sub-overseers for the Tank Restoration Branch, &c. The abolition of class certificates and the fixing of one definite standard of qualification in the case of draftsmen and surveyors will remove the present difficulty and probably increase the supply. The completion of the College workshop renders it possible to reduce the period of training in the Public Works Workshop. The College Workshop should also afford facilities for the students of mofussil technical institutions recognized by the Department learning practical work. This may be effected by the affiliation of these institutions to the College—an arrangement which would tend to place the branches of technical education allied to engineering on a more satisfactory footing. As required in paragraph 3 of G.O., dated 16th June 1894, No. 443, statements showing receipts and charges during the year are enclosed for information.

(A true Extract.)

(Signed) D. DUNCAN,
Director of Public Instruction.

Order—dated 21st June 1895, No. 521, Educational.

The report on the working of the College of Engineering in 1894 and the Director's review of it are, as usual, full and call for but few remarks.

2. The strength of the college has continued to increase, but the examination results, particularly in the Draughtsman class, leave much to be desired. The Government cannot accept the Principal's explanation of the high percentage of failures among the draughtsmen as adequate. As the Board of Examiners remarks, Estimating is a subject which can be satisfactorily tested by examination, and the change in the method of assigning college marks does not account for the very poor results achieved. The explanation must be that the instruction afforded is inadequate, that the students examined were of unusually poor capacity, or that the old system of assigning college marks was radically defective. Whichever of these causes may have been at work, it is clear that enhanced importance must be attached to the subject "Estimating". If, as the Principal remarks, "the vast majority of the students trust wholly and solely to their college marks to make good deficiencies in their examination papers, there can be little question as to the desirability of adopting his suggestion that separate qualifying minima should be prescribed for examination and college marks. The Director should report his views on the matter. It is most desirable in the interests of the public service that a sufficient supply of qualified draughtsmen should be available. At present this is not the case and Government trusts that every effort to effect this end will be made.

The disqualification of several candidates for unfair practices is another unsatisfactory feature of the year. To prevent a repetition of such misconduct at future examinations the Director should endeavour to arrange with the Syndicate to hold at the Senate House examinations in such subjects as may appear desirable.

The delay in fixing on a site for the hundred-ton testing machine is to be regretted, and every endeavour should now be made to get it in working order at an early date.

3. The total expenditure on the college rose slightly and the fee-income fell heavily—a circumstance which, as the Director remarks, should have been explained. As a consequence, the average *nett* cost *per* student rose from Rs. 209 in 1893 to Rs. 223 in the year under report. The necessity for extra accommodation is evident, and Dr. Duncan should therefore expedite the submission of his application for sanction to the preparation of the necessary plans and estimates.

It is presumed that, when submitting the revised rules—in the preparation of which there has been excessive delay—the Director will discuss the various important matters, such as the proposed abolition of the military students' probationary year, the extension of the practical surveying course, &c., which are alluded to in his review as being under consideration.

(True Extract.)

J. F. PRICE,
Chief Secretary.

To the Director of Public Instruction, with enclosures.
" Public Works Department.
" Local and Municipal Department.
" Lieutenant-General Commanding the Forces, Madras.
Editors' Table.

Exd. A. Raitt.

Govt. of {1895} Madras.

EDUCATIONAL.

Issued

Recd. *Encl.*

G.O., 21st June 1895, No. 521.

JUNE.

College of Engineering.

Reviewing the report on the working of the — during the year 1894, and forwarding a copy of the Proceedings to the Under Secretary of State.

GOVERNMENT OF MADRAS.

EDUCATIONAL DEPARTMENT.

Read—the following paper:—

From the Honourable Mr. D. DUNCAN, M.A., D.Sc., Director of Public Instruction, to the Chief Secretary to Government, dated Madras, 14th May 1895, No. 5715.

I have the honour to submit, for the information of Government, a copy of my Proceedings, No. 5670, dated 13th instant, reviewing the report on the College of Engineering for the calendar year 1894. The reports of the individual Examiners, a copy of Mr. Chatterton's explanation as to his omission to give instruction in "Roads and Railway construction," and the note relating to the recruitment and prospects of military students referred to by the Board of Examiners, are enclosed for reference and favour of return.

Enclosures.

Proceedings of the Director of Public Instruction, dated 13th May 1895, No. 5670.

From the Acting Principal, College of Engineering, Madras, to the Director of Public Instruction, dated 25th March 1895, No. 1250-C.

I have the honour to submit the following review of the working of the College of Engineering during the year 1894. A supplemental report will be forwarded in April next so as to complete the review for the official year. The matter contained in the supplemental report of April 1894 is included in the present report.

2. *Establishment.*—Mr. A. Chatterton, who was temporarily transferred to the Public Works Department for a period of two years, rejoined the College on the 15th January 1894. Mr. E. W. Middlemast having been appointed to act as Principal of the Kumbakónam College, was relieved by M.R.Ry. B. Hanumanta Row from that College on 15th February. Major H. D. Love, R.E., who proceeded on furlough to Europe, was succeeded by Lieutenant-Colonel A. W. Smart, R.E., from the Public Works Department, on 31st March. Mr. Chatterton having availed himself of two months' privilege leave to England from 10th May, was in addition permitted to spend an extra month there, on special duty, in inspecting important Workshops and Engineering Laboratories; he returned to duty on 8th August. M.R.Ry. A. Krishnama Chari, Assistant in Vernacular, who had been for about thirteen years Tamil and Telugu Munshi to the Military Probationers' class then stationed at Bangalore, retired on the 1st June on a superannuation pension, after a service of about 21 years, and was succeeded by M.R.Ry. M. Parthasarathi Aiyangar, B.A., from the Educational Department, who took up his appointment on the 1st July. Two new appointments were sanctioned in connection with the College Workshops, viz., an Instructor and Assistant Instructor. Mr. J. P. Perkins from the Perambúr Workshops was given the former post on probation, the salary for the time being fixed at

Rs. 100; T. N. Govindaswami Row, Instructor in Carpentry and Fitting, was promoted to the new post of Assistant Instructor, Workshops, R. Ramaswami Nayakar from the Perambúr Workshops taking his place as Instructor in Carpentry and Fitting. The dates of these appointments were as follows: Mr. J. P. Perkins, Instructor, from 18th August; Govindaswami Row, Assistant Instructor, from 16th October; Ramaswami Nayakar from 23rd October. A stoker on Rs. 10 was also appointed. The Acting Principal, Lieutenant-Colonel Smart, R.E., having gone home on furlough in November, I assumed charge of his duties from 6th of that month.

3. *Numbers.*—The numbers on the rolls at the end of the Session were :—

Class.	Practical Course.		In College.			Total.
	Second year.	First year.	First Division.	Second Division.	Third Division.	
Engineer classes	4	3	4	7	6	24
Engineer Subordinate class	10	25	31	23	22	111
Military probationers	..	..	..	..	..	3
Draftsman class	..	..	39	34	..	73
Surveyor class	..	..	32	25	..	57
Artisan class	..	..	..	..	..	39
Total ..	..	..	..	..	..	307

Excluding the students going through the practical courses in Workshops and on works, the total number actually in the College on the 31st December was 265. The corresponding totals for the four preceding years were—1893, 252; 1892, 217; 1891, 189; 1890, 136.

The numbers arranged by classes of the community were :—

Europeans and Eurasians	13
Brahmans	141
Other Hindus	87
Native Christians	15
Mussalmans	7
Others	2
Total ...	265

The following statement shows the distribution of the different sections of the community among the college classes :—

Class.	Europeans and Eurasians.	Brahmans.	Other Hindus.	Native Christians.	Mussal-mans.	Others.	Total.
Engineer classes	1	13	2	1	..	..	17
Engineer Subordinate classes	8	53	11	2	..	2	76
Military probationers	3	..	..	..	..	..	3
Draftsman class	..	24	39	7	3	..	73
Surveyor class	1	44	10	..	2	..	57
Artisan class	..	7	25	5	2	..	39
Total ..	13	141	87	15	7	2	265

The numbers offering for admission were: Engineer class 16, of whom 8 passed the entrance examination of December 1894; Engineer Subordinate class 26, of whom 25 qualified in April 1894 for admission; Draftsman and Surveyor classes 62 and 43, of whom 38 and 30 qualified in December 1894; Artisan class, 135 for 40 vacancies. By the middle of 1895, when another batch of Engineer Subordinate students will join, the numbers in the college will probably reach 245.

Students of the Surveyor and Draftsman classes have been this year for the first time admitted by competitive examination, instead of by selection. It is hoped that the result of this fresh departure will be (1) the entry of students of higher intellectual

ability and (2) a noticeable increase in the number who obtain first and second class certificates.

4. The final and term examinations of all the classes were conducted in December 1894 by the Board of Examiners appointed by Government, Mr. F. W Ashpitel being President.

5. The results of these examinations are as follows :—

(*a*) *The Engineer classes.*—The first division contained only three students, of whom one who appeared as an independent candidate failed to pass; the other two both did well, S. A. Jagadisa Aiyar with 2,089 marks securing first place; Natesa Aiyar being only 165 marks behind; full marks obtainable, 3,000. Jagadisa Aiyar secures the gold medal and Narayana Oonythan prize, while Natesa Aiyar obtains a prize in Surveying.

The second and third divisions consisting of 7 and 6 students, respectively, passed the usual term examinations. P. V. Manicka Nayakar of the second division and S. Bhaskara Aiyar of the third division retain their scholarships, Rs. 30 each.

(*b*) *The Engineer Subordinate class.*—In the senior division of 31 students who competed, 19 were successful, and they have since joined the Public Works Workshops for their year's course there.

Two independent candidates presented themselves for the examination, and both were successful.

The second and third divisions consisting of 23 and 22 students, respectively, went through the usual term examinations, the results of which compare favourably with preceding years.

In the senior division, J. S. Muttayya gains the silver medal and Rogers' prize, and prizes in other subjects. The prize for Vernacular is won by A. Krishna Pillai, and prizes for Drawing and for workshop practice by Sergeant R. Cuthbert.

The two scholarships of Rs. 12–8–0 available for the second division are awarded to V. K. Kuppuswami Aiyar and S. Natesa Aiyar; and the two for the third division, to K. Panchanatha Aiyar and A. R. Subrahmanya Aiyar.

(*c*) *The Draftsman class.*—The senior division consisted of 34 students; of this number only 10 gained certificates, all in the third class. Of the 21 students who failed, 18 were disqualified in Estimating, a subject of the very greatest importance and yet out of which the entire class not excepting those who qualified showed themselves deplorably ignorant; two were disqualified by the Board of Examiners for unfair practices; and one was absent.

The student occupying the first place is A. Kuppuswami Aiyangar, who, with 66 per cent. of the total marks, gains the college bronze medal, and the prize for general proficiency. The second student A. V. Rajabathar Mudaliar secures 65 per cent. of the marks and receives a prize.

Twenty-seven independent candidates presented themselves for examination for certificates. One passed in the first class and three in the third class.

The second division of the Draftsman class contained 34 students, of whom two did not appear for the examination. S. Sandanam Pillai and V. M. Duraiswami Mudaliar secure the two scholarships of Rs. 8 each. Three of the students failed to obtain the requisite minimum in *Geometrical Drawing*.

(*d*) *Surveyor class.*—The senior division consisted of 25 students; of these 20 were successful at the examination held in December 1894,—six obtaining second-class and fourteen third-class certificates,—four failed, and one was disqualified by the Board of Examiners for unfair practices.

The senior student is R. Natesa Aiyar with 71 per cent. of the total marks. He gains the college bronze medal, and the prize for general proficiency. The second student with 70 per cent. of the total marks is also awarded a prize.

Eleven independent candidates presented themselves for examination, of whom three passed in the third class, and the rest failed.

The second division consisted of 25 students. V. Rangaswami Mudaliar and T. Venkoba Rau (of Periyár) gain the two scholarships of Rs. 8. Three students failed to obtain the requisite minimum in *Chain, Compass, and Plane Table Surveying.*

6. In the following table, a comparison is made of the marks gained in December 1894 by the senior division of each class with those gained in previous year; and these prove pretty clearly, so far as figures can prove it, that the Engineer, Engineer Subordinate and Surveyor classes are of very equal merit with the classes of preceding years. The Draftsman class shows a falling off, but this is due almost entirely to the very general failure in "Estimating," a subject of which the students as a body proved themselves hopelessly ignorant. The students who failed are of course eligible for examination next December, and it is to be hoped they will then, as independent candidates, secure certificates. It is not very easy to explain why there should have been so general a failure in this subject; it may be due in part to the sessions marks given in the college not being so high as usual. Estimating is, however, a subject, knowledge of which can be tested very satisfactorily by examination, and the results of the examination held by the Board merely confirm and support the correctness of the college marking.

Engineer class.	1894.	1893.	Average of four years previous to 1893.
Mathematics	70	75	55
Science	64	54	40
Engineering	68	71	55
Drawing	69	77	67
Surveying	75	68	67
Vernacular language	61	49	56
Drills and Exercises	69	84	80
Total	67	68	55

Engineer Subordinate Class.			
Mathematics	50	54	42
Engineering	53	55	46
Drawing	51	58	58
Surveying	54	49	61
Vernacular language	57	42	51
Drills and Exercises	66	75	81
Total	53	54	53

Draftsman Class.			
Practical Geometry	52	64	68
Freehand, Perspective and Model drawing	51	58	60
Building drawing	60	55	65
Machine drawing	44	68	55
Estimating	29	56	52
Topographical drawing	44	55	54
Gymnastics and drills	66	80	79
Total	48	60	60

Surveyor Class.			
Chain, Compass and Plane Table surveying	54	53	63
Levelling	66	64	63
Theodolite surveying	57	58	61
Topographical drawing	51	54	60
Gymnastics and drill	66	77	72
Total	57	58	62

7. Of the passed students of the college undergoing practical training, three out of the four who passed out of the Engineer class in December 1892 completed their full practical course; and the remaining student P. Ranganayakulu Nayudu will do so in May next, having been absent for about five months in the middle of his course through illness. The senior student G. S. Rama Aiyar secures the guaranteed appointment of Assistant Engineer. Of the thirteen Engineer subordinates who also passed out of the college in the year 1892, nine completed their full course, one died, and one being prevented by private reasons from joining the Public Works Workshops in January 1893 was specially permitted to join in January 1894. He is now undergoing practical training in a division. The remaining two and one independent candidates did not join for the practical course. Of the nine Engineer subordinates who secure the diploma, one military student has been appointed to the Public Works Department as an Overseer, first grade, six civil students, as Overseer, third grade, and two others as temporary Overseers. The three Engineer students (including one independent candidate) and 24 Engineer subordinates who qualified at the examinations of December 1893, together with the Engineer subordinate student of the batch of 1892 above mentioned, having successfully gone through the workshop course, have been posted to different divisions for practical instruction in actual work. All these students underwent for the first time in the history of the college a short course in riding at the Body Guard school. This training has been declared compulsory for all future Engineer and Engineer Subordinate students entering the Public Works Department.

8. *Military students.*—The total number of soldier students on 31st December 1894, was 13, viz., one on works, two in the Public Works Workshops, seven in the Engineer Subordinate classes, and three probationers. The question of abolishing the year of probation has again been raised by the Chief Engineer, Public Works Department, and it is now under the consideration of the Director of Public Instruction. It need not be dwelt on here.

9. *Artisan class.*—At the beginning of the year 40 out of 139 were admitted. The class at the close of the year consisted of 39 students; of whom 37 receive certificates. In November last 135 candidates applied for admission, 40 have been elected, and there are now 40 students in the class.

The applicants and those selected come from very much the same classes as those described in last year's report.

10. *Government Technical Examinations.*—Of the college regular students who voluntarily appeared for the Government Technical Examinations in Engineering subjects, twenty (20) passed the Intermediate examinations—nine in the first-class and eleven in the second. One of the old students of the college Artisan class passed the Elementary test in Mensuration in the second-class.

11. *Surveying.*—During February, the first and second divisions of the Engineer class, the first and second divisions of the Engineer Subordinate class and the senior division of the Surveyor class, comprising in all 98 students, were encamped at Guindy for a fortnight, engaged in surveying with the theodolite and on a railway project survey. In July the three divisions of the Engineer class, the second division of the Engineer Subordinate class, and the first division of the Survey class, in all 72 students, were encamped at Gúduvánchéri for one fortnight. The classes were divided into several parties and carried out a series of surveying and levelling operations. The cost of the two camps was Rs. 822.

I do not, as was done last year, give the total outturn of work, as this appears to me the very worst method of gauging the knowledge gained by the students. Given two qualified surveyors, the outturn of work within a fixed time might be a fair test of their qualifications, but with students who are virtually learning for the first time the use of the theodolite, the level, and the prismatic compass, it stands to reason the greater the outturn of work the greater the inaccuracy. In my opinion it is of the very first importance when teaching levelling or surveying to impress upon each student the absolute necessity of being accurate in his work, and this cannot be done unless time is available to do work carefully and consequently slowly. Rapidity in the manipulation of the several instruments can only come by practice; it cannot be

expected of students who are many of them handling their instruments for the first time. I cannot but think that the present custom of getting through in a fixed time a large amount of survey and levelling work, much of which work is very inaccurately done, leaves upon the minds of the majority of the students a general impression that "accuracy" is a very minor matter, rapidity being the first essential. Such men, in after-life, make inaccurate levellers and surveyors and thereby waste both the time and money of their employers. I have elsewhere reported as to the modifications I would recommend in the field work course.

12. *Inspection of works.*—The usual inspections of works were made during the year, and the students were given many opportunities of practically acquainting themselves with the manufactures of cement and of bricks, and with building work in general.

13. *College workshops and laboratory and experimental work.*—Early in the year Messrs. Massey and Co. completed the work of fitting up the steam-engine, the shafting and the machinery; and the shops were put under the Professor of Engineering.

A workshop instructor was not, however, appointed till September consequently the work done during the year was comparatively small. A new pattern of wood-working lathe was built, and a second one started, and a number of benches and miscellaneous fittings were made by the students assisted by the workshop staff. In June and July the Professor of Engineering was absent on special duty in England. In September the 100-ton testing machine arrived, but so far it has been of little benefit to any one, as its various parts still repose packed in their several cases. Much discussion has taken place about the most suitable site for this testing machine and the possible alterations which may be required in the workshops. I have recorded my views in this office letter No. 206 S., dated 18th December 1894, and need not therefore enter on the question here. Laboratory and experimental work was carried on as usual, but nothing requiring special mention was done.

14. *Students undergoing practical course.*—Mr. Ellis, the Superintendent of the workshops, reports as follows regarding the students attending those shops during the year under review:—

"On assuming charge of these shops, I stopped the students working at models and toys, such as small boxes, useless screw-cutting, nails, &c., and put them on to regular jobs to assist our workmen. In a very short time, I found how intelligence and education could compete with mere skilled labour. The students have all done good work; and I am glad to report that a laudable emulation came into force, and every work attempted was well done.

"2. In all the shops, the students readily undertook both light and heavy jobs, and there was no shirking.

"3. Their conduct, as far as came under my scrutiny, was generally good, and I had no insubordination; but on the contrary I always found a ready desire to give satisfaction and obedience to all orders."

The reports received through Superintending Engineers of the students undergoing practical work under Executive Engineers have been as usual satisfactory; details of the remarks made by the reporting officers are hardly necessary in this review, but these reports show that Executive Engineers are at much pains to give these students as varied an acquaintance with work as the character of the works in progress in the limits of the division will allow. In most divisions a course of levelling forms an important item of the instruction given.

15. The question of revising the rules and revising the syllabus is still under consideration. During the year under review a course of equitation has been introduced, and in future all students, while attending the workshops, will have in addition to go through a riding course at the Body Guard school; students failing to go through this course will not be eligible for the Public Works Department.

16. *College buildings.*—During the year, funds not being available, the several extensions and improvements contemplated were not carried out. The buildings were kept in repair, all works under this head being executed under the orders of the Consulting Architect.

17. *Physical training.*—Regular instruction was given in gymnastics and drill to all the students, except those of the Artisan class, the drills being conducted by the military students. Tennis was played as usual. Cricket and foot-ball seemed to be more in favour than in previous years, and this is evidenced by the fact that this year (1895) the students have unanimously agreed to pay a term subscription of Re. 1 per head for the support of these two games. The new cricket ground has been cleared of trees, but till money is allotted to meet the cost of levelling and making, the ground is of but little use for cricket, though it serves fairly well as a foot-ball field. The Director of Public Instruction has been separately addressed on this subject.

18. *Library and Reading-room.*—Since last year seventy volumes have been added; the total number of volumes now stands at 3,155. During the year 6,199 were issued —845 to the staff, and 5,354 to the students. The figures show that the library is well used.

A subscription of Re. 1 per term has now been laid down, and the management of the reading-room, as also of all games, has been placed in the hands of a committee of students with Mr. Hanumanta Row, Professor of Mathematics, as President, Mr. Goddard, Vice-President.

19. *Attendance and Conduct.*—The percentage of numbers present daily to numbers on the rolls was 94 for the Engineer and junior classes. The conduct of the students was generally very good throughout the year. The detection by the Board of Examiners of unfair practices on the part of two students of the Draftsman class and one of the Surveyor class has already been alluded to.

20. *B.C.E. Degree Examination.*—This examination in its old form and designation was held for the last time in January. The two students of the senior Engineer class in 1893 obtained second classes. One Mechanical Engineer student who had previously passed the B.C.E. (1892), appeared in Mechanical Engineering and obtained a second-class pass. Five independent candidates, former students, also presented themselves; three passed—one in the second class, and two in the third.

21. *Employment of passed students.*—Information in the great detail in which it was given last year is not at present available, but so far as can be ascertained, the large majority of passed students of the college appear to find little difficulty in getting employment. If the proposals for re-organizing the Conservancy department of the Public Works Department now under consideration are given effect to, there will be a very large demand for qualified surveyors, and also for men who have passed the Engineer Subordinate examination.

22. *Financial details.*—Detailed statements of the receipts and expenditure of the college during the calendar year 1894 are enclosed. The total expenditure of the year, including remuneration to Board of Examiners, exchange compensation allowance and scholarships, but excluding travelling allowance to Mr. Chatterton during deputation, capital cost of the new workshop machinery and cost of repairs to buildings, amounts to Rs. 67,407; and the income from fees, &c., to Rs. 13,817.

The net cost of educating each student, taking the total number of average attendances at 240 (viz., College department 16, School department 224), was therefore Rs. 223.

From the Board of Examiners, to the Director of Public Instruction, dated Madras, 20th January 1895.

We have the honour to forward, herewith, a list of marks obtained at the examinations recently held at the College of Engineering, with reports by the various Examiners which, for convenience, have been extracted to correspond with the divisions of subjects in the mark sheet. The general results, indicated by the reports received from Examiners, have also been tabulated, and, though the description given may possibly be open to question, in our opinion it indicates with tolerable accuracy the general impression regarding the examinations as a whole. You will notice that Mathematics are described as good, though it is necessary to observe that the military students do not show that they have profited much by the extra year's instruction

which they receive in this subject; Science and Engineering as fair; while the knowledge of Drawing and Survey, taking the College as a whole, appears to be indifferent. It may be said that the marks do not justify the word "bad" in so many cases, but we would point out the general failure in every class to make up a level book, the absolute want of accuracy in estimating, the untidy, inaccurate drawing, and are of opinion that when there is a general failure in the practical part of a subject, no other word than "bad" is applicable. In Estimating, for instance, with but few exceptions, there was a hopeless want of accuracy: paper after paper was examined in which the sub-heads were absolutely incorrect, and, as practical estimates, the answer papers submitted were worthless, though marks were obtained, as each sub-head was marked separately. In Levelling, again, a student could obtain a fair number of marks in spite of having failed to make up the extract from a field book correctly, but a Surveyor is not of much use if he does not know the A.B.C. of his work. The examination in Topographical Drawing was also very unsatisfactory, as it was perfectly evident that wholesale copying was the rule though only seven students were actually disqualified for this reason. The failure among Draftsmen is lamentable, but was unavoidable.

2. As each examination approaches a good deal is heard about setting papers common to several classes in order to reduce the expense, and the result appears to be that the efficiency of the test, which is the object of the examination, is in danger of being seriously impaired. Papers are set common to several large classes for whose examination there is not sufficient available space in the College, if each man is to be properly isolated. The result, especially in the drawing examinations, is wholesale copying which cannot be avoided so long as two men in the same class or working at the same paper, are seated at the same small table, and a student has only to look round to get a view of several other men's work. To remedy this state of affairs, either more space appears to be absolutely necessary or separate papers must be set for each class. Possibly the Senate House might be made available, but if the extra space cannot be provided, there seems to be no alternative but to set different papers. The tables in the examination room might also be numbered and allotted to students, instead of allowing men to sit where they please, as now appears to be the custom.

3. Orders have recently been issued for a general revision of the College syllabus and various suggestions for modifying the course of instruction for Draftsmen and Surveyors have already been made. For the other classes we would suggest that the entrance examination in Mathematics may be made a more severe test, and the study of the more elementary part of this subject omitted from the College course. The marks now given for what is called "Practical work" in Mathematics might also probably be omitted, but on this point the Board is unable to give an opinion in the absence of information regarding the nature and object of the examination. However we are of opinion that a student cannot avail himself fully of the instruction given in engineering subjects unless he has a good knowledge of Arithmetic, Algebra and Euclid before he enters the College, and these subjects might with advantage be omitted and the time spent on them devoted to other work such as Estimating and the practical part of survey for which extra time is evidently required.

4. The examinations clearly show that though students may have a theoretical knowledge of Surveying, they are unable to apply their knowledge and have not had sufficient instruction in practical work. The existing course of Practical Surveying in the field is said to be limited to a fortnight at the beginning of the course of instruction, and further practical work in the field is said to be impracticable owing to the batta which each student now receives. It is suggested that this system of giving batta might be abolished, as students should be able to afford the small extra expense entailed, and that the practical course of instruction in the field should be extended and deferred until the theoretical part of the subject and the handling of instruments has been mastered. It is not necessary to spend much time away from the College to learn the use of a theodolite or to handle a level, and it is believed that the Acting Principal has already issued orders that a part of the time now spent in the drawing room shall be devoted to practical work at the College. A few months of Surveying, Levelling and Estimating whilst on the practical course would also largely increase the value of newly passed men.

5. In Estimating, the failure both in the Board's examination and in College work is universal, and seeing that the subject is of the greatest importance and is a sure test whether a man properly understands a plan, merits special notice. The importance of this subject, especially with reference to Drawing, does not appear to have been fully realized by the College authorities, judging by the few marks awarded, and we would suggest that much more time should be devoted to Practical Estimating, and that the marks awarded should be considerably increased. There is, no doubt, a practical difficulty in teaching this subject for want of suitable materials, but the Chief Engineer for Irrigation would probably have no objection to place a number of tank restoration plans and estimates at the disposal of the Principal for completion and check. If this is done the students would be able to learn practical work in a way which is otherwise not possible. This question, as said before, merits special attention as the failures this year in the Draftsman class are excessive and are largely attributable to the total failure in the examinations in Estimating.

6. When revising the College syllabus it is suggested that the points raised in last year's report should not be lost sight of, as it may be that some of the suggestions made, especially in the direction of a general reduction of marks awarded by the College, may be found practicable. It is also suggested that the examination in drills and exercises might be transferred from the Board to the College and that the College examination in Estimating should be abandoned as superfluous.

7. A note regarding military students is appended, as it is believed that under the altered circumstances which now prevail some modification in the method of recruitment and length of College course is absolutely necessary.

8. The Board have to bring to notice that none of the Engineer class, Second Division, appeared for examination in Roads and Railways.

Results of examinations held in 1895 at the College of Engineering, Madras.

—	Mathematics.	Science.	Engineering.	Drawing.	Survey.
Engineer Class.					
E-i	Good	Fair	Good	Bad	Good.
E-ii	Do.	Do.	Bad	Do.	Bad.
E-iii	Do.		Good	Do.	Indifferent.
Engineer Subordinate Class.					
E.S.-i	Good		Good	Bad	Fair.
E.S.-ii	Do.		Fair	Do.	Bad.
E.S.-iii	Do.		Good		

Draftsman Class.

—	Geometrical Drawing.	Freehand, &c.	Building Drawing.	Machine Drawing.	Estimating.	Topographical.
D-i		Fair	Bad	Bad	Bad	
D-ii	Good		Fair			

Surveyor Class.

—	Chain, Compass, &c.	Levelling.	Theodolite Survey.	Topographical.
S-i		Bad	Bad	Indifferent.
S-ii	Bad			

No. 707.

Referred to the Principal, College of Engineering, Madras, for remarks and favour of return.

24th January 1895. (Signed) D. DUNCAN,
Director of Public Instruction.

Read the following letter from the Principal, College of Engineering, Madras, to the Director of Public Instruction, Madras, dated 25th February 1895, No. 1162-C. :—

I have the honour to return the papers which accompanied your No. 707, dated 24th January 1895, and to submit the following remarks on the report of the Board of Examiners.

2. Paragraph 1 calls for little remark from me; it expresses the opinion of the Examiners based on results and may therefore be accepted as true. The explanation given with regard to the epithet "bad" makes it clear that the epithet in question has been used on very sufficient grounds. I saw very many of the replies to the Estimating Paper and am surprised that marks should have been obtained for answers which being utterly incorrect and wide of the mark, made these answers in the sense of being estimates of the "Plan and Specification" given as the question, absolutely valueless. In the case of the Draftsman's class the failure in Estimating was specially noticeable; it is possible that, as up to the present year the admissions to this class have been merely by selection, the explanation may be want of education; a qualifying entrance examination has now been introduced which it is hoped will raise the intellectual standard of the class. The advisability of abolishing the year of probation for military students has been separately reported on—*vide* this office No. 1129-C., dated 15th February 1895.

3. There is much truth in paragraph 2; it applies, however, solely I think to papers, the answering of which entails submission of large drawings. A comparison of the drawings sent in was ample proof that copying must have been indulged in; when two or more original drawings, prepared as answers to questions set, are absolutely incorrect in their details, *i.e.*, the details are not those which would appear if the question were correctly answered and yet these details are themselves identical the natural inference is that two out of three men whose drawings show identical errors must have copied the third one, and the inference is strengthened when out of several such drawings one only is completed, the others all displaying various stages of progress. The Examiners' remarks are based on facts such as those above described; they suggest in their report two remedies, viz., more space or different sets of papers; the former certainly cannot be provided in the College, as all available space is fully utilized; the second suggestion, different sets of papers, means additional expense, it would no doubt meet the difficulty, but I hardly like, with my limited experience, to recommend its adoption. The suggestion, with which this paragraph 2 of the report concludes, should certainly be adopted in future, this in itself would act as a deterrent, and closer supervision might do the rest.

4. The suggestions made in paragraph 3 will be considered during the revision of the syllabus, and I consider that their adoption *in toto* would be a distinct advantage.

5. Paragraph 4 of the report expresses very much my own opinion of the system which at present obtains, and I was contemplating bringing to your notice how greatly this system hampers the practical instruction in surveying and levelling. The various classes of students entered on their fortnight in camp on the 18th instant, in arranging for this camp the one thing of importance to which everything else is subordinated is the question of cost; the students go on to camp ostensibly to get a practical knowledge of surveying and levelling in the field, but there appears to be an unwritten law that this practical knowledge must be obtained at a minimum of cost;

Rs. 500 would appear to be the sum which Government is prepared to spend, consequently all the arrangements for this fortnight of practical work are made on the understanding that the outlay must be within Rs. 500. The Principal may consider that an extra week in camp would be most valuable to the students, but it is out of his power to go out of the beaten track; as far as I can understand, a maximum of work has to be done in a minimum of time, because expenditure beyond a certain lump sum is not permissible, and this restriction is due to the fact that for some unexplained reason Government has undertaken to meet the cost to the student of this most necessary part of his College course by giving him while in camp daily batta, with the result that the necessity for keeping this batta within given limits governs the entire arrangements, and to a great extent vitiates the advantages the student might otherwise derive from his time in the field.

6. Some modification of the present system of paying batta is, I consider, most necessary. I find from the records that an additional fee of Rs. 8 paid by each student would enable the Principal to arrange for the two periods now spent in camp, without feeling himself absolutely bound to limit the time so spent to a specified number of days, and consequently the Instructor and Assistant Instructors would not feel themselves working against time, and would therefore be in a better position to really instruct the students.

7. My proposal is that an additional fee of Rs. 8 be levied from each student to meet the cost of his two periods in camp, that the sum so raised be paid out to the students in batta at a fixed rate of say As. 4 per day, that Government meet the cost as they now do of instruments, pegs, ropes, &c., and the pay of lascars; that the two periods now regularly spent in camp be each limited by a minimum of 16 and a maximum of 28 days; the cost to each student of the first sixteen days being borne by himself, of the days in excess of this limit by Government; decision as to the duration of the camp within the maximum limit of 28 days to rest with the Principal. If the above proposals be adopted, the cost to Government of these camps would, under no circumstances, be greater than is now the case, while the Principal would have a free hand so far as sketching out and carrying through a scheme of work was concerned; the work would be done more slowly and in consequence more carefully, the Instructors on the spots having time to make students re-do bad work, &c.

8. Paragraph 5 remarks on the very general failure in the subject of estimating, especially in the Draftsman class; judged by the marks allotted to it in the syllabus, this subject would appear to be considered of the least importance of all those taught in the Draftsman class; the student very naturally forms his opinion of the relative importance of the various subjects by a comparison of the marks given, and a not unnatural consequence of the low marks allotted to "Estimating" is neglect of this subject by the student. A good knowledge of "Estimating" is of the very greatest importance both to Draftsmen and to subordinates in the department. It is impossible for a Draftsman to draw a plan from a specification, or to check estimates of plans, unless he thoroughly understands this subject; similarly a subordinate who is incapable of taking out the quantities from a plan, has still to learn the very A.B.C. of his work when he arrives in a division.

9. Knowledge of estimating can be tested with absolute accuracy by examination, and I would recommend that in future no marks be awarded in this subject except by the Examiners, in other words that College marks be abolished, and the student stand and fall by the knowledge he displays in examination The marks at present allotted should be considerably raised, and a qualifying minimum of at least 50 per cent. laid down. If this be done I am of opinion that this subject will receive the attention it deserves, not only at the hands of the Instructors, but what is of much greater importance, at the hands of the students themselves.

10. The offer of the Chief Engineer for Irrigation to place plans at the disposal of the College will be noted, and if the proposal is found feasible, will be taken advantage of.

11. I have referred to the last year's report by Board of Examiners, and am unable to find in it any distinct and definite proposal to reduce marks awarded by the

College, as stated in paragraph 6 of the report under reply. I am, however, of opinion that some modification of the present custom is necessary. My experience of the examinations held in December last has convinced me that the vast majority of the students of the College trust wholly and solely to their College marks to make good deficiencies in examination papers, and from numerous letters received by me they would appear to think that these marks are awarded for the one purpose of correcting the evil results of low marks obtained in examination. This, I submit, is not as it should be, whatever may be the use of so-called "Sessions marks" the very last object with which they should be given is that of minimising the evil results of an indifferent examination. The simplest way out of the difficulty, and one which would make it necessary for every student during his time in College to put his shoulder to the wheel would be to lay down a qualifying minimum, not in the combined total of Board and College marks, but in each separately. If it was understood that a qualifying minimum of say 30 per cent. of the marks given in each subject by the Board must be obtained to secure a pass, there would be no necessity to make any alteration in the totals of the marks as now awarded by the College.

12. Of the two suggestions with which this paragraph 6 concludes, the first I have already recommended (*vide* paragraph 9) for adoption, that is, I have recommended that knowledge of estimating be tested by examination alone; the second suggestion is a common sense one and might be adopted with advantage; the examination in drills and exercises as now carried out is a very tedious and lengthy business, the marks eventually awarded being very much the same as the College staff would have given.

13. The subject-matter of paragraph 7 will be separately remarked on; the point noticed in paragraph 8 has already been reported to you with explanation of the cause, and arrangements have been made in accordance with orders issued by you to give the Engineer Class, II Division, of last year lectures during the current year in Road and Railways.

14. I forward copy of note by Mr. Chatterton explanatory of the supposed failure in Practical Chemistry.

Enclosure.

From the Professor of Engineering, to the Principal, College of Engineering, dated 31st January 1895.

In returning the report of the Examiners on the examinations held last December, I have only one remark to make and that is in reference to Mr. Moffat's statement that in Practical Chemistry the Engineer students of the third year did very badly. This report is not, I think, justified by the facts of the case. The practical examination consisted of a qualitative examination of a simple salt and to that I take no exception; but the quantitative work asked of them was to determine the amount of sulphur in a sample of coal and the time allowed by Mr. Moffat was between two and three hours. The length of time allowed was simply absurd as to go through the necessary operations in this analysis would require at least eight hours and of course in three hours the students could show no result, and hence the Examiner considers they have done very badly. The marks in this subject do not in any way materially influence the general result of the examination, and I have only drawn attention to the fact in the hope that if the same Examiner is on the Board at the end of this year he will not repeat the same mistake and that he will arrange to be present throughout the whole of the practical examination and not leave in the middle of it as he did last year.

Staff.—Major H. D. Love, the Principal, proceeded on furlough on the 31st March, his place being filled by Lieutenant-Colonel A. W. Smart, R.E., up to 6th November when he went on leave, and by Mr. J. Davidson for the remaining portion of the year. In February Mr. Middlemast, Professor of Mathematics, was transferred to the

Kumbakónam College as Acting Principal, his place being taken by M.R.Ry. B. Hanumanta Rao. Mr. A. Chatterton, Professor of Engineering, after an absence of nearly two years in the Public Works Department, rejoined the college in the middle of January. He was on privilege leave for two months and on special duty for one month during the year under review. The completion of the college workshops necessitated the strengthening of the subordinate staff by the appointment of an instructor and an assistant instructor. There were also some minor changes which do not call for remarks.

2. *Strength.*—It is satisfactory to note that since 1889 the strength of the college has steadily increased. Excluding 42 students who were undergoing the practical courses the college numbered on the rolls 265 on 31st December 1894, as against 252 on the corresponding date of the previous year. The Engineer Subordinate class excepted, all the classes participated in the increase. In view of the reduced tuition fees to be introduced shortly and the additional scholarships to be awarded under G.O. No. 128, Educational, dated 28th February 1894, a satisfactory increase may be expected in the Engineer class. The number that sought admission into the Draftsman and Surveyor classes was less than in the previous year. This was probably due to the institution of an entrance test to determine the selection of candidates. This test should lead to better qualified men joining these classes, with the result that when the draftsmen and surveyors leave the college they will be better trained. The Artisan class was as strong as could be expected under existing arrangements. The proposals under consideration to convert it into a day class and to enlarge its scope will afford facilities for the training of a larger number of students. Among the students Brahmans, as usual, predominated, while Europeans and Eurasians showed a further fall. There was, however, a slight rise in the number of Native Christians and Muhammadans. The Principal would have done well to have distributed the students according to the occupation and wealth condition of their parents. This information should be furnished in future. It is also desirable to note how far each district is represented in the college.

3. *Examinations*—(i) *University Tests.*—The Acting Principal should have noted in the report the results of the First Examination in Engineering held for the first time in January 1894. It is, however, observed from the supplemental report for 1893–94 submitted by Lieutenant-Colonel Smart that two out of three students passed the above examination. In the B.C.E. Degree Examination again, which was held for the last time under its old form and designation in January 1894, both the students of the senior Engineer class of 1893 passed in the second class; besides these two, five independent candidates—former students of the college—appeared for the examination and three met with success; the results were so far satisfactory.

(ii) *College Board Examinations.*—From the report of the Board it has to be gathered that the results achieved at the several examinations were not encouraging, as is evident from the remarks of the individual Examiners. The report should have been signed by all the members.

Engineer class.—The results of the final examination of the first division were creditable, though it is reported to have fared badly in Practical Chemistry. Mr. Chatterton, who taught the subject, attributes the unsatisfactory results to the disproportionately short time allowed to the examinees. The second and third divisions acquitted themselves fairly at the term examinations. But the results obtained in Science, Geometrical drawing, Building drawing, Freehand, Perspective and Model drawing, Estimating, Machine drawing, and Levelling were not satisfactory. The last three subjects were characterized by want of accuracy. Several of these subjects had to be remarked upon unfavourably in the last review also. More attention should be paid to them.

Engineer Subordinate class.—Thirty students of the senior division were examined at the final examination and 19 passed, all in the second class. The results compare very unfavourably with those of the year previous when, as many as 24 passed out of 26 presented. From the percentages of marks obtained in the several subjects it is observed with regret that all the subjects except Surveying and Vernacular language

showed deterioration. More attention should be paid to Topographical drawing, Estimating, Hydraulics and Irrigation works, Building drawing, Bridges and Irrigation works. The students did not appear to understand the formulas, which they had simply got by rote. The results of the term examinations of the Second and Third divisions were very fair. Here, again, want of accuracy and neatness was noticeable in Building drawing. Mr. Ashpitel recommends that more attention should be paid to Practical levelling. In commenting on Building drawing (Buildings) by the students of the Second division, he remarks that they actually wasted hours together in doing what was incorrect or inaccurate, without knowing the value of time, and suggests the desirability of awarding a proportion of the college marks for work done within a fixed time. The suggestion is commended to the Principal's attention. Mr. Scovell remarks that students have not had sufficient practical training in "Earthwork and roads." It is much to be regretted that no instruction was given in "Roads and railways." The explanation of Mr. Chatterton as to this omission is not altogether satisfactory. He should have drawn the attention of the Acting Principal to the subject in time. Necessary arrangements have, however, been made for the instruction of these students in the current year.

Draftsman class.—Of the 39 students in the senior division, one was absent, five appeared as independent candidates and 33 as regular college students; ten of the latter passed, all in the third class. The percentage of failures was thus unprecedentedly large. Of the remaining 23 college students, two were disqualified for malpractices, and as many as 18 failed in Estimating. The large number of failures in this subject is much to be regretted in view of its great importance.

Major Love ascribes this deplorable result mainly to the novel method employed by the Professor of Engineering in awarding college marks. The latter, it would appear, assigned marks on the results of a single class examination held in December, instead of following the usual method of marking with reference to the estimating work done actually in class throughout the session; and the consequence was that the percentage of marks fell so low as 23 as against 66, the average for the previous three years. More time should be devoted to practical estimating. The recommendation of the Board to do away with the college examination in Estimating does not commend itself to the Director. Apart from this drawback, the students of the First division displayed a general ignorance of perspective drawing. The class, as a whole, did not seem to understand a plan. Mr. Ashpitel remarks that the topographical drawings executed by the students were mere scrawls, and attributes the neglect of the subject to the absence of a separate minimum. This point will be attended to in the redistribution of marks when revising the syllabuses. The results, taken as a whole, were far inferior to those of the year previous, the average percentage of marks obtained in the several subjects being 48 as against 60, which has been the proportion for the last five years. The class does not appear to have received sufficient attention. The Second division, however, fared better and does not call for any remarks.

Surveyor class.—Of the 32 students in the senior division, 25 were examined as college students and the remainder as independent candidates. It is gratifying to find that not less than 20 of the 25 regular students were successful—six in the second class and fourteen in the third class. These results compare favourably with those of the preceding year, but none obtained a first-class certificate. The students should have had more practical training in Levelling and Theodolite Survey in which they were found deficient. In the Second division more attention should be paid to the Chain compass and Plane table.

It will thus be observed that, on the whole, the work of the college during the year cannot be considered quite satisfactory. The practical knowledge of the students was much below the standard required. Mr. Davidson and Major Love consider it desirable to increase the period spent in camp. The latter recommends that the duration of stay might be limited to a minimum of 16 and a maximum of 28 days, except in the case of the Surveyor class; it being feared that any further extension would interfere with other branches of study. The subject will receive consideration. The wholesale copying in "Drawing" appears to have been facilitated by want of

sufficient accommodation and by the defective arrangements for conducting the examinations. Until additional accommodation is provided, the examination of some of the classes might be held in the Senate House with the permission of the Syndicate. The addition of Drawing as a subject of the entrance test for admission to the Draftsman and Surveyor classes will, it is believed, ensure the admission of such men as have already some knowledge of the subject. A qualifying minimum in Estimating in the marks awarded by the college seems desirable. The Board's recommendation as to the necessity of revising the course of study in Mathematics and of the students devoting more attention to the Engineering subjects will be duly considered.

(iii) *Government Technical Examinations.*—The Principal has not been able to furnish information as to the number of entrances for these examinations. The following statement gives the details of the success in the several subjects of the Intermediate examination:—

Subject.	First class.	Second class.	Total.
Building Materials and Construction	2	1	3
Building Drawing and Estimating	1	1	2
Earth-work and Road-making	1	..	1
Applied Mechanics	1	..	1
Practical Plane and Solid Geometry	2	3	5
Surveying and Levelling	2	5	7
Mensuration	..	1	1
Total	9	11	20

Excepting one Engineer student and one Draftsman student who passed in Geometry, and one *ex*-Draftsman student who passed in Surveying and Levelling, all the successful candidates belonged to the Engineer Subordinate class. It is satisfactory to note that an old student of the Artisan class passed the Elementary Examination in Mensuration in the second class.

4. *Independent candidates.*—The results of the final examination held by the Board of Examiners for the last two years are compared below:—

Final Examination.	1893.		1894.	
	Examined.	Passed.	Examined.	Passed.
Engineers	1	1	1	..
Engineer Subordinates	2	..	2	2
Draftsmen	10	7	27	13
Surveyors	2	..	11	3

The only candidate that appeared from the Engineer class failed. It is, however, gratifying to note that both the candidates from the Engineer Subordinate class met with success. As many as nine of the thirteen that passed from the Draftsman class already held third or second class certificates. They again appeared for the examination with a view to secure certificates of a higher class, but failed. The results, as a whole, cannot be considered satisfactory.

5. *Artisan class.*—The number stood at 39 against 38 in the previous year. With the exception of two, all secured certificates. This is satisfactory. The large numbers who resort to this class for admission point to the demand for the services of men trained on the present system, and the demand will probably increase as the training improves. The proportion of the students belonging to the genuine Artisan class continued to be low.

6. *Military students.*—The Military students were distributed as follows:—

Works course.	Workshop course.	Engineer subordinates.			Probationers.	Total.
		1st Division.	2nd Division.	3rd Division.		
1	2	3	2	2	3	13

The Government of India finally decided in July 1894 that five candidates should annually be admitted into the College and suggested the expediency of curtailing the period of training. Several suggestions have recently been thrown out as to the advisability of shortening the course of training undergone by the Military students and of bettering their prospects. To render the College more attractive and to make the penalty for failure to obtain a guaranteed appointment lighter owing to the very limited number of sanctioned appointments, viz., two, Mr. Ashpitel suggests the shortening of the College course by doing away with the year of probation and the re-arranging of the course of instruction in the College by the institution of a qualifying examination after a study of two years, so that those who fail in it may be remanded to their regiments. He also suggests the desirability of curtailing the practical course from two years to one year—six months to be spent in workshops and six months on works. The Board of Examiners point out that the Military students did not acquit themselves well in Mathematics, a fact indicating that they have not profited much by the extra year's instruction in this subject. The Chief Engineer, the Acting Principal and Major Love are all in favour of dispensing with the probationary course. The subject being still under correspondence, nothing can be definitely stated here. The question will be well sifted before final recommendations are made.

7. *Practical Courses.*—Three of the Engineer class and nine of the Engineer subordinate class students of December 1892 completed their full practical courses. The remaining Engineer student of that year will have completed his course during the current month. One Engineer subordinate died, and three, including an independent candidate, failed to join for the practical course. All the passed Engineers and Engineer subordinates of 1893, together with one Engineer subordinate of 1892, having gone through the workshop course, have been posted to different works. Students undergoing the practical course are now required to go through a short course of riding at the Body Guard school, those failing to comply with this requisition not being eligible for appointments in the Public Works Department. The Director is glad to note that the conduct of the students was, as usual, good. The practical survey work done by the College students at Guindy and Gúduvánchéri in February and July 1894, respectively, has been reported on favourably by Lieutenant-Colonel Smart though in point of quality it left much to be desired.

8. *Workshop.*—The College workshop was completed and thoroughly fitted up by the beginning of the year, but owing to a variety of causes very little work was done. The workshop instructors were not appointed till September. Mr. Chatterton while on special duty inspected important workshops and engineering laboratories in England. There has been a diversity of professional opinion with regard to the removal of the engine and to the location of the 100-ton testing machine in a separate room. Major Love's views as to the alterations required in the workshops are awaited.

9. *Accommodation.*—The increasing strength of the College requires improved accommodation. The remarks of the Board of Examiners as to the evils arising from insufficient space are noted. It has not been found possible on financial grounds to carry out the necessary extensions. Rupees 17,000 has been provided in the Public Works budget of the current official year under part I, class B works for the required additions. With reference to G.O., No. 717, Educational, dated 26th September 1894, the sanction of Government will soon be obtained for the preparation of plans and estimates.

10. *Library and Reading-rooms.*—The library received an addition of 70 volumes during the year and good use seems to have been made of it both by the staff and the tudents. The steps taken to place the reading-room on an efficient footing are noted with satisfaction.

11. *Physical education.*—Physical exercises continued to be popular with the students. With a few exceptions, they passed a satisfactory examination in gymnastics and drill. Foot-ball and cricket appear to have particular attractions for them and their interest is evidenced by the subscriptions they have willingly undertaken to pay towards the support of the games. The recreation ground being found insufficient has since been added to and arrangements are being made for levelling the additional space. The Director has had to notice in connection with the bills of remuneration to the members of the Board of Examiners that a separate fee was claimed for the first time for examination in Drill and Gymnastics. In accordance with the recommendations of the Board this work will in future be entrusted to the Principal, who is a Military officer.

12. *Employment of passed students.*—A register of passed students and of their actual employments should have been regularly maintained. The prospects of the passed students seem to be brighter now than before. The nine Engineer subordinates of 1892 who completed their courses secured employment readily. Under G.O., No. 986, Educational, dated 22nd December 1894, the prospects of draftsmen also have improved. Such men as hold lower class certificates have been allowed to be promoted to higher grades when their work has been found satisfactory by the Chief Engineer. This concession will, it is believed, improve the status of these men, who have laboured hitherto under great disadvantages. With reference to paragraph 2 of its Order, No. 143, Educational, dated 16th June 1894, Government has been requested to reconsider its decision that the apprenticeship in the case of an Engineer student should date only from the completion of the two years' practical course, and, if that cannot be done, to allow him an initial salary of Rs. 250 a month as heretofore.

13. *Finance.*—The total expenditure rose from Rs. 67,070 to Rs. 67,407. Owing to the heavy fall in the fee-income from Rs. 15,957 to Rs. 13,817, the net cost of educating each student amounted to Rs. 223 as against Rs. 209 in the previous year and Rs. 238 in 1891–92. This is not satisfactory. For statistical purposes the Engineer subordinate class should in future be treated as part and parcel of the College department. The large decrease in the fee revenue should have been explained.

14. *Revision of rules.*—Among the important changes made during the year were the institution of an entrance examination for the draftsman and surveyor classes, the introduction of a short course of equitation for the students of the Engineer and Engineer subordinate classes at the Body Guard school, the fixing of a minimum proportion of marks to be secured by soldier students, and the addition of elementary drawing to the preliminary course of study. The fee for the Engineer class has been reduced from Rs. 16 to Rs. 12 and three scholarships of Rs. 15 in place of a single scholarship of Rs. 30 have been instituted. In the middle of 1894 the Government of India desired a reduction of the period of training of the Military students. This question, as well as the proposals for the re-organization of the artisan class, has yet to be settled. With reference to paragraph 2 of G.O., No. 710, Educational, dated 25th September 1894, the Board of Examiners pointed out the advisability of revising the College syllabuses so as to make them identical for those classes for which similar papers are considered to be permissible. A committee consisting of the gentlemen named in the margin was appointed to revise the syllabuses. The delay in the submission of the revised rules is due to the foregoing causes, as well as to the changes regarding the promotion and the prospects of employment of draftsmen. The committee's report was received a few weeks ago and it will be submitted to Government with necessary recommendations after consultation with Major Love.

Mr. J. P. Davidson.
„ H. C. West.
„ R. E. Ellis.
„ Alfred Chatterton.
M.R.Ry. B. Hanumanta Rao.

15. *General.*—The absence of Major Love on furlough and the changes in the Principalship during the year under review have more or less interfered with the working of the institution. The instructors in surveying and drawing should exert themselves and get their students to work better. At the present time the demand for efficient draftsmen, surveyors and overseers is in excess of the supply. The syllabus for the surveyor class needs modification to meet the pressing demand in the Public Works Department for sub-overseers for the Tank Restoration Branch, &c. The abolition of class certificates and the fixing of one definite standard of qualification in the case of draftsmen and surveyors will remove the present difficulty and probably increase the supply. The completion of the College workshop renders it possible to reduce the period of training in the Public Works Workshop. The College Workshop should also afford facilities for the students of mofussil technical institutions recognized by the Department learning practical work. This may be effected by the affiliation of these institutions to the College—an arrangement which would tend to place the branches of technical education allied to engineering on a more satisfactory footing. As required in paragraph 3 of G.O., dated 16th June 1894, No. 443, statements showing receipts and charges during the year are enclosed for information.

(A true Extract.)

(Signed) D. DUNCAN,
Director of Public Instruction.

Order—dated 21st June 1895, No. 521, Educational.

The report on the working of the College of Engineering in 1894 and the Director's review of it are, as usual, full and call for but few remarks.

2. The strength of the college has continued to increase, but the examination results, particularly in the Draughtsman class, leave much to be desired. The Government cannot accept the Principal's explanation of the high percentage of failures among the draughtsmen as adequate. As the Board of Examiners remarks, Estimating is a subject which can be satisfactorily tested by examination, and the change in the method of assigning college marks does not account for the very poor results achieved. The explanation must be that the instruction afforded is inadequate, that the students examined were of unusually poor capacity, or that the old system of assigning college marks was radically defective. Whichever of these causes may have been at work, it is clear that enhanced importance must be attached to the subject "Estimating". If, as the Principal remarks, "the vast majority of the students trust wholly and solely to their college marks to make good deficiencies in their examination papers, there can be little question as to the desirability of adopting his suggestion that separate qualifying minima should be prescribed for examination and college marks. The Director should report his views on the matter. It is most desirable in the interests of the public service that a sufficient supply of qualified draughtsmen should be available. At present this is not the case and Government trusts that every effort to effect this end will be made.

The disqualification of several candidates for unfair practices is another unsatisfactory feature of the year. To prevent a repetition of such misconduct at future examinations the Director should endeavour to arrange with the Syndicate to hold at the Senate House examinations in such subjects as may appear desirable.

The delay in fixing on a site for the hundred-ton testing machine is to be regretted, and every endeavour should now be made to get it in working order at an early date.

3. The total expenditure on the college rose slightly and the fee-income fell heavily—a circumstance which, as the Director remarks, should have been explained. As a consequence, the average *nett* cost *per* student rose from Rs. 209 in 1893 to Rs. 223 in the year under report. The necessity for extra accommodation is evident, and Dr. Duncan should therefore expedite the submission of his application for sanction to the preparation of the necessary plans and estimates.

It is presumed that, when submitting the revised rules—in the preparation of which there has been excessive delay—the Director will discuss the various important matters, such as the proposed abolition of the military students' probationary year, the extension of the practical surveying course, &c., which are alluded to in his review as being under consideration.

(True Extract.)

Lionel Davidson
5.7
for *Chief Secretary.*

To the Director of Public Instruction, with enclosures.
" Public Works Department.
" Local and Municipal Department.
" Lieutenant-General Commanding the Forces, Madras.
Editors' Table.

Exd. A. Raitt.

10 / C.

Govt. of {1895} Madras.

EDUCATIONAL.

No. 1795 W dt 17-7-95

Issued

Recd. Encl.

G.O., 21st June 1895, No. 521.

JUNE.

College of Engineering.

Reviewing the report on the working of the — during the year 1894, and forwarding a copy of the Proceedings to the Under Secretary of State.

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