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C.E. for Rys
Supdg. Engrs
C.A. to Govt
Sec of W.P. Board

College of Engineering.

Reviewing the report on the — for the year 1893.

alluded to in my report for 1892, although it occurred after the close of that year. The vacant Instructorship was filled by Sergeant B. O. Reynolds, whose services were lent by the Public Works Department, and who was gazetted on the 15th February. Conductor Cames' duties as Superintendent of Military students devolved on Sergeant W. H. Goddard, Instructor in Surveying and Drawing, who was appointed from 21st January. M.R.Ry. B. Hanumanta Rau, B.A., from Kumbakónam College, took over on 27th January the duties of Professor of Mathematics during Mr. Middlemast's absence in England on sick leave, relinquishing them in favour of the permanent incumbent on 21st June. Consequent on the absence on leave without pay of Mr. J. D'Cruz, B.C.E., Assistant Instructor in Surveying, which was followed by his resignation on 20th March, the following appointments, substantive *pro tem.*, were made from 19th January :—M.R.Ry. R. A. Bhakya Mudaliar from Second Assistant Instructor to be Assistant Instructor in Surveying, and M.R.Ry. R. Sundarum Aiyar, B.C.E., to be Second Assistant Instructor. The latter officer resigned on 13th May on appointment to the Public Works Department, and his place was filled on 1st September by M.R.Ry. M. A. Anantalwar, B.A. The Assistant Instructorship in Drawing was occupied, substantive *pro tem.*, from 19th January by Mr. W. C. H. Littlewood, and M.R.Ry. S. Subramanya Aiyar was appointed to the Second Assistant Instructorship. Mr. Whiteley's deputation to the chair of Engineering, *vice* Mr. Chatterton, would have terminated on 30th January 1894, but for his nomination to special service under the Mysore Government. He left the College on 30th November 1893, and Mr. Chatterton's reversion was postponed until the commencement of the following session. The above changes in the staff, although numerous, occurred for the most part at the beginning and end of the year and caused little inconvenience. From July to November the instruction of the Engineer class in practical chemistry was undertaken, as last year, by M.R.Ry. C. Krishnan, B.A.

I have to acknowledge the good work done by the members of the College staff, and specially that of the Professor of Mathematics, Mr. Middlemast, and the Acting Professor of Engineering, Mr. Whiteley. Mr. Whiteley combined with the closest application to his duties a tact and method which contributed towards harmonious work by the junior members of the staff and towards willing industry on the part of the students. I also notice with pleasure the steady work done by Sergeant Goddard, the Instructor in Surveying and Drawing, and by Sergeant Reynolds, the Instructor in Engineering. The latter, besides conducting his teaching with energy and ability, has done extra work in connection with the revision of the College, "Notes on Building Construction." I also acknowledge the co-operation of the Board of Examiners, the Locomotive Superintendent of the Madras Railway and the various Public Works Officers who have assisted in the practical training of the students.

4. *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	4	2	4	8	22
Engineer Subordinate class	* 8	10	26	31	24	99
Military probationers	..	..	..	..	..	2
Draftsman class	..	..	27	..	..	67
Surveyor class	..	..	19	40	..	50
Artisan class	..	..	..	31	..	38
Total ..	..	..	..	..	..	278

* Includes four students specially appointed to the Public Works Department before the termination of their course.

Excluding the students going through the practical courses in Workshops and on works, the total number actually in the College on 31st December 1893 was 252. The corresponding totals of the four preceding years were 1892, 217 ; 1891, 189 ; 1890, 136 ; 1889, 109.

The numbers arranged by classes of the community were—

Europeans and Eurasians	16
Brahmans	131
Other Hindus	83
Native Christians	13
Mussalmans	5
Others	4
Total ...	252

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	2	7	3	2	..	..	14
Engineer Subordinate class	11	53	11	3	..	3	81
Military probationers	2	..	..	..	..	..	2
Draftsman class	..	27	31	6	3	..	67
Surveyor class	1	40	8	..	1	..	50
Artisan class	..	4	30	2	1	1	38
Total ..	16	131	83	13	5	4	252

The numbers offering for admission were :—Engineer class 11, all of whom passed the entrance examination of December 1893 ; Engineer Subordinate class 27, of whom 25 qualified in April 1893 for admission ; Draftsman class 132 in November 1893 for 36 vacancies ; Surveyor class 72 for 28 vacancies ; Artisan class 139 for 40 vacancies. By the middle of 1894, when another batch of Engineer Subordinate students will join, the numbers in the College will probably reach 275, the maximum for which space can be found.

The marked increase in the strength of the Engineer class is gratifying. During the year one student of that class was compelled by illness to leave temporarily, another was nominated by Government to the Telegraph class at Roorkee, and one student of the Royal Indian Engineering College, Cooper's Hill, was permitted under certain restrictions to join the Second year division. There was less competition for admission to the Engineer Subordinate class than in 1891, which I attribute to the changes which have taken place in the University Matriculation course. The numbers applying for admission to the Draftsman, Surveyor and Artisan classes continue to be very large.

5. *Examinations.*—The final and term examinations of all the classes were conducted in December 1892 by the Board of Examiners appointed by Government. A brief abstract of the results is given below, and a synopsis of the final examination marks forms an appendix to this report. Under the Presidentship of Mr. Stoney, who was relieved on departure to England in November by Mr. Llewellyn Jones, the faults in the examination papers noticed in my last annual report have this year been corrected. The practical examinations by this College in Survey Field work, which were introduced last year, were extended to all the classes learning Surveying. The points noted by the Board in connection with the examinations of December 1892 received careful attention during the year. The examinations for admission to the Engineer and Engineer Subordinate classes were conducted by the College. Proposals were made for the institution of an entrance examination for the Draftsman and Surveyor classes, but the consideration of the matter has been deferred until 1894. The numbers applying for admission to these classes are now so large that dissatisfaction is felt with the present system of selection ; and an examination giving credit for knowledge of English, Arithmetic, Hand-writing and Drawing has become a pressing need.

6. *Engineer Classes.*—In August 1892 proposals were made for the removal of some of the disabilities under which these classes labour, as compared with the corresponding classes in the other Indian Engineering Colleges, but orders thereon are still

awaited. The proposals involved a reduction of fee-rates, an increase in the number of scholarships, and the guarantee of one appointment to the Upper Subordinate Establishment of the Public Works Department. The numbers applying for admission have, however, increased substantially during the last two years. Several applications have been received from Ceylon candidates, who have passed the Senior Cambridge Local examination, and it has been decided that such persons may be admitted on the understanding that they are not eligible for any prize, scholarship, diploma, or guaranteed appointment, nor for the practical course. The restriction as regards the final certificate seems, however, too severe, as no person is likely to go through a three years' course unless he has the prospect of securing some evidence of his proficiency at the end of it. It is worthy of consideration whether, so long as the number of fully-qualified candidates is insufficient to fill the class, the Principal might not be authorised to accept any person whom he deems to possess sufficient educational qualifications, and to allow him to take the full theoretical course, and appear for the final examination like an ordinary student. Such special students might further be allowed to proceed to the practical courses on payment of a contribution, calculated to reimburse the State for the expense it incurs, and thus to secure for themselves the full diploma.

Four students completed their final year's practical course on 31st December 1893, viz., L. D. Venkatarama Aiyar, B.A., J. Kuriyan, B.A., V. R. Pranatartihara Aiyar, B.A., B.C.E., and S. Rajagopalaswami Mudaliyar, the first and third as Civil Engineers, the second and fourth as Mechanical. L. D. Venkatarama Aiyar secures the guaranteed appointment as Assistant Engineer, and the other three have been offered overseerships of the first and second grades.

The next batch of Engineer students (four in number) consisting of G. S. Rama Aiyar, B.A., P. Ranganayakulu Nayudu, B.C.E., V. Gopala Aiyar, B.C.E., and V. S. Ramakrishna Aiyar has completed one year in workshops, and the students have now been drafted to works. One of them has been nominated to the East Coast Railway, and the others to different public works divisions.

Of the three divisions of the Engineer class actually in the College, the senior, consisting of two students, appeared for final examination in December last and both students passed. The average percentages of marks for the division under the various subject heads were as follow :—

	1893.	Average of four years.
Mathematics	75	55
Science	54	40
Engineering	71	55
Drawing	77	67
Surveying	68	67
Vernacular Language	49	56
Drills and Exercises	84	80
Total ...	68	55

Compared with the mean of the four preceding years, there has been a very marked improvement in all subjects except Language, and an advance of no less than 13 per cent. on the total. Both students have done exceptionally well, and there was a keen contest for the first place. This was won by R. N. Arokeaswami Mudaliyar, who, with 2,111 marks out of 3,000, distanced his competitor A. W. King by 110 marks. Arokeaswami receives the gold medal awarded to the most distinguished student, and obtains a prize consisting of a prismatic compass for proficiency in *Drawing and Surveying*. He also gains the Narayana Oonythan prize, consisting of a copy of Molesworth's Pocket book, and a Sir Madhava Rau prize for Workshop practice, viz., a field glass. He will, on the completion of his two years' practical course, provided he passes the B.C.E. degree examination, be appointed to the Engineer Establishment of the Public Works Department. To A. W. King is awarded a prize for *Mathematics*, viz., an aneroid barometer, and one for *Engineering* consisting of a copy of Mullins' "Irrigation Manual."

One special student was permitted to attend the lectures in Sanitary Engineering to aid in qualifying himself for the University degree in Sanitary Science.

One independent candidate presented himself for the College final examination and was successful.

The second division of the Engineer class, containing three ordinary students, has appeared for a term examination, the marks for which count towards the final total. The average of the division was 57 per cent. The scholarship of Rs. 30 per mensem is gained by S. A. Jagadisa Aiyar, B.A., who secures 71 per cent. of the total marks.

The third division, consisting of eight students, made an average of 65 per cent. of the total marks at the late term examination. This high figure indicates the existence of good material. The scholarship is won by P. V. Manicka Nayakar with 74 per cent. of the total marks.

7. *Engineer Subordinate Class.*—Eight students completed their final year's course on works. Owing to a pressing need of Upper Subordinates in the Public Works Department, four of these, viz., S. Dakshnamurti, P. N. Ramachendra Aiyar, J. S. Mullen and S. Iswara Sastri, were appointed to the establishment in October—two months earlier than usual. Private C. H. Briant has also been appointed permanently, while the other three, D. S. Sankara Aiyar, E. T. Jordon and M. Ramaswami Pillai, have been offered temporary overseerships. Of the four additional students of this batch who passed the final examination of December 1891, Corporal Blake was temporarily invalided to England, but will rejoin early in 1894, while the other three elected not to proceed to the practical course.

The next batch of Engineer Subordinate students (ten in number) spent the year 1893 in the Public Works Workshops. Their work will be referred to later. Of the four additional students of this batch who elected not to proceed to the practical course, one has been permitted to join the workshops in January 1894.

Of the three divisions of the Engineer Subordinate class in the College proper, the senior, consisting of twenty-six students, joined in July 1891 and proceeded to the final examination in December last. Twenty-four were successful. The average percentages of marks gained by the division were—

	1893.	Average of four years.
Mathematics	54	42
Engineering	55	46
Drawing	58	58
Surveying	49	61
Vernacular Language	42	51
Drills and Exercises	75	81
Total ...	54	53

Compared with the mean of the four preceding years, there has been a substantial improvement in Mathematics and Engineering, a considerable falling off in Surveying (due mainly to greater stringency in the award of College marks) and in Language, and a moderate fall in Drills and Exercises. There has, however, been a rise in the total, and the class may be considered a good average one. It contains neither exceptional talent, nor unusual inferiority, but is distinguished throughout by respectable mediocrity.

The senior student is M. R. Natesa Aiyar, who secures 63 per cent. of the total marks. He gains the silver medal awarded to the most distinguished student, and a prize for *Engineering*, consisting of a silver lever watch. He also gains the Rogers' prize of books. The second, third and fourth students, M. S. Narayanaswami Aiyar, N. Kandasawami Pillai and M. N. Ramakrishna Aiyar, secure 60 per cent. with only a mark between them. M. S. Narayanaswami Aiyar wins a parallel rule as a prize for *Vernacular Language*. The prize for *Mathematics*, a magnetic compass, falls to L. D. Ramachandra Aiyar, that for *Surveying*, an optical square, to R. Panchapakesa Aiyar, while Corporal H. A. Furnell receives a field glass as a prize for *Drawing* and *Drills and Exercises*. Sir T. Madhava Rau prizes for *Workshop Practice*, consisting of an optical square and a colour box, are awarded to S. Natesa Aiyar and A. Rama Rau respectively, to the former for special proficiency, and to the latter as a Mahratta Brahman. Corporal Furnell is also distinguished for proficiency in the workshops.

Two independent candidates presented themselves for the examination, but both were unsuccessful.

The second division of the Engineer Subordinate class contains thirty-one students, who scored an average of 55 per cent. of the total marks at the term examination of December 1893. M. Krishnaswami Aiyar heads the list with 76 per cent. The two scholarships of Rs. 12–8–0 are awarded to him and to the second student J. S. Muthayya.

The third division of the Engineer Subordinate class, which contains twenty-four students, obtained 54 per cent. of the marks at the term examination in December last. One of the two scholarships of Rs. 12–8–0 is won by S. Natesa Aiyar, who occupies the first place, while the other will be divided between G. Lakshmana Rau and R. Srinivasa Raghava Charri, who stand third with equal marks. The second place is taken by a Military student, Drummer Whittaker.

8. *Draftsman Class.*—The senior division, consisting of twenty-six regular students, appeared for the final examination in December last. Twenty-one were successful in gaining certificates, five in the second class and sixteen in the third. One candidate failed, and four were disqualified by the Board for unfair practices during the examination, evidenced by similarity of answers in Estimating.

Omitting the results of the disqualified candidates, the average percentages gained by the division under the various subject heads were as follow :—

	1893.	Average of four years.
Practical Geometry	64	68
Freehand, Perspective and Model Drawing	58	60
Building Drawing	55	65
Machine Drawing	68	55
Estimating	56	52
Topographical Drawing	55	54
Gymnastics and Drill	80	79
Total ...	60	60

Comparing the results with the mean of the four preceding years, it will be seen that there has been a fall in Practical Geometry and in Building Drawing, a substantial rise in Machine Drawing and an improvement in Estimating. The rise in Estimating is gratifying, as the marks in this subject have always been low. The total reaches the mean, and the class is an average one. Like the senior division of the Engineer Subordinate class, it is one of uniform but ordinary merit.

The student occupying the first place is N. L. Ramachandra Rau, who, with 72 per cent. of the total marks, gains the College bronze medal and a prize of a colour box for general proficiency. The second student, D. N. Narasimhayya, secures 70 per cent. of the marks, and receives a prize consisting of a set of scales. Both these students secure second-class certificates as Draftsmen, as do T. R. Krishnaswami Aiyar, Y. Rajabathar Mudaliar and T. Krishna Rau. Special prizes are awarded for proficiency in *Estimating* to V. Venkatarama Aiyangar and K. Krishnamachari, consisting of an ivory rule in each case.

Ten independent candidates presented themselves for examination for certificates. Two passed in the second class, five in the third, and three failed.

The second division of the Draftsman class contained forty students. The mean percentage of marks gained by the division at the term examination was 57. One of the two scholarships of Rs. 8 is won by S. Subrahmanya Aiyar, who occupies the first place, while the other will be divided between A. K. Kuppusawami Aiyangar and C. K. Krishna Rau, who stand second with equal marks. Five of the students failed to obtain the requisite minimum in *Geometrical Drawing*.

Thirty-six candidates have been accepted for admission to the new junior division which will be formed early in 1894.

9. *Surveyor Class.*—In the senior division of 1893 there were eighteen students. Four of these gained certificates in the second class and eight in the third class, while six failed.

The average percentages obtained under different subject heads were—

	1893.	Average of four years.
Chain, Compass and Plane Table Surveying	53	63
Levelling	64	63
Theodolite Surveying	58	61
Topographical Drawing	54	60
Gymnastics and Drill	77	72
Total ...	58	62

Comparing the figures with the mean of the four preceding years, it will be seen that there has been a fall in *Chain, Compass and Plane Table Surveying* and in *Topographical Drawing*. The class is decidedly below the average.

The senior student is G. Venkatarama Aiyar with 72 per cent. of the total marks. He wins the College bronze medal, and a prize consisting of a clinometer rule for general proficiency. To the second student, G. Somayya Sastri, who is only two marks below the first man, is awarded a prize of a pillar compass. The remaining winners of second-class certificates are K. P. Sadasiva Aiyar and T. R. Jivanna Rau.

The second division of the Surveyor class, containing thirty-one students, secured an average of 49 per cent. at the December term examination. The two scholarships of Rs. 8 are awarded to T. Subrahmanya Pillai and R. Natesa Aiyar. Five students failed to obtain the requisite minimum in *Chain, Compass and Plane Table Surveying*.

Twenty-eight candidates have been accepted for admission to the junior division which will be formed early in 1894.

10. *Artisan Class.*—At the commencement of the year, forty out of one hundred and forty-seven candidates were admitted. Two students were dismissed during the session, leaving thirty-eight at the close of the year. About a dozen of these are actual artisans or maistries. The class received the usual evening instruction, supplemented by survey field work one morning a week, and by occasional inspections of works in progress.

In November, 139 candidates applied for admission. Of these 40 have been accepted. The following statements of the occupations of the persons selected, and of their parents, show that the type of students for whose benefit the class was instituted is now being secured :—

Classification of students by occupation.

Maistry or apprentice to maistry	20
Contractor or contractor's assistant	5
Apprentice to carpenter	1
Time-keeper, Public Works Department	2
Apprentice to overseer	2
Clerk	1
Student, or no occupation	9
Total ...	40

Classification of students by parent's occupation.

Bricklayer maistry, or bricklayer	4
Carpenter maistry, or carpenter	2
Maistry, road maistry, or Public Works maistry	9
Contractor	4
Overseer or sub-overseer	3
Draftsman	1
Kurnam	1
Clerk or accountant	5
Peon	1
Cultivator or land-holder	4
Merchant	3
No occupation	3
Total ...	40

Consideration has been given during the year to the best mode of developing the artisan class, and definite proposals were submitted in September. The first requirement is more time, which might best be given by converting the class into a day one. Few of the students, even those who are maistries, are in actual employment while at the College, and suitable candidates would rarely be excluded by the change. The subjects of instruction would remain as at present, but would be carried to a higher standard. One full day per week could be devoted to surveying field work, and some workshop practice might perhaps be introduced. The students should be required to pass a final examination, and those successful might be held eligible for the appointments of sub-overseer, channel superintendent, and head maistry. The artisan class will thus be developed into one for lower subordinates, and will meet a decided want.

11. *Military students.*—The total number of soldier students on 31st December 1893 was twelve, viz., one on works, one in the Public Works Workshops, eight in the Engineer Subordinate class, and two probationers. One was remanded to his regiment in May owing to failure to pass the examination at the end of his probationary course, and two reverted at their own request. It was notified in June that the early abolition of the military class was in contemplation, and that only two admissions in place of five would be sanctioned for 1893. The Supreme Government decided, however, that recruitment of the Public Works Department from the army shall continue, but recommended that in view of the difference between the numbers entering the College and the numbers passing out, the standard of entrance examination should be made equivalent to that at Roorkee. It has been pointed out, however, that although during the last twenty years only fifty-three Military students passed out, while one hundred entered, yet the difference is not due to failure at examinations, but to remands at students' own request, or on account of ill-health, or occasionally for misconduct, such remands generally occurring early in the course. It has been noted also that in this College the entrance examination admits to a probationary class only, and that a year's instruction, followed by a further examination, is imposed before the soldiers join the Engineer Subordinate class. In this class they do not, as at Roorkee, form a division by themselves; but they compete with the civil students, and are able to hold their own.

The barrack accommodation in the College has been increased by the transfer of the workshops to the new building. Sanction has been accorded to the Military students being attached to the Wellington depôt for the long vacation during May and June.

12. *Government Technical Examinations.*—A number of the regular students of the College presented themselves voluntarily for Government Technical examinations in engineering subjects. Under the Intermediate standard there were 21 applications, and 13 passes, viz., 8 in the first class and 5 in the second. Under the Elementary standard there were 15 applications and 7 passes, viz., 4 in the first class and 3 in the second. Eleven students of the artisan class, not included above, came forward in April for the Elementary examination in mensuration, but all failed. As the technical examinations take place in April, while the artisan students join at the end of January, the latter have no reasonable prospects of success until their connection with the College has terminated.

13. *Surveying.*—During February the first and second divisions of the Engineer class, and the senior divisions of the Engineer Subordinate, and Surveyor classes, comprising fifty-three students, were in camp at Guindy for a fortnight engaged on a railway survey project. In July the three divisions of the Engineer class, the second division of the Engineer Subordinate class and the first division of the Surveyor class, comprising sixty-four students, proceeded to Gúduvánchéri, and remained in camp for a fortnight. The survey parties, ten in number, were disposed over about thirty square miles of hilly country, which was surveyed and levelled over in various ways. The senior division of the Engineer Subordinate class had at the same time two weeks of continuous survey work in Madras. The cost of the camps of February and July was Rs. 760. The field work of the remaining divisions of the different classes was

spread over the whole year. The total outturn was as follows, exclusive of that of the artisan class:—

No. of parties.	Description of work.	Miles of levelling and traversing.	Acres filled in.
	First half-year.		
4	Skeleton chain survey	7	..
3	Chain survey	..	261
8	Compass traverse	50	..
11	Levelling	101	..
13	Theodolite traverse	70	..
8	Setting out curves	12	..
	Second half-year.		
4	Chain survey	..	420
12	Compass survey	..	50,460
11	Compass traverse	136	..
14	Plane table traverse	32	..
14	Plane table survey	..	29,920
19	Levelling	77	..
8	Contouring	31	..
9	Hill sketching	..	4,163
5	Ghat tracing	5	..
6	Theodolite traverse	74	..
6	Setting out curves	10	..
1	Pocket sextant survey	..	1,920
4	Trigonometrical survey	..	25,600

The outturn per party is considerably higher than in previous years, but the results of the practical examinations held in the College indicate that more attention must be paid to accuracy, especially in levelling, and less to rapidity of work.

14. *Inspections of works.*—Some forty inspections of works were made during the year, including inspection of the preparation of materials at the brickfields, lime kilns, and cement works; of building construction at the Victoria Technical Institute; of bridges in Madras and on the Buckingham canal; of irrigation works and water-supply at the Red Hills; and of machinery at the Public Works Workshops, the Buckingham Mills, and the Government Bakery. Buildings and bridges were measured up and drawn by the students, and work was also set out on the ground.

15. *College Workshop.*—The students practised as usual at carpenter's and fitter's work. They were exercised in sawing and planing to given dimensions, in making joints, in wood turning, and in the construction of benches, tables and other furniture required for the College. In the fitter's shop, they were engaged in chipping and filing cast and wrought iron, and in drilling, turning, and screw-cutting. The new workshop building, measuring 80 feet by 60 feet, was handed over on 21st August 1893, and the tools and plant in the temporary shop were at once transferred thither. The engine, boiler and machine tools were delivered in October, and their erection, as well as the supply of brackets, pedestals, shafting, pulleys and belting, was entrusted to the firm of Messrs. Massey and Company. The work was almost complete by the end of the year. The plant consists of a 10-horse power horizontal engine, a 12-horse power locomotive boiler, two surfacing and screw-cutting lathes, a slotting machine, shaping machine, drilling machine, and milling machine, with two grinders. These with the lathes and drill previously in the shop will suffice to give practice to the students in the ordinary classes of machine work, while the steam power is sufficient to meet possible further demands in the future. The completion of the shops early in 1894 will permit of more time being devoted to practical work by the Engineer and Engineer Subordinate students, and of the admission of other students to the advantages of this class of work. A corresponding reduction will be necessary in the theoretical courses, and the revision of the syllabuses is engaging attention.

16. *Laboratory and Experimental Work.*—Work in the chemical and engineering laboratories was conducted as usual. Cement testing was practised, and indicator diagrams were taken at the Buckingham Mills by the kind permission of Messrs. Binny and Company. A 100-ton Wicksteed's testing machine has been ordered, and will be erected in the workshop building. Other testing apparatus already possessed by the

College will eventually be transferred to that building, which will become a combined workshop and engineering laboratory.

The apparatus imported during the year consisted chiefly of surveying instruments, and models of pieces of mechanism. A few models were made in the workshops; sections of rolled beams were kindly presented to the College by Messrs. Massey and Company, and models of a venetian door and a well curb by M.R.Ry. J. R. Sivasubrahmanya Aiyar of the Sanitary Engineer's Department.

17. *Practical Course, Mechanical Engineers.*—Two students of the Engineer class of December 1891, viz., J. Kuriyan and S. Rajagopalaswami, Mudaliyar spent the year in the Madras Railway Locomotive Workshops at Perambur. Mr. Phipps, the Locomotive Superintendent, writes as follows:—Both students "have conducted themselves very well, and to my entire satisfaction. They have both evinced much interest in their work, have stuck well to it, and made as good progress as could be looked for in the time at their disposal. They have also kept good time, and their conduct has been all that I could have wished." In the fitting shop they fitted up connecting rods, engine motion work, and general work; in the lathe shop they were practised in turning, and at the marking off table; in the iron foundry and in the brass foundry they were painstaking and careful in the work given them. They were engaged for three months in the smith's shop on general work; and in the boiler shop they worked at plating, marking off, and rivetting boilers. They completed their course with two months in the drawing office. Rajagopalaswami was further engaged on general work in the carriage building and carpenter's shop, and worked on the engines as fireman for a month.

18. *Workshop Course, Civil Engineers and Subordinates.*—Four Engineer and ten Engineer Subordinate students were attached throughout the year to the Public Works Workshops, Ráyapuram. The Superintendent Mr. Wickham reports as follows:—"The students passed through the machine shop, including turning, drilling and planing, the fitter's, carpenter's, and smith's shops and the foundry. Their progress was, on the whole, good, and I would make special mention of Engineer students G. S. Rama Aiyar and Ramakrishna Aiyar, and Engineer Subordinate students M. V. Venkatarama Aiyar and D. V. Venkatarama Aiyar. The best piece of work was an Archimædean screw, 12 feet long and $2\frac{1}{2}$ feet in diameter, the whole of which, excepting the heavy smith's work, was done by the students. The conduct of the students was good. From the first March the students were put on the same footing as the workmen, fines being replaced by extra work during holidays. I would add that, owing to the paucity of trained supervision under me, it depends on the student himself how much he learns."

19. *Works Course, Civil Engineers and Subordinates.*—Two Engineer and nine Engineer Subordinate students were attached throughout the year to various circles where important works are under construction. The abstract of the progress reports given below shows that in most cases it has been found possible, as was recommended last year, to give the students responsible work to carry out:—

Name.	Abstract of Progress Report.
L. D. Venkatarama Aiyar, B.A.	*Kistna Eastern Division and Consulting Architect's Division.*—Mr. C. A. Smith reports:—He was first instructed in management of labour and system of accounts, and afterwards engaged on a tour of inspection and preparation of river charts. He was subsequently placed in charge of a head sluice where well sinking and pile driving were in progress. His conduct has been quite satisfactory, and he has shown himself diligent and ready in acquiring practical experience. Mr. Irwin writes:—He was put in charge of a new Police station, and supervised its construction throughout, gaining a practical acquaintance with laying out, excavation, brickwork, roofing, &c., and with measuring up. He assisted to lay out the new Law College, and in deviating a main drain. His conduct throughout was good.

Name.	Abstract of Progress Report.
V. R. Pranatartihara Aiyar. B.A., B.C.E.	*Consulting Architect's Division and Kistna Eastern Division.*—Mr. Irwin writes:—He received instruction in the management of labour, in construction, and in measuring up at the College of Engineering Workshop, the Presidency College extension, and the new Light House. He was also practised in making estimates for works, and in taking levels. His conduct throughout was satisfactory. Mr. Traill reports that, during the second half-year, the student assisted in taking current meter observations under Mr. Chatterton, and that he gained experience in working portable engines and centrifugal pumps, and in the details of water distribution. He was afterwards employed on building work, in the erection of a girder bridge, and in the preparation of bridge designs. He worked in a satisfactory manner and proved a useful assistant.
S. Dakshanamurti ...	*South Arcot Division.*—Mr. J. D. Legge reports:—This student has nearly completed a drainage sluice which has been directly under his charge. He has also been employed on a deviation of the Coleroon bank, and on the preparation of doors and windows for a Taluk office. He is active and devotes much time and attention to his duties, and I can report very favorably of the progress he has made, and of his general behaviour.
P. N. Ramachandra Aiyar.	*Chingleput Division.*—Mr. Wilson states that the student was first placed on the construction of a large tank weir, where he saw excavating, and concrete, brick, and stone work, as well as brick making and the preparation of materials. He was then employed on the repair of a tank bund, the construction of police huts and the repair of buildings. He also made surveys and estimates for a new channel, and attended the sub-division office. He was diligent and attentive to his work.
J. S. Mullen	*Gódávari Eastern Division.*—The Superintending Engineer, First Circle, reports that the student was at first employed in gaining acquaintance with the preparation of materials, and subsequently on works at Cocanada. His conduct was satisfactory, and he took an intelligent interest in his work. No report has been received for the second half-year.
S. Iswara Sastri	*Periyár Division, No.* 2.—Mr. Carless says:—The student has been employed in setting out works and on masonry works in progress. He takes an interest in acquiring practical knowledge.
D. S. Sankara Aiyar ...	*Periyár Division, No.* 2.—Mr. Carless reports:—This student has been employed in setting out superpassages and sluices and in running levels. He has also had charge of masonry and earthwork. He is very painstaking and has acquired a good practical knowledge of work. Is likely to make a good overseer.
Private C. H. Briant ...	*Consulting Architect's Division*—Mr. Irwin writes:—Private Briant was employed at the Government Brickfields, at the Victoria Technical Institute, and at the School of Arts, Madras. He was also engaged in making surveys. During the second half-year he prepared plans and estimates for two culverts, and assisted in other works in which he gave satisfaction. His conduct was exceptionally good; he was diligent and attentive to his work, and gave entire satisfaction. He is intelligent, has passed the higher standard in Telugu, and with experience will make a very useful subordinate.
E. T. Jordon	*Rushikulya Division* and *Kistna Eastern Division.*—Mr. Somers-Eve writes that this student received instruction on reservoir works, and on a channel, anicut, and head works. He made himself useful in many ways. His conduct was good. Mr. C. A. Smith reports that the student was employed during the second half-year on buildings at head-quarters. His conduct was satisfactory, and he appeared to take an intelligent interest in his work.

Name.	Abstract of Progress Report.
M. Ramaswami Pillai ...	*Kistna Western Division.*—Mr. Malet states that the student was employed in superintending masonry works, and in laying down lines and taking levels for a new drain. This work he has done fairly well. He also attended a sub-division office to learn office work. He was subsequently detailed to look after buildings. He proved a willing and painstaking student, and his conduct was good.

20. *Revision of Rules.*—The only changes made in the rules are those providing that Engineer apprentices of the Provincial Service shall not be promoted to assistants until after a year's training as apprentices, and that the salary of an apprentice may be increased to Rs. 150 after the first six months of apprenticeship. The first ruling might, it is considered, be made inapplicable to Madras, as the second year's practical course should render any further period of apprenticeship unnecessary. It has also been notified that an Engineer student may, in special circumstances, be granted horse allowance during his final year of practical training. It has further been ruled that, during the practical course, leave will be limited to periods aggregating one month per annum; and that independent candidates for the College Examinations need not be examined in gymnastics, but may credit the marks they received for Drills and Exercises when they left the College.

There are several important matters in which changes of existing rules are pending, such as the modification of the present practical courses, the amelioration of the condition of the Engineer class, the institution of entrance examinations for the Draftsman and Surveyor classes, the grant of permission to Draftsmen who qualified under the old rules to appear for a higher class of certificate under the new, and the development of the Artisan class. On all these points proposals have been submitted, and it is hoped that orders will shortly be issued.

21. *College Buildings.*—In February 1893 Government authorised the preparation of estimates for improving the lighting and accommodation of the old building. A partial estimate was sanctioned in December embracing the provision of fan-lights and skylights in the Reading-room and in several of the class rooms, and of the conversion of four small rooms on the ground floor into a class room. This work was carried out during the Christmas holidays. Further improvements, however, are needed, prominent among which are the erection of balconies for the quadrangles, and of large windows and verandahs along the east and west fronts. The Consulting Architect has estimates in preparation.

22. *Library and Reading-room.*—The Library, which consists of a lending and a consulting branch, contains a total of 3,085 volumes, of which 122 were added during 1893. In the course of the year 5,078 books were issued, viz., 516 to the staff and 4,562 to students, while 1,084 references were made to the Consulting Library. The steadily increasing use of the lending library is shown by the following numbers of books issued during the last five years, 1889, 2,543; 1890, 3,780; 1891, 3,860; 1892, 4,042; 1893, 5,078.

Most of the book-cases have been fitted, in the workshop, with doors at back as well as front, so that their capacity has been considerably increased. The Reading-room is at present supplied by Government with a few professional periodicals and sundry books of reference. It is in contemplation to make admission to the Reading-room dependent on subscription by the students and to entrust the management of the room to a committee of which a member of the staff would be president. If the scheme proves successful, the room might be lighted and opened in the evening.

23. *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. The cricket club has made considerable progress, as evidenced by the success which has attended several of the matches played. The club is not supported as it should be by the native students. The Madras Athletic Association has introduced a new rule limiting the age of members of competing

cricket teams. This will have the unfortunate effect of preventing the College of Engineering from taking part in the competitions of 1894. A numerously signed memorial was received asking for a football ground. Application was accordingly made for a plot adjacent to the cricket ground. The Consulting Architect thereupon submitted a proposal to clear the greater part of the land in Chepak Park, south of the Madras Cricket Club enclosure, and to make the southern half available as a recreation ground for the Presidency College, and the northern half for the College of Engineering.

24. *Attendance and Conduct.*—The percentage of numbers present daily to numbers on the rolls was 97 for the Engineer classes and 96½ for the 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 four students of the Draftsman class during the examination in Estimating has already been alluded to. The students were disqualified and declared ineligible to present themselves for re-examination within twelve months.

25. *B.C.E. Degree Examination.*—The four students who in 1892 composed the senior division of the Engineer class presented themselves for examination in January 1893, and three passed, viz., two in the second class and one in the third. Seven independent candidates, former students of the College, also attended the examination and two passed, one in the civil branch and one in the mechanical.

The B.C.E. degree examination will be held under the present syllabus for the last time in 1894. The *First Examination in Engineering* under the new scheme for the B.E. degree examination will take place concurrently with it, while the second or degree examination will be held for the first time in the following year.

26. *Employment of passed students.*—The students who qualified in December 1892 obtained remunerative employment without difficulty. Of the four Engineers, one is an Assistant in the Superior Establishment of the Public Works Department, and the other three are Upper Subordinates in the same department. Of the six Engineer Subordinates of 1892, all are employed as Overseers in the Public Works Department. Of the eighteen Draftsmen, seventeen are known to be employed with salaries ranging from Rs. 25 to Rs. 40, viz., eleven in the Public Works Department, one in the Military Works Department, two in the Forest Department, and three under Local Boards. Of the sixteen Surveyors of 1892, fifteen are employed on salaries ranging from Rs. 25 to Rs. 100, viz., seven by the Public Works Department, five by the Survey Department, one by the Forest Department, one by a Local Board, and one by the Ceylon Government.

The prospects of the students who qualified in December 1893 are excellent. The senior Engineer student has been appointed an Assistant Engineer in the Public Works Department and the other three have been offered overseerships of the first and second grades, which two, who are Mechanical Engineers, have accepted. In the Engineer Subordinate class five appointments were made in October before the students had finished their course, owing to the urgent need of the services of Upper Subordinates. The other three students were offered temporary overseerships in the department, which two have accepted. The successful Draftsmen and Surveyors are not likely to have to wait long for employment.

At the present time the demand for Draftsmen, Surveyors and especially for Overseers is in excess of the supply. During the last three years the Public Works Department has absorbed, or been ready to absorb, all the Upper Subordinates available, with the result that no qualified men are left to fill vacancies in Local Boards. This is regrettable, but it is a state of things which will disappear as the larger classes now in the College complete their period of training. Government has lately resolved that from 1st January 1897 training in the College, or such approved service as the Governor in Council may consider equivalent, will be required as a qualification for Public Works appointments under District Boards and Municipalities carrying salaries of Rs. 100 and upwards, and that preference is generally to be given to men so trained. A circular has lately been received from the Bengal Government, stating that under certain circumstances, graduates in Engineering from the Madras College may be appointed to the Public Works Upper Subordinate Establishment in Bengal.

The vacancies notified during the year in the Gazette, the public press, by letter to the Principal, &c., were one hundred and seventy in number, of which fifty-one were

under Government, twenty-four under Local Boards and Municipalities, twenty-three on Railways, five under Native States, and four under private employers. Seven of the vacancies were for Engineers and Assistants, eighteen for Overseers, thirty-one for Draftsmen, twenty-eight for Surveyors, seven for Lower Subordinates, and four for Maistries, while the remainder were of a miscellaneous character. Four of the appointments carried Rs. 250 and upwards, eleven were between Rs. 100 and Rs. 250, twenty-eight between Rs. 50 and Rs. 100, and sixty-four under Rs. 50. The vacancies are classified in the following table :—

Vacancies.	Government.			Local Boards and Municipalities.				Railways.				Native States.			Private employers.		Total.
	100 to 250.	50 to 100.	Under 50.	Above 250.	100 to 250.	50 to 100.	Under 50.	Above 250.	100 to 250.	50 to 100.	Under 50.	100 to 250.	50 to 100.	Under 50.	50 to 100.	Under 50.	
Engineer or Assistant ..	..	..	..	2	3	..	..	2	..	..	..	..	..	..	..	..	7
Overseer	..	2	..	..	..	6	5	..	..	..	..	4	..	..	1	..	18
Draftsman	1	4	15	..	..	1	5	..	1	2	1	..	..	1	..	..	31
Surveyor	1	10	5	..	..	..	..	..	..	..	11	..	..	..	1	..	28
Sub-Overseer	..	1	5	..	..	..	1	..	..	..	..	..	..	..	..	..	7
Maistry	..	..	3	..	..	..	1	..	..	..	..	..	..	..	..	..	4
Anicut Superintendent or Assistant.	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	2
Conservancy Inspector ..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Pipe-laying Inspector ..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Inspector's Assistant ..	..	..	..	..	..	..	..	..	..	..	6	..	..	..	..	..	6
Teacher of Surveying and Drawing.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2
Total ..	3	17	31	2	3	7	12	2	1	2	18	4	..	1	2	2	107

Financial details.—The total expenditure during the calendar year 1893, including scholarships, but exclusive of travelling allowance to Mr. Chatterton during deputation, was approximately Rs. 67,070. This figure does not include the capital cost of the new workshops nor the cost of repairs to buildings, funds for which are provided in the Public Works Department. The income from fees, &c., was Rs. 15,957. The net cost of educating each student taking the total number at 245 was therefore Rs. 209.

Considerable inconvenience is caused by the attemped division of every item of expenditure between the so-called College and School departments of the institution, and the results are delusive. Many items which reach the Accountant-General without passing through the College, such as cost of Europe stores, are incorrectly divided and assigned; and no sound estimate can be formed of the separate cost of the Engineer classes. Moreover, the limitation of these classes to the College department is productive of misapprehension. For instance, the statement in the report on Public Instruction for 1891-92, that there are "twelve students on the rolls of the College" is misleading, especially as the notice of the "School of Engineering" occurs in another part of the volume. The conveniences would be avoided if the institution, like the College of Agriculture, were treated as one and indivisible. The sole reason for the retention of the present arrangement is that the Engineer classes send up students for a University degree examination; but this examination is a mere incident as compared with the College examination for diplomas, to which the energies of the students are mainly directed.

If this proposal cannot be accepted, I submit that a sounder estimate of the cost of the higher education imparted would be obtained by classifying the Engineer and Engineer Subordinate students as the College department, and the remaining classes as the school. The Civil students of the Engineer Subordinate class are picked Matriculates, and some have passed the First Arts examination. In common with the Engineer classes, they receive instruction from the Principal and Professors, and in any other institution they would be classed as College students. The objection that they are not prepared for any higher University examination may be met by pointing to the College of Agriculture, which is classed as a College, although it is unconnected with the University.

Relation of the College to Technical Institutes.—In conclusion I would offer a remark on the attitude which the College should assume towards technical education in respect to Engineering. The College has already assisted the Victoria Technical Institute by training some of its scholarship holders to act as teachers in Surveying and Building Drawing. One or both of these subjects are now taught at the Government College, Mangalore, the A.N.M.'s Institution, Bangalore, the Vizagapatam L.M. High school, and the Albert Victor Technical Institute, Trichinopoly; and there are other schools in which teaching is being given in Carpentry, Geometrical Drawing and Mensuration. It has recently been proposed by the Principal of the Calcutta Engineering College to connect that College with the industrial schools in Bengal in relation to the training of mechanical apprentices; and it seems to me that it would be advantageous to affiliate the Provincial institutes in Madras which I have named, and others which may be formed in the future, to the College of Engineering, and to offer special facilities to their students of admission to the College. The pupils would thus be afforded either the opportunity of further prosecuting their special work, or the advantage of entering on easy terms one of the regular classes of the institution. Thus, students who have been trained in Carpenter's or Fitter's work would have excellent opportunities of improving themselves in the new workshop. Mr. Spring, lately Engineer-in-Chief of the East Coast Railway, has suggested to me that such pupils might be employed in making furniture and, later on, machine tools, which could be disposed of at cost price of materials to the various technical institutions which are being formed, and which are unable to bear the expense of purchase in the open market. For theoretical instruction these pupils might be attached to the Artisan class. Again students who have been trained in elementary Surveying may, if their general educational qualifications are sufficient, be admitted to the Surveyor class for the full course in preference to candidates who possess no technical knowledge; while students from the School of Arts, or elsewhere, who have been taught Geometrical or Freehand Drawing, will form excellent material for the Draftsman class. As technical education spreads, special facilities might be given for admission to the Engineer Subordinate, or even the Engineer class, and the College of Engineering would thus become the centre towards which converge the paths from all those subsidiary institutions which are engaged in the elementary teaching of various subjects connected with Engineering.

(Signed) H. D. LOVE, Major, R.E.,
Principal, College of Engineering.

From the Board of Examiners, College of Engineering, Madras, to the Director of Public Instruction, dated Madras, 1st March 1894.

We have the honour of presenting the following report on the examinations of the College of Engineering, Madras, held in December 1893, and of submitting a statement of the marks awarded.

2. The accompanying detailed reports on the different papers have been drawn up by the individual members of the Board. From these and the mark-book forwarded herewith, it will be seen that Surveying was the weakest subject with all the students who have just completed their course at the College, with the exception of those in the Engineer class. These students are the subjects of the remarks that follow in paragraph 3.

3. *Engineer Class, Division I.*—The two students who form this class and one independent candidate appeared for the final examination, and all of them passed in the second class. Arokiaswami Mudaliyar comes out first, being 100 marks out of a total of 3,000 ahead of the second, King. Both of these obtained over two-thirds of the maximum total, and they may be considered good men. Evidence is not wanting, which tends to show that they have not done as well as they might in Mathematics at any rate. The highest percentage of marks was obtained in Drawing.

Engineer Subordinate Class, Division I.—This class consists of 26 students, all of whom, with two exceptions, have passed. Two independent candidates presented themselves for examination and both failed. The mathematical subjects were on the

whole fairly well done, the poorest being Elementary Statics. Attention has been called to the weakness of the class in this particular subject in a previous report, and the question, whether their knowledge of the subject can be of much use to them—seeing how limited and inaccurate it generally is—has been raised. There is no doubt that some knowledge of the subject is very desirable, but it cannot be insisted on by the present system of examination, in which Trigonometry and Elementary Statics are given in one paper. The subject is discussed in the report of one of the members of the Board.

Draftsman Class, Division I.—Of the 26 students in this class, one failed and four were disqualified. Each of these four had either given assistance to or received assistance from another of their number in answering the paper on Estimating. Their answer papers were almost identical, and on enquiry it was found that they had been sitting together in the examination room. These considerations show that they must have communicated with one another during the time given for answering the paper. The Board accordingly disqualified them. Ten independent candidates were examined; of these, seven passed, three in the second class and four in the third.

Surveyor Class, Division I.—This class is decidedly below the average. It consists of 18 students, 12 of whom passed, 4 in the second class and 8 in the third. Two independent candidates appeared, but both failed.

4. It will be noticed that out of a maximum of 1,000 marks obtainable by the students in the Draftsman and Surveyor classes, 400 are given by the College authorities. If the marks given by the Board are compared with those given by the College, it will be found that the latter are very much higher than the former. No objections have been urged by the College staff against the examination as a whole as conducted by the Board. On the other hand, the Board have, as usual, inspected the work done by the students in the College and are perfectly satisfied with the marks awarded for the work. The discrepancy between the work of the students in the College and in the examination room can, it seems to us, be only attributed to two causes:—

(i) that in the examination room these students are, and feel themselves to be, working under abnormal conditions, the principal and probably the most important one being the limited time at their disposal for a piece of work (this is not the case, for practical purposes at any rate, in their College work);

(ii) that they obtain too much help in their College work from their instructors. The marks seem to be given on the result obtained, no account being taken of the amount of help given or time required to produce it. The result of giving too much assistance to a student is loss of confidence in himself. If this be the case, we would suggest that, as far as is practicable, some account be taken, in awarding marks, of the time a student spends over a piece of work and of the assistance and kind of assistance he receives. We do not advise reducing the College work to anything of the nature of a perpetual examination. What is required is a limit of time fixed for a piece of work and this limit narrowed as the class improves. Speed as well as accuracy would thus be aimed at, and this is a condition which obtains in the work they have to do after qualifying at the College.

5. The suggestion made by the Board in their report last year, of giving an "examination number" to each student which they are to write on their answer papers, has been carried out and has proved of great convenience. As might have been expected, some neglected to attach their numbers to their papers. It is sufficient to call attention to this, to have its importance impressed on the students in the future.

From Major H. D. LOVE, R.E., Principal, College of Engineering, Madras, to the Director of Public Instruction, Madras, dated 8th March 1894, No. 1558-C.

I have the honour to enclose the synopsis of marks awarded at the final examination of December 1893, which is referred to in paragraph 5 of my No. 1350-C., dated 29th January 1894.

APPENDIX.

ENGINEER CLASS.

Abstract of Marks.

Rank.	Names.	I. Mathematics.	II. Science.	III. Engineering.	IV. Drawing.	V. Surveying.	VI. Language.	VIII. Drills and Exercises.	Total.	Remarks.
	Maximum Marks ..	475	525	775	500	400	200	125	3,000	
	College Students.									
1	R. N. Arokiaswami Mudaliyar .	344	308	544	401	288	127	99	2,111	Passed Second class.
2	A. W. King	371	257	561	373	258	69	112	2,001	
	Average per cent. ..	75·2	53·8	71·2	77·4	68·2	49·0	84·4	68·5	
	Independent Candidate.									
1	M. Radhakrishna Aiyar.. ..	230	202	443	273	254	115	109	1,626	Passed Second class.
	Average per cent. ..	48·4	38·4	57·1	54·6	63·5	57·5	87·2	54·2	

ENGINEER SUBORDINATE CLASS.

Abstract of Marks.

Rank.	Names.	I. Mathematics.	II. Engineering.	III. Drawing.	IV. Surveying.	V. Language.	VI. Drills and Exercises.	Total.	Remarks.
	Maximum Marks ..	370	600	400	350	180	100	2,000	
	College Students.								
1	M. R. Natesa Aiyar	256	435	257	167	74	81	1,270	
2	M. S. Narayanaswami Aiyar ..	208	359	264	185	100	79	1,195	
3	N. Kandaswami Pillai	260	354	258	191	70	61	1,194	
4	M. N. Ramakrishna Aiyar ..	194	384	239	202	94	80	1,193	
5	T. S. Narayanaswami Aiyar ..	231	363	217	184	72	86	1,153	
6	Gunner M. Power	195	348	239	189	94	77	1,142	
7	M. K. Kesava Pillai	153	374	263	188	81	78	1,137	
8	R. Panchapakesa Aiyar	180	350	267	212	48	74	1,131	
9	P. Seshachari	212	373	196	174	92	72	1,119	
10	K. R. Ganapati Aiyar	222	334	227	171	73	70	1,102	
11	V. S. Rangaswami Aiyar ..	220	332	232	172	70	72	1,098	
12	Corporal H. A. Furnell	157	324	272	182	47	100	1,082	Passed Second class.
13	L. D. Ramachandra Aiyar ..	282	289	205	164	67	75	1,082	
14	U. R. Bashyam Aiyangar ..	191	333	283	157	89	74	1,077	
15	T. S. Rangaswami Aiyar ..	183	312	250	149	85	78	1,057	
16	E. King	187	342	206	171	67	79	1,052	
17	C. J. Rangaswami Aiyangar ..	217	291	231	174	62	73	1,048	
18	A. Manika Mudaliyar	155	295	226	175	98	91	1,040	
19	P. S. Natesa Sastri	156	367	214	165	61	73	1,036	
20	J. A. David	201	287	238	164	79	59	1,028	
21	A. Rama Rau	246	306	188	155	69	64	1,028	
22	P. Rangaswami Aiyangar ..	136	353	240	163	73	57	1,022	
23	S. Natesa Aiyar	195	337	224	121	65	75	1,017	
24	T. V. Saptarishi Sastri	240	227	222	173	62	78	1,002	
25	F. G. D'Rozario	146	281	217	161	87	75	967	Failed in Total.
26	A. G. Abraham	168	275	180	167	95	60	945	Do. in Total.
	Average per cent ..	53·9	55·2	57·7	49·1	42·2	74·6	54·2	
	Independent Candidates.								
1	C. R. Gopalaswami Dikshatar ..	140	306	220	186	48	77	977	Failed in Total.
2	A. Arunachala Mudaliyar ..	109	292	203	138	84	77	903	Do. in I and Total.
	Average per cent. ..	33·6	49·8	52·8	46·2	36·6	77·0	47·0	

Draftsman Class.

Abstract of Marks.

Rank.	Names.	I. Geometrical Drawing.	II. Free-hand Perspective and Model Drawing.	III. Building Drawing.	IV. Machine Drawing.	V. Estimating.	VI. Topographical Drawing.	VII. Drills and Exercises.	Total.	Remarks.
	Maximum Marks ..	100	120	270	200	180	80	50	1,000	
	College Students.									
1	N. L. Ramachandra Rau	79	88	188	164	105	54	40	718	Passed Second class.
2	D. N. Narasimhayya	68	90	170	150	109	62	48	697	
3	T. R. Krishnaswami Aiyar ..	69	78	192	146	99	61	44	689	
4	Y. Rajabathar Mudaliyar ..	76	90	164	137	130	41	38	676	
5	T. Krishna Rau	67	84	174	164	90	48	43	670	
6	V. Venkatarama Aiyangar ..	57	72	148	128	134	50	41	630	Passed Third class.
7	A. Mariasusai Pillai	64	64	171	143	99	52	36	629	
8	S. Subbarama Aiyar	74	78	134	137	109	45	43	620	
9	C. Virabrahmam	66	66	173	157	79	39	38	618	
10	C. S. Kuppu Rau	75	87	142	130	109	40	33	616	
11	R. Chithambara Mudaliyar ..	52	60	139	156	119	44	43	613	
12	G. Kesavalu Nayudu	55	68	158	141	104	38	40	604	
13	G. Kamaraju	79	67	148	120	94	51	41	600	
14	K. Krishnamachari	48	48	145	138	134	45	42	600	
15	K. Lakshmikanta Rau	74	61	155	114	99	43	42	588	
16	M. Subbarau Nayudu	71	70	139	144	84	43	37	588	
17	T. M. Sankara Rau	63	84	119	129	94	39	44	572	
18	V. Srinivasa Aiyar	54	43	134	129	114	41	40	555	
19	A. D. Nallaswami Nayudu ..	47	57	147	130	79	33	40	533	
20	G. Kasturi Chetti	69	55	119	127	84	31	37	529	
21	C. Ratnasabhapati Mudaliyar ..	66	73	106	125	84	38	42	527	
22	A. Arokiaswami Pillai	39	50	102	86	32	41	34	384	Failed in V and Total.
23	G. V. Balakrishna Chetti ..	67	75	124	155	59	36	47	..	Disqualified.
24	N. Raghunatha Rau	59	66	127	144	59	38	43	..	
25	T. Ranganatha Mudaliyar ..	50	60	128	121	44	43	38	..	
26	P. S. Visvanatha Aiyar	65	51	97	100	44	38	30	..	
	Average per cent. * ..	64·1	58·1	55·0	68·1	55·1	55·6	80·5	60·2	
	Independent Candidates.									
1	A. L. Singaravelu Mudaliyar ..	50	83	203	161	135	42	30	704	Passed Second class.
2	S. Purandara Rau	56	85	217	135	96	43	31	663	
3	S. Subbarama Aiyar	48	57	148	105	91	39	40	528	
4	T. K Gopalachari	52	49	154	132	83	27	33	527	Passed Third class.
5	P Subbarayulu Nayudu	51	79	134	95	102	32	28	521	
6	W. Chinnaswami Nayudu ..	54	61	143	93	70	34	48	503	
7	V. Subrahmanya Aiyar	38	45	117	104	116	48	35	503	
8	P. Ramaswami Mudaliyar ..	50	59	162	128	56	43	35	533	Failed in V.
9	S. Anjaneyalu Nayudu	51	59	146	86	48	31	34	455	Do. in V and Total.
10	C. K. Venkatasubba Rau ..	39	59	110	83	71	39	33	434	Do. in Total.
	Average per cent. ..	48·9	52·7	56·8	56·1	48·2	47·2	69·4	53·7	

* *Note.*—The marks of the four disqualified candidates are excluded in the calculation of average percentages.

Surveyor Class.

Abstract of Marks.

Rank.	Names.	I. Chain, Compass and Plane Table.	II. Levelling.	III. Theodolite Surveying.	IV. Topographical Drawing.	V. Drills and Exercises.	Total.	Remarks.
	Maximum Marks ..	255	215	200	280	50	1,000	
	College Students.							
1	G. Venkatarama Aiyar	154	168	179	186	35	722	Passed Second class.
2	G. Somayya Sastri	175	191	149	171	34	720	
3	K. P. Sadasiva Aiyar	147	139	179	204	44	713	
4	T. R. Jeevanna Rau	179	148	137	182	36	682	
5	N. Suriyanarayana	174	179	128	129	37	647	Passed Third class.
6	B. R. Ramakrishna Aiyangar ..	138	129	135	198	36	636	
7	E. A. Ambasankara Aiyar	155	168	102	148	46	619	
8	N. Rangaswami Aiyar	131	168	115	145	42	601	
9	V. Venkateswara Aiyar	139	143	107	180	30	599	
10	S. R. Muttuswami Aiyar	141	122	122	166	38	589	
11	A. Venkatachari	110	135	112	117	37	511	
12	A. R. Natesa Aiyar	97	116	95	158	41	507	
13	A. Mohanavelu Mudaliyar ..	139	103	68	175	35	520	Failed in III.
14	S. Lakshmanachari	121	105	81	143	41	491	Failed in Total.
15	P Narasimha Rau	100	130	99	115	41	485	
16	V. Panchapakesa Aiyar	94	134	97	105	38	468	
17	E. A. Ramaswami Aiyar	112	115	91	106	42	466	
18	C. Govindaraja Mudaliyar ..	126	73	79	111	41	430	Failed in II and Total.
	Average per cent. ..	52·9	63·7	57·6	54·3	77·1	57·8	
	Independent Candidates.							
1	C. R. Rangachari	131	113	74	113	26	457	Failed in Total.
2	T. K. Govindarajulu Nayudu ..	94	83	63	103	26	369	Do. in III and Total.
	Average per cent. ..	44·1	45·5	34·2	38·5	52·0	41·3	

No. 2244.

Referred to the Principal, College of Engineering, Madras, for early remarks, if he has any to offer.

(Signed) A. MONRO,
Ag. Dir. of Public Instruction.

14*th March* 1894.

From the Principal, College of Engineering, Madras, to the Director of Public Instruction, Madras, dated 17th March 1894, No. 1602-C.

Referring to your endorsement No. 2244, dated 14th March 1894, on papers herewith returned, I have the honour to offer the following observations on the reports of the Board of Examiners and of the individual Examiners composing the Board.

2. *Surveying.*—The Board characterises *Surveying* as the weakest subject of examination. The percentages secured in this subject, as compared with the average of the last four years, were—

	December 1893.	Average of 4 years.
Engineer class, 1st division	68	67
Engineer Subordinate class, 1st division	49	61
Surveyor class, 1st division	58	62

The Engineer class is slightly above the average, the falling off in the Surveyor class is accounted for by the fact that the division which passed out in December 1893 was admittedly below the average; while the serious diminution in the Engineer Subordinate class is partly due, as explained in paragraph 7 of my annual report, to greater stringency in the award of marks by the College.

3. *Statics of Engineer Subordinate class.*—Indifferent results have always been obtained by this class in *Statics*, and the professor of Mathematics has, during the last

two years, given special attention to the matter. I consider that Mr. Jones' proposal to allot separate papers of 1½ hours in *Trigonometry* and in *Statics* would probably result in higher marks being gained for the latter subject. At the same time I am of opinion that the paper on *Statics* set in December 1893, though quite within the syllabus, was not in harmony with the method of teaching the subject which is laid down in the footnote to the syllabus (*vide* College Calendar for 1893). The subject is taught, as far as possible, experimentally, graphical methods of solution being employed; and the course has a special bearing on engineering problems. I enclose a copy of the paper set, from which you will be able to judge how far the questions are in accordance with the above note.

4. *College marks awarded to Students of the Draftsman and Surveyor classes.*—The Board points out that the marks given by the College are generally higher than those awarded in the same subject by the Board. The Board has, however, examined some of the session work on which the College marks were awarded, and is satisfied with those marks. This being so, it appears hardly necessary to refer particularly to the remarks made by Mr. Ashpitel on the subject, and his proposal that there should be a qualifying minimum in the Board's marks alone in each group of subject. From this proposal I entirely dissent. The Board states that the higher average in the case of the College marks is probably due to (*a*) time at disposal being unlimited, (*b*) assistance being given by instructors. These causes may have some influence, but there is another which is far more potent, viz., the difference in the nature of the work for which the marks are given. To illustrate this I will give the detailed distribution of the marks awarded by the College to the Surveyor class:—

I—Chain, Compass and Plane Table Surveying.

	Marks.	Marks.	Marks.
1. Practical examination in the Field—			
(*a*) Chain, with time limit	16½		
(*b*) Compass, do.	4½		
(*c*) Plane Table, do.	9		
		30	
2. Session Field work—			
(*a*) Manipulation of instruments	9		
(*b*) Field books	7½		
(*c*) Intelligence in carrying out instructions ...	7½		
(*d*) Regularity of attendance	6		
		30	
3. Session Plans—			
(*a*) Agreement of plans with field books	15		
(*b*) Accuracy of drawing	12½		
(*c*) Neatness and finish	12½		
		40	
			100

II—Levelling.

1. Practical examination in the Field, with time limit ...	45		
		45	
2. Session Field work—			
(*a*) Manipulation of instruments	13		
(*b*) Field books	11		
(*c*) Intelligence in carrying out instructions ...	11		
(*d*) Regularity of attendance	9		
		45	
			90

III—Theodolite Surveying.

1. Practical examination in the Field, with time limit—			
(*a*) Theodolite traverse	26		
(*b*) Setting out curves	14		
		40	
2. Session Field work—			
(*a*) Manipulation of instruments	12		
(*b*) Field books	10		
(*c*) Intelligence in carrying out instructions ...	10		
(*d*) Regularity of attendance	8		
		40	
			80

IV—Topographical Drawing.

	Marks	Marks.
(1) Agreement of plans with field books	50	
(2) Accuracy of drawing	40	
(3) Neatness and finish	40	
	—	130
Grand Total ...		400

I think that scrutiny of this distribution will show that the causes assigned by the Board have little weight. The qualities tested by the College are those which are essential to the practical surveyor. They cannot, from their nature, be tested at an office examination in a very limited time. The imperfect acquaintance of the candidates with English is to some extent responsible for the low average of the examination marks, but even if this disability were removed, I consider it inevitable that the marks given for practical work extending from day to day over two years will be greater than those given for a set of examination answers. It would be regrettable if it were otherwise; and I deprecate in the most emphatic terms any proposal like that of Mr. Ashpitel, already alluded to, which would have the effect of increasing the present difficulty in securing certificates. Notwithstanding that it is admitted on all sides that the draftsmen and surveyors now trained in the College possess higher qualifications than those educated under the old scheme, yet since the reorganization only five draftsmen and three surveyors have succeeded in obtaining certificates of the first class. The direction in which improvement should be looked for is in the stamp of candidates entering the Draftsman and Surveyor classes. An entrance examination will doubtless improve matters, while attention paid to writing, drawing and manual training in primary and secondary schools would do much more.

Introduction.—The Principal has appropriately opened the report for 1893 by an interesting reference to the centenary of the College. It is unnecessary to dwell here on the services which the institution has, in its varied phases, rendered to the engineering profession during the past one hundred years of its existence.

2. *Staff.*—Several changes occurred in the staff during the year; but none of them is reported to have interfered with the working of the College. Mr. Middlemast, the Professor of Mathematics, was absent in England on leave on medical certificate during the first half of the year, and his place was occupied by M.R.Ry. B. Hanumanta Rau, B.A., from Kumbakónam. Mr. J. J. Whiteley, who had been acting for Mr. Chatterton as Professor of Engineering, severed his connection with the College on the 30th November 1893. Major Love paid in the last report a fitting tribute to the memory of Conductor W. Cames, who had been useful to the College in several ways. He was succeeded as Instructor in Engineering by Sergeant B. O. Reynolds, and as Superintendent of Military Students by Sergeant W. H. Goddard. The testimony borne by Major Love to the good work done by the members of the staff is noted with satisfaction.

3. *Strength.*—Excluding the 26 students in their practical courses, the strength of the College on the 31st December was 252 as against 214 (excluding the special students) on the corresponding date in 1892, so that the increase during the year was nearly 18 per cent.; and the increase during the past four years was as high as 85 per cent. This is very encouraging. Each class shared in the increase, with the exception of the Military Probationers' class. The increase particularly in the Engineer class was noteworthy, and it is hoped that with improved prospects of employment of the qualified Engineers, and the substantial reduction in the rates of tuition fees and the stimulus of additional scholarships sanctioned by Government, this class will grow even stronger and more popular. As regards the different nationalities represented at the College, it is observed that Brahmans and non-Brahman Hindus advanced, while there was a slight decrease under

Europeans and Eurasians, Native Christians and Muhammadans. This last community, it is further observed, was unrepresented in the Engineer or the Engineer Subordinate class which shows that Muhammadans have not yet begun to evince a real aptitude for engineering education.

4. *Accommodation and Equipment.*—Certain improvements were effected in the College buildings during the year, and the other improvements suggested by the Principal will be considered on receipt of estimates. The library was well used. Major Love's proposals for increasing the scope and usefulness of the reading-room meet with the entire approval of the Acting Director.

5. *Examinations*—(i) *University Examinations.*—The results of the B. C. E. Degree Examination of January 1893 were satisfactory. It is hoped that the bifurcation of this examination will enable the students to appear for the examination better prepared and to secure uniformly good results.

(ii) *College Board Examinations.*—The report of the Board of Examiners has not been altogether favorable, the students having exhibited weakness in several important subjects.

Engineer Class.—The first or the senior division of the Engineer class acquitted itself on the whole creditably at the final examination, the percentage of marks secured under each subject head, the vernacular language excepted, being higher than that obtained in 1892 and also higher than the average of the marks gained in the preceding four years. It should, however, be borne in mind that there were only two students in the division as against four that competed for the examination in 1892. The second division of this class did not fare as well as in the preceding year and is reported not to have done satisfactorily in a large number of subjects, such as Road and Railway Construction, Building and Bridge Construction, Free-hand, Model and Perspective Drawing, Levelling, Chain, Compass and Plane Table Surveying, Algebraic Geometry and Hydromechanics. The batch of students composing this division needs therefore to be more closely supervised. The last division acquitted itself more satisfactorily on the whole.

Engineer Subordinate Class.—Of the 26 students sent up from the first division of the Engineer Subordinate class for the final examination, 24 were successful, though all of them qualified for second class certificates only. The average of marks gained by this division in Surveying and in the Vernacular Language was much below the average of the past four years, and in the latter subject this division further produced worse results than the corresponding division of the Engineer class. Sufficient attention does not also seem to have been paid to Elementary Statics, Building Drawing, Bridge and Irrigation Works, Topographical Drawing and Mensuration. The second division fared better on the whole with an average of 55 per cent. of the total marks as against only 49 per cent. in December 1892; but the average secured by the third division did not compare favorably with that gained in the previous year.

Draftsman Class.—The results of the final examination of the first division were fairly satisfactory. As usual, however, the bulk of the passed candidates were placed in the third class, while none qualified for first class certificates. Deterioration was noticeable in Practical Geometry, Free-hand, Perspective and Model Drawing, Building Drawing and Estimating. The second division fared better than in the preceding year.

Surveyor Class.—Twelve out of 18 examinees secured certificates at the final examination. The remarks made above as regards the quality of passes in the Draftsman class apply with equal force to the senior division of this class also. In the words of Major Love this division was "admittedly below the average." The results of the second division were also not encouraging.

On the whole, the results obtained at the final examination of December 1893 cannot be considered a great improvement on those of 1892. Major Love's explanation for the observation made by the Board of Examiners that Surveying was the weakest subject in the College is accepted. This subject and the other subjects above referred to should, however, receive greater attention. As a check against students using the ruler in answering the paper on Free-hand and Model Drawing, Mr. Ashpitel

suggests that the students should not be allowed the use of the mathematical instruments until they have done with their free-hand and model drawings. The Acting Principal will be good enough to report on this point. He will also consider Mr. Ashpitel's suggestion that the extra text books on Earthwork and Roads which the students seem to be using should be selected by them under the direction of the Professor or instructor concerned. Major Love does not seem to have any objection to Mr. Jones' proposal to have a separate paper in Elementary Statics for the Engineer Subordinate class in order that increased attention may be paid to the subject. The Acting Director thinks that not only should Elementary Statics be dissociated from Trigonometry, but also a separate minimum should be fixed for each subject if the result aimed at by Mr. Jones is to be secured. The Acting Principal and the Board of Examiners are requested to report on this point. Mr. Ashpitel objects to the present arrangement of adding the College marks with those awarded by the Board for practical work, inasmuch as the former are not always secured by the independent exertions of the students and would insist on a separate minimum being obtained in the marks awarded by the Board. Major Love strongly deprecates any change in the existing arrangements, and the Acting Director would leave the matter as at present until further experience has been gained, but would require that the marking by the College staff be made with the utmost care and precision. It has been remarked by more than one Examiner that the scanty knowledge of English possessed by the students composing the Draughtsman and Surveyor classes stands in the way of their profiting fully by the instruction received and qualifying for higher class certificates. A similar complaint was made last year also, and the Acting Director concurs with Major Love in thinking that the institution of the entrance tests, which Government has recently approved, will lead to a decided improvement in this direction. A raising of the standard of minimum educational qualification for admission seems inexpedient at present.

(iii) *Government Technical Examinations.*—The success of the students at the Intermediate Technical Examinations was fairly satisfactory, but they did not acquit themselves at the Elementary Examination as satisfactorily as might have been expected. None of the pupils of the Artisan class who appeared for the Elementary Examination in Mensuration met with success. The reasons for this have been satisfactorily explained by Major Love. In future, none from this class should be allowed to appear for the Elementary Technical examination except with the permission of the Principal, which should be granted only if there is any reasonable chance of success.

6. *Independent Candidates.*—The following statement compares the results of the independent candidates for the past four years :—

Final examinations.	1890.		1891.		1892.		1893.	
	Number registered.	Number passed.	Number registered.	Number passed.	Number registered.	Number passed.	Number registered.	Number passed.
For Engineers	2	1	1	..				
,, Engineer Subordinates.	5	1	1	1	2	..	1	1
,, Draughtsmen	6	6	7	3	1	1	2	..
,, Surveyors	3	1	4	2	8	1	10	7
					..	..	2	..

The Engineer and Draughtsman candidates fared well on the whole at the last examination, but the results of the Engineer Subordinate and Surveyor candidates were very disastrous. The success of the draughtsman independent candidates has been unsurpassed since 1890, and it is particularly noted that two of the successful candidates qualified for second class certificates.

7. *Maistry and Artisan Class.*—This class continued to be popular, though genuine artisans and maistries constituted but a small proportion of the attendance. The Principal's proposals for the reorganization of this class are now under the consideration of Government.

8. *Practical Courses.*—The College workshop was put into almost thorough working order towards the close of the year. This will enable Engineer and Engineer Subordinate students, who complete their theoretical course in future to devote more time to works. The work and conduct of the students during their practical courses have been uniformly satisfactory. The Engineer, Engineer Subordinate and Surveyor classes were, as usual, taken to Guindy and Gúduvánchéri for field work. The work of the students while on such survey tours should be very closely supervised, and, as remarked by Major Love, greater accuracy of work should be the chief aim of the students.

9. *Revision of the Rules.*—The College rules have been thoroughly recast and the draft revised rules have had the benefit of Major Love's perusal. On receipt of the opinion of the Chief Engineer, Public Works Department, to whom the draft has been referred, the rules will be submitted to Government for sanction. The revision of the syllabuses has been engaging the attention of the Principal.

10. *Physical Education.*—Physical education seems to have received due attention. It is hoped that the Cricket Club will receive the warm support of the native students. The question of providing the College with a foot-ball ground is under the consideration of Government.

11. *Prospects of Passed Students.*—The Principal's remarks under this head are very interesting and encouraging. Every possible facility has been afforded to help qualified students of the College to secure remunerative employment. It is noteworthy that the Madras graduates in Engineering have under certain conditions been declared eligible for appointments in the Public Works Department in Bengal.

12. *Finance.*—For the first time the financial particulars have been furnished for the calendar year. It is satisfactory to note that the net cost of educating each student fell from Rs. 238 during 1891–92 to Rs. 209 during 1893. The Principal points out the inconveniences resulting from the present classification of expenditure. For statistical purposes, however, the College and School departments must be returned as two distinct institutions, and the present arrangements for the exhibition of the charges must be continued. The College and School departments of the Medical College and the Teachers' College are exhibited separately in the statistical returns. The case of the College of Agriculture is different and will be considered after its future is settled.

13. *General.*—Major Love recommends under certain circumstances, the concession to candidates other than graduates and under-graduates of the Indian Universities of equal privileges with those who are strictly eligible for admission under the College rules. The Acting Director does not consider it expedient at present to introduce any general rule of this kind. Considering the encouragement as now afforded to students trained in the College, it is probable that the strength of the several classes will be greater than the accommodation will admit. Major Love's proposals in regard to the affiliation of mofussil technical institutions, which have been recognised by the Department, to the College of Engineering seem to have been well conceived, and are calculated to place these institutions under abler supervision and on a more efficient footing. The Board of Examiners, the Secretary to the Victoria Technical Institute, the Superintendent, School of Arts, the Inspectors of Schools and the Acting Principal will be requested to favour the Acting Director with their views on the subject. With reference to Dr. Duncan's remarks in his last review regarding the practical difficulties existing in Madras in providing hostels for the accommodation and boarding of students of the College, the Acting Director observes that these difficulties will, to some extent, be obviated when the new hostels are established, and that it should be possible to find accommodation for some of the students in the block of hostel proposed to be built in the Chepauk Park by the Victoria Hostel Committee. In the meanwhile it might be of advantage if the College staff would inspect the hostels in which the students at present lodge and satisfy themselves whether these are in a sanitary condition. The tutorial system, as in the Kumbakónam and Rajahmundry Colleges, might be introduced, each Professor having a certain number of students assigned to him for whose conduct and progress he would be responsible.

14. In conclusion, the Acting Director is pleased to record here his appreciation of the work done by Major Love, the Professors and instructors and assistants during the year, and his thanks are due to the Board of Examiners for the several valuable suggestions contained in their report.

(A true Extract.)

(Signed) A. MONRO,
Ag. Director of Public Instruction.

To the Principal, College of Engineering.
" Principals of other Government Colleges.
" Inspectors of Schools.
" Superintendent, School of Arts.
" President, Board of Examiners, College of Engineering.
" Honorary Secretary, Anjuman Mufidi-Ali-Islam.
" Secretary, Victoria Technical Institute.
" Honorary Secretary, Victoria Hostel Committee.
" Editor, Indian Journal of Education, Madras.
" Government with Covering Letter.

Order—dated 16th June 1894, No. 443, Educational.

The report on the working of the College of Engineering during 1893 and the Director's review on the report are both very full and but few remarks on the part of Government are called for. In most respects a decided improvement has taken place and the college is manifestly increasing rapidly in popularity. The steps recently taken to render the instruction imparted more practical in character and the proposals which received the general approval of Government in G.O., dated 28th February 1894, No. 128, Educational, should have the effect of still further enhancing the utility of the institution and, in particular, of raising the strength of the Engineer classes which, even in 1893, were but poorly attended. The number of applications for admission to the three lowest classes in 1893 was greatly in excess of the vacancies. The institution of an entrance test for the Draughtsman and Surveyor classes will probably have a markedly deterrent effect but, if this proves to be otherwise, it may be found expedient to raise the fees in certain cases so as to reduce the cost of the institution to the State. It will also, no doubt, be necessary to enlarge the buildings before long. The demand for men trained at the college is said to be much in excess of the supply and the rejection of candidates for admission on the ground of want of room is a necessity to be greatly regretted. For the present, however, no active measures in this direction are called for.

2. The Government is disposed to agree with the Director of Public Instruction in considering it inexpedient to grant the Principal authority to admit into the Engineer classes persons who are not qualified for admission under the rules. The existing restrictions constitute a guarantee that every man who has passed through the Engineer classes possesses certain literary as well as professional qualifications and it is not desirable that this guarantee should be removed. Indeed, the admission of the Ceylon students referred to in paragraph 6 of the report was not, strictly speaking, in consonance with the rules and the Principal does not quote any authority for the restrictions as to scholarships, &c., which were imposed upon them. It is observed that the Director has made no comments upon Major Love's suggestion in paragraph 20 of his report that the rule requiring a year's apprenticeship of Engineer apprentices of the Provincial Service should be declared inapplicable to Madras. The matter will be duly considered if the arguments in favour of the change are set out more fully.

3. The information furnished on the subject of Finance is meagre in the extreme and it is impossible to ascertain therefrom whether the institution is economically conducted or otherwise. The nett cost of each student is stated to have been Rs. 209, which is less than the figure for 189, but the Government is not aware whether this outlay compares favorably or the reverse with the expenditure in other

Engineering Colleges. The Director of Public Instruction should make enquiries on this point and intimate the result to Government and in future a proper balance sheet showing particulars of receipts and expenditure should invariably accompany the report. The Government notes that the Principal complains strongly of the inconvenience caused by the present classification of accounts and is inclined to think that his complaint is reasonable and that the arbitrary division of professional institutions into Collegiate and School departments should be avoided as far as possible. The Director will accordingly be requested to give fully his reasons (1) for saying that the separation of the accounts is essential for statistical purposes and (2) for treating the College of Agriculture on a different principle.

4. The reference in paragraph 5 of the report to the examinations conducted in December 1892 is apparently a mistake. The examinations of December 1893 seem to be meant. The result of these was, as the Director notes, somewhat unfavorable in certain respects and it is observed that not a single first-class Draughtsman's or Surveyor's certificate was awarded and that none of the students appeared for the Advanced Standard Government Technical examinations. These are unsatisfactory features of a report which is otherwise of a very promising character. In conclusion the Principal will be requested to reduce the length of this report as much as possible. The synopsis of marks contained in Major Love's letter, dated the 8th March 1894, No. 1558-C, for example, need not have been furnished to Government, nor is it necessary to specify in detail the nature of each prize awarded, and in other respects the report enters into rather too much detail.

(True Extract.)

J. F. PRICE,
Chief Secretary.

To the Director of Public Instruction.
" Public Works Department.
" Military Department.
" Local and Municipal Department.
Editors' Table.

Exd. A. Raitt.

Govt. of {1894} Madras.

EDUCATIONAL.

No 1795 w.a. 17-July 1894.

Commd to officers of the P.W. Dept for information

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Issued

Read. *Encl.*

G.O., 16th June 1894, No. 443.

JUNE.

CE for I
CE for Railways
Supdg Engs.
C A & Govt
Supdt of works P. Projects

College of Engineering.

Reviewing the report on the — for the year 1893.

GOVERNMENT OF MADRAS.

EDUCATIONAL DEPARTMENT.

READ—the following paper :—

From the Hon'ble Mr. A. MONRO, M.A., B.C.L., Acting Director of Public Instruction, Madras, to the Chief Secretary to Government, dated Ootacamund, 14th May 1894, No. 91-O.

I have the honour to submit, for the information of Government, a copy of my Proceedings, No. 4364, dated 10th instant, reviewing the report on the working of the College of Engineering, Madras, during the past calendar year.

ENCLOSURE.

Proceedings of the Director of Public Instruction, dated 10th May 1894, No. 4364.

Read—the following papers :—

From the Principal, College of Engineering, Madras, to the Acting Director of Public Instruction, Madras, dated 29th January 1894, No. 1350-C :—

I have the honour to submit the following review of the working of the College of Engineering during the year 1893. 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 1893 is included in the present report.

2. *Centenary of the College.*—Before commencing the review, it is fitting that attention should be drawn to the circumstance that a hundred years have elapsed since the birth of the institution. Founded as a Survey school in 1794 with Mr. John Goldingham, the Company's Astronomer, as its first Superintendent, its object was to train European apprentices as Surveyors, Draftsmen, Writers and Interpreters for employment under Collectors, on tank repairs, and in the Quartermaster-General's department. These early features are still traceable, in the now developed College, in the attention devoted to Hydraulic Engineering and in the special classes for Draftsmen and Surveyors—features by which this institution is differentiated from the other Engineering Colleges of India. After a temporary interruption in the second decade of the present century, the Survey school was re-opened in connection with the Board of Revenue and was placed in the charge of Major de Havilland, the Inspector of Tank estimates, an engineer who has left the mark of his distinguished ability in many parts of Madras. During his rule the training in the school assumed a more decided professional character. In 1846 the Civil Engineer's Department of the Board of Revenue, afterwards called the Public Works Department, began to employ European non-commissioned officers of Sappers as subordinates, and when the Survey school was in 1858 elevated into a Civil Engineering College, with Captain Winscom as Principal, the military students were nearly as numerous as the civil. In 1861 the College began to train civilian undergraduates as well as a few military commissioned officers as Civil Engineers, in addition to the classes for Overseers, Draftsmen and Surveyors, and the institution was developed on these lines down to 1886, when it was extended to meet the general engineering requirements of the Presidency, and designated the College of Engineering. This extension, involving increased staff, new buldings, longer courses and practical training, has been referred to in recent reports and need not be here described.

3. *Establishment.*—The lamented death on 20th January 1893 of Conductor W. Cames, Instructor in Engineering and Superintendent of Military students, was

alluded to in my report for 1892, although it occurred after the close of that year. The vacant Instructorship was filled by Sergeant B. O. Reynolds, whose services were lent by the Public Works Department, and who was gazetted on the 15th February. Conductor Cames' duties as Superintendent of Military students devolved on Sergeant W. H. Goddard, Instructor in Surveying and Drawing, who was appointed from 21st January. M.R.Ry. B. Hanumanta Rau, B.A., from Kumbakónam College, took over on 27th January the duties of Professor of Mathematics during Mr. Middlemast's absence in England on sick leave, relinquishing them in favour of the permanent incumbent on 21st June. Consequent on the absence on leave without pay of Mr. J. D'Cruz, B.C.E., Assistant Instructor in Surveying, which was followed by his resignation on 20th March, the following appointments, substantive *pro tem.*, were made from 19th January :—M.R.Ry. R. A. Bhakya Mudaliar from Second Assistant Instructor to be Assistant Instructor in Surveying, and M.R.Ry. R. Sundarum Aiyar, B.C.E., to be Second Assistant Instructor. The latter officer resigned on 13th May on appointment to the Public Works Department, and his place was filled on 1st September by M.R.Ry. M. A. Anantalwar, B.A. The Assistant Instructorship in Drawing was occupied, substantive *pro tem.*, from 19th January by Mr. W. C. H. Littlewood, and M.R.Ry. S. Subramanya Aiyar was appointed to the Second Assistant Instructorship. Mr. Whiteley's deputation to the chair of Engineering, *vice* Mr. Chatterton, would have terminated on 30th January 1894, but for his nomination to special service under the Mysore Government. He left the College on 30th November 1893, and Mr. Chatterton's reversion was postponed until the commencement of the following session. The above changes in the staff, although numerous, occurred for the most part at the beginning and end of the year and caused little inconvenience. From July to November the instruction of the Engineer class in practical chemistry was undertaken, as last year, by M.R.Ry. C. Krishnan, B.A.

I have to acknowledge the good work done by the members of the College staff, and specially that of the Professor of Mathematics, Mr. Middlemast, and the Acting Professor of Engineering, Mr. Whiteley. Mr. Whiteley combined with the closest application to his duties a tact and method which contributed towards harmonious work by the junior members of the staff and towards willing industry on the part of the students. I also notice with pleasure the steady work done by Sergeant Goddard, the Instructor in Surveying and Drawing, and by Sergeant Reynolds, the Instructor in Engineering. The latter, besides conducting his teaching with energy and ability, has done extra work in connection with the revision of the College, "Notes on Building Construction." I also acknowledge the co-operation of the Board of Examiners, the Locomotive Superintendent of the Madras Railway and the various Public Works Officers who have assisted in the practical training of the students.

4. *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	4	2	4	8	22
Engineer Subordinate class	* 8	10	26	31	24	99
Military probationers	..	..	..	..	..	2
Draftsman class	..	..	27	..	..	67
Surveyor class	..	..	..	40	..	2
Artisan class	..	..	19	31	..	67
Total ..	..	..	..	..	..	50
						38
	..	..	..	..	..	278

* Includes four students specially appointed to the Public Works Department before the termination of their course.

Excluding the students going through the practical courses in Workshops and on works, the total number actually in the College on 31st December 1893 was 252. The corresponding totals of the four preceding years were 1892, 217 ; 1891, 189 ; 1890, 136 ; 1889, 109.

The numbers arranged by classes of the community were—

Europeans and Eurasians	16
Brahmans	131
Other Hindus	83
Native Christians	13
Mussalmans	5
Others	4
Total ...	252

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	2	7	3	2	..	..	14
Engineer Subordinate class	11	53	11	3	..	3	81
Military probationers	2	..	..	..	..	..	2
Draftsman class	..	27	31	6	3	..	67
Surveyor class	1	40	8	..	1	..	50
Artisan class	..	4	30	2	1	1	38
Total ..	16	131	83	13	5	4	252

The numbers offering for admission were :—Engineer class 11, all of whom passed the entrance examination of December 1893 ; Engineer Subordinate class 27, of whom 25 qualified in April 1893 for admission ; Draftsman class 132 in November 1893 for 36 vacancies ; Surveyor class 72 for 28 vacancies ; Artisan class 139 for 40 vacancies. By the middle of 1894, when another batch of Engineer Subordinate students will join, the numbers in the College will probably reach 275, the maximum for which space can be found.

The marked increase in the strength of the Engineer class is gratifying. During the year one student of that class was compelled by illness to leave temporarily, another was nominated by Government to the Telegraph class at Roorkee, and one student of the Royal Indian Engineering College, Cooper's Hill, was permitted under certain restrictions to join the Second year division. There was less competition for admission to the Engineer Subordinate class than in 1891, which I attribute to the changes which have taken place in the University Matriculation course. The numbers applying for admission to the Draftsman, Surveyor and Artisan classes continue to be very large.

5. *Examinations.*—The final and term examinations of all the classes were conducted in December 1892 by the Board of Examiners appointed by Government. A brief abstract of the results is given below, and a synopsis of the final examination marks forms an appendix to this report. Under the Presidentship of Mr. Stoney, who was relieved on departure to England in November by Mr. Llewellyn Jones, the faults in the examination papers noticed in my last annual report have this year been corrected. The practical examinations by this College in Survey Field work, which were introduced last year, were extended to all the classes learning Surveying. The points noted by the Board in connection with the examinations of December 1892 received careful attention during the year. The examinations for admission to the Engineer and Engineer Subordinate classes were conducted by the College. Proposals were made for the institution of an entrance examination for the Draftsman and Surveyor classes, but the consideration of the matter has been deferred until 1894. The numbers applying for admission to these classes are now so large that dissatisfaction is felt with the present system of selection ; and an examination giving credit for knowledge of English, Arithmetic, Hand-writing and Drawing has become a pressing need.

6. *Engineer Classes.*—In August 1892 proposals were made for the removal of some of the disabilities under which these classes labour, as compared with the corresponding classes in the other Indian Engineering Colleges, but orders thereon are still

awaited. The proposals involved a reduction of fee-rates, an increase in the number of scholarships, and the guarantee of one appointment to the Upper Subordinate Establishment of the Public Works Department. The numbers applying for admission have, however, increased substantially during the last two years. Several applications have been received from Ceylon candidates, who have passed the Senior Cambridge Local examination, and it has been decided that such persons may be admitted on the understanding that they are not eligible for any prize, scholarship, diploma, or guaranteed appointment, nor for the practical course. The restriction as regards the final certificate seems, however, too severe, as no person is likely to go through a three years' course unless he has the prospect of securing some evidence of his proficiency at the end of it. It is worthy of consideration whether, so long as the number of fully-qualified candidates is insufficient to fill the class, the Principal might not be authorised to accept any person whom he deems to possess sufficient educational qualifications, and to allow him to take the full theoretical course, and appear for the final examination like an ordinary student. Such special students might further be allowed to proceed to the practical courses on payment of a contribution, calculated to reimburse the State for the expense it incurs, and thus to secure for themselves the full diploma.

Four students completed their final year's practical course on 31st December 1893, viz., L. D. Venkatarama Aiyar, B.A., J. Kuriyan, B.A., V. R. Pranatartihara Aiyar, B.A., B.C.E., and S. Rajagopalaswami Mudaliyar, the first and third as Civil Engineers, the second and fourth as Mechanical. L. D. Venkatarama Aiyar secures the guaranteed appointment as Assistant Engineer, and the other three have been offered overseerships of the first and second grades.

The next batch of Engineer students (four in number) consisting of G. S. Rama Aiyar, B.A., P. Ranganayakulu Nayudu, B.C.E., V. Gopala Aiyar, B.C.E., and V. S. Ramakrishna Aiyar has completed one year in workshops, and the students have now been drafted to works. One of them has been nominated to the East Coast Railway, and the others to different public works divisions.

Of the three divisions of the Engineer class actually in the College, the senior, consisting of two students, appeared for final examination in December last and both students passed. The average percentages of marks for the division under the various subject heads were as follow :—

	1893.	Average of four years.
Mathematics	75	55
Science	54	40
Engineering	71	55
Drawing	77	67
Surveying	68	67
Vernacular Language	49	56
Drills and Exercises	84	80
Total ...	68	55

Compared with the mean of the four preceding years, there has been a very marked improvement in all subjects except Language, and an advance of no less than 13 per cent. on the total. Both students have done exceptionally well, and there was a keen contest for the first place. This was won by R. N. Arokeaswami Mudaliyar, who, with 2,111 marks out of 3,000, distanced his competitor A. W. King by 110 marks. Arokeaswami receives the gold medal awarded to the most distinguished student, and obtains a prize consisting of a prismatic compass for proficiency in *Drawing and Surveying*. He also gains the Narayana Oonythan prize, consisting of a copy of Molesworth's Pocket book, and a Sir Madhava Rau prize for Workshop practice, viz., a field glass. He will, on the completion of his two years' practical course, provided he passes the B.C.E. degree examination, be appointed to the Engineer Establishment of the Public Works Department. To A. W. King is awarded a prize for *Mathematics*, viz., an aneroid barometer, and one for *Engineering* consisting of a copy of Mullins' "Irrigation Manual."

One special student was permitted to attend the lectures in Sanitary Engineering to aid in qualifying himself for the University degree in Sanitary Science.

One independent candidate presented himself for the College final examination and was successful.

The second division of the Engineer class, containing three ordinary students, has appeared for a term examination, the marks for which count towards the final total. The average of the division was 57 per cent. The scholarship of Rs. 30 per mensem is gained by S. A. Jagadisa Aiyar, B.A., who secures 71 per cent. of the total marks.

The third division, consisting of eight students, made an average of 65 per cent. of the total marks at the late term examination. This high figure indicates the existence of good material. The scholarship is won by P. V. Manicka Nayakar with 74 per cent. of the total marks.

7. *Engineer Subordinate Class.*—Eight students completed their final year's course on works. Owing to a pressing need of Upper Subordinates in the Public Works Department, four of these, viz., S. Dakshnamurti, P. N. Ramachendra Aiyar, J. S. Mullen and S. Iswara Sastri, were appointed to the establishment in October—two months earlier than usual. Private C. H. Briant has also been appointed permanently, while the other three, D. S. Sankara Aiyar, E. T. Jordon and M. Ramaswami Pillai, have been offered temporary overseerships. Of the four additional students of this batch who passed the final examination of December 1891, Corporal Blake was temporarily invalided to England, but will rejoin early in 1894, while the other three elected not to proceed to the practical course.

The next batch of Engineer Subordinate students (ten in number) spent the year 1893 in the Public Works Workshops. Their work will be referred to later. Of the four additional students of this batch who elected not to proceed to the practical course, one has been permitted to join the workshops in January 1894.

Of the three divisions of the Engineer Subordinate class in the College proper, the senior, consisting of twenty-six students, joined in July 1891 and proceeded to the final examination in December last. Twenty-four were successful. The average percentages of marks gained by the division were—

	1893.	Average of four years.
Mathematics	54	42
Engineering	55	46
Drawing	58	58
Surveying	49	61
Vernacular Language	42	51
Drills and Exercises	75	81
Total ...	54	53

Compared with the mean of the four preceding years, there has been a substantial improvement in Mathematics and Engineering, a considerable falling off in Surveying (due mainly to greater stringency in the award of College marks) and in Language, and a moderate fall in Drills and Exercises. There has, however, been a rise in the total, and the class may be considered a good average one. It contains neither exceptional talent, nor unusual inferiority, but is distinguished throughout by respectable mediocrity.

The senior student is M. R. Natesa Aiyar, who secures 63 per cent. of the total marks. He gains the silver medal awarded to the most distinguished student, and a prize for *Engineering*, consisting of a silver lever watch. He also gains the Rogers' prize of books. The second, third and fourth students, M. S. Narayanaswami Aiyar, N. Kandasawami Pillai and M. N. Ramakrishna Aiyar, secure 60 per cent. with only a mark between them. M. S. Narayanaswami Aiyar wins a parallel rule as a prize for *Vernacular Language*. The prize for *Mathematics*, a magnetic compass, falls to L. D. Ramachandra Aiyar, that for *Surveying*, an optical square, to R. Panchapakesa Aiyar, while Corporal H. A. Furnell receives a field glass as a prize for *Drawing* and *Drills and Exercises*. Sir T. Madhava Rau prizes for *Workshop Practice*, consisting of an optical square and a colour box, are awarded to S. Natesa Aiyar and A. Rama Rau respectively, to the former for special proficiency, and to the latter as a Mahratta Brahman. Corporal Furnell is also distinguished for proficiency in the workshops.

Two independent candidates presented themselves for the examination, but both were unsuccessful.

The second division of the Engineer Subordinate class contains thirty-one students, who scored an average of 55 per cent. of the total marks at the term examination of December 1893. M. Krishnaswami Aiyar heads the list with 76 per cent. The two scholarships of Rs. 12–8–0 are awarded to him and to the second student J. S. Muthayya.

The third division of the Engineer Subordinate class, which contains twenty-four students, obtained 54 per cent. of the marks at the term examination in December last. One of the two scholarships of Rs. 12–8–0 is won by S. Natesa Aiyar, who occupies the first place, while the other will be divided between G. Lakshmana Rau and R. Srinivasa Raghava Charri, who stand third with equal marks. The second place is taken by a Military student, Drummer Whittaker.

8. *Draftsman Class.*—The senior division, consisting of twenty-six regular students, appeared for the final examination in December last. Twenty-one were successful in gaining certificates, five in the second class and sixteen in the third. One candidate failed, and four were disqualified by the Board for unfair practices during the examination, evidenced by similarity of answers in Estimating.

Omitting the results of the disqualified candidates, the average percentages gained by the division under the various subject heads were as follow :—

	1893.	Average of four years.
Practical Geometry	64	68
Freehand, Perspective and Model Drawing	58	60
Building Drawing	55	65
Machine Drawing	68	55
Estimating	56	52
Topographical Drawing	55	54
Gymnastics and Drill	80	79
Total ...	60	60

Comparing the results with the mean of the four preceding years, it will be seen that there has been a fall in Practical Geometry and in Building Drawing, a substantial rise in Machine Drawing and an improvement in Estimating. The rise in Estimating is gratifying, as the marks in this subject have always been low. The total reaches the mean, and the class is an average one. Like the senior division of the Engineer Subordinate class, it is one of uniform but ordinary merit.

The student occupying the first place is N. L. Ramachandra Rau, who, with 72 per cent. of the total marks, gains the College bronze medal and a prize of a colour box for general proficiency. The second student, D. N. Narasimhayya, secures 70 per cent. of the marks, and receives a prize consisting of a set of scales. Both these students secure second-class certificates as Draftsmen, as do T. R. Krishnaswami Aiyar, Y. Rajabathar Mudaliar and T. Krishna Rau. Special prizes are awarded for proficiency in *Estimating* to V. Venkatarama Aiyangar and K. Krishnamachari, consisting of an ivory rule in each case.

Ten independent candidates presented themselves for examination for certificates. Two passed in the second class, five in the third, and three failed.

The second division of the Draftsman class contained forty students. The mean percentage of marks gained by the division at the term examination was 57. One of the two scholarships of Rs. 8 is won by S. Subrahmanya Aiyar, who occupies the first place, while the other will be divided between A. K. Kuppusawami Aiyangar and C. K. Krishna Rau, who stand second with equal marks. Five of the students failed to obtain the requisite minimum in *Geometrical Drawing*.

Thirty-six candidates have been accepted for admission to the new junior division which will be formed early in 1894.

9. *Surveyor Class.*—In the senior division of 1893 there were eighteen students. Four of these gained certificates in the second class and eight in the third class, while six failed.

The average percentages obtained under different subject heads were—

	1893.	Average of four years.
Chain, Compass and Plane Table Surveying	53	63
Levelling	64	63
Theodolite Surveying	58	61
Topographical Drawing	54	60
Gymnastics and Drill	77	72
Total ...	58	62

Comparing the figures with the mean of the four preceding years, it will be seen that there has been a fall in *Chain, Compass and Plane Table Surveying* and in *Topographical Drawing*. The class is decidedly below the average.

The senior student is G. Venkatarama Aiyar with 72 per cent. of the total marks. He wins the College bronze medal, and a prize consisting of a clinometer rule for general proficiency. To the second student, G. Somayya Sastri, who is only two marks below the first man, is awarded a prize of a pillar compass. The remaining winners of second-class certificates are K. P. Sadasiva Aiyar and T. R. Jivanna Rau.

The second division of the Surveyor class, containing thirty-one students, secured an average of 49 per cent. at the December term examination. The two scholarships of Rs. 8 are awarded to T. Subrahmanya Pillai and R. Natesa Aiyar. Five students failed to obtain the requisite minimum in *Chain, Compass and Plane Table Surveying*.

Twenty-eight candidates have been accepted for admission to the junior division which will be formed early in 1894.

10. *Artisan Class.*—At the commencement of the year, forty out of one hundred and forty-seven candidates were admitted. Two students were dismissed during the session, leaving thirty-eight at the close of the year. About a dozen of these are actual artisans or maistries. The class received the usual evening instruction, supplemented by survey field work one morning a week, and by occasional inspections of works in progress.

In November, 139 candidates applied for admission. Of these 40 have been accepted. The following statements of the occupations of the persons selected, and of their parents, show that the type of students for whose benefit the class was instituted is now being secured :—

Classification of students by occupation.

Maistry or apprentice to maistry	20
Contractor or contractor's assistant	5
Apprentice to carpenter	1
Time-keeper, Public Works Department	2
Apprentice to overseer	2
Clerk	1
Student, or no occupation	9
Total ...	40

Classification of students by parent's occupation.

Bricklayer maistry, or bricklayer	4
Carpenter maistry, or carpenter	2
Maistry, road maistry, or Public Works maistry	9
Contractor	4
Overseer or sub-overseer	3
Draftsman	1
Kurnam	1
Clerk or accountant	5
Peon	1
Cultivator or land-holder	4
Merchant	3
No occupation	3
Total ...	40

Consideration has been given during the year to the best mode of developing the artisan class, and definite proposals were submitted in September. The first requirement is more time, which might best be given by converting the class into a day one. Few of the students, even those who are maistries, are in actual employment while at the College, and suitable candidates would rarely be excluded by the change. The subjects of instruction would remain as at present, but would be carried to a higher standard. One full day per week could be devoted to surveying field work, and some workshop practice might perhaps be introduced. The students should be required to pass a final examination, and those successful might be held eligible for the appointments of sub-overseer, channel superintendent, and head maistry. The artisan class will thus be developed into one for lower subordinates, and will meet a decided want.

11. *Military students.*—The total number of soldier students on 31st December 1893 was twelve, viz., one on works, one in the Public Works Workshops, eight in the Engineer Subordinate class, and two probationers. One was remanded to his regiment in May owing to failure to pass the examination at the end of his probationary course, and two reverted at their own request. It was notified in June that the early abolition of the military class was in contemplation, and that only two admissions in place of five would be sanctioned for 1893. The Supreme Government decided, however, that recruitment of the Public Works Department from the army shall continue, but recommended that in view of the difference between the numbers entering the College and the numbers passing out, the standard of entrance examination should be made equivalent to that at Roorkee. It has been pointed out, however, that although during the last twenty years only fifty-three Military students passed out, while one hundred entered, yet the difference is not due to failure at examinations, but to remands at students' own request, or on account of ill-health, or occasionally for misconduct, such remands generally occurring early in the course. It has been noted also that in this College the entrance examination admits to a probationary class only, and that a year's instruction, followed by a further examination, is imposed before the soldiers join the Engineer Subordinate class. In this class they do not, as at Roorkee, form a division by themselves; but they compete with the civil students, and are able to hold their own.

The barrack accommodation in the College has been increased by the transfer of the workshops to the new building. Sanction has been accorded to the Military students being attached to the Wellington depôt for the long vacation during May and June.

12. *Government Technical Examinations.*—A number of the regular students of the College presented themselves voluntarily for Government Technical examinations in engineering subjects. Under the Intermediate standard there were 21 applications, and 13 passes, viz., 8 in the first class and 5 in the second. Under the Elementary standard there were 15 applications and 7 passes, viz., 4 in the first class and 3 in the second. Eleven students of the artisan class, not included above, came forward in April for the Elementary examination in mensuration, but all failed. As the technical examinations take place in April, while the artisan students join at the end of January, the latter have no reasonable prospects of success until their connection with the College has terminated.

13. *Surveying.*—During February the first and second divisions of the Engineer class, and the senior divisions of the Engineer Subordinate, and Surveyor classes, comprising fifty-three students, were in camp at Guindy for a fortnight engaged on a railway survey project. In July the three divisions of the Engineer class, the second division of the Engineer Subordinate class and the first division of the Surveyor class, comprising sixty-four students, proceeded to Gúduvánchéri, and remained in camp for a fortnight. The survey parties, ten in number, were disposed over about thirty square miles of hilly country, which was surveyed and levelled over in various ways. The senior division of the Engineer Subordinate class had at the same time two weeks of continuous survey work in Madras. The cost of the camps of February and July was Rs. 760. The field work of the remaining divisions of the different classes was

spread over the whole year. The total outturn was as follows, exclusive of that of the artisan class:—

No. of parties.	Description of work.	Miles of levelling and traversing.	Acres filled in.
	First half-year.		
4	Skeleton chain survey	7	261
3	Chain survey	..	..
8	Compass traverse	50	..
11	Levelling	101	..
13	Theodolite traverse	70	..
8	Setting out curves	12	..
	Second half-year.		
4	Chain survey	..	420
12	Compass survey	..	50,460
11	Compass traverse	136	..
14	Plane table traverse	32	..
14	Plane table survey	..	29,920
19	Levelling	77	..
8	Contouring	31	..
9	Hill sketching	..	4,163
5	Ghat tracing	5	..
6	Theodolite traverse	74	..
6	Setting out curves	10	..
1	Pocket sextant survey	..	1,920
4	Trigonometrical survey	..	25,600

The outturn per party is considerably higher than in previous years, but the results of the practical examinations held in the College indicate that more attention must be paid to accuracy, especially in levelling, and less to rapidity of work.

14. *Inspections of works.*—Some forty inspections of works were made during the year, including inspection of the preparation of materials at the brickfields, lime kilns, and cement works; of building construction at the Victoria Technical Institute; of bridges in Madras and on the Buckingham canal; of irrigation works and water-supply at the Red Hills; and of machinery at the Public Works Workshops, the Buckingham Mills, and the Government Bakery. Buildings and bridges were measured up and drawn by the students, and work was also set out on the ground.

15. *College Workshop.*—The students practised as usual at carpenter's and fitter's work. They were exercised in sawing and planing to given dimensions, in making joints, in wood turning, and in the construction of benches, tables and other furniture required for the College. In the fitter's shop, they were engaged in chipping and filing cast and wrought iron, and in drilling, turning, and screw-cutting. The new workshop building, measuring 80 feet by 60 feet, was handed over on 21st August 1893, and the tools and plant in the temporary shop were at once transferred thither. The engine, boiler and machine tools were delivered in October, and their erection, as well as the supply of brackets, pedestals, shafting, pulleys and belting, was entrusted to the firm of Messrs. Massey and Company. The work was almost complete by the end of the year. The plant consists of a 10-horse power horizontal engine, a 12-horse power locomotive boiler, two surfacing and screw-cutting lathes, a slotting machine, shaping machine, drilling machine, and milling machine, with two grinders. These with the lathes and drill previously in the shop will suffice to give practice to the students in the ordinary classes of machine work, while the steam power is sufficient to meet possible further demands in the future. The completion of the shops early in 1894 will permit of more time being devoted to practical work by the Engineer and Engineer Subordinate students, and of the admission of other students to the advantages of this class of work. A corresponding reduction will be necessary in the theoretical courses, and the revision of the syllabuses is engaging attention.

16. *Laboratory and Experimental Work.*—Work in the chemical and engineering laboratories was conducted as usual. Cement testing was practised, and indicator diagrams were taken at the Buckingham Mills by the kind permission of Messrs. Binny and Company. A 100-ton Wicksteed's testing machine has been ordered, and will be erected in the workshop building. Other testing apparatus already possessed by the

College will eventually be transferred to that building, which will become a combined workshop and engineering laboratory.

The apparatus imported during the year consisted chiefly of surveying instruments, and models of pieces of mechanism. A few models were made in the workshops; sections of rolled beams were kindly presented to the College by Messrs. Massey and Company, and models of a venetian door and a well curb by M.R.Ry. J. R. Sivasubrahmanya Aiyar of the Sanitary Engineer's Department.

17. *Practical Course, Mechanical Engineers.*—Two students of the Engineer class of December 1891, viz., J. Kuriyan and S. Rajagopalaswami, Mudaliyar spent the year in the Madras Railway Locomotive Workshops at Perambur. Mr. Phipps, the Locomotive Superintendent, writes as follows:—Both students "have conducted themselves very well, and to my entire satisfaction. They have both evinced much interest in their work, have stuck well to it, and made as good progress as could be looked for in the time at their disposal. They have also kept good time, and their conduct has been all that I could have wished." In the fitting shop they fitted up connecting rods, engine motion work, and general work; in the lathe shop they were practised in turning, and at the marking off table; in the iron foundry and in the brass foundry they were painstaking and careful in the work given them. They were engaged for three months in the smith's shop on general work; and in the boiler shop they worked at plating, marking off, and rivetting boilers. They completed their course with two months in the drawing office. Rajagopalaswami was further engaged on general work in the carriage building and carpenter's shop, and worked on the engines as fireman for a month.

18. *Workshop Course, Civil Engineers and Subordinates.*—Four Engineer and ten Engineer Subordinate students were attached throughout the year to the Public Works Workshops, Ráyapuram. The Superintendent Mr. Wickham reports as follows:—"The students passed through the machine shop, including turning, drilling and planing, the fitter's, carpenter's, and smith's shops and the foundry. Their progress was, on the whole, good, and I would make special mention of Engineer students G. S. Rama Aiyar and Ramakrishna Aiyar, and Engineer Subordinate students M. V. Venkatarama Aiyar and D. V. Venkatarama Aiyar. The best piece of work was an Archimædean screw, 12 feet long and $2\frac{1}{2}$ feet in diameter, the whole of which, excepting the heavy smith's work, was done by the students. The conduct of the students was good. From the first March the students were put on the same footing as the workmen, fines being replaced by extra work during holidays. I would add that, owing to the paucity of trained supervision under me, it depends on the student himself how much he learns."

19. *Works Course, Civil Engineers and Subordinates.*—Two Engineer and nine Engineer Subordinate students were attached throughout the year to various circles where important works are under construction. The abstract of the progress reports given below shows that in most cases it has been found possible, as was recommended last year, to give the students responsible work to carry out:—

Name.	Abstract of Progress Report.
L. D. Venkatarama Aiyar, B.A.	*Kistna Eastern Division and Consulting Architect's Division.*—Mr. C. A. Smith reports:—He was first instructed in management of labour and system of accounts, and afterwards engaged on a tour of inspection and preparation of river charts. He was subsequently placed in charge of a head sluice where well sinking and pile driving were in progress. His conduct has been quite satisfactory, and he has shown himself diligent and ready in acquiring practical experience. Mr. Irwin writes:—He was put in charge of a new Police station, and supervised its construction throughout, gaining a practical acquaintance with laying out, excavation, brickwork, roofing, &c., and with measuring up. He assisted to lay out the new Law College, and in deviating a main drain. His conduct throughout was good.

Name.	Abstract of Progress Report.
V. R. Pranatartihara Aiyar, B.A., B.C.E.	*Consulting Architect's Division and Kistna Eastern Division.*—Mr. Irwin writes:—He received instruction in the management of labour, in construction, and in measuring up at the College of Engineering Workshop, the Presidency College extension, and the new Light House. He was also practised in making estimates for works, and in taking levels. His conduct throughout was satisfactory. Mr. Traill reports that, during the second half-year, the student assisted in taking current meter observations under Mr. Chatterton, and that he gained experience in working portable engines and centrifugal pumps, and in the details of water distribution. He was afterwards employed on building work, in the erection of a girder bridge, and in the preparation of bridge designs. He worked in a satisfactory manner and proved a useful assistant.
S. Dakshanamurti ...	*South Arcot Division.*—Mr. J. D. Legge reports:—This student has nearly completed a drainage sluice which has been directly under his charge. He has also been employed on a deviation of the Coleroon bank, and on the preparation of doors and windows for a Taluk office. He is active and devotes much time and attention to his duties, and I can report very favorably of the progress he has made, and of his general behaviour.
P. N. Ramachandra Aiyar.	*Chingleput Division.*—Mr. Wilson states that the student was first placed on the construction of a large tank weir, where he saw excavating, and concrete, brick, and stone work, as well as brick making and the preparation of materials. He was then employed on the repair of a tank bund, the construction of police huts and the repair of buildings. He also made surveys and estimates for a new channel, and attended the sub-division office. He was diligent and attentive to his work.
J. S. Mullen	*Gódávari Eastern Division.*—The Superintending Engineer, First Circle, reports that the student was at first employed in gaining acquaintance with the preparation of materials, and subsequently on works at Cocanada. His conduct was satisfactory, and he took an intelligent interest in his work. No report has been received for the second half-year.
S. Iswara Sastri	*Periyár Division, No.* 2.—Mr. Carless says:—The student has been employed in setting out works and on masonry works in progress. He takes an interest in acquiring practical knowledge.
D. S. Sankara Aiyar ...	*Periyár Division, No.* 2.—Mr. Carless reports:—This student has been employed in setting out superpassages and sluices and in running levels. He has also had charge of masonry and earthwork. He is very painstaking and has acquired a good practical knowledge of work. Is likely to make a good overseer.
Private C. H. Briant ...	*Consulting Architect's Division*.—Mr. Irwin writes:—Private Briant was employed at the Government Brickfields, at the Victoria Technical Institute, and at the School of Arts, Madras. He was also engaged in making surveys. During the second half-year he prepared plans and estimates for two culverts, and assisted in other works in which he gave satisfaction. His conduct was exceptionally good; he was diligent and attentive to his work, and gave entire satisfaction. He is intelligent, has passed the higher standard in Telugu, and with experience will make a very useful subordinate.
E. T. Jordon	*Rushikulya Division* and *Kistna Eastern Division.*—Mr. Somers-Eve writes that this student received instruction on reservoir works, and on a channel, anicut, and head works. He made himself useful in many ways. His conduct was good. Mr. C. A. Smith reports that the student was employed during the second half-year on buildings at head-quarters. His conduct was satisfactory, and he appeared to take an intelligent interest in his work.

Name.	Abstract of Progress Report.
M. Ramaswami Pillai ...	*Kistna Western Division.*—Mr. Malet states that the student was employed in superintending masonry works, and in laying down lines and taking levels for a new drain. This work he has done fairly well. He also attended a sub-division office to learn office work. He was subsequently detailed to look after buildings. He proved a willing and painstaking student, and his conduct was good.

20. *Revision of Rules.*—The only changes made in the rules are those providing that Engineer apprentices of the Provincial Service shall not be promoted to assistants until after a year's training as apprentices, and that the salary of an apprentice may be increased to Rs. 150 after the first six months of apprenticeship. The first ruling might, it is considered, be made inapplicable to Madras, as the second year's practical course should render any further period of apprenticeship unnecessary. It has also been notified that an Engineer student may, in special circumstances, be granted horse allowance during his final year of practical training. It has further been ruled that, during the practical course, leave will be limited to periods aggregating one month per annum; and that independent candidates for the College Examinations need not be examined in gymnastics, but may credit the marks they received for Drills and Exercises when they left the College.

There are several important matters in which changes of existing rules are pending, such as the modification of the present practical courses, the amelioration of the condition of the Engineer class, the institution of entrance examinations for the Draftsman and Surveyor classes, the grant of permission to Draftsmen who qualified under the old rules to appear for a higher class of certificate under the new, and the development of the Artisan class. On all these points proposals have been submitted, and it is hoped that orders will shortly be issued.

21. *College Buildings.*—In February 1893 Government authorised the preparation of estimates for improving the lighting and accommodation of the old building. A partial estimate was sanctioned in December embracing the provision of fan-lights and skylights in the Reading-room and in several of the class rooms, and of the conversion of four small rooms on the ground floor into a class room. This work was carried out during the Christmas holidays. Further improvements, however, are needed, prominent among which are the erection of balconies for the quadrangles, and of large windows and verandahs along the east and west fronts. The Consulting Architect has estimates in preparation.

22. *Library and Reading-room.*—The Library, which consists of a lending and a consulting branch, contains a total of 3,085 volumes, of which 122 were added during 1893. In the course of the year 5,078 books were issued, viz., 516 to the staff and 4,562 to students, while 1,084 references were made to the Consulting Library. The steadily increasing use of the lending library is shown by the following numbers of books issued during the last five years, 1889, 2,543; 1890, 3,780; 1891, 3,860; 1892, 4,042; 1893, 5,078.

Most of the book-cases have been fitted, in the workshop, with doors at back as well as front, so that their capacity has been considerably increased. The Reading-room is at present supplied by Government with a few professional periodicals and sundry books of reference. It is in contemplation to make admission to the Reading-room dependent on subscription by the students and to entrust the management of the room to a committee of which a member of the staff would be president. If the scheme proves successful, the room might be lighted and opened in the evening.

23. *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. The cricket club has made considerable progress, as evidenced by the success which has attended several of the matches played. The club is not supported as it should be by the native students. The Madras Athletic Association has introduced a new rule limiting the age of members of competing

cricket teams. This will have the unfortunate effect of preventing the College of Engineering from taking part in the competitions of 1894. A numerously signed memorial was received asking for a football ground. Application was accordingly made for a plot adjacent to the cricket ground. The Consulting Architect thereupon submitted a proposal to clear the greater part of the land in Chepak Park, south of the Madras Cricket Club enclosure, and to make the southern half available as a recreation ground for the Presidency College, and the northern half for the College of Engineering.

24. *Attendance and Conduct.*—The percentage of numbers present daily to numbers on the rolls was 97 for the Engineer classes and 96½ for the 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 four students of the Draftsman class during the examination in Estimating has already been alluded to. The students were disqualified and declared ineligible to present themselves for re-examination within twelve months.

25. *B.C.E. Degree Examination.*—The four students who in 1892 composed the senior division of the Engineer class presented themselves for examination in January 1893, and three passed, viz., two in the second class and one in the third. Seven independent candidates, former students of the College, also attended the examination and two passed, one in the civil branch and one in the mechanical.

The B.C.E. degree examination will be held under the present syllabus for the last time in 1894. The *First Examination in Engineering* under the new scheme for the B.E. degree examination will take place concurrently with it, while the second or degree examination will be held for the first time in the following year.

26. *Employment of passed students.*—The students who qualified in December 1892 obtained remunerative employment without difficulty. Of the four Engineers, one is an Assistant in the Superior Establishment of the Public Works Department, and the other three are Upper Subordinates in the same department. Of the six Engineer Subordinates of 1892, all are employed as Overseers in the Public Works Department. Of the eighteen Draftsmen, seventeen are known to be employed with salaries ranging from Rs. 25 to Rs. 40, viz., eleven in the Public Works Department, one in the Military Works Department, two in the Forest Department, and three under Local Boards. Of the sixteen Surveyors of 1892, fifteen are employed on salaries ranging from Rs. 25 to Rs. 100, viz., seven by the Public Works Department, five by the Survey Department, one by the Forest Department, one by a Local Board, and one by the Ceylon Government.

The prospects of the students who qualified in December 1893 are excellent. The senior Engineer student has been appointed an Assistant Engineer in the Public Works Department and the other three have been offered overseerships of the first and second grades, which two, who are Mechanical Engineers, have accepted. In the Engineer Subordinate class five appointments were made in October before the students had finished their course, owing to the urgent need of the services of Upper Subordinates. The other three students were offered temporary overseerships in the department, which two have accepted. The successful Draftsmen and Surveyors are not likely to have to wait long for employment.

At the present time the demand for Draftsmen, Surveyors and especially for Overseers is in excess of the supply. During the last three years the Public Works Department has absorbed, or been ready to absorb, all the Upper Subordinates available, with the result that no qualified men are left to fill vacancies in Local Boards. This is regrettable, but it is a state of things which will disappear as the larger classes now in the College complete their period of training. Government has lately resolved that from 1st January 1897 training in the College, or such approved service as the Governor in Council may consider equivalent, will be required as a qualification for Public Works appointments under District Boards and Municipalities carrying salaries of Rs. 100 and upwards, and that preference is generally to be given to men so trained. A circular has lately been received from the Bengal Government, stating that under certain circumstances, graduates in Engineering from the Madras College may be appointed to the Public Works Upper Subordinate Establishment in Bengal.

The vacancies notified during the year in the Gazette, the public press, by letter to the Principal, &c., were one hundred and seventy in number, of which fifty-one were

under Government, twenty-four under Local Boards and Municipalities, twenty-three on Railways, five under Native States, and four under private employers. Seven of the vacancies were for Engineers and Assistants, eighteen for Overseers, thirty-one for Draftsmen, twenty-eight for Surveyors, seven for Lower Subordinates, and four for Maistries, while the remainder were of a miscellaneous character. Four of the appointments carried Rs. 250 and upwards, eleven were between Rs. 100 and Rs. 250, twenty-eight between Rs. 50 and Rs. 100, and sixty-four under Rs. 50. The vacancies are classified in the following table :—

Vacancies.	Government.			Local Boards and Municipalities.				Railways.				Native States.			Private employers.		Total.
	100 to 250.	50 to 100.	Under 50.	Above 250.	100 to 250.	50 to 100.	Under 50.	Above 250.	100 to 250.	50 to 100.	Under 50.	100 to 250.	50 to 100.	Under 50.	50 to 100.	Under 50.	
Engineer or Assistant ..	..	..	..	2	3	..	..	2	..	..	..	..	..	..	..	..	7
Overseer	..	2	..	..	..	6	5	..	..	..	..	4	..	..	1	..	18
Draftsman	1	4	15	..	..	1	5	..	1	2	1	..	..	1	..	..	31
Surveyor	1	10	5	..	..	..	..	..	..	..	11	..	..	..	1	..	28
Sub-Overseer	..	1	5	..	..	..	1	..	..	..	..	..	..	..	..	..	7
Maistry	..	..	3	..	..	..	1	..	..	..	..	..	..	..	..	..	4
Anicut Superintendent or Assistant.	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	2
Conservancy Inspector ..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Pipe-laying Inspector ..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Inspector's Assistant ..	..	..	..	..	..	..	..	..	..	..	6	..	..	..	..	..	6
Teacher of Surveying and Drawing.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2
Total ..	3	17	31	2	3	7	12	2	1	2	18	4	..	1	2	2	107

Financial details.—The total expenditure during the calendar year 1893, including scholarships, but exclusive of travelling allowance to Mr. Chatterton during deputation, was approximately Rs. 67,070. This figure does not include the capital cost of the new workshops nor the cost of repairs to buildings, funds for which are provided in the Public Works Department. The income from fees, &c., was Rs. 15,957. The net cost of educating each student taking the total number at 245 was therefore Rs. 209.

Considerable inconvenience is caused by the attemped division of every item of expenditure between the so-called College and School departments of the institution, and the results are delusive. Many items which reach the Accountant-General without passing through the College, such as cost of Europe stores, are incorrectly divided and assigned; and no sound estimate can be formed of the separate cost of the Engineer classes. Moreover, the limitation of these classes to the College department is productive of misapprehension. For instance, the statement in the report on Public Instruction for 1891-92, that there are "twelve students on the rolls of the College" is misleading, especially as the notice of the "School of Engineering" occurs in another part of the volume. The conveniences would be avoided if the institution, like the College of Agriculture, were treated as one and indivisible. The sole reason for the retention of the present arrangement is that the Engineer classes send up students for a University degree examination; but this examination is a mere incident as compared with the College examination for diplomas, to which the energies of the students are mainly directed.

If this proposal cannot be accepted, I submit that a sounder estimate of the cost of the higher education imparted would be obtained by classifying the Engineer and Engineer Subordinate students as the College department, and the remaining classes as the school. The Civil students of the Engineer Subordinate class are picked Matriculates, and some have passed the First Arts examination. In common with the Engineer classes, they receive instruction from the Principal and Professors, and in any other institution they would be classed as College students. The objection that they are not prepared for any higher University examination may be met by pointing to the College of Agriculture, which is classed as a College, although it is unconnected with the University.

Relation of the College to Technical Institutes.—In conclusion I would offer a remark on the attitude which the College should assume towards technical education in respect to Engineering. The College has already assisted the Victoria Technical Institute by training some of its scholarship holders to act as teachers in Surveying and Building Drawing. One or both of these subjects are now taught at the Government College, Mangalore, the A.N.M.'s Institution, Bangalore, the Vizagapatam L.M. High school, and the Albert Victor Technical Institute, Trichinopoly; and there are other schools in which teaching is being given in Carpentry, Geometrical Drawing and Mensuration. It has recently been proposed by the Principal of the Calcutta Engineering College to connect that College with the industrial schools in Bengal in relation to the training of mechanical apprentices; and it seems to me that it would be advantageous to affiliate the Provincial institutes in Madras which I have named, and others which may be formed in the future, to the College of Engineering, and to offer special facilities to their students of admission to the College. The pupils would thus be afforded either the opportunity of further prosecuting their special work, or the advantage of entering on easy terms one of the regular classes of the institution. Thus, students who have been trained in Carpenter's or Fitter's work would have excellent opportunities of improving themselves in the new workshop. Mr. Spring, lately Engineer-in-Chief of the East Coast Railway, has suggested to me that such pupils might be employed in making furniture and, later on, machine tools, which could be disposed of at cost price of materials to the various technical institutions which are being formed, and which are unable to bear the expense of purchase in the open market. For theoretical instruction these pupils might be attached to the Artisan class. Again students who have been trained in elementary Surveying may, if their general educational qualifications are sufficient, be admitted to the Surveyor class for the full course in preference to candidates who possess no technical knowledge; while students from the School of Arts, or elsewhere, who have been taught Geometrical or Freehand Drawing, will form excellent material for the Draftsman class. As technical education spreads, special facilities might be given for admission to the Engineer Subordinate, or even the Engineer class, and the College of Engineering would thus become the centre towards which converge the paths from all those subsidiary institutions which are engaged in the elementary teaching of various subjects connected with Engineering.

(Signed) H. D. LOVE, Major, R.E.,
Principal, College of Engineering.

From the Board of Examiners, College of Engineering, Madras, to the Director of Public Instruction, dated Madras, 1st March 1894.

We have the honour of presenting the following report on the examinations of the College of Engineering, Madras, held in December 1893, and of submitting a statement of the marks awarded.

2. The accompanying detailed reports on the different papers have been drawn up by the individual members of the Board. From these and the mark-book forwarded herewith, it will be seen that Surveying was the weakest subject with all the students who have just completed their course at the College, with the exception of those in the Engineer class. These students are the subjects of the remarks that follow in paragraph 3.

3. *Engineer Class, Division I.*—The two students who form this class and one independent candidate appeared for the final examination, and all of them passed in the second class. Arokiaswami Mudaliyar comes out first, being 100 marks out of a total of 3,000 ahead of the second, King. Both of these obtained over two-thirds of the maximum total, and they may be considered good men. Evidence is not wanting, which tends to show that they have not done as well as they might in Mathematics at any rate. The highest percentage of marks was obtained in Drawing.

Engineer Subordinate Class, Division I.—This class consists of 26 students, all of whom, with two exceptions, have passed. Two independent candidates presented themselves for examination and both failed. The mathematical subjects were on the

whole fairly well done, the poorest being Elementary Statics. Attention has been called to the weakness of the class in this particular subject in a previous report, and the question, whether their knowledge of the subject can be of much use to them—seeing how limited and inaccurate it generally is—has been raised. There is no doubt that some knowledge of the subject is very desirable, but it cannot be insisted on by the present system of examination, in which Trigonometry and Elementary Statics are given in one paper. The subject is discussed in the report of one of the members of the Board.

Draftsman Class, Division I.—Of the 26 students in this class, one failed and four were disqualified. Each of these four had either given assistance to or received assistance from another of their number in answering the paper on Estimating. Their answer papers were almost identical, and on enquiry it was found that they had been sitting together in the examination room. These considerations show that they must have communicated with one another during the time given for answering the paper. The Board accordingly disqualified them. Ten independent candidates were examined; of these, seven passed, three in the second class and four in the third.

Surveyor Class, Division I.—This class is decidedly below the average. It consists of 18 students, 12 of whom passed, 4 in the second class and 8 in the third. Two independent candidates appeared, but both failed.

4. It will be noticed that out of a maximum of 1,000 marks obtainable by the students in the Draftsman and Surveyor classes, 400 are given by the College authorities. If the marks given by the Board are compared with those given by the College, it will be found that the latter are very much higher than the former. No objections have been urged by the College staff against the examination as a whole as conducted by the Board. On the other hand, the Board have, as usual, inspected the work done by the students in the College and are perfectly satisfied with the marks awarded for the work. The discrepancy between the work of the students in the College and in the examination room can, it seems to us, be only attributed to two causes:—

(i) that in the examination room these students are, and feel themselves to be, working under abnormal conditions, the principal and probably the most important one being the limited time at their disposal for a piece of work (this is not the case, for practical purposes at any rate, in their College work);

(ii) that they obtain too much help in their College work from their instructors. The marks seem to be given on the result obtained, no account being taken of the amount of help given or time required to produce it. The result of giving too much assistance to a student is loss of confidence in himself. If this be the case, we would suggest that, as far as is practicable, some account be taken, in awarding marks, of the time a student spends over a piece of work and of the assistance and kind of assistance he receives. We do not advise reducing the College work to anything of the nature of a perpetual examination. What is required is a limit of time fixed for a piece of work and this limit narrowed as the class improves. Speed as well as accuracy would thus be aimed at, and this is a condition which obtains in the work they have to do after qualifying at the College.

5. The suggestion made by the Board in their report last year, of giving an "examination number" to each student which they are to write on their answer papers, has been carried out and has proved of great convenience. As might have been expected, some neglected to attach their numbers to their papers. It is sufficient to call attention to this, to have its importance impressed on the students in the future.

From Major H. D. LOVE, R.E., Principal, College of Engineering, Madras, to the Director of Public Instruction, Madras, dated 8th March 1894, No. 1558-C.

I have the honour to enclose the synopsis of marks awarded at the final examination of December 1893, which is referred to in paragraph 5 of my No. 1350-C., dated 29th January 1894.

APPENDIX.

Engineer Class.

Abstract of Marks.

Rank.	Names.	I. Mathematics.	II. Science.	III. Engineering.	IV. Drawing.	V. Surveying.	VI. Language.	VIII. Drills and Exercises.	Total.	Remarks.
	Maximum Marks ..	475	525	775	500	400	200	125	3,000	
	College Students.									
1	R. N. Arokiaswami Mudaliyar .	344	308	544	401	288	127	99	2.111	Passed Second class.
2	A. W. King	371	257	561	373	258	69	112	2,001	
	Average per cent. ..	75·2	53·8	71·2	77·4	68·2	49·0	84·4	68·5	
	Independent Candidate.									
1	M. Radhakrishna Aiyar.. ..	230	202	443	273	254	115	109	1,626	Passed Second class.
	Average per cent. ..	48·4	38·4	57·1	54·6	63·5	57·5	87·2	54·2	

Engineer Subordinate Class.

Abstract of Marks.

Rank.	Names.	I. Mathematics.	II. Engineering.	III. Drawing.	IV. Surveying.	V. Language.	VI. Drills and Exercises.	Total.	Remarks.
	Maximum Marks ..	370	600	400	350	180	100	2,000	
	College Students.								
1	M. R. Natesa Aiyar	256	435	257	167	74	81	1,270	
2	M. S. Narayanaswami Aiyar ..	208	359	264	185	100	79	1,195	
3	N. Kandaswami Pillai	260	354	258	191	70	61	1,194	
4	M. N. Ramakrishna Aiyar ..	194	384	239	202	94	80	1,193	
5	T. S. Narayanaswami Aiyar ..	231	363	217	184	72	86	1,153	
6	Gunner M. Power	195	348	239	189	94	77	1,142	
7	M. K. Kesava Pillai	153	374	263	188	81	78	1,137	
8	R. Panchapakesa Aiyar	180	350	267	212	48	74	1,131	
9	P. Seshachari	212	373	196	174	92	72	1,119	
10	K. R. Ganapati Aiyar	222	334	227	171	78	70	1,102	
11	V. S. Rangaswami Aiyar ..	220	332	232	172	70	72	1,098	
12	Corporal H. A. Furnell	157	324	272	182	47	100	1,082	Passed Second class.
13	L. D. Ramachandra Aiyar ..	282	289	205	164	67	75	1,082	
14	U. R. Bashyam Aiyangar ..	191	333	233	157	89	74	1,077	
15	T. S. Rangaswami Aiyar ..	183	312	250	149	85	78	1,057	
16	E. King	187	342	206	171	67	79	1,052	
17	C. J. Rangaswami Aiyangar ..	217	291	231	174	62	73	1,048	
18	A. Manika Mudaliyar	155	295	226	175	98	91	1,040	
19	P. S. Natesa Sastri	156	367	214	165	61	73	1,036	
20	J. A. David	201	287	238	164	79	59	1,028	
21	A. Rama Rau	246	306	188	155	69	64	1,028	
22	P. Rangaswami Aiyangar ..	136	353	240	163	73	57	1,022	
23	S. Natesa Aiyar	195	337	224	121	65	75	1,017	
24	T. V. Saptarishi Sastri	240	227	222	173	62	78	1,002	
25	F. G. D'Rozario	146	281	217	161	87	75	967	Failed in Total.
26	A. G. Abraham	168	275	180	167	95	60	945	Do. in Total.
	Average per cent ..	53·9	55·2	57·7	49·1	42·2	74·6	54·2	
	Independent Candidates.								
1	C. R. Gopalaswami Dikshatar ..	140	306	220	186	48	77	977	Failed in Total.
2	A. Arunachala Mudaliyar ..	109	292	203	138	84	77	903	Do. in I and Total.
	Average per cent. ..	33·6	49·8	52·8	46·2	36·6	77·0	47·0	

DRAFTSMAN CLASS.

Abstract of Marks.

Rank.	Names.	I. Geometrical Drawing.	II. Free-hand Perspective and Model Drawing.	III. Building Drawing.	IV. Machine Drawing.	V. Estimating.	VI. Topographical Drawing.	VII. Drills and Exercises.	Total.	Remarks.
	Maximum Marks ..	100	120	270	200	180	80	50	1,000	
	College Students.									
1	N. L. Ramachandra Rau	79	88	188	164	105	54	40	718	Passed Second class.
2	D. N. Narasimhayya	68	90	170	150	109	62	48	697	
3	T. R. Krishnaswami Aiyar ..	69	78	192	146	99	61	44	689	
4	Y. Rajabathar Mudaliyar ..	76	90	164	137	130	41	38	676	
5	T. Krishna Rau	67	84	174	164	90	48	43	670	
6	V. Venkatarama Aiyangar ..	57	72	148	128	134	50	41	630	Passed Third class.
7	A. Mariasusai Pillai	64	64	171	143	99	52	36	629	
8	S. Subbarama Aiyar	74	78	134	137	109	45	43	620	
9	C. Virabrahmam	66	66	173	157	79	89	38	618	
10	C. S. Kuppu Rau	75	87	142	130	109	40	33	616	
11	R. Chithambara Mudaliyar ..	52	60	139	156	119	44	43	613	
12	G. Kesavalu Nayudu	55	68	158	141	104	38	40	604	
13	G. Kamaraju	79	67	148	120	94	51	41	600	
14	K. Krishnamachari	48	48	145	138	134	45	42	600	
15	K. Lakshmikanta Rau	74	61	155	114	99	43	42	588	
16	M. Subbarau Nayudu	71	70	139	144	84	43	37	588	
17	T. M. Sankara Rau	63	84	119	129	94	39	44	572	
18	V. Srinivasa Aiyar	54	43	134	129	114	41	40	555	
19	A. D. Nallaswami Nayudu ..	47	57	147	130	79	33	40	533	
20	G. Kasturi Chetti	69	55	119	127	84	31	37	529	
21	C. Ratnasabhapati Mudaliyar ..	66	73	106	125	84	38	42	527	
22	A. Arokiaswami Pillai	39	50	102	86	32	41	34	384	Failed in V and Total.
23	G. V. Balakrishna Chetti ..	67	75	124	155	59	36	47	..	Disqualified.
24	N. Raghunatha Rau	59	66	127	144	59	38	43	..	
25	T. Ranganatha Mudaliyar ..	50	60	128	121	44	43	38	..	
26	P. S. Visvanatha Aiyar	65	51	97	100	44	38	30	...	
	Average per cent. * ..	64·1	58·1	55·0	68·1	55·1	55·6	80·5	60·2	
	Independent Candidates.									
1	A. L. Singaravelu Mudaliyar ..	50	83	203	161	135	42	30	704	Passed Second class.
2	S. Purandara Rau	56	85	217	135	96	43	31	663	
3	S. Subbarama Aiyar	48	57	148	105	91	39	40	528	
4	T. K Gopalachari	52	49	154	132	83	27	33	527	Passed Third class.
5	P. Subbarayulu Nayudu	51	79	134	95	102	32	28	521	
6	W. Chinnaswami Nayudu ..	54	61	143	93	70	34	48	503	
7	V. Subrahmanya Aiyar	38	45	117	104	116	48	35	503	
8	P. Ramaswami Mudaliyar ..	50	59	162	128	56	43	35	533	Failed in V.
9	S. Anjaneyalu Nayudu	51	59	146	86	48	31	34	455	Do. in V and Total.
10	C. K. Venkatasubba Rau ..	39	59	110	83	71	39	33	434	Do. in Total.
	Average per cent. ..	48·9	52·7	56·8	56·1	48·2	47·2	69·4	53·7	

* *Note.*—The marks of the four disqualified candidates are excluded in the calculation of average percentages.

SURVEYOR CLASS.

Abstract of Marks.

Rank.	Names.	I. Chain, Compass and Plane Table.	II. Levelling.	III. Theodolite Surveying.	IV. Topographical Drawing.	V. Drills and Exercises.	Total.	Remarks.
	Maximum Marks ..	255	215	200	280	50	1,000	
	College Students.							
1	G. Venkatarama Aiyar	154	168	179	186	35	722	Passed Second class.
2	G. Somayya Sastri	175	191	149	171	34	720	
3	K. P. Sadasiva Aiyar	147	139	179	204	44	713	
4	T. R. Jeevanna Rau	179	148	137	182	36	682	
5	N. Suriyanarayana	174	179	128	129	37	647	Passed Third class.
6	B. R. Ramakrishna Aiyangar ..	138	129	135	198	36	636	
7	E. A. Ambasankara Aiyar	155	168	102	148	46	619	
8	N. Rangaswami Aiyar	131	168	115	145	42	601	
9	V. Venkateswara Aiyar	139	143	107	180	30	599	
10	S. R. Muttuswami Aiyar	141	122	122	166	38	589	
11	A. Venkatachari	110	135	112	117	37	511	
12	A. R. Natesa Aiyar	97	116	95	158	41	507	Failed in III.
13	A. Mohanavelu Mudaliyar ..	139	103	68	175	35	520	
14	S. Lakshmanachari	121	105	81	143	41	491	Failed in Total.
15	P Narasimha Rau	100	130	99	115	41	485	
16	V. Panchapakesa Aiyar	94	134	97	105	38	468	
17	E. A. Ramaswami Aiyar	112	115	91	106	42	466	
18	C. Govindaraja Mudaliyar ..	126	73	79	111	41	430	Failed in II and Total.
	Average per cent. ..	52·9	63·7	57·6	54·3	77·1	57·8	
	Independent Candidates.							
1	C. R. Rangachari	131	113	74	113	26	457	Failed in Total.
2	T. K. Govindarajulu Nayudu ..	94	83	63	103	26	369	Do. in III and Total.
	Average per cent. ..	44·1	45·5	34·2	38·5	52·0	41·3	

No. 2244.

Referred to the Principal, College of Engineering, Madras, for early remarks, if he has any to offer.

(Signed) A. MONRO,
Ag. Dir. of Public Instruction.

14th March 1894.

From the Principal, College of Engineering, Madras, to the Director of Public Instruction, Madras, dated 17th March 1894, No. 1602-C.

Referring to your endorsement No. 2244, dated 14th March 1894, on papers herewith returned, I have the honour to offer the following observations on the reports of the Board of Examiners and of the individual Examiners composing the Board.

2. *Surveying.*—The Board characterises *Surveying* as the weakest subject of examination. The percentages secured in this subject, as compared with the average of the last four years, were—

	December 1893.	Average of 4 years.
Engineer class, 1st division	68	67
Engineer Subordinate class, 1st division	49	61
Surveyor class, 1st division	58	62

The Engineer class is slightly above the average, the falling off in the Surveyor class is accounted for by the fact that the division which passed out in December 1893 was admittedly below the average; while the serious diminution in the Engineer Subordinate class is partly due, as explained in paragraph 7 of my annual report, to greater stringency in the award of marks by the College.

3. *Statics of Engineer Subordinate class.*—Indifferent results have always been obtained by this class in *Statics*, and the professor of Mathematics has, during the last

two years, given special attention to the matter. I consider that Mr. Jones' proposal to allot separate papers of 1½ hours in *Trigonometry* and in *Statics* would probably result in higher marks being gained for the latter subject. At the same time I am of opinion that the paper on *Statics* set in December 1893, though quite within the syllabus, was not in harmony with the method of teaching the subject which is laid down in the footnote to the syllabus (*vide* College Calendar for 1893). The subject is taught, as far as possible, experimentally, graphical methods of solution being employed; and the course has a special bearing on engineering problems. I enclose a copy of the paper set, from which you will be able to judge how far the questions are in accordance with the above note.

4. *College marks awarded to Students of the Draftsman and Surveyor classes.*—The Board points out that the marks given by the College are generally higher than those awarded in the same subject by the Board. The Board has, however, examined some of the session work on which the College marks were awarded, and is satisfied with those marks. This being so, it appears hardly necessary to refer particularly to the remarks made by Mr. Ashpitel on the subject, and his proposal that there should be a qualifying minimum in the Board's marks alone in each group of subject. From this proposal I entirely dissent. The Board states that the higher average in the case of the College marks is probably due to (*a*) time at disposal being unlimited, (*b*) assistance being given by instructors. These causes may have some influence, but there is another which is far more potent, viz., the difference in the nature of the work for which the marks are given. To illustrate this I will give the detailed distribution of the marks awarded by the College to the Surveyor class:—

I—Chain, Compass and Plane Table Surveying.

	Marks.	Marks.	Marks.
1. Practical examination in the Field—			
(*a*) Chain, with time limit	16½		
(*b*) Compass, do.	4½		
(*c*) Plane Table, do.	9		
		30	
2. Session Field work—			
(*a*) Manipulation of instruments	9		
(*b*) Field books	7½		
(*c*) Intelligence in carrying out instructions ...	7½		
(*d*) Regularity of attendance	6		
		30	
3. Session Plans—			
(*a*) Agreement of plans with field books	15		
(*b*) Accuracy of drawing	12½		
(*c*) Neatness and finish	12½		
		40	
			100

II—Levelling.

1. Practical examination in the Field, with time limit ...	45		
		45	
2. Session Field work—			
(*a*) Manipulation of instruments	13		
(*b*) Field books	11		
(*c*) Intelligence in carrying out instructions ...	11		
(*d*) Regularity of attendance	9		
		45	
			90

III—Theodolite Surveying.

1. Practical examination in the Field, with time limit—			
(*a*) Theodolite traverse	26		
(*b*) Setting out curves	14		
		40	
2. Session Field work—			
(*a*) Manipulation of instruments	12		
(*b*) Field books	10		
(*c*) Intelligence in carrying out instructions ...	10		
(*d*) Regularity of attendance	8		
		40	
			80

IV—Topographical Drawing.

	Marks	Marks.
(1) Agreement of plans with field books	50	
(2) Accuracy of drawing	40	
(3) Neatness and finish	40	
	—	130
Grand Total ...		400

I think that scrutiny of this distribution will show that the causes assigned by the Board have little weight. The qualities tested by the College are those which are essential to the practical surveyor. They cannot, from their nature, be tested at an office examination in a very limited time. The imperfect acquaintance of the candidates with English is to some extent responsible for the low average of the examination marks, but even if this disability were removed, I consider it inevitable that the marks given for practical work extending from day to day over two years will be greater than those given for a set of examination answers. It would be regrettable if it were otherwise; and I deprecate in the most emphatic terms any proposal like that of Mr. Ashpitel, already alluded to, which would have the effect of increasing the present difficulty in securing certificates. Notwithstanding that it is admitted on all sides that the draftsmen and surveyors now trained in the College possess higher qualifications than those educated under the old scheme, yet since the reorganization only five draftsmen and three surveyors have succeeded in obtaining certificates of the first class. The direction in which improvement should be looked for is in the stamp of candidates entering the Draftsman and Surveyor classes. An entrance examination will doubtless improve matters, while attention paid to writing, drawing and manual training in primary and secondary schools would do much more.

Introduction.—The Principal has appropriately opened the report for 1893 by an interesting reference to the centenary of the College. It is unnecessary to dwell here on the services which the institution has, in its varied phases, rendered to the engineering profession during the past one hundred years of its existence.

2. *Staff.*—Several changes occurred in the staff during the year; but none of them is reported to have interfered with the working of the College. Mr. Middlemast, the Professor of Mathematics, was absent in England on leave on medical certificate during the first half of the year, and his place was occupied by M.R.Ry. B. Hanumanta Rau, B.A., from Kumbakónam. Mr. J. J. Whiteley, who had been acting for Mr. Chatterton as Professor of Engineering, severed his connection with the College on the 30th November 1893. Major Love paid in the last report a fitting tribute to the memory of Conductor W. Cames, who had been useful to the College in several ways. He was succeeded as Instructor in Engineering by Sergeant B. O. Reynolds, and as Superintendent of Military Students by Sergeant W. H. Goddard. The testimony borne by Major Love to the good work done by the members of the staff is noted with satisfaction.

3. *Strength.*—Excluding the 26 students in their practical courses, the strength of the College on the 31st December was 252 as against 214 (excluding the special students) on the corresponding date in 1892, so that the increase during the year was nearly 18 per cent.; and the increase during the past four years was as high as 85 per cent. This is very encouraging. Each class shared in the increase, with the exception of the Military Probationers' class. The increase particularly in the Engineer class was noteworthy, and it is hoped that with improved prospects of employment of the qualified Engineers, and the substantial reduction in the rates of tuition fees and the stimulus of additional scholarships sanctioned by Government, this class will grow even stronger and more popular. As regards the different nationalities represented at the College, it is observed that Brahmans and non-Brahman Hindus advanced, while there was a slight decrease under

Europeans and Eurasians, Native Christians and Muhammadans. This last community, it is further observed, was unrepresented in the Engineer or the Engineer Subordinate class which shows that Muhammadans have not yet begun to evince a real aptitude for engineering education.

4. *Accommodation and Equipment.*—Certain improvements were effected in the College buildings during the year, and the other improvements suggested by the Principal will be considered on receipt of estimates. The library was well used. Major Love's proposals for increasing the scope and usefulness of the reading-room meet with the entire approval of the Acting Director.

5. *Examinations*—(i) *University Examinations.*—The results of the B. C. E. Degree Examination of January 1893 were satisfactory. It is hoped that the bifurcation of this examination will enable the students to appear for the examination better prepared and to secure uniformly good results.

(ii) *College Board Examinations.*—The report of the Board of Examiners has not been altogether favorable, the students having exhibited weakness in several important subjects.

Engineer Class.—The first or the senior division of the Engineer class acquitted itself on the whole creditably at the final examination, the percentage of marks secured under each subject head, the vernacular language excepted, being higher than that obtained in 1892 and also higher than the average of the marks gained in the preceding four years. It should, however, be borne in mind that there were only two students in the division as against four that competed for the examination in 1892. The second division of this class did not fare as well as in the preceding year and is reported not to have done satisfactorily in a large number of subjects, such as Road and Railway Construction, Building and Bridge Construction, Free-hand, Model and Perspective Drawing, Levelling, Chain, Compass and Plane Table Surveying, Algebraic Geometry and Hydromechanics. The batch of students composing this division needs therefore to be more closely supervised. The last division acquitted itself more satisfactorily on the whole.

Engineer Subordinate Class.—Of the 26 students sent up from the first division of the Engineer Subordinate class for the final examination, 24 were successful, though all of them qualified for second class certificates only. The average of marks gained by this division in Surveying and in the Vernacular Language was much below the average of the past four years, and in the latter subject this division further produced worse results than the corresponding division of the Engineer class. Sufficient attention does not also seem to have been paid to Elementary Statics, Building Drawing, Bridge and Irrigation Works, Topographical Drawing and Mensuration. The second division fared better on the whole with an average of 55 per cent. of the total marks as against only 49 per cent. in December 1892; but the average secured by the third division did not compare favorably with that gained in the previous year.

Draftsman Class.—The results of the final examination of the first division were fairly satisfactory. As usual, however, the bulk of the passed candidates were placed in the third class, while none qualified for first class certificates. Deterioration was noticeable in Practical Geometry, Free-hand, Perspective and Model Drawing, Building Drawing and Estimating. The second division fared better than in the preceding year.

Surveyor Class.—Twelve out of 18 examinees secured certificates at the final examination. The remarks made above as regards the quality of passes in the Draftsman class apply with equal force to the senior division of this class also. In the words of Major Love this division was "admittedly below the average." The results of the second division were also not encouraging.

On the whole, the results obtained at the final examination of December 1893 cannot be considered a great improvement on those of 1892. Major Love's explanation for the observation made by the Board of Examiners that Surveying was the weakest subject in the College is accepted. This subject and the other subjects above referred to should, however, receive greater attention. As a check against students using the ruler in answering the paper on Free-hand and Model Drawing, Mr. Ashpitel

suggests that the students should not be allowed the use of the mathematical instruments until they have done with their free-hand and model drawings. The Acting Principal will be good enough to report on this point. He will also consider Mr. Ashpitel's suggestion that the extra text books on Earthwork and Roads which the students seem to be using should be selected by them under the direction of the Professor or instructor concerned. Major Love does not seem to have any objection to Mr. Jones' proposal to have a separate paper in Elementary Statics for the Engineer Subordinate class in order that increased attention may be paid to the subject. The Acting Director thinks that not only should Elementary Statics be dissociated from Trigonometry, but also a separate minimum should be fixed for each subject if the result aimed at by Mr. Jones is to be secured. The Acting Principal and the Board of Examiners are requested to report on this point. Mr. Ashpitel objects to the present arrangement of adding the College marks with those awarded by the Board for practical work, inasmuch as the former are not always secured by the independent exertions of the students and would insist on a separate minimum being obtained in the marks awarded by the Board. Major Love strongly deprecates any change in the existing arrangements, and the Acting Director would leave the matter as at present until further experience has been gained, but would require that the marking by the College staff be made with the utmost care and precision. It has been remarked by more than one Examiner that the scanty knowledge of English possessed by the students composing the Draughtsman and Surveyor classes stands in the way of their profiting fully by the instruction received and qualifying for higher class certificates. A similar complaint was made last year also, and the Acting Director concurs with Major Love in thinking that the institution of the entrance tests, which Government has recently approved, will lead to a decided improvement in this direction. A raising of the standard of minimum educational qualification for admission seems inexpedient at present.

(iii) *Government Technical Examinations.*—The success of the students at the Intermediate Technical Examinations was fairly satisfactory, but they did not acquit themselves at the Elementary Examination as satisfactorily as might have been expected. None of the pupils of the Artisan class who appeared for the Elementary Examination in Mensuration met with success. The reasons for this have been satisfactorily explained by Major Love. In future, none from this class should be allowed to appear for the Elementary Technical examination except with the permission of the Principal, which should be granted only if there is any reasonable chance of success.

6. *Independent Candidates.*—The following statement compares the results of the independent candidates for the past four years:—

Final examinations.	1890.		1891.		1892.		1893.	
	Number registered.	Number passed.	Number registered.	Number passed.	Number registered.	Number passed.	Number registered.	Number passed.
For Engineers	2	1	1	..	2	..	1	1
,, Engineer Subordinates.	5	1	1	1	1	1	2	..
,, Draughtsmen	6	6	7	3	8	1	10	7
,, Surveyors	3	1	4	2	..	..	2	..

The Engineer and Draughtsman candidates fared well on the whole at the last examination, but the results of the Engineer Subordinate and Surveyor candidates were very disastrous. The success of the draughtsman independent candidates has been unsurpassed since 1890, and it is particularly noted that two of the successful candidates qualified for second class certificates.

7. *Maistry and Artisan Class.*—This class continued to be popular, though genuine artisans and maistries constituted but a small proportion of the attendance. The Principal's proposals for the reorganization of this class are now under the consideration of Government.

8. *Practical Courses.*—The College workshop was put into almost thorough working order towards the close of the year. This will enable Engineer and Engineer Subordinate students, who complete their theoretical course in future to devote more time to works. The work and conduct of the students during their practical courses have been uniformly satisfactory. The Engineer, Engineer Subordinate and Surveyor classes were, as usual, taken to Guindy and Gúduvánchéri for field work. The work of the students while on such survey tours should be very closely supervised, and. as remarked by Major Love, greater accuracy of work should be the chief aim of the students.

9. *Revision of the Rules.*—The College rules have been thoroughly recast and the draft revised rules have had the benefit of Major Love's perusal. On receipt of the opinion of the Chief Engineer, Public Works Department, to whom the draft has been referred, the rules will be submitted to Government for sanction. The revision of the syllabuses has been engaging the attention of the Principal.

10. *Physical Education.*—Physical education seems to have received due attention. It is hoped that the Cricket Club will receive the warm support of the native students. The question of providing the College with a foot-ball ground is under the consideration of Government.

11. *Prospects of Passed Students.*—The Principal's remarks under this head are very interesting and encouraging. Every possible facility has been afforded to help qualified students of the College to secure remunerative employment. It is noteworthy that the Madras graduates in Engineering have under certain conditions been declared eligible for appointments in the Public Works Department in Bengal.

12. *Finance.*—For the first time the financial particulars have been furnished for the calendar year. It is satisfactory to note that the net cost of educating each student fell from Rs. 238 during 1891–92 to Rs. 209 during 1893. The Principal points out the inconveniences resulting from the present classification of expenditure. For statistical purposes, however, the College and School departments must be returned as two distinct institutions, and the present arrangements for the exhibition of the charges must be continued. The College and School departments of the Medical College and the Teachers' College are exhibited separately in the statistical returns. The case of the College of Agriculture is different and will be considered after its future is settled.

13. *General.*—Major Love recommends under certain circumstances, the concession to candidates other than graduates and under-graduates of the Indian Universities of equal privileges with those who are strictly eligible for admission under the College rules. The Acting Director does not consider it expedient at present to introduce any general rule of this kind. Considering the encouragement as now afforded to students trained in the College, it is probable that the strength of the several classes will be greater than the accommodation will admit. Major Love's proposals in regard to the affiliation of mofussil technical institutions, which have been recognised by the Department, to the College of Engineering seem to have been well conceived, and are calculated to place these institutions under abler supervision and on a more efficient footing. The Board of Examiners, the Secretary to the Victoria Technical Institute, the Superintendent, School of Arts, the Inspectors of Schools and the Acting Principal will be requested to favour the Acting Director with their views on the subject. With reference to Dr. Duncan's remarks in his last review regarding the practical difficulties existing in Madras in providing hostels for the accommodation and boarding of students of the College, the Acting Director observes that these difficulties will, to some extent, be obviated when the new hostels are established, and that it should be possible to find accommodation for some of the students in the block of hostel proposed to be built in the Chepauk Park by the Victoria Hostel Committee. In the meanwhile it might be of advantage if the College staff would inspect the hostels in which the students at present lodge and satisfy themselves whether these are in a sanitary condition. The tutorial system, as in the Kumbakónam and Rajahmundry Colleges, might be introduced, each Professor having a certain number of students assigned to him for whose conduct and progress he would be responsible.

14. In conclusion, the Acting Director is pleased to record here his appreciation of the work done by Major Love, the Professors and instructors and assistants during the year, and his thanks are due to the Board of Examiners for the several valuable suggestions contained in their report.

(A true Extract.)

(Signed) A. MONRO,
Ag. Director of Public Instruction.

To the Principal, College of Engineering.
" Principals of other Government Colleges.
" Inspectors of Schools.
" Superintendent, School of Arts.
" President, Board of Examiners, College of Engineering.
" Honorary Secretary, Anjuman Mufidi-Ali-Islam.
" Secretary, Victoria Technical Institute.
" Honorary Secretary, Victoria Hostel Committee.
" Editor, Indian Journal of Education, Madras.
" Government with Covering Letter.

ORDER—dated 16th June 1894, No. 443, Educational.

The report on the working of the College of Engineering during 1893 and the Director's review on the report are both very full and but few remarks on the part of Government are called for. In most respects a decided improvement has taken place and the college is manifestly increasing rapidly in popularity. The steps recently taken to render the instruction imparted more practical in character and the proposals which received the general approval of Government in G.O., dated 28th February 1894, No. 128, Educational, should have the effect of still further enhancing the utility of the institution and, in particular, of raising the strength of the Engineer classes which, even in 1893, were but poorly attended. The number of applications for admission to the three lowest classes in 1893 was greatly in excess of the vacancies. The institution of an entrance test for the Draughtsman and Surveyor classes will probably have a markedly deterrent effect but, if this proves to be otherwise, it may be found expedient to raise the fees in certain cases so as to reduce the cost of the institution to the State. It will also, no doubt, be necessary to enlarge the buildings before long. The demand for men trained at the college is said to be much in excess of the supply and the rejection of candidates for admission on the ground of want of room is a necessity to be greatly regretted. For the present, however, no active measures in this direction are called for.

2. The Government is disposed to agree with the Director of Public Instruction in considering it inexpedient to grant the Principal authority to admit into the Engineer classes persons who are not qualified for admission under the rules. The existing restrictions constitute a guarantee that every man who has passed through the Engineer classes possesses certain literary as well as professional qualifications and it is not desirable that this guarantee should be removed. Indeed, the admission of the Ceylon students referred to in paragraph 6 of the report was not, strictly speaking, in consonance with the rules and the Principal does not quote any authority for the restrictions as to scholarships, &c., which were imposed upon them. It is observed that the Director has made no comments upon Major Love's suggestion in paragraph 20 of his report that the rule requiring a year's apprenticeship of Engineer apprentices of the Provincial Service should be declared inapplicable to Madras. The matter will be duly considered if the arguments in favour of the change are set out more fully.

3. The information furnished on the subject of Finance is meagre in the extreme and it is impossible to ascertain therefrom whether the institution is economically conducted or otherwise. The nett cost of each student is stated to have been Rs. 209, which is less than the figure for 189, but the Government is not aware whether this outlay compares favorably or the reverse with the expenditure in other

Engineering Colleges. The Director of Public Instruction should make enquiries on this point and intimate the result to Government and in future a proper balance sheet showing particulars of receipts and expenditure should invariably accompany the report. The Government notes that the Principal complains strongly of the inconvenience caused by the present classification of accounts and is inclined to think that his complaint is reasonable and that the arbitrary division of professional institutions into Collegiate and School departments should be avoided as far as possible. The Director will accordingly be requested to give fully his reasons (1) for saying that the separation of the accounts is essential for statistical purposes and (2) for treating the College of Agriculture on a different principle.

4. The reference in paragraph 5 of the report to the examinations conducted in December 1892 is apparently a mistake. The examinations of December 1893 seem to be meant. The result of these was, as the Director notes, somewhat unfavorable in certain respects and it is observed that not a single first-class Draughtsman's or Surveyor's certificate was awarded and that none of the students appeared for the Advanced Standard Government Technical examinations. These are unsatisfactory features of a report which is otherwise of a very promising character. In conclusion the Principal will be requested to reduce the length of this report as much as possible. The synopsis of marks contained in Major Love's letter, dated the 8th March 1894, No. 1558-C, for example, need not have been furnished to Government, nor is it necessary to specify in detail the nature of each prize awarded, and in other respects the report enters into rather too much detail.

(True Extract.)

J. F. PRICE,
Chief Secretary.

To the Director of Public Instruction.
" Public Works Department.
" Military Department.
" Local and Municipal Department.
Editors' Table.

Exd. A. Baitt.

GOVERNMENT OF MADRAS.

EDUCATIONAL DEPARTMENT.

READ—the following paper :—

From the Hon'ble Mr. A. MONRO, M.A., B.C.L., Acting Director of Public Instruction, Madras, to the Chief Secretary to Government, dated Ootacamund, 14th May 1894, No. 91-O.

I have the honour to submit, for the information of Government, a copy of my Proceedings, No. 4364, dated 10th instant, reviewing the report on the working of the College of Engineering, Madras, during the past calendar year.

ENCLOSURE.

Proceedings of the Director of Public Instruction, dated 10th May 1894, No. 4364.

Read—the following papers :—

From the Principal, College of Engineering, Madras, to the Acting Director of Public Instruction, Madras, dated 29th January 1894, No. 1350-C :—

I have the honour to submit the following review of the working of the College of Engineering during the year 1893. 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 1893 is included in the present report.

2. *Centenary of the College.*—Before commencing the review, it is fitting that attention should be drawn to the circumstance that a hundred years have elapsed since the birth of the institution. Founded as a Survey school in 1794 with Mr. John Goldingham, the Company's Astronomer, as its first Superintendent, its object was to train European apprentices as Surveyors, Draftsmen, Writers and Interpreters for employment under Collectors, on tank repairs, and in the Quartermaster-General's department. These early features are still traceable, in the now developed College, in the attention devoted to Hydraulic Engineering and in the special classes for Draftsmen and Surveyors—features by which this institution is differentiated from the other Engineering Colleges of India. After a temporary interruption in the second decade of the present century, the Survey school was re-opened in connection with the Board of Revenue and was placed in the charge of Major de Havilland, the Inspector of Tank estimates, an engineer who has left the mark of his distinguished ability in many parts of Madras. During his rule the training in the school assumed a more decided professional character. In 1846 the Civil Engineer's Department of the Board of Revenue, afterwards called the Public Works Department, began to employ European non-commissioned officers of Sappers as subordinates, and when the Survey school was in 1858 elevated into a Civil Engineering College, with Captain Winscom as Principal, the military students were nearly as numerous as the civil. In 1861 the College began to train civilian undergraduates as well as a few military commissioned officers as Civil Engineers, in addition to the classes for Overseers, Draftsmen and Surveyors, and the institution was developed on these lines down to 1886, when it was extended to meet the general engineering requirements of the Presidency, and designated the College of Engineering. This extension, involving increased staff, new buldings, longer courses and practical training, has been referred to in recent reports and need not be here described.

3. *Establishment.*—The lamented death on 20th January 1893 of Conductor W. Cames, Instructor in Engineering and Superintendent of Military students, was