

PUBLIC WORKS DEPARTMENT REORGANIZATION COMMITTEE.

APPENDIX

TO THE

REPORT

OF THE

PUBLIC WORKS DEPARTMENT REORGANIZATION COMMITTEE

VOLUME II.

MINUTES OF EVIDENCE

Taken at Bombay, Nagpur, Calcutta and Madras

WITH

APPENDICES.



CALCUTTA
SUPERINTENDENT GOVERNMENT PRINTING, INDIA
1917

Price Rs. $\frac{1}{2}$ annas 5 or 5s. 9d.

U

PUBLIC WORKS DEPARTMENT REORGANIZATION COMMITTEE.

JR 193

24151

APPENDIX

TO THE

D. 2. NIT

REPORT

E7

OF THE

PUBLIC WORKS DEPARTMENT
REORGANIZATION COMMITTEE

VOLUME II.

MINUTES OF EVIDENCE

Taken at Bombay, Nagpur, Calcutta and Madras

WITH



CALCUTTA
SUPERINTENDENT GOVERNMENT PRINTING, INDIA

1917

TABLE OF CONTENTS.

	Page
LIST OF WITNESSES EXAMINED BEFORE THE COMMITTEE	ii
MINUTES OF EVIDENCE	5
APPENDICES	329

LIST OF WITNESSES EXAMINED BEFORE THE COMMITTEE.

At BOMBAY, Monday, 8th January, 1917.

H. O. B. SHOUBRIDGE, Esq., M.I.C.E., Sanitary Engineer, Bombay	5
K. S. FRAMJI, Esq., Executive Engineer, Bombay	12
G. WITTET, Esq., F.R.I.B.A., Consulting Architect, Bombay	19

At BOMBAY, Tuesday, 9th January, 1917.

SIR FREDERICK L. SPROTT, Kt., Chairman, Bombay Port Trust	24
W. F. STUART-MENZIES, Esq., M.I.E.E., A.M.I.C.E., Electrical Engineer, Bombay	27
DR. H. N. ALLEN, B. Sc., Ph. D., Principal, College of Engineering, Poona	33
T. S. DAWSON, Esq., Principal, Victoria Jubilee Technical Institute, Bombay	36
C. C. SWETENHAM, Esq., Deputy Accountant-General, Bombay	39

At BOMBAY, Thursday, 11th January, 1917.

C. J. HANSOTI, Esq., Superintending Engineer, Bombay	45
F. ST. J. GEBBIE, Esq., Chief Engineer, Sind	50
H. D. GILL, Esq., Partner, Messrs. Richardson and Cruddas, Bombay	52
W. E. COPLESTON, Esq., Divisional Forest Officer, North Thana	54
E. G. TURNER, Esq., I.C.S., Collector of Dharwar	58

At BOMBAY, Friday, 12th January, 1917.

J. W. MACKISON, Esq., M.I.C.E., Executive Engineer, Bombay Municipality	60
N. MAUGHAN, Esq., M.I.C.E., Drainage Engineer, Bombay Municipality	65
P. G. MESSENT, Esq., C.I.E., M.I.C.E., Chief Engineer, Bombay Port Trust	66
THE HON'BLE DEWAN BAHADUR K. R. GODBOLE, M.I.C.E., Executive Engineer (retired)	68

At BOMBAY, Monday, 15th January, 1917.

W. A. CHAMBERS, Esq., F.R.I.B.A., Partner, Messrs. Chambers and Fritchley, Architects and Civil Engineers, Bombay	72
G. T. MAWSON, Esq., M. SOC. C.E., M.C.I., General Manager, Messrs. Marsland, Price & Co., Ltd., Bombay	76
F. J. PRESTON, Esq., M.I.C.E., Chief Engineer, Great Indian Peninsula Railway	77
THE HON'BLE MR. F. G. PRATT, I.C.S., Commissioner, Northern Division	79
O. C. ORMSBY, Esq., M.I.C.E., Chief Engineer, Messrs. Pauling & Co., Shirawta	81

At BOMBAY, Tuesday, 16th January, 1917.

THE HON'BLE MR. B. S. KAMAT, Contractor, Poona	83
THE HON'BLE MR. LALUBHAI SAMALDAS MEHTA, C.I.E., Agent, Messrs. Marsland, Price & Co., Ltd., Bombay	86
DURGDAS. B. ADVANI, Esq., Architect, Engineer and Surveyor, Karachi	89

At NAGPUR, Monday, 22nd January, 1917.

G. L. THOMSON, Esq., Superintending Engineer, Central Provinces	92
B. C. DUBE, Esq., Executive Engineer, Central Provinces	103

At NAGPUR, Tuesday, 23rd January, 1917.

J. DESMOND, Esq., Executive Engineer, Central Provinces	109
THE HON'BLE MR. R. C. H. MOSS-KING, I.C.S., Inspector General of Police, Central Provinces	113
P. S. PATUCK, Esq., I.C.S., Deputy Commissioner, Narsinghpur	120
J. M. VACHA, Esq., Executive Engineer, Central Provinces	123

At NAGPUR, Thursday, 25th January, 1917.

THE HON'BLE MR. J. WALKER, C.I.E., I.C.S., Commissioner, Nerbudda Division	129
RAO SAHIB R. R. ABHYANKER, Divisional Local Fund Engineer, Central Provinces	137
THE HON'BLE RAO BAHADUR K. G. DAMLE, B.A., L.L.B., Chairman, District Board, Akola	144
THE HON'BLE RAO BAHADUR N. K. KELKAR, President of the Municipality, Balaghat	149
J. STUART-MILNE, Esq., and W. R. STEVENSON, Esq., Comptroller and Assistant Comptroller, Central Provinces	155

At NAGPUR, Friday, 26th January, 1917.

R. MITRA, Esq., A.M.I.C.E., Superintending Engineer, Public Works Department (retired)	158
--	-----

TABLE OF CONTENTS.

iii

	PAGE.
At CALCUTTA, Wednesday, 31st January, 1917.	
F. A. A. COWLEY, Esq., Chief Engineer and Secretary to the Government of Bengal, Public Works Department, Irrigation and Marine Branches	174
G. G. DEY, Esq., Superintending Engineer, Bengal	183
RAI BAHADUR AMAR NATH DAS, Superintending Engineer, Bengal	190
At CALCUTTA, Friday, 2nd February, 1917.	
H. A. CROUCH, Esq., F.R.I.B.A., Consulting Architect, Bengal	193
A. K. TAYLOR, Esq., A.M.I.C.E., M.I.E.E., A.C.G.L.L., Executive Engineer, Electrical Division, Calcutta	197
G. WILLIAMS, Esq., Sanitary Engineer, Bengal	201
At CALCUTTA, Tuesday, 6th February, 1917.	
THE HON'BLE MR. F. O. LECHMERE-OERTEL, A.M.I.C.E., F.R.I.B.A., Secretary to the Hon'ble the Chief Commissioner of Assam in the Public Works Department	206
J. W. MEARES, Esq., M.I.C.E., M.I.E.E., Electrical Adviser to the Government of India	212
J. ZORAB, Esq., Superintending Engineer, Bengal	219
F. RODDIS, Esq., Assistant to the Inspector General of Police, Bengal	221
At CALCUTTA, Thursday, 8th February, 1917.	
THE HON'BLE MR. L. BIRLEY, C.I.E., I.C.S., Secretary to the Government of Bengal, Revenue Department	223
B. HEATON, Esq., Principal, Civil Engineering College, Sibpur	229
RAI BAHADUR KRISHNA CHANDRA BANERJEE, Superintending Engineer, Public Works Department (retired)	239
At CALCUTTA, Friday, 9th February, 1917.	
OSWALD MARTIN, Esq., Partner, Messrs. Martin & Co., Engineers and Contractors, Calcutta	242
J. C. BANERJEE, Esq., Engineer, Builder and Contractor, Calcutta	245
J. HARPER, Esq., General Manager, Messrs. Marshall, Sons & Co., Ltd., Calcutta	247
H. G. TOMKINS, Esq., C.I.E., F.R.A.S., Accountant-General, Bengal	250
At MADRAS, Friday, 16th February, 1917.	
J. M. LACEY, Esq., A.M.I.C.E., Superintending Engineer, Madras	259
RAI SAHIB R. A. SRINIVASA AYYENGAR AVL, Executive Engineer, Madras	265
W. HUTTON, Esq., A.M.I.C.E., Sanitary Engineer, Madras	272
E. J. B. GREENWOOD, Esq., A.M.I.E.E., Electric Inspector, Madras	276
At MADRAS, Monday, 19th February, 1917.	
G. F. PADDISON, Esq., I.C.S., Collector, Madras	280
C. S. SCHMIDT, Esq., District Board Engineer, Madras	284
M. R. RY. V. GOPALA AYYAR AVL, District Board Engineer, Guntur	287
N. MAOMTCHAEK, Esq., I.C.S., Collector, Ganjam	290
R. SRINIVASA AYYAR, Esq., M.A., Deputy Accountant-General, Madras	292
At MADRAS, Tuesday, 20th February, 1917.	
THE HON'BLE SIR FRANCIS J. E. SPRING, K.C.I.E., M.I.C.E., M.I.M.E., Mem. Am. Soc. C.E., Chief Engineer and Chairman, Port Trust, Madras	299
THE HON'BLE MR. GORDON-FRASER, Chairman, Chamber of Commerce, Madras	303
RAO SAHIB T. NAMBERUMAL CHETTY, Contractor, Madras	305
S. D. PEARS, Esq., Chief Engineer, Public Works Department (retired)	307
HORMUSJI NOWROJI, Esq., A.M.I.C.E., Sanitary Engineer to the Government of Madras (retired)	310
At MADRAS, Thursday, 22nd February, 1917.	
C. T. MULLINGS, Esq., Superintending Engineer, Madras	314
W. H. JAMES, Esq., M.Sc., M.I.M.E., A.M.I.C.E., Principal, College of Engineering, Madras	320
M. R. RY. T. R. VENKATESA AYYAR, B.A., Engineer and Architect, Madras	324

List of Appendices.

I. Officials and non-officials in Bombay, the Central Provinces, Bengal and Madras who furnished written evidence to the Public Works Department Reorganization Committee in connection with their inquiry but who were not orally examined	329
II. Memorandum prepared by the Government of Bombay	330
III. Note by the Hon'ble the Chief Commissioner of the Central Provinces	340
IV. Memorandum prepared by the Administration of the Central Provinces	343
V. Note by the Administration of the Central Provinces on the system adopted in the Central Provinces for the execution of public works by local bodies	347
VI. Letter from the Hon'ble Mr. H. H. Green, Secretary to the Government of Bengal, Public Works Department, to the Secretary, Public Works Department Reorganization Committee, No. 492-E., dated the 29th January 1917	350
VII. Memorandum prepared by the Government of Madras	358

LIST OF APPENDICES.

- I. Officials and non-officials in Bombay, the Central Provinces, Bengal and Madras who furnished written evidence to the Public Works Department Reorganization Committee in connection with their inquiry but who were not orally examined.
- II. Memorandum prepared by the Government of Bombay.
- III. Note by the Hon'ble the Chief Commissioner of the Central Provinces.
- IV. Memorandum prepared by the Administration of the Central Provinces.
- V. Note by the Administration of the Central Provinces on the system adopted in the Central Provinces for the execution of public works by local bodies.
- VI. Letter from the Hon'ble Mr. H. H. Green, Secretary to the Government of Bengal, Public Works Department, to the Secretary, Public Works Department Reorganization Committee, No. 492-E., dated the 29th January 1917.
- VII. Memorandum prepared by the Government of Madras.

APPENDIX I

Officials and non-officials in Bombay, the Central Provinces, Bengal and Madras who furnished written evidence to the Public Works Department Reorganization Committee in connection with their inquiry but who were not orally examined.

Bombay.

1. F. C. Taraporvala, Esq., C.I.E., Superintending Engineer, Public Works Department (retired).
2. O. H. L. Napier, Esq., Conservator of Forests, Central Circle, Poona.
3. Rao Bahadur R. C. Artal, I.S.O., District Deputy Collector (retired), Belgaum.
4. Sardar Khan Bahadur Rustomji Jehangirjee, Vakil, Ahmedabad.
5. E. M. Duggan, Esq., B.Sc., A.M.I.C.E., Executive Engineer and Under Secretary to the Government of India, Public Works Department.
6. J. H. Advani, Esq., Professor, College of Engineering, Poona.
7. H. J. M. Cousens, Esq., B.Sc., Executive Engineer, Bombay.
8. T. S. Pipe, Esq., B.Sc., A.M.I.C.E., Executive Engineer on Special Duty, Karwar, Kanara.
9. The Hon'ble Mr. G. H. Thiselton-Dyer, M.A., A.M.I.C.E., Mechanical Engineer to Government, Poona.
10. R. B. Joyner, Esq., C.I.E., M.I.C.E., Superintending Engineer, Public Works Department (retired).
11. H. G. Jassing, Esq., B.E., M.R.S.I., (Hon.), Shikarpur (Sind).
12. Messrs. Phatak and Walchand, Ltd., Engineers and Contractors, 158 Foras Road, Bombay.

Central Provinces.

13. Khan Bahadur Byramjee Pestonjee, Contractor, Nagpur.
14. E. A. Lugard, Esq., Executive Engineer, Jubbulpore South Division.
15. C. M. B. Marsh, Esq., A.M.I.E.E., Electric Inspector, Central Provinces.
16. P. Davies, Esq., A.M.I.C.E., Executive Engineer, Central Provinces.
17. C. A. Clarke, Esq., I.C.S., Deputy Commissioner, Nagpur.
18. The Hon'ble Mr. M. B. Dadubhoy, C.I.E., Barrister-at-Law, Nagpur.
19. P. Hira Lal, Esq., Divisional Engineer, Nerbudda Division.

Bengal.

20. The Hon'ble Mr. W. W. Hornell, M.R.A.S., M.A., Director of Public Instruction, Bengal.
21. Rai Bahadur Kumudini Kanta Banerji, M.A., Principal, Rajshahi College, Rajshahi.
22. Messrs. Kar & Co., Engineers and Contractors, Calcutta.
23. Bengal National Chamber of Commerce, Calcutta.
24. Bengal Chamber of Commerce, Calcutta.
25. Rao Sahib Pandit Matadin Sukul, M.A., Executive Engineer, Nadia Rivers Division.
26. R. J. Browne, Esq., M.I.E.E., Electric Inspector for Bengal and Assam.
27. H. C. Vieyra, Esq., B.E., Executive Engineer, Burdwan Division.
28. A. Mellor, Esq., I.C.S., District Judge, Khulna.
29. N. N. Rakshit, Esq., Messrs. Sikdar & Co., 5 Hastings Street, Calcutta.
30. A. C. Mukerji, Esq., B.A., C.E., Private Engineer, 82 Haris Mukerji Road, Calcutta.
31. S. M. Ghatak, Esq., Contractor, Tangail.
32. C. K. Sarkar, Esq., C.E., M.S.A., M.S.E., Consulting Engineer and Architect, 10 Hastings Street, Calcutta.
33. N. K. Sarkar, Esq., Contractor, 5 Hastings Street, Calcutta.
34. A. C. Banerji, Esq., A.M.I.C.E., M.R.S.I., Assistant, Messrs. Jessop & Co., Engineers, Calcutta.
35. H. H. Jellett, Esq., B.A., B.A.I., T.C.D., M.I.C.E., Chief Engineer, Bengal Nagpur Railway, Calcutta.
36. P. C. Bhattacharya, Esq., B.A., B.E., District Engineer, Bogra.
37. The Calcutta Electric Supply Corporation, Ltd., Calcutta.
38. The Hon'ble Dr. Deva Prosad Sarvadhikary, C.I.E., Vice-Chancellor, Calcutta University.

Madras.

39. S. G. Roberts, Esq., I.C.S., District and Sessions Judge, South Arcot, Cuddalore.
40. Rao Bahadur Dr. C. B. Rama Rao Ayl., M.D., V.H.A.S., District Medical and Sanitary Officer, Tanjore.
41. W. Stokes, Esq., M.B., C.M., Superintendent, Government Lunatic Asylum, Calicut.
42. H. T. Reilly, Esq., Sub-Collector, Dindigul.
43. M. R. Ry. A. V. Ramachandra Ayyar, A. Can. Soc. C.E., Architect and Engineer, Madura.
44. The Secretary, Lower Subordinate Association, Madras.
45. A. Newmarch, Esq., Accountant-General, Madras.

APPENDIX II

APPENDIX II

Memorandum prepared by the Government of Bombay.

(i). *Whether the methods adopted for the execution of civil works are economical and suitable for the purpose for which they were devised.*

1. All the Engineers in the department who have been consulted are agreed that the methods at present adopted for the execution of civil works are in all respects economical and suitable for the purpose for which they were devised.

In Sind, civil works are carried out by contract—otherwise private agency—under strict Government supervision. In special cases where highly technical or new forms of construction are employed such as the use of re-inforced concrete departmental agency in construction is obligatory because of the total lack of technical knowledge on the part of the contractors. These contractors are merely suppliers of labour and materials and nothing else, and the present methods are the most suitable for Sind for an indefinite period to come.

Most of the work in Sind is irrigation work and with the exception of Karachi Buildings district where an Executive Engineer will always be required, the Irrigation Engineers look after the Roads and Buildings work as well.

2. In the Deccan and Gujarat as much as possible of the work is carried out by contract. Endeavour is always made to obtain contractors as far as possible. No Executive Engineer wishes to carry out work by departmental agency or petty piece-work if he can obtain a contractor who will do it at reasonable rates as departmental and petty piece-work methods give the department a great deal of extra trouble and labour in measurements, accounts, etc., which it is the aim to reduce to the minimum possible. Large contractors at present are difficult to obtain as a rule outside the bigger cities and the department has to fall back to a large extent on petty contractors and piece-workers. Much of the minor works in a district such as repairs to buildings and roads must be done by departmental work as the quantities in many cases are not easily determinable and measureable. The contractors in the Deccan and Gujarat are, like those in Sind, generally only suppliers of labour and materials, relying on the officers and subordinates of the Public Works Department for proper supervision, advice and guidance in the execution of the works.

3. The fact that departmental agency and piece-work has to be employed very largely is the natural outcome of the great scarcity of contractors in the country and that scarcity makes it necessary to retain the power of departmental work as a defence against contractor rings and to secure economy in construction. The methods employed by the department for the execution of civil works are based upon the accumulated experience of years, as best suited to prevailing conditions, and are not *per se* inefficient and out of date. That they are not the methods adopted in Europe and other more advanced countries is well known but Indian conditions are widely different from those obtaining in Europe and America where high rates of wages make the extensive use of all sorts of labour saving devices an absolute necessity if works are to be executed at reasonable cost, and capital attracted to finance them.

Until recent years the pay of the Indian labourer has been so low that he has been able to compete successfully with machinery. But the economic conditions in India are changing rapidly and this must react in the direction of the more extensive use of modern plant and methods. In the big cities such development is already taking place and much of the work which a decade ago was undertaken by hand is now performed by machinery.

No doubt the young engineer when he first joins the department, and the representatives of big engineering firms in the country who have plant of all kinds for

sale, are apt to denounce the slow and to them antiquated methods of the East, but their views, particularly those of the former, usually undergo a remarkable change under the burden of responsibility when they come into close daily contact with the inertia of Indian labour and the difficulties in the way of getting things done.

4. To ascertain whether work is being done economically or otherwise examination must be made of the cost of the Architect's or Engineer's work and his supervision, and of the rates for work and material; another factor which may also have to be taken into account is celerity in execution.

It is believed that Railway Companies as a rule pay much higher rates than the Public Works Department though there is little difference in the quality of the work done. On Railway works time is usually a factor of great importance and the higher rates they pay may be justified by the need of economy in time.

In their letter No. 903-A.G., dated 3rd September 1912, the Government of India invited a discussion of possible economies in carrying out Public Works Department work. A copy of this Government's reply No. A.—366, dated 13th January 1914, Public Works Department, is attached (Annexure I). A comparison made at that time of rates paid for work and materials by certain architects and mill-owners in Bombay and Ahmedabad with the rates paid by the Public Works Department disclosed little difference between the two and though it was conceded that private persons might get individual pieces of work done more cheaply than Government, it was considered probable that the work would not be of the same quality and that private work might not prove more economical if it were on a larger scale and carried out, not in favourable conditions only, but also in unfavourable. The Public Works Department do the best quality of work at comparatively low rates. With the advent of the Consulting Architect and the continued expansion of his field of work a great improvement has been effected in the design of buildings. This improvement naturally costs money; but it is money well spent.

5. It is sometimes urged that the style of building preferred by the Public Works Department is more solid and substantial than need be and that on this account their work is not economical. But this high standard is not an inherent defect in the organization. The standard may be raised or lowered according to the policy approved. It must be borne in mind, however, that the poorer the class of construction used the more money must be spent on future yearly repairs and it can be shown that it is true economy in the long run to put up the best class of work. It is well known that Public Works Department work is infinitely superior to the bulk of the work carried out by private agency even in a place like Bombay where so much building work is done.

6. The incidence of establishment charges is illustrated in the attached statements and diagrams, *vide* Annexure II (a) to (g) inclusive. These have been prepared for work done in the Roads and Buildings Branch only. A more complete view would be obtained if all work done by the Public Works Department were included. Figures for all the work including irrigation, are given in the statement marked Annexure II (c). In studying the effect of the Roads and Buildings figures several important points have to be considered. In the first place the bulk of the work done by the Department for local bodies, and of contribution works is done by the Roads and Buildings Branch and as the charge made on local bodies on account of establishment is 10 per cent. and for contribution works may be less or nothing at all the deficit between recoveries and actual cost of

* Annexures II (f) and (g) not printed.

APPENDIX II—continued.

establishment on these works goes to raise the percentage on Government work. Secondly no establishment is charged against famine work. Another point of particular importance is that on account of the uncertainty of the rainfall, years of financial stringency recur not infrequently. In these years the grant for Roads and Buildings is the first to be reduced in order to secure the enforced reduction of public expenditure. Thus while the expenditure on Irrigation either remains constant or is slowly expanding or slowly contracting, that under Roads and Buildings is liable to sudden fluctuation and in a year of diminished activity following on a year of great activity the establishment percentage necessarily works out to a comparatively high figure. Lastly the cost of establishment covers much work done in the investigation and preparation of schemes. Taking these points into consideration and bearing in mind that the work is scattered over a wide area the figures do not disclose any strong ground for holding that for the work done the machinery is unnecessarily expensive. Curve C in Annexure II* (g) shows the percentage which establishment charges bear to the cost of the work, excluding the cost of establishment and omitting the cost of direction and accounts. In 1913-14 the percentage was 11. Whatever system might be adopted the expenditure for direction and accounts must remain and if another agency is employed account will have to be taken of the cost of the Government inspecting staff.

7. Where a waste of energy and therefore of money does occur is in the close supervision which has to be exercised over the subordinate staff. It is a general complaint that the subordinate staff are apt to be lacking in alertness and intelligence if left to themselves, and there is evidence that, subjected as they are to great temptations, there is among them an undesirable amount of corruption. This may be got rid of by improving their pay and prospects, by increasing the mobility of the supervising staff and by such a decentralization as will give the Executive Engineer and the Superintending Engineer more control over their subordinates. In any case it is hardly correct to say that the close control which is necessary is abnormal. Looking to the conditions prevailing in this country such a state of things is not abnormal and is not confined to the Public Works Department. The same close control would be necessary if work was being done by any other agency and improvement in the matter is not likely to be slower or more difficult under Government than under private or local board agency.

(ii). *Whether under the existing system private enterprise is sufficiently encouraged, and whether it is possible and desirable to entrust the construction and upkeep of certain classes of public works to agency other than departmental, and, if so, upon what lines such changes should be effected.*

1. There are several suggestions underlying this question. The first is that the length to which Departmental activities extend seriously restricts the field open to private enterprise and thereby prevents the normal development of engineering enterprise among the public generally. There is undoubtedly some truth in this view. The Department found no private engineers competent to design and construct buildings in a workmanlike manner and consequently had to make their own arrangements. They have always been ready to hand over as much of the work as possible to private agency but that agency has been represented almost entirely by contractors who can do no more than collect and organize the labour and arrange for the supply of the material. It is only in recent years that a higher class of agency has begun to make its appearance. The position is correctly described in the following extract, from a letter from the Commissioner in Sind:—

"In so far as the great majority of public works are already carried out through private contractors, private enterprise may be said to be sufficiently encouraged.

* Not printed.

It must be recognised that private enterprise in the building trade is still in the initial stages of its growth. It is only necessary to compare the public buildings which Government have erected, with the ordinary style of buildings erected by the inhabitants of the neighbouring towns, (leaving out of consideration the palaces and temples which were constructed in bygone days regardless of cost), in order to perceive that British rule has inaugurated a totally new era. The growth of public wealth and the growth of public confidence in the justice of the State have led private citizens within quite recent years to construct their private residences in accordance with a wholly new standard of comfort and convenience and to a great extent with new materials, stone and marble replacing brick, and brick replacing mud. These signs which may be observed in every part of India, betoken the establishment of a new industry and profession.

Speaking generally, as yet this industry is in the hands of the old type of *mistry*; an uneducated contractor who does not know how to take levels or calculate strains, but who has a practical acquaintance with materials and the handling of men. Except in a few cases in such cities as Bombay, the young Engineer trained in the Government Engineering College has not yet entered this field as a contractor; nor has he been able to secure the confidence of the old-fashioned contractor, who seldom or never employs an L. C. E. on his staff. However, there can be no doubt that the building art has rapidly improved in recent years, and is improving; and the credit for this improvement is undoubtedly due to the Public Works Department alone. It must not be forgotten that the Public Works Department has only been in existence for some 40 years, and that it began in a very humble way; even in 1890 there were less than a hundred trained Engineers in the Bombay Presidency to practise and teach their art to a population of 20 millions.

If these premises are correct, the conclusion stands evident that the policy of Government should be patience; that there should be no hasty upheaval of a system whose achievements have been remarkable and that all that is required is the strengthening of weak points and the reform of doubtful tendencies."

2. The conclusions which that officer draws are undoubtedly sound. A private demand has arisen, those who have come forward to meet it have been stimulated by the Architectural work done by the Department and, in Bombay, by the City Improvement Trust also, and it seems desirable that Government should make a call on this new profession in order to stimulate its development. This will not be immediately economical because it will be long before the employment of private agency will permit of an appreciable reduction in the Departmental staff but the object in view is worth some sacrifice. The main difficulty ahead is that Indian firms very rarely pay the proper value for honesty in their employes. If the control and influence exercised by the Architects and Surveyors' Institutes are beneficial at home, such control and influence are still more necessary in India.

3. In the field of road and bridge engineering, there is less scope for private enterprise and where the distances are so great and the need of good roads so important, it is distinctly inadvisable to make any change which might bring a decline in the standard of efficiency already attained.

4. The second suggestion underlying the question is that a portion or the whole of the work done by the Department might be transferred to local bodies. It is urged that if local bodies are encouraged and enabled to arrange more extensively than at present for the execution by their own staff or by private agency of their works it will not only be a further step in the direction of decentralization but also would stimulate the growth of firms of standing in the building and allied trades and encourage further industrial activity. So far as the latter object is concerned the facilities for the development of industrial activity can be afforded in an equal degree whether the works are controlled by Govern-

APPENDIX II—continued.

ment or by local bodies. As regards decentralization, Municipalities in this Presidency make their own arrangements for their roads and buildings and it is only in the case of large works of sanitation or water supply, towards which Government have given a contribution, that they are required to entrust construction to the Public Works Department. There are outstanding examples of good municipal management in the matter of road-making, building and large engineering enterprise, but as a rule in the *mofussil* municipalities the average standard of engineering work, particularly as regards road-making and road maintenance, is distinctly low.

5. As municipalities have a large measure of independence the suggestion must refer chiefly to local boards. None but the most ardent optimist will look for any immediate economy or increased efficiency as a result of the transfer of Government works to local boards. The question is whether it is desirable to sacrifice something of efficiency in order to foster the capacity for Local Self-Government. In this Presidency we should have to make an entirely new departure for the local boards have no engineering staff worthy of the name and many of them have not of their own a sufficiency of work on which a competent staff could be profitably employed. There would be more scope for local board engineering staff if Government transferred to the boards the maintenance and improvement of Provincial roads and the construction and repair of Government buildings, together with the funds necessary for these services. Their work for many years to come would have to be arranged for on the same lines as in the Public Works Department at present. The Government of Bombay have recently been devoting much attention to the possibility of a more progressive policy in the matter of local boards. The preliminary steps have been taken. The constitution of the boards is being liberalized while from some the official element has been eliminated and steps are being taken to provide an efficient executive to do the work formerly done by the official members. Further development depends on the solution of certain questions regarding the control to be exercised by a central authority. Some such control is considered necessary for the State is ultimately responsible for the proper expenditure of funds raised by local taxation and still more so if it hands over part of the public revenues for expenditure by a local body. The local boards at present receive substantial grants from public funds and as their own resources are small and slow of growth, the subventions will have to be increased if progress is to be made. Pending the settlement of this larger question, the Government of Bombay are not prepared to put local boards in funds in order that they may maintain their own engineering staff. There is not room for two agencies, Government and local board, and after all the object in view, namely, the furthering of Local Self-Government, does not depend on the particular agency employed in carrying out work. It depends rather on freedom to determine questions of policy and to decide what schemes should be taken up. Further as there is nothing that hastens the development of rural areas so much as an efficient system of communications the Government of Bombay would be entirely opposed to any change in the agency for the maintenance and improvement of provincial roads unless the new agency is certain to give at least as good results as the Public Works Department have done in the past. They are inclined to believe that ultimately the most satisfactory arrangement will be to provincialise all local board roads of any importance and entirely relieve the local boards of all expenditure in connection with them.

6. The Public Works Department has a large number of irrigation and road projects both ready and under preparation which are well suited for the employment of famine labour.

Famines in this Presidency, particularly in the Deccan districts, have been of common occurrence and though the increase of trade and industry has greatly diminished the danger the contingency cannot be disregarded. The machinery of the Public Works Department from long experience in handling labour and a knowledge of

the country is well adapted to cope with the task of organising and carrying out measures of famine relief.

With the abolition of the present machinery and the substitution of the contract system it would not be easy to cope with a serious famine except at very great expense, and the hurried employment of a supervising agency quite inexperienced in such work.

(iii). Whether any changes recommended by the Committee necessitate any modification of the organisation of the staff of the Public Works Department, and, if so, what.

No reply can be given to this point until the changes recommended by the Committee are known.

(iv). Whether the Public Works Department meets the needs of other Departments of the Administration, and whether the relations *inter se* of the various sub-divisions of the Buildings and Roads Branch, Sanitary, Architectural, Electrical and Civil Engineering, are satisfactory.

As to whether the Public Works Department meets the needs of other Departments of the Administration can only be judged by a reference to those departments, but from the replies received to this question from prominent members of the Civil Service it may be answered in the affirmative.

One Commissioner states that he has found the relationship between the Public Works Department and other Departments excellent throughout his service and has never failed to obtain advice and assistance whenever he has asked for it. He points out that at the moment of writing, an Executive Engineer is devoting all his spare time to constructing a system of drainage for a Municipality. Executive Engineers are expected to and do give other officers all the assistance in their power.

2. Relations *inter se* of the various sub-divisions of the Buildings and Roads Branch, Sanitary, Architectural, Electrical and Civil Engineering are satisfactory.

(v). Whether further decentralization within the Public Works Department itself is desirable, and, if so, to what extent and in what directions.

It is impossible to give a full reply to this rather intricate question in the short time available.

A substantial amount of decentralisation has been introduced in recent years and at present, conditions appear fairly satisfactory. A few matters which now seem to call for further decentralisation are noted on below.

2. All Superintending Engineers may be given power to accept tenders up to Rs. 50,000, and be allowed to sanction engineering details of works costing up to Rs. 50,000, instead of the figure being restricted to Rs. 20,000. The powers at present enjoyed in this respect by Superintending Engineers are shown in Annexure III.

3. Executive Engineers are at present empowered to grant technical sanction to works costing up to Rs. 2,500. It is thought that this limit may be increased to Rs. 5,000. Their power to accept tenders at present is Rs. 5,000, and this may be increased to Rs. 10,000.

4. Executive Engineers have no power at present to sanction estimates for Tools and Plant. It is thought that they should have this power up to Rs. 1,000.

5. The power of Executive Engineers to grant administrative approval for Provincial Works other than residential buildings and those in connection with Government houses and Ecclesiastical buildings may be raised from Rs. 2,500, to Rs. 5,000. Powers of administrative approval at present delegated to different officers are shown in Annexure III.

6. Executive Engineers may be given greater powers regarding sanctioning excesses on sub-heads of estimates. The extent to which this may be given would require to be considered carefully. This Government has not had time to look into this matter.

7. The powers of Public Works Department Officers regarding purchase of stores are laid down in Appendix

APPENDIX II—continued.

30 of Public Works Department Code, Volume III. It is considered the limits laid down might be safely increased to the figures shown below :—

	For purchases under Rule 3(a). Rs.	For purchases under Rule 5. Rs.
Executive Engineer or Assistant Engineer holding charge of a District	500	1,000
Superintending Engineer	5,000	10,000
Local Government	50,000	Full powers.

It would be a great convenience also if the stores rules were so modified as to allow of a great deal more local purchase, seeing there are so many firms, branches of firms and agents now in India who can quote very reasonable rates for the articles in which they deal.

8. Appointments of persons to the temporary Upper and Lower Subordinate establishment may be left to the Executive Engineer, provided the appointment and scale of pay has been sanctioned by higher authority. The power of dismissing these persons should rest with the Executive Engineer.

9. The Executive Engineer should have full power to make appointments against vacancies in the permanent and temporary staff of his office, subject to the rules regarding admissibility of applicants for appointment being complied with.

10. Selected Upper Subordinates in charge of Sub-divisions may be allowed to make cash payments up to Rs. 200 on bills for work done on running account.

11. Sub-divisional Officers may be empowered to enter into contracts up to Rs. 200, provided the rates are within the general rates sanctioned by the Executive Engineer. This limit may be increased to Rs. 500 in the case of Assistant Engineers holding charge of a Sub-division who are over 2 years standing.

12. Sub-divisional Officers who are Upper Subordinates may be allowed to sanction rates for and purchase materials up to Rs. 100 in value without reference to the Executive Engineer, provided the value is covered by provision in the sanctioned estimate and the rates are within the general rates sanctioned by the Executive Engineer also provided the purchases comply with code rules.

13. Sub-divisional officers may be given more powers with respect to carrying out current repairs to buildings. It should be left to them to a great extent to carry out repairs after consulting the officers in charge of the different buildings and the Executive Engineer can have a useful check if they maintain a concise record of the work actually executed kept up to date and available when called for. If this were maintained and copied monthly in the Executive Engineer's office and the Executive Engineer's expenditure noted in both copies, it would be possible to do away with the register of works, work abstracts and monthly progress reports for these works. At present estimates for these repair works are prepared annually by Sub-divisional officers and checked by Executive Engineers. There is a large number of these works. These estimates are never adhered to except as regards the total expenditure on repairs. It is under consideration to do away with them and substitute a much simpler and suitable arrangement.

14. About six years ago, the Civil and Public Works Accounts Departments were amalgamated. Hitherto discretion has been given to Local Governments to introduce local variations in accordance with the orders contained in the letter from the Government of India, Finance Department, No. 2866-A., dated 30th April 1912. The Government of India now consider that sufficient time has elapsed for experience to have been gained of such changes as have been introduced tentatively and that so far as may be practicable a uniform system of accounts should now be laid down applicable to all provinces. With this object the Comptroller and Auditor General submitted a scheme to the Govern-

ment of India in 1914 and this has been referred to the Local Governments for their consideration after selected officers of the Public Works Department, both of administrative and executive rank, had examined and reported on the proposals. This Government's reply to the Government of India is about to be despatched. The intention is that while securing efficiency and reasonable simplicity and economy of work on the accounts and audit side, full regard should be paid to considerations of administrative convenience. At present that part of an Executive Engineer's duties occupies an undue proportion of his time. If the proposals now under consideration are adopted, there will be a substantial reduction in the amount of accounts work.

15. It is possible that Executive Engineers and Sub-divisional officers could be saved a good deal of office work by a reduction in the number of returns they have to submit. The question requires careful examination before any recommendations can be made.

(vi). *Whether the Public Works Department Code which regulates the execution and maintenance of Civil Works, is unduly restrictive, and, if so, in what direction change is desirable.*

The general opinion of officers consulted in the Public Works Department is that the Public Works Department Code is not unduly restrictive.

2. Several points in this connection are dealt with under point (v) which concern the Public Works Department Code, such for example, as increased powers to Public Works Department Officers there proposed.

One argument for increasing the powers of sanction to plans and estimates is that there has been a considerable rise in the cost of carrying out work of late years in India.

3. The present regulations governing the accommodation to be provided in officers' bungalows should be altered. The cost is regulated in proportion to the occupant's pay, regardless of the fact that the cost of building may be considerably greater in one district than another. This could be improved by laying down definite areas of accommodation for different grades of pay and thereby saving a good deal of labour and time in discussion as to the accommodation to be provided.

4. Particular attention is invited to the Stores Rules, noted on in the reply to point (v). It would be a great benefit if the powers permitting local purchase of materials imported into the country were extended and greater freedom allowed in placing orders with local agents instead of having to indent on the Stores Department. It would encourage firms in this country and local branches and agents for Home firms to keep stocks in the country and to bring samples of new or improved goods to the notice of possible buyers. One of the difficulties in this country is to keep up to date with modern fittings and appliances. At Home agents regularly lay all the improvements their firms bring out before people interested in the building trades, but in India there is at present very little inducement for them to do so.

(vii). *Whether the system of education in Government Engineering Colleges is organized on a sufficiently broad basis to meet the needs of private agency as well as of Government, whether it attracts suitable candidates, and whether the standard of instruction is sufficiently advanced to provide fully qualified civil engineers for employment by Government, local bodies, and private engineering and contracting firms, and, if not, in what directions and to what extent improvement is required.*

The Engineering Colleges in this Presidency are the following :—

- (1) College of Engineering, Poona.
- (2) Dayaram Jethmal Sind College in Karachi.

The College of Engineering at Poona is under the control of a Principal who is subordinate to the Director of Public Instruction. Selected students who have

APPENDIX II—continued.

studied for at least one year in an Arts College affiliated to the Bombay University are educated through the medium of the English language for the University degrees of Bachelor of Engineering (Civil), and Bachelor of Engineering (Mechanical). A school for Engineering apprentices is attached to the College. There is a general course lasting for two years, and the third year men on passing the prescribed examination can join one of the three following classes :—

- (a) Sub-Overseer class.
- (b) Mechanical Engineer class.
- (c) Electrical Engineer class.

The number of students admitted to the College yearly at present is approximately :—

	From Bombay Presidency.	From other presidencies.
Civil Engineering course .	42	8
Mechanical Engineering course	8	2
Sub-Overseers course	about 32	about 8

Government at present guarantee the following appointments :—

- One Apprentice Engineer who becomes a Provincial Assistant Engineer after 1 year.
- Three Overseers.
- Three Sub-Overseers.

The three years University course leading to the degree of B. E. (Civil) will be found on pages 27 to 30 of the College Calendar and the so-called Sub-Overseer (Civil) course on pages 59 to 60.

An Advisory Committee for the College was appointed by the Bombay Government a few years ago whose functions are to advise Government on questions of policy, organization, staff, building equipment, the formation and reconstitution of classes, curriculum, etc., and also to take the initiative in suggesting improvements and reforms in respect of any of the above items. The Advisory Committee has on its board the Chief Engineer and Secretary to Government, Public Works Department, and other practical Engineers (officials and non-officials).

The course of studies, as laid down by the Bombay University, extends over three years, but while the general body of students present themselves for the final degree examination in the year succeeding that in which they pass the second year's examination, such of the students as wish to make their studies as thoroughly complete as possible, with a view to having a better chance for the guaranteed appointment of Assistant Engineer, invariably spend an additional year before they appear for the final examination on the results of which the selection for this appointment depends. The unsuccessful students have either to find private employment as Engineers or subordinates if they do not accept the guaranteed Overseer's post. Many of the next best men do accept these as they prefer Government posts to others even though they have to start on the lowest pay of the Upper Subordinate establishment.

Further information on the College course will be found in the memoranda prepared for the Public Services Commission which are incorporated in* this.

The Advisory Committee has drawn up a proposed four years' course which is now being considered by the Bombay University. A copy of this is attached as Annexure IV.* The extra time is mainly devoted to workshop practice and other practical work. There is a certain amount of revision in the lecture courses, but it is not intended to make them more difficult than at present. It is proposed to limit the number of admissions to this course as the number of openings for men with an Engineer's training in this Presidency and the surrounding States is not large. The limit will require to be expanded as circumstances necessitate

it. At present the majority of Graduates have to be content with Overseers' posts. It is hoped it will be possible to give better instruction to a small class of a dozen or so than to the present classes of fifty and over.

A copy of the proposed 3 years' diploma course for Overseers is also attached as Annexure V.* This contains more workshop practice and other practical work than the present B. E. course. It is thought that the men who have been through this course will be better Overseers than those who have gone through the present B. E. course.

The Sub-Overseers' course is not proposed to be altered. It has recently been revised.

2. The general opinion of officers of the Public Works Department is that the education imparted at the College of Engineering, Poona, is of a high order and is sufficient to turn out Civil Engineers capable of making their mark in the professional world. It has been stated that the college laboratory is larger and better fitted out than the Engineering laboratory at Cambridge University.

The B. E. degree of the Bombay University is not yet recognised by the Institution of Civil Engineers as sufficient to exempt those holding it from passing the examination for Associate Membership. It is hoped that when the new four years' course is introduced that recognition will be accorded. It is understood that no Engineering College or University degree in India is as yet so recognised a fact which may be taken to indicate the standard of education in Engineering is not yet up to European requirements. The defect may be due to the lack of practical training, a subject which is dealt with later on.

3. The Dayaram Jethmal Sind College] has an Engineering branch attached to the College, the full course of instruction in Civil and Mechanical Engineering extending over 3 years; the proficiency of the students is tested annually by examinations conducted by the Public Works Department and the certificates are granted on the results of these examinations, but it is not proposed at present to prepare students for the degree in Engineering of the University of Bombay. A special grant is made by Government in aid of these classes and four appointments, viz., 1 Overseer and 3 Sub-Overseers, in the Public Works Department are granted to students holding the full certificate.

The Chief Engineer in Sind remarks as follows about this College :—

"The Dayaram Jethmal Sind Arts College is the only institution in Sind which teaches Engineering and as the teachers are men of no particular professional standing it is quite impossible for them to turn out fully qualified engineers and architects. The direction and extent of improvement is obvious in this case."

4. For the lower paid posts the education imparted as the Poona College of Engineering is possibly on too broad a basis, and by men who will never rise beyond the grade of Overseer the time might be spent more profitably on practical engineering, such as levelling, survey, classification of materials, measuring work, simple specification work, and the like, instead of in cramming theoretical knowledge out of books which they are unable to apply in practice.

(viii). Whether adequate provision is made for the practical training on works of students who have received their scientific education in English or Indian Colleges.

The present position is best illustrated by a reference to correspondence noted below :—

The Government of India in their Department of Education letter No. 2228, dated 27th September 1912, stated that it seemed to them that the time had come to endeavour to connect educational institutions more closely with business firms, railways and other employers of labour to enquire how the former can better meet the requirements of the latter, and to point out the way to further employment of Indians in them. For this enquiry Colonel Atkinson and Mr. Dawson

* Not printed.

* Not printed.

APPENDIX II—continued.

were selected as having special practical experience on the subject.

The Government of India asked for the views of the local Governments on the recommendations contained in the report submitted by those officers. Amongst the general recommendations were the following :—

(1). That every student passing out of a civil engineering college should be given an apprenticeship for one year on practical work in the Public Works Department.

(2). That an inspecting and advisory officer should be appointed for all technical institutions in India and that an employment bureau should be established under his supervision and control.

(3). That the course of Civil Engineering at the Poona College of Engineering should include a term of apprenticeship under some competent officer.

(4). That the courses then prescribed at the College for the apprentice classes of Sub-Overseers, Mechanical Engineers and Electrical Engineers should be revised with a view to specialisation in the several branches at the earlier stage of the course.

(5). That the course of Mechanical and Electrical Engineering should include a term of two years' apprenticeship in works.

The views of the local Government were communicated to the Government of India in this Government Educational Department letter No. 1585, dated 27th May 1915. Paragraphs 6 to 10 inclusive of this letter relate to the Public Works Department training of Engineering students and are quoted below in full as they deal fully with this matter. The Government of India have not yet sent their reply.

"6. With regard to recommendation (1), the Governor in Council is of opinion that it would undoubtedly be conducive to efficiency if every student passing out of the College of Engineering at Poona could be given an apprenticeship for a year in the Public Works Department. From the narrower point of view of the immediate interests of that Department it may, it is true, be questioned whether it should be burdened with the task of training the considerable body of young men who annually complete their course of study at the College. These number about forty, and for the great majority of them permanent employment could not be found, so that they would necessarily leave to seek employment elsewhere and would thus cease to be of use to the Department. But against this it is necessary to take into account the wider considerations to which Colonel Atkinson and Mr. Dawson rightly give prominence. A large percentage of the men turned out from Indian engineering colleges obtain employment under municipalities, district boards, railways and contractors, but the excellent material thus obtained is often impaired in its efficiency through the want of that practical training which can be obtained only in the various branches of the Public Works Department and which, in existing conditions, is seldom or never given except in the case of men who have secured guaranteed appointments under Government. On this aspect of the case it may well be contended that the cost to Government of granting a year's apprenticeship in practical work to every man passed out of an engineering college would be amply repaid by the general benefit which such a measure would confer on the country at large professionally and financially. In nearly all cases the interests of the ultimate employer of every grade of civil engineer are closely related in some way or other to the interests of the State, and consequently the State will be a considerable gainer if the general standard of efficiency in the engineering profession is raised by means of a universal scheme of apprenticeship such as is contemplated.

7. While this more liberal view of the question cannot fail to commend itself on grounds of general policy and expediency, it has at the same time to be recognised that the proposal is open to certain practical difficulties.

Experience shows that Indian students, as soon as they terminate their college course, are actuated by one idea only, namely, that of placing themselves at the earliest possible opportunity in a position where they can earn a living, and, unless their certificates are withheld until they have served the desired term of apprenticeship, it is extremely doubtful whether a system of apprenticeships could successfully be imposed upon them to any general extent. The question arises accordingly whether, in the case of the students of the Poona College of Engineering who proceed to the B. E. degree of the Bombay University, that body would consent to withhold their certificates until they had passed a period of apprenticeship in the Public Works Department. The Governor in Council does not believe that the University would ever acquiesce in such a proposal inasmuch as it would have the effect of making the award of its B. E. degree dependent on the certificate of the Public Works Department and would therefore be regarded as an attempt to subordinate the University to a Government Department.

8. The advantages of a system of apprenticeship for civil engineer students are, however, so patent that, even admitting that it is not possible to apply it universally, it is worth while making the experiment of introducing it partially and on a voluntary basis. The officers of the Public Works Department who have been consulted consider that for ordinary engineering work a year's training would, in the first instance, be sufficient, and propose that a subsistence allowance of Rs. 30 per mensem, with travelling allowance for actual travelling, should be given to each student undergoing apprenticeship. The annual expenditure entailed in training 25 men on these terms is estimated at Rs. 15,000 or more according to the amount of travelling actually done by the apprentices. The system advocated by Colonel Atkinson and Mr. Dawson is the one in force for the training of apprentice overseers passing out of the Civil Engineering College at Roorkee. It is understood that at this institution a stipend of Rs. 40 per mensem is paid to each Indian apprentice, and that, where absolutely necessary, rent for quarters and an allowance for the upkeep of a horse are granted in addition. The travelling expenses incurred by the apprentices are also apparently paid by the College. A further feature of the Roorkee system is the payment of an honorarium to the Public Works Department officer under whom an apprentice is placed for practical instruction. If only in the interests of the apprentices, it appears undesirable that the work of training students should be added to the ordinary duties of the subordinate officers of the Public Works Department without some provision for the payment of extra remuneration, and it is accordingly proposed to adopt the rates of honorarium allowed in the case of Roorkee, viz., Re. 1 per diem for the first apprentice and eight annas each for any additional apprentices. The expenditure involved on this account would not exceed Rs. 9,000 per annum. The proposals of the officers of the Public Works Department, which follow generally the lines of the system in operation at Roorkee, commend themselves to the Governor in Council.

9. At the same time a scheme has been formulated for the practical training which is to be given to the apprentices on the works of the Public Works Department. It provides that they shall, as far as possible, be given both irrigation work and roads and building work, each kind of work occupying six months. During one or two months of the year of apprenticeship the students will also be required to devote some time to the work of management. Each apprentice will be required to submit at the end of every month to the Executive Engineer concerned, notes on the lines of those which were formerly required of the students at Coopers Hill College. Superintending Engineers will be expected to examine the apprentices occasionally in the following subjects :—

Construction (including nature of materials).

APPENDIX II—continued.

Management of labour with special regard to—

Supply of materials.

Actual construction.

Discipline.

Collecting labour.

Payment and accounts including—

Calling for contracts.

Piece-work.

Departmental work.

10. The scheme outlined above, which will in due course be worked out in greater detail, also follows generally the lines of the system in force at Roorkee, and the Governor in Council, on learning that it meets with the approval of the Government of India, will be prepared to bring it into force on a voluntary basis as soon as the financial situation admits. With regard to the question of its acceptability to civil engineering students, generally, I am to observe that appointing agencies are likely to prefer applicants for employment who have undergone a practical training to those who have had no such experience and that this consideration, combined with the proposed payment of subsistence and travelling allowances, may be expected to afford a fairly strong inducement to the students to take up the proposed course of apprenticeship, more especially if an announcement is made that only those who are so trained will in future be employed by Government."

ANNEXURE I

Letter from H. F. Beale, Esq., M. Inst. C.E., Secretary to the Government of Bombay, Public Works Department, to the Secretary to the Government of India, Public Works Department, No. A.-366, dated the 13th January 1914.

I am directed to reply to your letter No. 903 A. G., dated 3rd September 1912, on the subject of possible economies in the scale of expenditure on unremunerative public works, and to say that this question has frequently engaged the attention of the Government of Bombay. All projects submitted are carefully scrutinized as to the class of work and rates adopted, and a standard book of specifications (termed Marryat's) has been published, in which are described all the classes of work which may be used in this Presidency.

2. In Sind, mud masonry is used a good deal for the superstructure of buildings, but in the Presidency proper, it is mostly confined to buildings of a temporary nature. Everywhere efforts have been made to substitute some cheaper form of wood for Burma teak. At one time Jharrah looked promising, but that, like all the other woods, is very readily attacked by white ants. Yet, with the aid of preservatives, many of the cheaper woods have been brought into use in districts where they are readily obtainable. I am to say that no hope can be held out of further economies for the reasons detailed below.

3. So far from anticipating any reduction of rates, I am to show that it is far more probable that the rates will continue to rise. Able-bodied coolies are now receiving from 5 to 8 annas a day in places where 20 years ago they received from 3 to 5 annas; the rise in the cost of food and the facilities for travel, which enable them to repair to the most favourable market

for labour, are the causes for this increase. The competition for labour amongst employers is now very great in this Presidency. As the prosperity of the country increases, the demand for new works must continue to grow. At the present moment great activity prevails in the construction of dock works, railway extensions, electrical projects, large irrigation schemes, and many important buildings at the various large centres in this Presidency. Unless the prosperity of the country receives a serious set-back, there is no reason to anticipate any great reduction in this activity in the near future; but on the completion of these works, especially the irrigation schemes, great benefit will accrue to the working population, and the demand for a higher standard of living must necessarily follow.

4. A comparison has been made in Bombay and Ahmedabad between the rates paid for work and materials by the Public Works Department and by certain architects and mill-owners. There is little difference to be found in the figures reported, but it may be conceded that private persons can very frequently get work done more cheaply than Government, and there are several good reasons to account for this. In Government work the system of advances, which is universal with private employers, is objected to. Also Public Works Department Officers pay special attention to secure materials and work of the quality required, while many private employers care little about specifications and know nothing of the rules for sound construction. The better supervision referred to involves a charge for establishment. These are the main reasons for higher rates, but there are others, such as building in out of the way places, or when the market is unfavourable, etc.

5. In reference to the suggestion that a less durable and cheaper form of construction may be advisable for certain buildings, I am to say that the Government of Bombay has, as explained in paragraph 2 above, already adopted this principle as far as it is considered advisable. It has been ascertained that the repairs of *kutcha* buildings amount to 3 per cent. on their capital cost, and of *pucca* buildings to 1½ per cent. only. It follows that about 27 per cent. more may be spent on the latter in capital cost, and these buildings are more sanitary and satisfactory. White ants are the great enemy both of mud walls and cheap wood work, while in many places in Sind the creep of damp *kalar* is another objection to work of inferior quality.

6. The third query in your letter under reply is in connection with the possibility of reducing the superior establishment by extending charges of supervision. I am to state that this Government has already given its opinion that the Public Works Department in the Bombay Presidency is undermanned. A letter* was addressed to the Government of India asking for an increase in the cadre of permanent Engineers, because the proportion of temporary men on the establishment is considered too great. The answer of the Government of India was unfavourable, and the question is being studied again in the light of the remarks made by them in their Public Works Department letter No. 2309-E., dated the 31st October 1913. The Government of Bombay is now about to request the Government of India to sanction an increase of 54 men to the existing cadre of 249 Upper Subordinates. Hence it is evident that no reduction can be recommended as possible. With reference to the facilities for travelling brought about by the construction of good roads and railways I am to remark that the railways are seldom of any use to an Executive Engineer in his District, and that, without a motor vehicle, which only a few can afford to buy, the rate of travelling is not appreciably faster now than it was 10 or 15 years ago.

* No. E.—4418, dated 23rd April 1913.

APPENDIX II—continued.

ANNEXURE II(a).

Actual Expenditure incurred in Public Works Department from the year 1889-1890 to the year 1915-1916—Roads and Buildings Branch.

Year.	Imperial Military.	Imperial Civil.	Famine.	45—Civil Works Provincial.	Local.	Contribution.	Total gross Outlay on Works and Repairs, Buildings and Roads.	I Deduct Outlay on which Establishment Charges are not admissible.	Balance on which Establishment is charged.	Establishment Charges.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1889-90	10,77,528	1,85,961	....	26,73,172	8,11,077	4,32,735	61,30,473	8,24,953	48,05,520	11,93,389
1890-91	1,61,789	1,99,965	....	30,80,975	8,55,729	7,61,702	50,80,250	8,21,454	42,38,796	11,13,670
1891-92	1,77,908	2,42,490	....	30,37,638	10,55,158	7,68,331	52,61,525	6,83,500	45,78,016	11,32,260
1892-93	1,46,738	2,12,260	....	24,68,747	11,24,551	5,41,443	44,93,739	3,57,295	41,36,444	11,52,732
1893-94	1,49,562	8,86,828	....	23,55,933	10,70,246	3,19,141	42,31,710	2,98,408	39,33,302	11,54,486
1894-95	1,57,718	35,927	....	23,74,924	12,81,856	3,81,592	42,32,017	4,22,115	38,09,902	11,38,753
1895-96	1,83,822	1,80,393	....	24,32,428	13,16,511	6,78,370	47,01,564	6,42,022	41,40,542	11,40,371
1896-97	1,51,326	1,70,397	26,48,660	22,48,278	12,98,562	7,32,694	71,49,917	30,35,415	41,60,502	11,12,032
1897-98	2,30,101	1,06,210	58,84,957	18,14,106	9,89,204	6,30,423	90,55,001	63,20,043	33,28,958	9,91,283
1898-99	1,88,000	1,79,078	1,84,679	18,77,725	9,75,021	2,35,388	36,20,481	4,47,932	21,72,549	10,10,944
1899-1900	1,82,967	1,09,217	85,23,346	17,54,206	8,82,366	1,27,513	1,15,89,620	87,58,368	28,31,252	9,64,086
1900-01	1,18,827	2,02,630	1,79,23,857	18,48,097	7,30,678	2,62,484	2,10,91,573	1,83,52,049	27,39,524	9,37,222
1901-02	1,20,189	4,22,564	44,42,894	24,85,959	7,60,337	2,13,991	84,45,877	40,30,323	35,15,554	10,70,175
1902-03	1,16,070	2,65,094	21,47,388	32,57,412	88,86,950	1,17,756	87,89,582	4,07,496	67,89,582	10,95,999
1903-04	6,005	1,11,884	....	1,87,749	68,934	1,53,444	4,07,496	4,07,496	....	....
1904-05	1,45,622	2,66,613	....	33,05,300	9,75,216	2,83,732	49,76,483	49,76,483	....	....
1905-06	17,972	2,72,540	....	5,40,124	85,356	44,807	9,60,599	9,60,599	49,76,483	11,37,825
1906-07	1,32,317	2,49,564	....	32,99,862	10,14,168	1,97,915	49,12,922	6,65,531	49,12,922	11,97,376
1907-08	14,122	3,55,876	19,096	1,77,227	63,820	54,486	6,65,531	6,65,531	....	....
1908-09	71,219	4,04,572	97,426	29,11,785	13,50,959	2,68,955	51,04,796	7,83,765	51,04,796	12,64,860
1909-10	5,544	76,374	....	5,07,083	95,401	99,363	7,83,765	7,83,765	....	....
1910-11	69,852	5,76,809	4,82,884	45,79,167	11,19,474	3,59,755	71,87,241	9,35,851	71,87,241	13,49,560
1911-12	4,766	1,76,673	....	4,01,126	1,77,204	1,76,082	9,35,851	9,35,851	....	....
1912-13	85,325	7,91,915	3	61,60,416	15,01,072	2,74,922	88,54,153	7,92,844	80,61,309	18,59,300
1913-14	73,878	8,54,786	....	58,00,009	17,32,163	2,47,821	87,08,632	5,78,121	81,30,511	13,71,395
1914-15	66,119	8,25,814	....	54,84,843	19,96,190	2,65,975	86,38,941	7,86,256	78,52,685	14,51,071
1915-16	65,072	9,41,967	....	59,37,219	14,40,142	6,98,301	90,82,701	12,75,883	78,06,818	14,40,922
1916-17	65,855	8,03,736	4,44,680	64,19,730	16,99,096	12,37,966	1,06,71,063	24,47,080	82,24,003	12,39,277
1917-18	60,666	3,39,401	5,69,963	68,72,838	16,83,990	13,09,719	1,08,36,677	19,07,981	89,28,596	13,82,309
1918-19	67,112	7,18,513	147	85,95,411	15,88,339	13,98,737	1,23,63,259	21,93,242	1,01,60,017	14,97,764
1919-20	75,015	10,28,948	....	86,21,990	16,77,495	11,85,879	1,25,89,327	18,36,700	1,07,52,627	16,76,759
1920-21	55,166	8,97,846	....	54,82,012	17,28,357	17,36,482	98,44,808	17,47,750	80,97,113	18,20,917

ANNEXURE II(b).

Detail of Establishment Charges from the year 1889-1890 to 1915-1916.—Roads and Buildings Branch.

Year.	Imperial Military.	Imperial Civil.	Famine.	45—Civil Works Provincial.	Local.	Contribution.	Total as per Finance Accounts Buildings and Roads Branch.	Deduct Charges for Establishment specially engaged for any particular work.	Net Establishment Charges.	Direction.	Accounts.	Construction.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1889-90	2,38,251	26,283	....	8,40,307	92,068	26,840	12,32,729	39,340	11,93,389	1,79,675	1,25,616	8,88,098
1890-91	36,611	40,130	....	9,31,990	1,10,425	35,339	11,54,485	40,825	11,13,670	1,68,809	1,22,787	8,22,074
1891-92	40,976	50,268	....	9,09,820	1,30,092	44,232	11,75,387	43,027	11,32,360	1,64,726	1,29,744	8,37,390
1892-93	31,020	47,313	....	9,27,104	1,39,894	45,296	11,90,717	37,085	11,52,732	1,68,697	1,06,618	8,77,417
1893-94	33,923	52,388	....	9,42,858	1,27,587	31,601	11,88,357	33,871	11,54,486	1,81,325	1,02,203	8,70,953
1894-95	22,659	23,056	....	9,48,121	1,30,246	23,454	11,60,536	22,783	11,33,753	1,81,339	1,07,794	8,44,620
1895-96	35,369	36,082	....	9,06,962	1,47,084	42,342	11,67,819	27,448	11,40,371	1,86,228	1,14,168	8,39,920
1896-97	30,538	36,119	49,567	8,41,626	1,47,415	34,054	11,30,319	27,287	11,12,032	1,76,296	1,08,172	8,27,504
1897-98	29,654	21,562	1,74,183	8,38,048	96,892	22,825	11,33,154	1,91,871	9,91,283	1,62,721	1,12,137	7,16,425
1898-99	32,249	35,709	4,436	8,47,523	1,10,237	23,423	10,54,577	33,633	10,10,944	1,65,792	1,15,684	1,38,558
1899-1900	24,717	28,932	96,368	8,39,459	1,01,974	13,675	11,05,125	1,40,439	9,04,686	1,66,043	1,17,111	6,81,532
1900-01	22,665	34,724	3,92,921	8,34,789	86,036	6,154	13,77,289	4,40,066	9,37,223	1,77,350	1,14,022	6,46,851
1901-02	23,468	58,039	1,25,041	9,27,806	91,621	8,170	12,33,944	1,63,769	10,70,175	1,88,905	1,21,914	7,59,366
1902-03	27,143	66,015	34,415	9,57,576	1,08,650	5,949	11,97,748	1,01,749	10,95,999	1,86,261	1,22,457	7,87,281
1903-04	34,027	65,852	....	9,70,878	1,16,104	15,136	12,01,997	64,172	11,37,825	2,00,573	1,23,434	8,13,818
1904-05	31,028	66,327	762	10,40,122	1,23,064	10,750	12,72,643	75,067	11,97,576	2,19,135	1,24,575	8,53,866
1905-06	16,825	99,386	2,580	10,64,995	1,59,120	10,775	13,53,681	85,812	12,64,869	3,03,417	1,18,414	8,43,038
1906-07	16,586	1,36,127	30,567	11,37,656	1,34,100	19,141	14,74,188	1,24,614	13,49,569	3,21,044	1,13,859	9,14,640
1907-08	13,909	1,58,061	945	11,10,593	1,72,343	18,743	14,76,194	1,15,894	13,59,300	2,87,865	1,22,629	9,48,906
1908-09	15,458	1,83,182	574	11,26,965	1,70,035	13,168	15,09,384	1,37,989	13,71,395	3,18,774	1,30,374	9,22,247
1909-10	14,176	1,87,283	....	12,15,879	1,74,343	26,780	16,18,461	1,66,790	14,51,671	3,64,322	1,32,958	9,54,301
1910-11	14,331	1,50,125	....	12,82,509	1,40,858	47,800	16,35,713	1,94,791	14,40,922	3,40,632	1,41,567	9,58,723
1911-12	14,379	1,73,608	19,480	9,99,483	1,67,352	1,11,373	14,85,575	2,46,398	12,39,277	3,22,291	....	9,16,986
1912-13	12,993	80,875	56,724	12,68,543	1,48,639	69,156	16,66,929	2,84,620	13,82,309	3,56,322	....	10,26,987
1913-14	13,201	1,44,739	81	14,78,395	1,52,829	24,968	18,14,231	3,16,487	14,97,764	3,98,829	....	11,38,938
1914-15	15,683	1,90,730	....	14,85,168	1,66,331	90,100	19,51,018	2,74,259	16,76,759	3,50,911	....	13,28,848
1915-16	11,051	1,60,772	....	15,77,060	1,55,127	78,913	19,77,923	1,57,600	18,20,317	3,54,367	....	14,65,950

APPENDIX II—continued.

ANNEXURE II(c).

Statement of expenditure on Famine Relief Works.

Year.	Famine Relief Works carried out by the Roads and Buildings Branch.	Famine Relief Works carried out by the Irrigation Branch.	Actual Roads and Buildings, Famine Establishments charges from Finance accounts.
	Rs.	Rs.	Rs.
1896-97	20,50,222	34,781	40,247
1897-98	46,78,948	12,08,000	1,58,208
1898-99	18,794	1,65,885	2,528
1899-1900	62,84,686	22,84,600	77,643
1900-01	1,20,39,505	58,99,352	2,22,837
1901-02	20,44,610	22,92,284	52,341
1902-03	1,97,788	20,45,800	62,620
1903-04 . . . . .	..	..	..
1904-05 . . . . .	..	24,000	..
1905-06	57,468	41,311	800
1906-07	2,90,931	1,96,120	24,207
1907-08 . . . . .	..	..	943
1908-09 . . . . .	..	..	874
1909-10 . . . . .	..	..	..
1910-11 . . . . .	..	..	..
1911-12	1,46,901	2,97,779	10,480
1912-13	1,04,812	4,65,151	42,175
1913-14 . . . . .	..	..	81
1914-15 . . . . .	..	..	..
1915-16 . . . . .	..	..	..

ANNEXURE II(d).

ROADS AND BUILDINGS BRANCH.

Public Works Department.

Establishment Percentages.

Year.	Net cost of works on which Establishment is charged. (This does not include famine outlay.)	Cost of famine work carried out by Roads and Buildings Branch only.	Total of columns 2 and 3.	Net Establishment charges.	Establishment charges incurred on Roads and Buildings Famine Works only.	Total of columns 5 and 6.	Total of columns 4 and 7 = total cost of work including Establishment.	A Percentage column 7 on column 4.	B Percentage column 7 on column 6.	Establishment construction charges only plus Famine Establishment charges vide column 6.	Column 4 plus column 11.	C Percentage column 11 on column 4.	D Percentage column 11 on column 4 plus column 11, i.e., column 12.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.			Rs.	Rs.		
1899-00	48,05,520	..	48,05,520	11,98,389	..	11,98,389	59,99,909	24.8	19.9	8,28,008	thousands 56.95	19.5	15.6
1899-01	42,38,796	..	42,38,796	11,18,670	..	11,18,670	53,57,466	20.4	20.8	8,22,074	50.60	19.4	15.2
1891-92	45,78,016	..	45,78,016	11,32,360	..	11,32,360	57,10,376	24.7	19.9	8,27,800	54.16	18.3	15.4
1892-93	41,36,444	..	41,36,444	11,52,732	..	11,52,732	52,89,176	27.0	21.8	8,77,417	50.14	21.2	17.5
1893-94	39,33,302	..	39,33,302	11,54,486	..	11,54,486	50,87,788	29.4	22.7	8,70,953	48.04	22.2	18.1
1894-95	38,09,902	..	38,09,902	11,33,753	..	11,33,753	49,43,655	29.8	23.0	8,44,620	46.54	22.2	18.1
1895-96	41,49,542	..	41,49,542	11,40,371	..	11,40,371	52,89,918	27.5	21.6	8,39,920	49.40	20.2	16.6
1896-97	41,64,502	26,58,222	68,22,724	11,12,032	49,567	11,61,608	79,84,332	17.0	14.5	8,77,131	77.00	12.6	11.4
1897-98	33,23,558	46,78,948	80,07,906	9,91,233	1,53,208	11,44,466	91,52,392	14.3	12.5	8,69,628	88.77	10.6	9.8
1898-99	31,72,559	18,794	31,91,353	10,19,944	3,338	10,23,282	42,14,635	32.1	24.3	7,41,808	39.33	23.2	18.9
1899-1900	28,31,252	62,36,686	90,67,938	9,64,686	77,553	10,42,239	1,01,10,177	11.5	10.3	7,59,086	96.27	9.4	7.7
1900-01	27,39,524	1,20,39,505	1,47,79,029	9,37,223	2,23,837	12,61,060	1,60,40,089	8.6	7.8	9,69,688	1,57.49	6.6	6.1
1901-02	35,15,554	20,44,610	55,60,164	10,70,175	83,341	11,53,516	67,12,680	20.3	17.2	8,42,697	84.08	15.1	13.1
1902-03	67,89,592	1,97,788	69,87,370	10,95,999	62,650	11,58,649	81,46,019	16.8	14.2	8,49,931	78.37	12.2	10.9
1903-04	49,76,483	..	49,76,483	11,37,625	..	11,37,625	61,14,308	22.8	18.6	8,15,818	67.90	14.4	14.1
1904-05	49,12,922	..	49,12,922	11,97,576	..	11,97,576	61,10,498	24.4	19.6	8,52,866	57.67	17.4	14.6
1905-06	51,04,796	57,468	51,62,259	12,64,869	836	12,65,755	64,23,014	24.5	19.7	8,43,924	80.06	16.3	13.9
1906-07	71,87,241	2,90,931	74,78,172	13,49,569	24,267	13,73,836	88,52,008	18.4	15.5	9,38,918	84.17	12.6	11.1
1907-08	80,61,309	..	80,61,309	13,59,300	945	13,60,245	94,21,554	16.9	14.4	9,49,351	90.11	11.8	10.5
1908-09	81,80,511	..	81,80,511	13,71,895	574	13,71,969	95,02,490	16.9	14.4	9,22,321	90.53	11.3	10.2
1909-10	78,52,685	..	78,52,685	14,51,671	..	14,51,671	93,04,356	18.5	15.6	9,54,391	88.07	12.1	11.8
1910-11	78,06,813	..	78,06,813	14,40,922	..	14,40,922	92,47,735	18.5	15.6	9,58,723	87.66	12.3	10.9
1911-12	82,24,003	1,46,901	83,70,904	12,39,277	19,480	12,58,757	96,29,661	15.0	13.1	9,36,466	93.07	11.2	10.1
1912-13	89,28,595	1,04,812	90,33,408	13,82,809	48,175	14,25,484	1,04,58,892	15.8	13.7	10,69,162	1,01.08	11.8	10.6
1913-14	1,01,60,017	..	1,01,60,017	14,97,764	81	14,97,845	1,16,57,862	14.7	12.8	11,34,019	1,12.94	10.2	10.0
1914-15	1,07,52,627	..	1,07,52,627	16,76,759	..	16,76,759	1,24,29,386	15.6	13.5	12,25,848	1,20.78	12.3	11.0
1915-16	89,97,113	..	89,97,113	18,20,317	..	18,20,317	99,17,430	22.6	19.3	14,65,960	96.68	18.1	15.3

APPENDIX II—continued.

ANNEXURE II(e).*

Statement showing percentages of establishment charges on total value of works including irrigation executed by the Bombay Public Works Department.

Year.	NET TOTAL OUTLAY ON WORKS.			NET TOTAL ESTABLISHMENT CHARGES INCLUDING DIRECTOR AND ACCOUNTS.			PERCENTAGE AND ESTABLISHMENT TO WORKS.	
	Buildings and Roads Branch.	Irrigation Branch.	Total.	Buildings and Roads Branch.	Irrigation Branch.	Total.	Percentage of column 7 on column 4.	Percentage of column 7 to columns 4+7.
1	2	3	4	5	6	7	8	9
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.		
1889-90	48,05,520	20,97,812	69,03,332	11,93,399	6,01,878	17,94,767	26.0	20.6
1890-91	42,38,796	20,37,415	62,76,211	11,18,670	5,92,865	17,06,985	27.1	21.2
1891-92	45,78,016	17,14,736	62,92,752	11,32,360	5,15,210	16,47,570	26.1	20.7
1892-93	41,36,444	18,02,617	59,39,061	11,52,732	5,48,664	17,01,366	28.6	22.2
1893-94	39,38,302	22,62,652	61,96,954	11,54,456	6,33,429	17,92,915	28.9	22.4
1894-95	38,09,902	26,01,345	64,11,247	11,33,753	7,91,090	19,24,843	30.0	23.0
1895-96	41,49,542	23,74,463	70,24,005	11,40,371	7,85,539	19,25,910	27.4	21.5
1896-97	41,64,502	35,10,703	76,75,205	11,12,032	8,42,811	19,54,843	25.4	20.3
1897-98	33,28,958	33,63,290	66,92,248	9,91,283	8,53,585	18,44,818	27.5	21.6
1898-99	31,72,559	31,55,712	63,28,271	10,19,944	8,36,827	18,56,771	29.3	22.6
1899-1900	28,31,252	35,79,836	64,11,088	9,64,686	9,02,206	18,66,892	29.1	22.5
1900-01	27,39,524	40,73,309	68,12,833	9,37,223	10,09,825	19,47,048	28.5	22.2
1901-02	35,15,554	35,47,151	70,62,705	10,70,175	9,60,435	20,30,610	28.7	22.3
1902-03	37,89,582	45,40,510	1,18,30,092	10,95,999	9,88,712	20,84,711	17.9	15.2
1903-04	49,76,483	36,41,740	86,18,223	11,87,825	9,24,141	20,61,966	23.9	19.3
1904-05	49,12,922	34,69,450	83,82,372	11,97,576	9,88,617	21,81,193	26.0	20.6
1905-06	51,04,796	31,84,334	82,89,130	12,64,869	9,70,669	22,35,528	26.9	21.2
1906-07	71,87,241	31,16,638	1,03,03,879	13,49,569	10,06,952	23,56,521	22.8	18.6
1907-08	80,61,309	38,68,530	1,19,49,839	13,59,300	10,02,190	23,61,490	19.7	16.5
1908-09	81,30,511	42,96,891	1,24,27,402	13,71,395	11,52,464	25,23,849	20.3	16.8
1909-10	78,52,685	50,74,707	1,29,27,392	14,51,671	12,13,018	26,64,689	20.6	17.1
1910-11	78,06,813	48,54,295	1,26,61,108	14,40,922	12,63,569	27,04,491	21.3	17.6
1911-12	82,24,003	51,01,118	1,33,25,121	12,39,277	12,88,479	25,27,756	18.9	15.9
1912-13	89,28,596	54,00,622	1,43,29,218	13,82,309	13,65,229	27,47,538	19.1	16.1
1913-14	1,01,60,017	68,04,677	1,69,64,694	14,97,764	15,35,245	30,33,009	17.8	15.1
1914-15	1,07,52,627	72,83,959	1,80,36,586	16,78,759	15,37,865	32,14,624	17.8	15.1
1915-16	80,97,118	64,05,111	1,45,02,224	18,20,317	16,09,149	34,29,466	23.6	19.1

* Annexures II (f) and (g) not printed.

ANNEXURE III.†

Powers of administrative sanction in connection with Provincial Major and Minor Works up to the amounts mentioned against each.

Designation of officer.	Provincial Minor Works in connection with residential buildings, the total capital cost of which with the additions and alterations does not exceed the limits below and other than those connected with Government Houses and Ecclesiastical Buildings.	Provincial Works other than residential buildings and those in connection with Government Houses and Ecclesiastical Buildings.
Commissioner in Sind	Rs. 2,000, and as regards Police Sub-Inspectors' quarters as per Government Resolution No. C. W.—240, dated 11th January 1913.	Rs. 10,000
Commissioners of Divisions	Rs. 2,000	10,000
Commissioner of Customs, Salt, Opium and Abkari	" 2,000	10,000
Director of Agriculture	" 2,000	10,000
Settlement Commissioner and Director of Land Records	" 2,000	10,000
Inspector-General of Registration	" 2,000	10,000
Commissioner of Income Tax, Bombay	" 2,000	10,000
Superintendent of Stamps, Bombay	" 2,000	10,000
Collector of Bombay	" 2,000	10,000
Surgeon-General with the Government of Bombay	" 2,000	10,000
Director of Public Instruction	" 2,000	10,000
Inspector-General of Police	Rs. 2,000, and as regards Police Sub-Inspectors' quarters as per Government Resolution No. C. W.—4564, dated 26th April 1913.	10,000
Commissioner of Police, Bombay	Rs. 2,000	10,000
Inspector-General of Prisons	" 2,000	10,000
Agent to the Governor, Kathiawar	N/A	5,000
Political Resident, Aden	N/A	5,000
Chief Engineer in Sind	Rs. 2,000	10,000
Superintending Engineers of Divisions	" 2,000	10,000
Sanitary Engineer to Government	" 2,000	10,000
Executive Engineers	N/A	2,500

† Annexures (IV) and (V) not printed.

APPENDIX II—concluded.

ANNEXURE III—concluded.

Powers of certain Superintending Engineers to sanction estimates for works and to accept tenders.

Officers.	Power to sanction Engineering details of works.	Power to accept tenders.
	Ra.	Ra.
Mr. Ali Akbar, M. Inst. C.E., Superintending Engineer	50,000	50,000
Mr. F. St. J. Gebbie, Superintending Engineer, Indus Right Bank Division	20,000	20,000
Mr. F. Wright, Superintending Engineer, Southern Division	20,000	20,000
Mr. R. J. Kent, Assoc. M. Inst. C.E., Superintending Engineer, Central Division	20,000	20,000
Major F. M. Westropp, R.E., Superintending Engineer	20,000	20,000

APPENDIX III.

Note by the Hon'ble the Chief Commissioner of the Central Provinces.

In the note below I shall record my general opinion on certain of the matters referred to the Committee. I regret that I have had no time to work up the subject in the way that I should have liked, as I have been very busy and the reports of the officers who have been consulted reached me only a day or two ago.

2. In the Central Provinces we have, besides the Public Works organisation, a Divisional Local Fund Engineer establishment for carrying out work for local bodies. There are thus two agencies existing side by side, and a considerable body of opinion exists that this is uneconomical and should not be continued. This forms the chief question of reorganisation for decision in this Province, for it is admitted on all sides that considering local conditions there can be practically no change in existing *methods* of work and that no system of private enterprise can take the place of departmental agency for many years to come. On the latter point evidence will be given by the officers of Government who will be examined by the Committee, and I need not enlarge on the subject here, beyond saying that any attempts that have been made in the past to employ local men as large contractors for important public works have proved a failure. Instances in point are the new Secretariat and the Post Office at Nagpur and in the Irrigation Branch the Ramtek and Tendula Canal Head-works. Contracting firms in Calcutta and Bombay might no doubt be employed, but the general conclusion is that the rates of the Public Works Department are not a sufficient inducement to them to undertake works in these Provinces. I am at present considering the question of giving some building work in connection with schools to Messrs. _____, the engineers who are carrying out the _____ Works, but the matter has not yet got beyond the suggestion stage. This experiment, which would be made by the employment of an agency of standing and professional capacity, may show that with existing rates large contractors will come forward to undertake our works. But the agency will be from outside the Province; in view of past experience we can hardly expect to obtain indigenous agency of a quality that will enable any saving to be made in the way of reduction of supervision and management of works.

3. The contractors at present employed are for the most part small men; they are mere suppliers of labour and to some extent of materials. The only labour they can obtain is generally inefficient and the materials they supply require the closest supervision. I believe that, as a matter of fact, our petty contractors make little more than a bare living; many of them have to work on borrowed money, and the question was raised some time ago of introducing a system of Government advances to approved men, so as to get contractors to come forward more readily and do better work. The idea, was, however, given up as impracticable.

4. If it is accepted that our existing system must remain, we have to face the fact that a strong supervising agency is necessary, and this being so it can scarcely be said that present *methods* are uneconomical or unsuitable. One frequently hears the view expressed that the Public Works Department is extravagant, and I shall below give some reasons which tend to produce this impression, for which there is something to be said. But the methods of working can hardly be gainaid, as there is nothing else to replace them.

5. As regards the Public Works Department organisation criticism is possible in respect of the following matters:—

(a). The service is not in such close touch with the general administrative officers, Commissioners and Deputy Commissioners, as are practically all the other departmental services. It is a specialist department, which goes on its own lines and is not responsive to criticism. I quote the following remarks made on this point in replies which have been received:—

Mr. Marten, Deputy Commissioner, Saugor:—

"As we cannot have the system in force in England of employing private firms we must have a Public Works Department and, admitting the great value of the work done by the present Public Works Department, there are certain defects which are, I think, patent. The Public Works Department originated as a body of expert Engineers employed to execute works required for the various branches of the Civil Administration. It has developed into an enormous departmental organisation running on parallel lines with the Civil Department, in many respects entirely independent and with a large power of control and allotment of funds. Though a parallel organisation the various charges do not coincide with the Civil charges and many districts have no resident Executive Engineer but are only visiting charges. This fact combined with a highly developed departmental spirit and a feeling of exclusiveness, which is perhaps natural in the expert in respect of technical work, tends to create an impression that the department is not responsive to criticism or even readily receptive of suggestion by the layman. However much the Deputy Commissioner may be interested in the Civil works of his district, the state of the roads, the progress of buildings, etc., he has, I think, a feeling that they are beyond his reach and outside his jurisdiction, as indeed they are, inasmuch as he has no direct control over them. He feels that only by protracted and perhaps acrimonious correspondence through devious channels can he make his opinions felt or bring home his criticisms, and that even then there is little chance of enforcing individual responsibility in respect of matters which may have been dealt with by numerous individuals and are susceptible of endless technical explanations. I mention these

APPENDIX III—continued.

matters not in a bitter spirit but because I believe that they illustrate what is the principal defect of the Public Works Department in over departmentalisation, too much internal organisation and too little control from without, resulting in want of individual responsibility, too much sticking to a groove and want of close sympathy with the departments directly concerned with the works being executed."

Mr. Wills, Deputy Commissioner, Betul :—

"The Public Works Department is in district administration somewhat of an *"imperium in imperio."* It is largely independent of control by District officers and is correspondingly indifferent to their criticism."

I believe that this aloofness from the general administrative machine and independence of outside control and criticism is largely responsible for what I consider to be the case, viz., that the Department as a whole is not up to the standard in point of view of all-round efficiency of other branches of the public service in India.

(b). I notice amongst some of the opinions sent in by Public Works Department officers themselves recognition that the personnel of the Department is not up to the mark. Mr. Thomson mentions the prevalence of inefficiency in the ranks of the Public Works Department. He speaks of the young Assistant Engineer who, finding himself relegated to measuring up stacks of metal and paying *coolies*, loses interest in his profession and adopts an attitude of carrying on to the detriment of his efficiency and capacity for higher posts. He further condemns the incremental system of promotion as being a narcotic which tends to kill competition and encourages a spirit of minimum effort. My personal opinion, as already stated, is that the Department has more bad bargains than should be the case. There is not the keenness amongst many men to make the best job of their work. There is a tendency to get into a groove and carry on. The way in which road-side trees will be planted and provided with tree-guards according to the book and then left to live or die, is an instance in point: on many roads in this Province money has been thrown away time and again through slackness in this particular. I shall not enlarge on the subject further, but I feel bound to state that all is not well in the Department.

(c). The subordinate establishment is frequently of poor quality and has not got the best of reputations for honesty. It may almost certainly be said that this touches the difficulty which is frequently experienced in getting contractors, a point that is often brought forward. If the contractor has to pay commission, he must make it good somehow, and scamped work is inevitable.

(d). The Public Works Department is blamed for its fondness for the "solid and substantial" in the matter of construction. This is not a defect in organisation, and the Department can say that it is for the officers giving administrative sanction to works to object. But it is probable that closer touch with the general administrative side would make it easier for such objection to be taken and would result in a partial measure of economy in this respect.

(e). Departmental criticism of the organisation of the Department raises the question of the unsuitability of many of the provisions of the Code—a view for which I understand there is much foundation—and the further question of far too much of the time of the professional agency being occupied with accounts. I believe there is a great deal in this latter criticism and it is a matter which deserves investigation. I would add my further opinion that there is too much writing work in the offices of Executive Engineers and their subordinates. In cases which have come before me I have noticed the use of formal correspondence about matters of the most trifling detail. I have tried to drop on this, but I believe the evil is still very pronounced. In a slackly run office the Babu always gets the upper hand and makes work for more clerks and still more. A thorough purge is wanted here.

6. I have referred to these criticisms which are generally made regarding the Department, as they certainly affect the *economy* of the Department although they hardly affect the *methods* of carrying out works except indirectly. It must be understood that I do not condemn every individual man in the Engineer service nor every individual subordinate employé. There are excellent men in the Public Works Department, but there are more than there should be who are indifferent bargains to the State, and there is not always manifest that keenness to get the best out of the money that is spent that one would like to see.

7. There is a further question which bears on economy, viz., that of the high rates of pay drawn by officers of the Imperial Service for doing the ordinary work of a Public Works Department division. This is a matter which I can best refer to when I come to make suggestions for a different organisation for the carrying out of ordinary works.

8. Side by side with the Public Works Department we have in these Provinces what is known as the Divisional Local Fund Engineer scheme for doing the work of local bodies. A separate note is being prepared dealing with this scheme, and witnesses will also speak regarding it. The District Councils of the Central Provinces (I exclude for the present Berar) are too poor to maintain a suitable establishment for their own works; and certain Provincial works have been transferred to the Divisional Local Fund Engineer, on which Government pays to the District Councils the usual supervision charges, in order that with the help of the latter the Councils may be able to finance the scheme. In Berar the District Boards have hitherto run an arrangement of this kind from their own resources. Recently approval has been given to the appointment of two Local Fund Engineers for Berar, and it is being suggested that certain Government works should be made over to them partly to provide funds for the two posts and partly as, on account of the depletion of the Public Works Department cadre because of the war, the Public Works Department Executive Engineers in Berar are overburdened with work.

9. In the Central Provinces the arrangement has not been successful. The charge of a Divisional Local Fund Engineer—a Commissioner's division—is too large for one man; the District Councils have inefficient subordinate staffs—they cannot afford to pay for better—and too much devolves on the Local Fund Engineer: the latter has really the position and responsibilities of an Executive Engineer and cannot undertake them. In Berar the District Boards have fairly well-paid Supervisors, who are really the Executive Engineers of the districts, and the Local Fund Engineer is more a Superintending Engineer. The Commissioner of Berar is satisfied with this arrangement; he thinks it is on the whole working well and holds out the prospect of considerable expansion on existing lines. The general conclusion may be stated that in the Central Provinces we must adopt a similar arrangement and abandon the scheme on the lines which are at present followed, i.e., the Divisional Local Fund Engineer should be an inspecting, and not an executive agency, and a well-paid Supervisor must be appointed in each district for the execution of works. This, however, involves heavy subsidies being paid from Government revenues to the District Councils and the transfer of more works. The District Councils are in most districts very badly off and their programme of works is a limited one.

10. The Divisional Local Fund Engineer is not under the District Councils in either the Central Provinces or Berar, but under the Commissioner. The position with regard to his staff, district supervisors and sub-overseers, in the Central Provinces is somewhat anomalous. The District Councils regard them as their own servants, but the staff take their orders from the Local Fund Engineer and are really outside the control of the Councils. In Berar the supervisors and sub-overseers are under

* Note.—In the Central Provinces we have District Councils. In Berar District Boards.

APPENDIX III—continued.

the District Boards. Mr. Walker, Commissioner of the Nerbudda Division, will explain the position in the Central Provinces more fully to the Committee and will also tell how the present position has arisen and what has been the past history of the execution of District Council works.

11. The main question which we have to deal with is, as I have stated at the beginning of this note, whether we should have two separate agencies for the execution of works in the districts, viz.:—

(1). The regular Public Works Department establishment.

(2). The so-called Divisional Local Fund Engineer establishment (based on the Berar model, which it will be necessary to adopt, if the system is to be continued). The system I would advocate is that we should employ only one agency and have a staff of District Engineers, to do the ordinary work both of Government and of the local bodies. Mr. Walker in his note has strongly pressed for this change and the same conclusion has been arrived at by Mr. Thomson, Superintending Engineer.

12. The main reason for the change is that it is the most economical that can be devised. The present arrangement is wasteful, more especially in the Central Provinces where District Councils have not enough work to provide an adequate staff and where over-lapping results. The other day at the headquarters of a *taluk* I found a Public Works Department Sub-Overseer and a Local Fund Sub-Overseer, both posted to the same place, and both doing work which constantly crossed. Again it cannot be denied that much of the work in an ordinary Public Works Department division does not require a highly paid man to look after it. We find men drawing Rs. 1,250 a month in charge of works which could be quite efficiently run by a man on half the pay or even less. There is extravagance in this respect in the present organisation of the Public Works Department.

13. If a system of District Engineers is adopted, the service should be akin to the present Public Works Department Provincial Service. It might be entirely recruited in India, where, by the time it is fully brought into force even if there is not at present, there will be ample material for the purpose. The Public Works Department service proper would then consist of a few superior and specialist posts under a Chief Engineer on the lines put forward by Mr. Thomson. In the Central Provinces for some time to come there are some districts which would not give sufficient work—Government and District Council combined—for one Engineer; in such cases it would be necessary to create an independent sub-division under an Assistant Engineer. It would also not be necessary to have a Superintending Engineer for each Commissioner's Division as Mr. Thomson suggests two for the Central Provinces and one for Berar would suffice.

14. The Superintending Engineers of this service would be associated with the Commissioner of the Division administratively, and the Executive Engineer with the Deputy Commissioner of the district. I hold that by bringing the Public Works service thus into direct touch with the administrative side, there would be much advantage to be gained; I need only refer to my remarks on this subject in paragraph 5(a) and (b) above. There would also be a check on the tendency to make works too expensive for the purpose they have to serve, see paragraph 5(d). Professionally the control would rest with the Chief Engineer as at present, as the service would be a Government service, but administratively the Superintending Engineers and Executive Engineers would be the co-adjutors of Commissioners and Deputy Commissioners, as is the case in other branches of the public service, where this light and elastic form of subordination works exceedingly well and without friction.

15. The one great practical obstacle to the adoption of this plan is that District Councils and Boards would cease to be responsible for the carrying out of their own works. They would merely propose schemes and provide money—paying their share of the expenses of the establishment either by a direct contribution or by a system

of regulated supervision charges, and there their function would practically cease. In the Central Provinces District Councils have never been invested with powers to carry out works, except of a petty nature, so that historically they can make no claim that their powers are being interfered with. But in practice the Councils have come to consider themselves masters of the staffs they entertain and pay for, and this is one of the complaints made against the Divisional Local Fund Engineer scheme, viz., that it derogates from their powers. And when so much is being said and written about the advancement of local self-government, there is hardly a doubt that the proposal to put the work of the Councils under a Government District Engineer will not be well received. In Berar, there will be a distinct breach with existing practice in this respect, where the District Boards have control over their works staff the Divisional Local Fund Engineer being merely an inspecting officer, with power to prepare or pass estimates professionally.

16. In my opinion we can hardly expect a proposal such as has been made to be carried through unless we provide some way of connecting local bodies with the scheme. Mr. Standen, the Commissioner of Berar, whom I have consulted would hold out for the existing Berar system of two separate agencies, side by side; and in the circumstances of Berar there is room for these two agencies, although one of them, the Public Works Department, can perhaps be considered over-expensive. But we should, if possible, have a uniform scheme, and the District Engineer proposal should hold the field. The suggestion I have to make is that there should be a district "board of works" of which the Deputy Commissioner would be the chairman and to which there would be appointed, say two members to represent District Councils or Boards and two to represent municipalities. The "board of works" could find work to do in the way of advising on road schemes, on the provision which is advisable for the proper upkeep of roads, on standard designs for buildings and the like. I think that in this way a place might be found for such a board in the district administrative machine. We should have to make it clear to local bodies that the District Engineer scheme is put forward on grounds of all-round economy if the service is recruited in India, this will be an additional palliative—that it must, to be efficient, be subject to single control, and that by means of the "works board" the District Councils will be able to bring forward their views and give expression to their opinions in the actual running of the scheme.

17. I put forward this proposal as one which I believe to be both practical and economical. The only objection is that we are taking a backward step in the way of excluding the people from the management of their own affairs, whereas we should endeavour to bring them on and educate them in this respect. In practice it is well known that in connection with a practical matter such as the execution of works a body like a District Council is beset with difficulties; in its corporate capacity it cannot take prompt action and deal with every day problems in a business-like manner. The Commissioner of Berar admits that the system of carrying out works there is rendered possible only because at each district headquarters there is a vice-chairman, generally a pleader, who disposes of the work of the Board with comparative expedition. Why not bring this representative of the local body on the suggested "board of works"? It may not be altogether the same thing in theory; but in practice it gives the District Board recognition. And with this, for the sake of economy and expedition in the carrying out of its works, the local body would have to be content.

18. It may be also that, as time goes on, the District Engineer organisation may be placed exclusively under the District Boards. This is a development which cannot be thought of for many years to come, but it is a possible evolution.

19. The above is the main practical suggestion which I have to lay before the Committee. If it is considered

APPENDIX III—concluded.

that action is possible on these lines, it hardly seems necessary to go into the whole of the points which the Committee have to consider, and which affect mainly the working of the Public Works Department as at present organised. I have said that the present organisation is unsatisfactory in certain respects, it is too centralised and it is too expensive for the greater part of the work it has to do. Let us look for a system which will be as free as possible of these defects, let there be more decentralisation and let us try to have better business methods in the office and accounts work of the engineers. On these lines, and not by an attempt entirely to change the methods of actual execution of works—a change of which there is no possibility in these Provinces at the present time—appears to me to lie the way to reform.

20. If the proposal above put forward should find acceptance, I would advocate that there should no longer be a separate Public Works Department Secretary to the Local Administration, at any rate in connection with Roads and Buildings. The Chief Engineer should remain the professional and departmental head of the service, but the Secretaryship should be combined with that of the Local and Municipal Department. There should be no departure in this respect from the system which is followed with regard to other departments of the administration. The Head of a Province requires as a Secretary a man with a talent for this partic-

ular kind of work. It is not to be expected that he will find it in every Chief Engineer; a good man professionally may be a very indifferent Secretary indeed. Further it is of advantage to have the questions which are submitted for the orders of the Government examined independently of the head of the department who puts them forward. The head of the department will be called into counsel, as is the custom followed at present with other departments, when a matter comes up on which further advice is required or in regard to which there is a division of opinion. A member of the Public Works Department should be eligible for appointment as Secretary to Government for the branch of the administration in which Public Works are included in the Secretariat. If, as I have suggested, the Secretaryship for Local and Municipal affairs is combined with Public Works, an Engineer under the scheme already set forth would have sufficient experience of dealings with District Councils and Municipalities to make a reasonably efficient Secretary, if he were otherwise suited for the post.

21. One other matter I should like to mention and that is the difficulty created by the financial year ending in April the middle of the working season. So far as concerns the Public Works, the date is about the worst that could be chosen. It may not be possible to effect any alteration, but if a change is ever to be made the Public Works point of view should be strongly pressed.

APPENDIX IV.

Memorandum prepared by the Administration of the Central Provinces.

The Public Works Department in the Central Provinces is divided into two branches, namely, Irrigation and Roads and Buildings. The Superior staff of both branches is on a combined cadre, but although in the earlier years of the existence of the Irrigation Department, which was only organized in 1902, transfers from the Roads and Buildings Branch to the Irrigation Branch were frequent as the latter developed such transfers are now exceptional, and the intention is to keep the staff of the two branches completely separate so far as is practicable.

2. The Roads and Buildings Branch is administered by a Chief Engineer who is also Secretary to the Local Administration, and two Superintending Engineers with headquarters at Nagpur and Jubbulpore, respectively. Other administrative posts are that of Under Secretary to the Administration and that of Assistant Secretary, the former being held by an Executive Engineer and the latter by an officer usually promoted from the subordinate clerical establishment. At the beginning of the current financial year the total number of divisional charges was 11, of which 1 has since been held in abeyance, due to causes connected with the war. (In addition to the above there were in the previous year 2 temporary Divisions which were closed on account of the war.) The number of Sub-divisional charges was 44. Of the Divisional charges, 7 were held by Imperial Engineers, and 4 by Provincial Engineers. Of the Sub-divisional charges, 3 were held by Imperial Engineers, 5 by Provincial Engineers, 4 by Temporary Engineers, 28 by Upper Subordinates and 4 by Lower Subordinates.

3. In addition to the above, the following specialist appointments have been sanctioned:—

- (a). Sanitary Engineer.
- (b). Electrical Inspector, and
- (c). Assistant Architect.

The appointment of Sanitary Engineer is equivalent to that of a Superintending Engineer, and it has hitherto been filled by an officer of the Roads and Buildings or Irrigation Branch; the question of obtaining an officer with special qualifications for the post will have to be considered after the war. The Sanitary Engineer pre-

pares Water-works and Drainage Projects for various Municipalities and supervises their construction which, as a rule, is carried out by the Executive Engineers of the Roads and Buildings Branch in addition to their ordinary work, though in certain cases special Sub-Divisions have been opened. A few of the more important Drainage Projects, notably that of Nagpur Town have been designed and are being executed by Messrs. _____, under the general

supervision of the Sanitary Engineer. Since the 1st of January the appointment of Sanitary Engineer has been placed in abeyance, as on account of the financial stringency it is impossible to take up projects on a large scale. The few works in progress have been made over to the ordinary Roads and Buildings staff.

The appointment of Electrical Inspector is a temporary one, the pay of the post being Rs. 500—40—700 per mensem. In all professional matters the Electrical Inspector ranks as an Executive Engineer and takes his orders direct from the Chief Engineer, the accounts of his office, however, are embodied in those of the Executive Engineer, Nagpur No. II Division, and all estimates prepared by him are submitted for sanction through the Executive Engineer, a similar procedure being followed in the case of all contracts proposed to be entered into by him.

An Assistant Architect was appointed for the Central Provinces in 1912, but the officer selected for the post was attached for training to the office of the Consulting Architect to the Government of India. The services of the officer in question have been lent to the Military Department, and although the Government of India have agreed to the appointment of a substitute as a temporary measure, no suitable officer was available for the purpose and it has been decided to leave the appointment in abeyance until the end of the war.

4. The Provincial Engineer Service is ordinarily recruited from two sources:—(a) by the appointment every year of a selected student from Roorkee College, and (b) from the Upper Subordinate establishment. Lately, some recruitment has also been made from the ranks of the Temporary Engineers of the Province. As regards the recruitment from Roorkee College, one

APPENDIX IV—continued.

appointment is usually made annually; two students are appointed to the Province for a year's practical training, and the better of the two is selected to fill the appointment.

5. The Subordinate establishment is generally recruited from passed students of Roorkee College, appointments being usually made in the first place on the Temporary Establishment, selected men being promoted to the permanent establishment as vacancies occur. One permanent appointment of Upper Subordinate is guaranteed in alternate years for a student of the Roorkee College, preference being given to a native of the Central Provinces. It has been recently decided to guarantee annually two permanent appointments of Sub-Overseer, third grade, for students of the Engineering School of Nagpur. The number has been limited to two, as the number of students attending the school is at present very small. It is intended substantially to increase the number of such guaranteed appointments as the class grows.

6. One scholarship of Ra. 10 per mensem is given from the Armstrong Endowment Fund. It is tenable for two years, and is open to any native of the Central Provinces who desires to qualify for a Sub-Overseership in the Public Works Department of the Central Provinces, and may be held at the Thomason College, Roorkee, the Civil Engineering College, Sibpur, the College of Science, Poona, or the Engineering School, Nagpur. The election is in the hands of the Chief Engineer, and where there is more than one candidate the scholarship is awarded to the one who possesses the highest educational qualifications. Particulars of certain scholarships at the Engineering School, Nagpur, are given in the prospectus of the school, a copy* of which is attached to this memorandum, and the attached extracts from the Central Provinces Education Manual give general particulars of all the scholarships at various Engineering institutions. (Annexure A.)

7. As regards practical training of subordinates, the Upper Subordinate from Roorkee appointed to the permanent establishment, *vide* paragraph 5 above, is placed on a year's probation, during which he is placed under a selected Upper Subordinate for training, in accordance with the rules laid down in the Public Works Department Code. Arrangements have recently been made for the whole of the students of the Civil Engineering course at the Nagpur School to receive six months' practical training on works under selected Subordinates three months in the Irrigation Branch and three in the Roads and Buildings Branch.

8. The following statements are attached to this memorandum :—

(i). Showing the areas of Circles and Divisional charges in the Central Provinces, and the average expenditure in each for the past three years. (Annexure B.)

(ii). Showing the total expenditure incurred under various heads on works and establishment during each of the past five years. (Annexure C.)

(iii). Showing the grants for major and minor works during the last five years. (Annexure D.)

(iv). Showing the powers of Administrative and Technical sanction delegated by the Local Administration to Heads of Departments and Superintending and Executive Engineers. (Annexure E.)

ANNEXURE A.

Extract from the Central Provinces Education Manual regarding the grant of Scholarships.

VOLUME I.

211. Thirteen College scholarships—senior—are awarded annually, on the result of the First Arts or Intermediate Examination of the Calcutta and Allahabad Universities. Of these

Number, method of award, place and period of tenure.

11 are tenable for two years in any College of Arts in the Central Provinces, or in any College of Medicine or Engineering or Superior School of Art outside the Central Provinces. The remaining two are tenable in any College of Medicine only for two years. All these scholarships may, with the express sanction of the Director, be extended for such further period as may, in the circumstances of the particular case, be desirable to enable the scholarship-holder to complete his course of study.

N.B.—If both the scholarships reserved as above for Medicine are not taken up, one of them may be awarded for Engineering or in the School of Art.

212. College scholarships—senior—are of the value of Ra. 10 and Ra. 15 per mensem each. A scholarship-holder will receive, if each joins an institution in a town in which his parents or guardians reside, Ra. 10 per mensem, otherwise Ra. 15 per mensem.

(2). *Roorkee, Sibpur and Poona Engineering Scholarships.*

239. Two scholarships of the value of Ra. 40 and Ra. 20, respectively, tenable for three years, the former in the Engineer and Telegraph class, the latter in the Upper Subordinate class of the Thomason College, Roorkee, or in equivalent classes of Civil Engineering College, Sibpur, or the College of Science, Poona, will be offered to candidates from these Provinces who compete successfully in the Entrance Examination of those institutions. These scholarships will be tenable on the same conditions as scholarships awarded by the Thomason College, Roorkee, or the Civil Engineering College, Sibpur.

247. (1). Three scholarships will be awarded annually to students of the Central Provinces and Berar who wish to take a course of Technical training in Textile Industries or Electrical or Mechanical Engineering. Candidates must have been resident in the Central Provinces or Berar for not less than three years.

(2). Candidates must have passed the Matriculation examination of the Allahabad University (from a school in Central Provinces or Berar), but preference will be given to such as have passed the Intermediate or Bachelor of Science examination.

(3). The value of each scholarship will be Ra. 30 per mensem for those who have passed the Bachelor of Science examination and Ra. 25 for those who have passed the Matriculation or Intermediate examination. In the case of Europeans or Eurasians these scholarships will be increased by Ra. 5 in each case.

(4). These scholarships will ordinarily be tenable for three years, but may be extended to a fourth year if necessary.

(5). Every application must be accompanied by the following papers :—

(a). Certificate of moral character.

(b). Health certificate.

(c). A statement giving the fullest information available as to the applicant's qualifications, physique and antecedents.

(6). Scholarships are liable to be withdrawn for failure to pass the usual examinations or misconduct.

(7). Applications must reach the Director of Public Instruction, Central Provinces, by the 1st November in each year.

The Balaram Das Technical Scholarship.

252. One Technical Scholarship of Ra. 12 per mensem tenable for two years at the Engineering Class, Nagpur, or for three years at the Agricultural College, Nagpur, or for four years at the Victoria Jubilee Technical Institute, Bombay, or Medical School, Patna, will be awarded when it falls vacant to a pupil of the Rajnandgaon High School who has passed the Matriculation examination of the Allahabad University. The scholarship was originally founded by Raja Bahadur Mahant Bahram Das, Feudatory Chief of Nandgaon State.

* Not printed.

APPENDIX IV—continued.

The Meckenzie Scholarship.

254. The scholarship is tenable for four years in any College of Arts, Medicine or Engineering by the Hindu student of the Neil City High School, Nagpur, who passes highest in the first Matriculation examination that may occur after the scholarship is vacant. It is of the value of Rs. 7-8-0 per mensem.

The Browning Scholarships.

255. These scholarships are as below :—

(a). The Browning scholarship of Rs. 20 per mensem tenable for two years in any College of Arts or Law in the Central Provinces or in any recognised institution of College of Engineering, Medicine, Agriculture, or Art in British India.

* * * *

The Wiggins Scholarship.

258. This scholarship is of the value of Rs. 2-4-0 per mensem, is open to any native student of the Saugor High School who passes the Entrance or School Final examination, and wishes to join a College of Arts or the Engineering Class, Nagpur.

The Rambaji Rao Scholarship.

263. The income accruing from Promissory Notes of of the value of Rs. 9,000 is applied in founding three

scholarships of Rs. 10 per mensem each or of such other sum as the income may produce. The scholarships are open to students of Neil City High School, Nagpur, and are tenable for one year in any recognised College of Arts, Law, Medicine or Engineering in British India.

VOLUME II.

II.—Special.

104. The following scholarships have been instituted to commemorate the Jubilee of the Nagpur Volunteer Rifles :—

(1). The scholarships shall be known as "The Nagpur Volunteer Rifles Scholarships." They shall comprise :—

* * * *

(c). One scholarship tenable for three years of Rs. 15 per mensem for the first and second years and Rs. 20 per mensem for the third year, to be held in the Civil Engineering Class of the Engineering School, Nagpur.

(d). One scholarship tenable for three years of Rs. 15 per mensem for the first and second year, Rs. 20 per mensem for the third year and Rs. 25 per mensem for the fourth year to be held in the Mechanical Engineering Class of the Engineering School when established at Nagpur.

ANNEXURE B.

Statement showing the number of Administrative, Divisional and Sub-Divisional Charges on the 1st April 1916, and approximate area of each Administrative and Divisional Charge and the average annual outlay (in round figures) for the preceding three years in Circle and Divisions.

NUMBER OF CHIEF ENGINEERSHIP.	SUPERINTENDING ENGINEERSHIP.			DIVISIONAL CHARGES.			Number of Sub-Divisions in each Division.	REMARKS.
	PERMANENT.		Average annual outlay for preceding three years.	PERMANENT.		Average annual outlay for preceding three years.		
	Name of Circle.	Approximate area in square miles.		Name of Division.	Approximate area in square miles.			
1	2	3	4	5	6	7	8	9
			Rs.			Rs.		
1	First	40,443	37,22,000	Nagpur No. I	3,090	9,87,000	4	Since amalgamated with Bhandara on account of the War.
				Nagpur No. II	3,178	5,79,000	3	
				Bhandara	7,097	2,78,000	2	
				East Berar	9,938	4,95,000	5	
				West Berar	7,823	6,21,000	4	
				Chanda	9,312	4,80,000	3	
	Second	59,380	28,58,000	Jubbulpore	10,600	7,90,000	5	Now called the Jubbulpore South Division with Headquarters at Jubbulpore.
				Mandla	5,057	2,76,000	3	
				Hoshangabad	7,909	5,47,000	5	
	Sanitary Circle.	..	..	Plateau	11,708	4,89,000	3	Special Sub-Divisions for Sanitary works only. Ordinary Roads and Buildings Sub-Divisions also carry out Sanitary works.
Eastern				22,039	7,56,000	4		
	Average	49,912	32,90,000		8,895	5,72,546		

APPENDIX IV—continued.

ANNEXURE C.

Expenditure incurred by the Central Provinces, Public Works Department, Buildings and Roads Branch, between the years 1911-12 and 1915-16 (including that for Local Bodies).

Years.	CIVIL BUILDINGS.		COMMUNICATIONS.		MISCELLANEOUS PUBLIC IMPROVEMENTS.		Total (columns 2 to 7).	ESTABLISHMENT CHARGES.			PERCENTAGE	
	Original works.	Repairs.	Original works.	Repairs.	Original works.	Repairs.		Director.	Construction.	Total.	Of columns 10 to 8.	Of columns 11 to 8.
1	2	3	4	5	6	7	8	9	10	11	12	13
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Per cent.	Per cent.
1911-12	16,41,600	2,51,241	9,25,452	15,25,293	4,25,345	2,25,490	49,02,481	2,35,220	7,43,916	9,79,166	14-90	19-61
1912-13	23,00,957	2,91,874	11,56,353	16,42,180	4,49,484	2,16,192	60,57,010	2,66,102	7,30,510	9,96,612	13-06	16-49
1913-14	29,79,668	3,24,775	12,42,213	16,64,895	4,14,893	—62,865	65,63,599	2,92,734	7,46,106	10,38,842	11-26	15-83
1914-15	32,46,197	3,36,384	14,21,858	16,76,621	7,48,680	18,956	74,48,696	2,72,150	8,37,475	11,09,625	11-24	14-89
1915-16	24,19,437	3,36,524	12,21,743	16,33,397	6,73,149	16,587	63,00,837	2,78,690	8,55,229	11,33,919	13-57	17-99

Expenditure incurred by the Public Works Department for Local Bodies.

1911-12	93,866	177	39,350	12,936	5,94,350	9,291	5,49,970	..	..	..	..	..
1912-13	77,850	12	31,688	22,316	4,21,292	11,120	5,64,278	..	..	..	..	..
1913-14	2,44,402	414	50,418	33,701	4,01,001	12,844	7,32,780	..	..	..	..	..
1914-15	2,31,528	278	33,693	15,562	7,22,334	14,828	10,18,223	..	..	..	..	..
1915-16	2,66,617	50	18,248	13,335	6,78,040	11,635	9,88,125	..	..	..	..	..

ANNEXURE D.

Grants for Civil Works.

Years.	CIVIL BUILDINGS.		COMMUNICATIONS.		MISCELLANEOUS PUBLIC IMPROVEMENTS.		TOTAL.		GRAND TOTAL.
	Major.	Minor.	Major.	Minor.	Major.	Minor.	Major.	Minor.	
1	2	3	4	5	6	7	8	9	10
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1911-12	20,000	17,970	..	..	..	..	20,000	17,970	37,970
1912-13	1,02,100	26,498	..	..	..	..	1,02,000	26,498	1,28,598
1913-14	2,63,788	23,398	..	..	..	..	2,63,788	23,398	2,92,186
1914-15	2,10,839	29,006	..	..	..	..	2,10,839	29,006	2,39,845
1915-16	1,56,208	20,890	..	..	..	..	1,56,208	20,890	1,77,098
			PROVINCIAL.						
1911-12	12,43,048	3,58,944	7,13,222	1,95,426	27,511	10,771	19,83,781	5,65,141	25,48,922
1912-13	17,19,635	4,48,873	9,31,347	1,27,339	23,567	4,693	26,74,549	5,80,905	32,55,454
1913-14	20,61,162	4,14,226	9,70,241	2,25,671	6,601	12,821	30,38,004	6,52,718	36,90,722
1914-15	23,46,450	4,16,763	11,43,795	2,31,487	19,041	9,266	35,09,286	6,57,516	41,66,802
1915-16	15,67,268	4,32,628	10,48,628	1,84,434	..	12,531	26,15,996	6,29,593	32,45,589

Total of Imperial and Provincial.

1911-12	12,63,048	3,76,914	7,13,222	1,95,426	27,511	10,771	20,03,781	5,83,111	25,86,892
1912-13	18,21,735	4,75,371	9,31,347	1,27,339	23,567	4,693	27,76,649	6,07,403	33,84,052
1913-14	23,24,950	4,42,624	9,70,241	2,25,671	6,601	12,821	33,01,792	6,81,116	39,82,908
1914-15	25,57,289	4,45,769	11,43,795	2,31,487	19,041	9,266	37,20,125	6,86,522	44,06,647
1915-16	17,23,576	4,58,518	10,48,628	1,84,434	..	12,531	27,72,204	6,50,483	34,22,687

APPENDIX IV—concluded.

ANNEXURE E.
POWERS OF SANCTION DELEGATED IN THE CENTRAL PROVINCES.
Administrative Sanction.

Heads of Departments.	IN CONNECTION WITH PROVINCIAL MINOR WORKS.	
	Residential buildings.	Other works.
Commissioners of Divisions and Heads of Departments	Nil	Ra. 5,000

NOTE.—Departmental buildings for the Public Works Department are sanctioned by the Commissioners of Divisions.

Technical Sanction and Contracts.

Powers to sanction detailed Estimates.	Limit fixed.
<i>Superintending Engineers—</i>	Rs.
Original works Civil Buildings on standard designs	50,000
" " " not on standard plans	25,000
" " Communications.	10,000
Acceptance of Contracts	50,000
Estimates for Tools and Plant	5,000
Estimates for Office Furniture	200
Purchase of Tents	(in each case.) 1,000
Contributitional works	(for each Estimate.) 10,000
<i>Executive Engineers—</i>	
Estimates for Original Works and Special Repairs (exclusive of Circuit Houses, Dāk and Inspection Bungalow furniture).	2,500
Acceptance of Contracts	5,000
Ordinary repairs to buildings and roads within the limit of Budget allotments	Full powers.
Estimates for the supply and repairs of Tools and Plant	500
Contribution Works	(in each case exclu- sive of office furni- ture and live-stock.) 200

APPENDIX V.

Note by the Administration of the Central Provinces on the system adopted in the Central Provinces for the execution of public works by local bodies.

In letter No. 1709-VII-8-90, dated the 7th November 1888, Commissioners of Divisions were addressed regarding the inefficiency and waste which attended the execution of local works by District Councils. Under the system then in force the execution of works was entrusted to unqualified or partially qualified subordinates on salaries varying from Rs. 15 to Rs. 80. The Councils, it was said, had had thrust on them a burden of executive detail which their constitution rendered them unfit to sustain efficiently, while their funds were too limited to enable them to employ competent paid staffs. The credit of the Local Administration was bound up with that of the Councils and the Local Administration must provide the executive agency which the Councils themselves were unable to supply. The Councils would retain all their powers of initiation and financial control, but important works would be executed by the Public Works Department, while for works not requiring professional skill the Deputy Commissioner with his subordinate staff of all grades would be the responsible executive agency. One great advantage of the system would be that the Chief Commissioner would be able to make grants-in-aid of roads from Provincial funds with more freedom than had hitherto been possible.

2. At the same time it was explained that there was every intention of utilizing the services of individual members of Local Boards in the supervision of minor works. The Local Boards would also advise the Councils. The position of the Councils would be that of consulting

bodies regarding the requirements of the district, deciding on the works to be undertaken and on the financial provision required.

3. These orders, which were issued with the approval of the Government of India, referred only to District Councils, but there was no objection, it was said, to including the works of Municipalities in the arrangement. But as a general rule, the ordinary repairs of town roads and the like could be undertaken by any Municipal Committee which could afford to pay for an overseer.

4. This letter was followed by a resolution No. 64-1840, dated the 6th March 1889. This resolution included the following orders:—

The construction of all new roads and the raising in class of all roads were to be done by the Public Works Department. The Public Works Department would also maintain all roads of Classes I and II. The maintenance of roads of Classes III-A and III-B was entrusted to Deputy Commissioners. Other works costing Rs. 1,500 and over would be undertaken by the Public Works Department. Works costing less than that sum would be carried out by Deputy Commissioners.

5. It was said that the Councils would find that their responsibilities and dignities were in no way impaired by their surrender of executive duties which their constitution rendered them incapable of fulfilling with efficiency.

6. Although the execution of minor works was entrusted to Deputy Commissioners, the Councils were

APPENDIX V—continued.

permitted to engage their own subordinate staff if this was considered necessary and in practice the Councils did engage overseers and sub-overseers.

7. In 1909 Mr. Laurie, Commissioner, Nerbudda Division, represented that, as the Local Bodies had subordinate staffs, the Local Boards might be entrusted with the execution of minor works. After certain correspondence Sir Reginald Craddock transferred from the Deputy Commissioner to the District Councils and Local Boards in the Central Provinces the maintenance of roads of Class III and the execution of works, other than roads, estimated to cost less than Rs. 1,500.

8. Previous to this Sir Reginald Craddock, as Commissioner of the Nagpur Division, had started his scheme for a Divisional Local Fund Engineer for that Division. His proposals were contained in a note dated the 4th January 1906. He pointed out that as regards petty works, though the help of the Executive Engineer could be asked for, that officer had too much work to do to comply, or at least to comply promptly. The system of making over large works and the money for them to the Public Works Department was unsatisfactory, as it was practically impossible to watch or criticise the Public Works Department. The Provincial Government might just as well appropriate the road cess and undertake the whole work of road construction and maintenance. Petty works could not be supervised by the Executive Engineer, and consequently, the Deputy Commissioner had to sign bills without any expert assistance. Even an overseer on Rs. 60 a month would not be sufficient.

9. Sir Reginald Craddock therefore proposed the appointment of a divisional local fund engineer. It was not possible, he thought, to have district engineers as there would not be enough work for them to do. He suggested that a good many provincial roads might be handed over to the engineer. He also proposed that municipalities should contribute small sums. Sir John Miller permitted the introduction of the scheme in the Nagpur Division. In 1910 Sir Reginald Craddock decided to extend the scheme to all divisions in the Province. He decided (1) that every division should employ an engineer; (2) that every district should have a proper subordinate staff consisting of a district overseer with such subordinates under him as might be necessary; and (3) that such district roads at present provincial as could be maintained by their staffs should be handed over to the Councils with grants necessary for their maintenance. He directed the Chief Engineer and Commissioners to work out how this could be done and to discuss and determine a common line of action. As regards municipal contributions he thought that these should be of two kinds (a) a retaining fee entitling to advice and general inspection and (b) a percentage on works actually executed. He wished the scheme to be started by the 1st of April 1911.

10. Superintending Engineers then submitted their proposals for the transfer of roads and these were noted on by Mr. Harriot, the Chief Engineer, but nothing definite appears to have been done although in pursuance of Sir Reginald Craddock's orders divisional local fund engineers were actually appointed. Finally in the Administration's letter No. 889, dated the 18th July 1913, Sir Benjamin Robertson gave orders for the full introduction of the scheme. Transfers of roads were to be effected and in addition to maintenance grants there was to be a contribution of 11½ per cent. for tools and plant from the Public Works Department. In future years budget provision for the transferred works, including the extra 11½ per cent. would be made under the head "Civil works in charge of Civil officers" and not under the head "Civil works—Public Works Department." Similar orders were issued regarding the transfer of buildings, e.g., Police Stations, Excise buildings and Girls' Schools. All transfers of roads and buildings were to be completed by the 1st April 1914. As regards supervision by the Public Works Department it was remarked that this was impossible, as the Public Works Department staff was fully employed, but where a Superintending Engineer in the course of his tours found anything to remark on in the case of a transferred work,

he should send his criticisms to the Deputy Commissioner. It was also said that when the full scheme had been got into working order a report should be submitted showing for each district (1) the amount of expenditure undertaken by the new establishment; (2) the cost of the establishment; and (3) the manner in which it was being financed. It was added that the whole position should be reviewed so as to render possible a decision whether any alterations in the scheme were desirable.

11. Reports, varying in the degree of their completeness, have been received from all divisions. The report from the Nagpur Division has only just been received; the other reports, besides being incomplete in some cases are already largely out of date, so no attempt is made to summarize them.

12. Annexure A.—A statement is appended showing the amount spent by District Councils in each division during 1915-16 on works. Information of the amounts (included in those sums) representing money spent on transferred Provincial roads and buildings is not available. Nor is information available regarding works executed for municipalities by the divisional and district fund establishments.

13. Annexure B.—A statement is also appended, showing the establishment, with its pay, employed under the scheme.

14. The extent to which the functions of the divisional engineer are executive or consultative and supervisory appears to vary from division to division. The extremes seem to be the Nagpur Division on the one hand, where the engineer is very largely an executive officer, and the Berar Division on the other where he has no executive functions. In Berar the Commissioner says, "the control of their works staff is in the hands of the Boards, and the divisional engineer is treated purely as an advisory and inspecting officer without executive functions." The Commissioner of Nagpur in his report just received, says:—"Whatever the original intention was, I am afraid that it must now be confessed that the scheme has evolved into a measure of centralization which is most unsatisfactory to the local bodies concerned, and that it does not even possess the merit of efficiency, because the work expected of the divisional engineer is far more than he can accomplish." This result appears to me to be entirely due to the fact that the "rules" regarding the control and proper working of the Divisional Local Fund Engineer's scheme for the Nagpur Division" were framed on radically wrong lines. The very first rule is that the divisional local fund engineer will be in executive charge of works under the new scheme. The staff of supervisors and sub-overseers was placed under his direct orders. For all works costing over Rs. 500 the divisional local fund engineer was to select and appoint contractors and enter into the necessary agreements. The appointment, promotion and dismissal of supervisors was vested in the Commissioner and of sub-overseers in the Deputy Commissioner, but all recommendations in this connection were to be submitted by the divisional local fund engineer. The diaries of the supervisors were to be submitted to the divisional local fund engineer who would return them to the supervisor. The divisional engineer was to countersign all travelling allowance bills, and to grant casual leave and privilege leave to sub-overseers and supervisors, though in the case of privilege leave he had first to consult the local bodies. It is true that the local bodies were left with the power to sanction works under Rs. 500, under rule 4 the Chairman was required to sign completion certificates, and under rule 7 the diaries of the sub-overseers had to be submitted to the Chairman for perusal. For the rest, the powers of the local bodies were entirely eliminated, and it is not surprising that it should now be reported that they have ceased to take any interest in works.

* The Commissioner is here referring to rules issued in 1914 apparently by one of his predecessors.

APPENDIX V—concluded.

ANNEXURE A.

Expenditure incurred by District Councils and Boards on works in 1915-16.

Name of Division.	Expenditure on Civil works.	Expenditure on establishment, tools and plant.	Total.	REMARKS.
1	2	3	4	5
Nagpur Division	Rs. 3,31,431	Rs. 62,069	Rs. 3,93,500	
Jubbulpore "	2,22,858	36,886	2,59,744	
Nerbudda "	1,84,335	41,715	2,26,050	
Chhattisgarh "	2,59,388	23,530	2,82,918	
Berar "	5,50,034	85,857	6,35,891	
TOTAL	15,48,046	2,50,057	17,98,103	

NOTE.—In Berar no roads have as yet been transferred to District Boards for maintenance.

ANNEXURE B.

Details of pay, etc., of Divisional Local Fund Engineer Staff and District Fund Public Works Staff in Central Provinces and Berar.

Name of District Council.	DIVISIONAL LOCAL FUND ENGINEER AND STAFF.			DISTRICT ESTABLISHMENT.				TAHSIL ESTABLISHMENT.			
	Divisional Local Fund Engineer.	Clerks, draftsmen and tracers.	Peons, etc.	Supervisors (and overseers in Berar).	Horse allowance.	Clerks.	Peons.	Sub-overseers.	Horse allowance.	Peons.	
NAGPUR DIVISION	1 (350-550)	1 (80), 1 (60-70), 1 (50-60), 3 (40), 1 (35), 1 (30), 1 (25).	1 (15)(a) 1 (8) 2 (7) 1 (7)(b) 1 (2)(c)	..	..	..	..	..	..	..	(a). Daftri.
Nagpur	1 (125-150)	..	1 (40)	1 (7)	4 (50)	4 (15)	4 (7)	(b). Chowkidar.
Chanda	1 (150)	..	1 (40)	1 (7)	1 (50)	4 (15)	4 (7)	(c). Sweeper.
Bhandara	1 (80-100)	..	1 (30)	1 (7)	3 (50), 1 (30)(d)	4 (15)	3 (7)	(d). Mistri.
Balaghat	1 (150)	..	1 (40)	1 (7)	3 (50)	3 (15)	3 (7)	
Wardha	1 (150)	..	1 (40)	1 (7)	2 (50), 1 (40)	3 (15)	3 (7)	
JUBBULPORE DIVISION	1 (300-600)	1 (50), 1 (40), 1 (25)	3 (7)	..	..	..	..	..	..	..
Jubbulpore	1 (125)	1 (25)	1 (40)	1 (7)	1 (50), 2 (40), 1 (30)	4 (15)	4 (7)	
Saugor	1 (100)	1 (25)	1 (35)	1 (7)	1 (50), 1 (40), 2 (30)	4 (15)	4 (7)	
Damoh	1 (100)	1 (25)	1 (35)	1 (7)	1 (50), 1 (40), 2 (40)	2 (15)	2 (7)	
Seoni	1 (80)	1 (25)	1 (30)	1 (7)	1 (50), 1 (40)	2 (15)	2 (7)	
Mandla	1 (80)	1 (25)	1 (30)	1 (7)	1 (50), 1 (40)	2 (15)	2 (7)	
NERBUDDA DIVISION	1 (400-600)	1 (60-70), 1 (40-50), 1 (25-30), 1 (24-30)	3 (7), 1 (7)(e), 1 (2)(f)	..	..	..	..	..	..	..	(e). Chowkidar.
Hoshangabad	1 (90-120)	1 (25)	1 (30-35)	1 (7)	4 (40-50)	4 (15)	4 (7)	(f). Farash.
Nimar	1 (90-120)	1 (25)	1 (30-35)	1 (7)	2 (40-50)	3 (15)	3 (7)	
Chhindwara	1 (70-90)	1 (25)	1 (25-30)	1 (7)	1 (35-45)	3 (15)	3 (7)	
Betul	1 (70-90)	1 (25)	1 (25-30)	1 (7)	1 (40-50)	3 (15)	3 (7)	
Narsinghpur	1 (70-90)	1 (25)	1 (25-30)	1 (7)	2 (35-45)	2 (15)	2 (7)	
CHHATTISGARH DIVISION.	1 (300-400)	1 (60), 1 (45), 1 (80), 1 (25)	3 (7)	..	..	..	..	..	..	..
Raipur	1 (125-150)	1 (25)	1 (30)	1 (7)	1 (60), 1 (50), 2 (40), 1 (35)	5 (15)	..	
Bilaspur	1 (100-125)	1 (25)	1 (30)	1 (7)	1 (50), 2 (40), 1 (35)	4 (15)	..	
Drug	1 (80-100)	1 (25)	1 (30)	1 (7)	1 (50), 2 (40), 1 (35)	4 (15)	..	
BERAR DIVISION	1 (400-600) (2) 1 (500 average).	1 (50-60), 1 (40-50), 1 (25-35), 1 (20-30)	3 (8)	..	..	..	..	..	..	..
Amraoti	..	Information not available	..	1 (150-200)	..	..	..	2 (50), 3 (40), 1 (30)	H	H	(g). Overseers.
Akola	1 (80), 1 (60) (g)	H	H	H	2 (50), 4 (40), 1 (35)	H	H	(h). Exact pay of the appointment is not available.
Buldana	1 (100-120), 1 (60)(g)	..	..	..	2 (50), 3 (40), 1 (30)	..	..
Yeotmal	1 (100-120), 1 (60-70)(g)	..	..	..	2 (50), 3 (40), 1 (30)	..	..

(H) Details are not available.

NOTE.—The Nagpur Division figures have been obtained from the Commissioner's Office.

APPENDIX VI.

APPENDIX VI.

Letter from the Hon'ble Mr. H. H. Green, Secretary to the Government of Bengal, Public Works Department, to the Secretary, Public Works Department Reorganization Committee, No. 492-E., dated the 29th January 1917.

I am directed to refer to Mr. Rose's letter No. 555 E. A., dated the 15th November 1916, on the subject of the proposed reorganization of the Public Works Department, and to state briefly what are the present views of this Government. At the same time I am to say that His Excellency in Council would have preferred to postpone his remarks until he had an opportunity of perusing the evidence and the report of the Committee. Such opinion as he may now express should therefore be considered as provisional and as subject to revision hereafter in the light of the evidence and the report.

2. The first point on which the views of the Local Government are desired is *whether the methods at present adopted for the execution of civil works are economical and suitable for the purpose for which they were devised.* In this connection I am to refer to the Local Government's letter No. 91 T.—A.,* dated the 16th May 1914. The Governor in Council has not seen any reason to modify the opinions which he then expressed, nor has the Hon'ble Nawab Sir Syed Shams-ul-Huda seen any reason to modify his note of dissent. The present opinion of the majority of the Council may therefore be taken to be that, on the whole, the existing system is fairly economical and fairly suitable.

3. The second point for consideration is *whether, under the existing system, private enterprise is sufficiently encouraged, and whether it is possible and desirable to entrust the construction and upkeep of certain classes of public works to agency other than departmental, and, if so, upon what lines such change should be effected.* On this question I am to say that in Bengal the Public Works Department does very little work on a purely departmental basis. Practically all work is given out to contractors, large or small, closely supervised by the officers of the Public Works Department. Except in small works it is customary for different portions of the work to be entrusted to different contractors. In Calcutta there are several large firms of "master contractors." Those firms are generally unwilling to take up work in the *mufassal*, unless the work be on a large scale, such as the buildings at Dacca. As regards petty contractors, they exist in large numbers, both in Calcutta and in the *mufassal*. They are generally men of small capital and an easy standard of integrity. Their work requires constant supervision at every stage. On the whole, the Governor in Council is of opinion that private enterprise, large and small, is at present receiving reasonable encouragement in this province. He is, however, quite prepared to entrust more work to reliable firms of master contractors, not only in Calcutta, but also (if and when they are prepared to undertake it) in the *mufassal*. He recognises that the work of such master contractors as already have earned a reputation for reliable work requires less supervision than the work of petty contractors. He also recognises that those master contractors have a right to expect that entire projects will be entrusted to them, and that they will not be asked to tender for specific portions of the work. One advantage in entrusting a whole project to a reliable master contractor is that once his tender has been made and accepted, the ultimate cost of the project is definitely known. Under the present system, on the other hand, it is inevitable that sanctioned estimates will sometimes be exceeded.

4. As regards the next point, namely, *whether any changes recommended by the Committee necessitate any modification of the organization of the staff of the Public Works Department and, if so, what,* the opinion of the Governor in Council may be briefly expressed by saying that so long as the master contractors mentioned above are unwilling to do work in the *mufassal* it is not

possible to propose any drastic changes in the staff of the Public Works Department. The Governor in Council anticipates, however, that if more projects be entrusted to master contractors in Calcutta new and reliable firms will gradually spring up, capable and willing of undertaking work in the *mufassal*. When this comes about a gradual reorganization and reduction of the Public Works Department will follow as a necessary sequence.

5. The next point is *whether the Public Works Department meets the needs of other departments of the Administration, and whether the relations inter se of the various sub-divisions of the Buildings and Roads Branch, Sanitary, Architectural, Electrical and Civil Engineering are satisfactory.* In reply, I am to say that while officers of other departments frequently indulge in more or less severe criticisms of the Public Works Department just as they indulge in similar criticisms of the Accountant-General and his staff, yet, on the whole, the relations between the Public Works Department and other departments are cordial. Those who are most forward in their criticisms are often the first to acknowledge that they have not studied the problem in detail and to admit that the Public Works Department has very special difficulties to meet and that it does its best to meet them. As regards the relations inter se of the various sub-divisions of the Roads and Buildings Branch of the Public Works Department, I am to say that in this province they are generally satisfactory. Incidentally the Governor in Council would warmly welcome an increase in the Architectural staff of the province. He is much impressed by the present insufficiency of trained architects.

6. As to *whether further decentralization within the Public Works Department itself is desirable, and, if so, to what extent and in what directions,* the opinion of the Governor in Council is that further decentralization is desirable, particularly in the direction of giving larger powers to Superintending Engineers.

7. The next point is *whether the Public Works Department Code, which regulates the execution and maintenance of civil works, is unduly restrictive and, if so, in what direction change is desirable.* On this point I am to say that the opinion of the Governor in Council is decidedly in the affirmative. The conditions vary so greatly in different provinces that the Governor in Council would like to see much less in an "all-India" Code and much more left to the discretion of Local Governments. As an outstanding example of the defects of the present system, I am to allude to the hard-and-fast rules regarding residential buildings, the admissible outlay upon the same, and the rent which the occupants have to pay to the State. It is not too much to say that, for no fault on the part of the Public Works officers in Bengal, the Government officials in this province live, as a whole, in unsuitable houses, with meagre compounds and excessive rents.

8. The next question is large and difficult, and is formulated thus: *whether the system of education in Government Engineering Colleges is organized on a sufficiently broad basis to meet the needs of private agency as well as of Government, whether it attracts suitable candidates and whether the standard of instruction is sufficiently advanced to provide fully qualified Civil Engineers for employment by Government, local bodies, and private engineering contracting firms, and, if not, in what directions and to what extent improvement is required.* Without going into details, which will be placed before the Committee in the evidence of Mr. Heaton, I am to say that on the whole the Civil Engineering College at Sibpur meets the needs of private agency as well as of Government, and that it attracts suitable candidates who afterwards reflect credit upon it. There is, however,

* Annexure A.

APPENDIX VI—continued.

one aspect of the institution which the Governor in Council cannot regard without misgiving. Although the majority of the people of Bengal are Muhammadans and although Muhammadans have a special aptitude for engineering (as witnessed by their marked success as practical engineers both on shore and in steamers) yet the students in Sibpur are almost entirely composed of Hindus and Anglo-Indians. This is mainly due to the poverty of Muhammadan students and to their desire to earn a livelihood by the cheapest and quickest means. As a result, Bengal is now turning out practically no Muhammadans, not only in the higher ranks of engineering but also in the higher ranks of medicine. The problem is receiving the anxious consideration of His Excellency in Council. In connection with the present state of efficiency in Sibpur College, it must be borne in mind that the institution has been greatly hampered for many years by schemes for its removal to Ranchi and for the establishment of an Engineering College at Dacca and a Technological Institute in Calcutta. The existence of these schemes—which, for various reasons have not borne fruit—has undoubtedly prejudiced the development of Sibpur College partly by the restriction of capital expenditure and partly by the general feeling of uncertainty.

9. The last point is *whether adequate provision is made for the practical training on works of students who have received their scientific education in English or Indian Colleges.* The Governor in Council understands that the question relates to Civil Engineering and therein mainly to Indian students. Those who have passed through Sibpur College have received, as already mentioned, a good scientific training and also, as far as possible, a good practical training. But, in order to be thoroughly efficient, they undoubtedly require a further practical training on actual works. The few who are selected for the higher ranks of the Public Works Department receive such a systematic training and the large contractors in Calcutta (particularly the Indian firms) can and do give such a training to those who enter their service. The Governor in Council would welcome a more general readiness on the part of European firms to give practical training on works to the passed students of Sibpur, with a view to their ultimate employment in responsible positions under those firms. It cannot, however, be denied that there are faults on both sides, and it is reported that some of the passed students of Sibpur appear to think that they have nothing further to learn.

10. In conclusion, I am to revert to the second subject in the resolution particularly in so far as it affects local bodies. In this province the Public Works Department does not carry out works for local bodies. The Calcutta Corporation has, of course, its own staff of highly trained engineers, which carries out all its works. The *mufassal* municipalities engage engineers of the overseer and sub-overseer class, who carry out their own works, generally of an unimportant nature. The District Boards, on the other hand, all employ more or less competent "District Engineers" with subordinate staffs below them. I am to annex a statement* showing the necessary qualifications for District Engineers and the actual qualifications and rates of pay of the present incumbents of those posts. An experiment was tried in the "Nineties" of entrusting District Boards (through their District Engineers) with carrying out Government works in addition to the works of the Board. The experiment met with varying success in different districts, but was finally condemned and abandoned. On the whole, the Governor in Council is not in favour of renewing the experiment, although it has undoubtedly some attractive features, particularly from the point of view of the District Officer. The reasons which weigh with the Governor in Council in not recommending a renewal of the experiment are that those District Boards which can afford a first-rate District Engineer have so much work of their own that the District Engineer cannot take up Government work in addition to his

primary duties; that no man can serve two masters without the danger of constant friction; and, lastly, that if the system of non-official Chairmen be introduced in District Boards, it will be impossible to ask the Boards to place their engineering establishment under the partial control of Government in the Public Works Department.

11. For the assistance of the Committee I am to annex† a note drawn up by the Chief Engineer showing the existing organization and methods followed in the execution of works in Bengal.

ANNEXURE A.

Letter from the Hon'ble Mr. H. H. Green, Secretary to the Government of Bengal, Public Works Department, to the Secretary to the Government of India, Public Works Department, No. 91-T-A., dated the 16th May 1914.

I am directed to acknowledge the receipt of your letter No. 904-A.G., dated the 3rd September 1912, on the subject of possible economies in the scale of expenditure on unremunerative public works. In that letter the Government of India point out that, provided proper economy is observed in regard to the scale of accommodation provided for public and administrative offices and buildings, any further economy must lie (a) in the reduction of the rates for various classes of work and materials if this is possible, and (b) in the adoption in the case of minor buildings of a less durable and cheaper class of construction.

2. The Government of India ask with regard to (a) that investigation may be made into the suggestion that the rates which are paid by the Public Works Department to contractors for materials and work are generally in excess of those which are paid by the general public, and with regard to (b), whether available records will permit of a comparison of the initial cost of minor buildings, plus the cost of repairs and renewals, in the case of *kuicha* construction, with similar expenditure in the case of *pucca* construction for the same class of buildings, and whether in the opinion of this Government economy can be obtained by a reversion to the old policy of a cheaper type of construction for such minor buildings.

3. The Government of India further ask this Government to consider the possibility of reducing the superior establishment by extending charges of supervision in consequence of the general improvement in recent years in facilities for communication by rail and road.

4. As to the reduction of rates for various classes of work and materials, I am to say that enquiries have been made in the matter of the rates paid for several large buildings in Calcutta by private firms, and those rates have been compared with the Public Works Department rates for the same class of work. From a comparison of this sort, it is extremely difficult to arrive at a definite result, as so much depends on the specification for each class of work, on the details of the construction and the preparation of the various materials used during the construction, which can only be accurately ascertained by supervision of the work while in progress. A fairly clear indication of the actual facts has, however, been secured through a comparison of the cost of work done on the Commerce and Industry building in Council House Street, Calcutta, which was built by the Public Works Department, and on the _____ building built by Messrs. _____, a well-known firm of Calcutta contractors. Both of these buildings have been constructed during the last three years. From the accompanying statement (marked A) of the cost of the chief items of work, viz., (1) concrete, (2) brick-in-lime, (3) steel work, (4) terracing (5) Indian patent-stone and (6) doors and windows, it will be seen that the actual cost of this work in the _____ building, had it been constructed by the Public Works Department at the rates on which the work on the Commerce and Industry building was carried out, would have

* Annexure B.

† Annexure C.

APPENDIX VI—continued.

been Rs. 1,962 more on a total of Rs. 98,624, i.e., about 2 per cent. more. It has also been ascertained that _____ paid for supervision of their building Rs. 300 a month, while the Public Works Department charges for the work establishment directly employed in the construction of the Commerce and Industry building amounted to Rs. 370 a month. The total cost of the _____ building was Rs. 2,15,331 against Rs. 10,04,194, the cost of the Commerce and Industry building, a much larger building, while the monthly cost of establishment for the former was Rs. 300 and for the latter Rs. 370 or 14 per cent. in the former case and 037 per cent. in the latter. It may be argued that, in addition to the establishment employed directly upon the Commerce and Industry building there is a large controlling establishment of Executive Engineers, Superintending Engineers and Chief Engineers, but whether buildings are carried out by the Public Works Department as they are now or if they be made over altogether to large contractors without any supervision of the details of the work, this controlling establishment will be necessary, unless departmental officers are found to be competent to inspect works while in progress to check the quality of the work and to take measurements of the work done for payment. Recent cases, however, have shown how impossible departmental officers find it to arrange for and carry out building works without the aid of the Public Works Department. As a matter of fact, it would also still be necessary to employ a portion of the establishment now considered as directly chargeable to the work, and in the case of the Commerce and Industry building it would have been necessary to employ a clerk of works or Sub-divisional Officer at Rs. 200 a month, together with a sub-overseer to assist him in measurement at Rs. 50 a month, and a sub-divisional clerk at Rs. 35 a month. Thus the saving in establishment by making the work over wholesale to a contractor would have been very small—about Rs. 85 a month.

5. In this connection I am also to forward herewith a statement showing the cost of the same building, if constructed at rates actually paid by the Public Works Department in the Government Telegraph Office extension, Calcutta (recently completed). The statement shows that had the _____ building been constructed by the Public Works Department at the rates paid in the Telegraph Office extension there would have been a saving of Rs. 1,220 on the amount paid to Messrs. _____.

6. Further comparisons have been made with the rates entered in estimates which have been prepared at different times by firms of building contractors for buildings constructed by them for private educational institutions in Calcutta. The results obtained by these comparisons show that the rates paid for different items of work on these buildings differed but slightly from those entered in the Public Works Department schedule of rates for similar items of work.

7. When comparing rates entered in an estimate prepared by a private firm with those entered in the Public Works Department schedule of rates, it has to be remembered that in some items, such as wood work and steel work allowance has been made in the Public Works Department schedule rates for fluctuations in the market rate of the materials, and that the actual rates paid are frequently less than those scheduled. At the same time the Governor in Council recognises that it is desirable to give out large works from time to time to approved contractors to assist Government in checking the rates paid and the work done in the department and this policy will be continued.

8. For works in the *mufassal* investigations have been made by the Superintending Engineers, Northern and Eastern Circles, and the information collected by them shows that the Public Works Department rates in the Northern Circle are not in excess of, and are in some instances lower than, those paid by private firms, while the Public Works Department work is believed to be superior. In the Eastern Circle the Public Works Department rates are in some cases rather in excess of

those paid by private parties, but it is claimed that the Public Works Department work here also is superior. The official residences at Dacca, for which Messrs. _____ tendered at Rs. 8-8 per square foot, were constructed by the Public Works Department, and it will be seen from the statement attached (marked B) that the actual average cost per square foot of pith area was Rs. 8-8, which is the same as the rate tendered for these buildings by Messrs. _____.

9. The comparison in statement attached (marked C) of the rates paid by this department in 1909 with those paid in 1882 (27 years before) shows how little rates in Calcutta have increased in spite of the large increase in general wages.

10. The Public Works Department in this province does practically no work by daily labour; all the work is done by contract, and it is open to any contractor, large or small, to tender. It doubtless would pay firms of contractors of good standing to take up large buildings in Calcutta, and possibly also in some *mufassal* stations, as they would thus keep in their own hands all the profits arising out of the imported materials, such as steel beams, tees, etc. They would also secure the supply of bricks, lime, *soorki*, doors and windows, and the profit now distributed among the suppliers of these materials would accrue to them, and they could with a small establishment keep efficient control over large works situated in one place. The difficulty which would arise would be in arranging for the repairs and the construction of buildings scattered all over the province; some of them costing not more than two or three thousand rupees, for which materials have to be collected and brought from great distances. For such works it will be necessary to retain a large subordinate establishment in the Public Works Department, who would not have the excellent training they get at present on large buildings carried out in the various headquarters towns. Further, the abolition of the present system of work in Calcutta under which the Public Works Department has its own brick-fields where a constant supply of bricks can be had at the same price, under which tenders are invited from various firms for lime and other materials, and under which the steel work is imported direct from Europe, would lead in a few years to a general rise in rates, as at present the rates in Calcutta are controlled more or less by the Public Works Department rates.

The Public Works Department insists on a high standard of work, but it is doubtful whether there is sufficient competition among building contractors in Calcutta to maintain that high standard should the present Public Works Department system of doing work be abolished.

11. In the circumstances set forth above, the Governor in Council does not consider that the rates paid by the Public Works Department are high as compared with the rates paid by private people, taking the quality of the work done into consideration, and does not consider that it is possible to make any material reduction in the rates for various classes of work and materials as now paid by the department. I am, however, directed to suggest that if the Government of India desire that further investigation should be made in this matter, a small committee may be appointed to examine the figures and contentions given in this letter and test them further. Such a committee should consist of Public Works Department officers and non-official members, the latter to be engineers employed by public bodies or railways. It would not be advisable to have on the committee persons interested in the building trade although such persons might properly be examined as witnesses before the committee.

12. As regards the adoption in the case of minor buildings of a less durable and cheaper class of construction this Government has made some enquiries, but is not prepared as yet to express a final opinion. The evidence obtained hitherto does not encourage the view that economy would actually result from such a change, but further enquiries are being made.

13. Regarding the possibility of reducing the superior establishment by extending charges of supervision, I

APPENDIX VI—continued.

am to state that the charges of superior establishment in Bengal have only recently come under examination, on the recent rearrangement of the province, and in the opinion of this Government no reduction is possible; in fact, with the increasing amount of work now being undertaken by the department, a larger establishment will be required in the near future.

14. I am to enclose for the information of the Government of India a note of dissent which has been recorded by the Hon'ble Nawab Syed Shams-ul-Huda regarding

the conclusions which have been embodied in the first part of this letter. The Hon'ble Nawab is of opinion that in comparing the cost of construction by the Public Works Department with the cost of construction by private firms, the pay of the superior establishment of the Public Works Department should be included and not excluded. His Excellency recognises that the point is arguable, but the conclusion set out in paragraph 4 of this letter represents the opinion of the majority of the Council.

A

Statement showing the difference of cost for the proposed new building at _____ for _____ as per Messrs. _____'s rate, ordinary Public Works Department schedule rate, and the rate actually paid in Commerce and Industry Secretariat.

DESCRIPTION OF WORK.	Quantity.	MESSRS. _____'s ESTIMATE.			COST AT ORDINARY SCHEDULE RATE.			COST AT RATE ACTUALLY PAID IN COMMERCE AND INDUSTRY SECRETARIAT.		
		Rate.	Unit.	Cost.	Rate.	Unit.	Cost.	Rate.	Unit.	Cost.
		C. ft.	Rs. A.	Per cent.	Rs.	Rs. A. P.	Per cent.	Rs.	Rs. A. P.	Per cent.	Rs.
Concrete	14,908	30 0	Per cent.	4,472	32 5 0	Per cent.	4,817	33 14 0	Per cent.	5,050
Brick-in-lime in floor and plinth	13,570	31 0	"	4,207	34 14 0	"	4,733	35 13 8	"	4,865
Ditto in ground floor	26,941	32 0	"	8,621	33 14 0	"	9,126	36 7 0	"	9,817
Ditto in first "	16,258	33 0	"	5,365	35 6 0	"	5,751	36 7 0	"	5,924
Ditto in second "	13,488	34 0	"	4,586	36 14 0	"	4,974	36 7 0	"	4,915
Ditto in third "	10,551	35 0	"	3,693	38 6 0	"	4,049	36 0 0	"	3,798
Ditto in fourth "	7,089	36 0	"	2,552	39 14 0	"	2,827	40 0 0	"	2,836
Cwt.										
Rolled steel joists	2,570	7 0	Cwt.	17,980	7 8 0	Cwt.	19,275	6 5 0	Cwt.	16,224
Steel tees	921	7 8	"	6,909	8 8 0	"	7,828	5 11 5	"	5,262
S. ft.										
Roofing terracing fifth floor	1,798	33 0	Per cent.	593	36 0 0	Per cent.	647	33 0 0	Per cent.	598
Ditto fourth "	8,645	33 0	"	2,853	35 0 0	"	3,026	33 0 0	"	2,853
Ditto third "	9,079	33 0	"	2,996	34 0 0	"	3,087	38 0 0	"	2,996
Ditto second "	8,515	33 0	"	2,810	33 0 0	"	2,810	33 0 0	"	2,810
Ditto first "	8,335	33 0	"	2,751	32 0 0	"	2,607	33 0 0	"	2,751
Ditto mezzanine	2,134	33 0	"	704	32 0 0	"	683	33 0 0	"	704
1" Indian patent-stone	30,705	26 0	"	7,982	25 0 0	"	7,876	26 0 0	"	7,982
Venetian sashes and frames	3,925	2 10	S. ft.	10,302	3 2 0	S. ft.	12,268	3 1 9	S. ft.	12,204
Swing doors and frames	200	1 12	"	350	1 11 6	"	344	1 11 6	"	344
Panel ditto	1,907	1 12	"	3,338	1 11 6	"	3,278	1 11 6	"	3,278
Batten ditto	1,114	1 6	"	1,532	1 6 0	"	1,532	1 6 0	"	1,532
Fanlight and frames	1,199	1 8	"	1,799	1 10 6	"	1,986	1 9 2	"	1,886
TOTAL				96,405			1,03,382			98,624
Rest of the items				1,18,926			1,18,926			1,18,926
Total cost of work				2,15,331			2,22,308			2,17,550
Deduct—If sand, <i>soorki</i> and lime is used instead of <i>soorki</i> and lime as was done by Messrs. _____										257
GRAND TOTAL										2,17,293

Statement showing the cost of the proposed new building at _____ for _____ if constructed at rates actually paid in the Government Telegraph Office extension.

Item No.	Description of work.	Quantity.	Rate as actually paid in Telegraph Office extension.	Cost.
		C. ft.	Rs. A. P.	Rs.
1	Concrete-in-lime	14,908	33 14 0	5,050
2	Brick-in-lime in foundation and plinth	13,570	34 14 0	4,733
3	Ditto in ground floor	26,941	33 14 0	9,126
4	Ditto in first "	16,258	34 14 0	5,670
5	Ditto in second "	13,488	35 14 0	4,839
6	Ditto in third "	10,551	36 14 0	3,891
7	Ditto in fourth " and parapet	7,089	37 14 0	2,685
8	Cwt.			
8	Rolled steel joists	2,570	6 3 0	15,460
9	Steel tees	921	5 11 5	5,262
10	S. ft.			
10	Roofing terracing over 18" tiles, fifth floor	1,798	33 0 0	598
11	Ditto ditto fourth floor	8,645	33 0 0	2,853
12	Ditto ditto third "	9,079	33 0 0	2,996
13	Ditto ditto second "	8,515	33 0 0	2,810
14	Ditto ditto first "	8,335	33 0 0	2,751
15	Roofing terracing over mezzanine	2,134	33 0 0	704
16	1" Indian patent-stone	30,705	24 1 0	7,388
17	Venetian sashes and frames	3,925	2 15 8	11,591
18	Swing doors and frames	200	1 11 6	344
19	Panel ditto	1,907	1 11 6	3,278
20	Batten ditto	1,114	1 6 0	1,532
21	Fanlight and frames	1,199	1 9 2	1,886
	Rest of the items			95,442
	Total cost as constructed by Messrs. _____			2,14,368
	Saving if constructed by Public Works Department over Messrs. _____			968
	Add—Difference in specification			257
	GRAND TOTAL			1,220

APPENDIX VI—continued.

B

Statement showing the actual cost and plinth area of 19 official residences at Dacca constructed by the Public Works Department for which Messrs. _____ tendered an average rate of Rs. 8-8 per square foot.

Residence of—	As constructed by Public Works Department.	
	Plinth area. (Sq. feet.)	Cost. Rs.
Accountant-General	5,170	42,320
Deputy Accountant-General	2,100	21,240
Commissioner	7,025	60,760
First Member, Board of Revenue	6,742	63,078
Second ditto	7,025	54,942
Secretary, Board of Revenue	2,747	23,194
Legal Remembrancer	4,435	42,040
Director of Land Records	2,650	23,078
Do. of Public Instruction	2,521	23,410
Principal, Dacca College	2,600	27,000
District Judge	5,170	44,271
Joint-Magistrate	2,394	21,045
Professors, Dacca College	4,732	32,464
Inspector-General of Police	3,656	32,630
Deputy Inspector-General of Police	3,412	29,407
Superintendent of Police	2,334	21,525
Deputy Sanitary Commissioner	2,316	21,032
Superintending Engineer	4,205	37,053
Executive Engineer	2,302	22,742
TOTAL	77,964	6,63,555
		Rs. A.
Rate per square foot	$\frac{6,63,555}{77,964}$	= 8 8

C

Statement showing differences of rates in the years 1882 and 1909.

DESCRIPTION OF WORK.	CALCUTTA.			CUTTACK.			RANCHI.			MUSAPPARPUR.			REMARKS.
	1882.	1909.	Difference.	1882.	1909.	Difference.	1882.	1909.	Difference.	1882.	1909.	Difference.	
	Rs. A.	Rs. A. P.	Rs. A. P.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A. P.	Rs. A. P.	Rs. A.	Rs. A.	Rs. A.	
1. Brick concrete (including filling).	24 10	(a) 27 12 0	3 2 0	15 8	18 0	2 8	16 12	20 0 0	3 4 0	15 15	18 0	0 15	(a) Rs. 20-14 is for engine mixed with slaked with shooting lime.
2. New work with burnt bricks-in-lime mortar in foundation and plinth (with bullock mill for mixing mortar).	80 6	(b) 80 8 0	0 2 0	16 0	21 0 to 22 0	5 0 to 7 0	19 0	27 0 0	8 0 0	18 14	22 0	3 2	(b) Rs. 22-12 is for engine mixed with stone lime.
3. New work with burnt bricks-in-lime mortar from foundation up to height of 24' above ground.	32 0	(c) 32 4 0	0 4 0	17 0	22 0 to 24 0	5 0 to 7 0	20 8	29 8 0	9 0 0	19 14	23 0	3 2	(c) Rs. 23 is for engine mixed with stone lime.
4. New work with burnt bricks-in-lime mortar from 24' to 45' above ground.	32 0	(d) 33 12 0	1 12 0	..	24 0 to 26 0	..	22 8	31 5 0	8 18 0	21 8	26 0	4 12	(d) Rs. 24-8 is for engine mixed with stone lime.
5. Teakwood scantling in door-frames fitted and fixed.	3 4	4 8 0	1 4 0	..	..	..	5 0	5 0 0	..	4 0	4 0	..	
6. Sal wood scantling in door frames fitted and fixed.	3 8	3 8 0	..	..	2 8 to 3 0	..	1 10	4 0 0	2 6 0	3 0	3 8	0 8	
7. 1½" teak venetian doors.	0 14	1 2 6	0 4 6	..	..	..	1 4	1 2 2 0	1 9	1 5	1 5	..	
8. 1½" teak panel doors	0 14	1 4 0	0 6 0	..	..	..	1 2	1 0 0 0	2 0	1 8	1 5	0 2	
9. 1½" teak glazed doors.	0 14	0 14 6	0 0 6	..	..	..	1 2	0 14 9 0	3 3	1 0	1 1	0 1	
10. 1½" teak batten doors.	0 13	0 14 0	0 1 0	..	..	..	1 0	1 0 0	..	1 0	1 0	..	
11. 1½" teak & glazed and ½ panel.	0 14	0 15 0	0 1 0	..	..	..	1 8	1 2 0 0	1 0	1 2	1 5	0 3	

APPENDIX VI—continued.

Note of dissent.

I THINK a case has been made out for an enquiry regarding the possibility of reduction in the Public Works Department rates for the various classes of work and materials. In accepting the contrary view, a great deal of reliance has been placed on a statement showing the cost of the _____ building as per Messrs. _____'s estimate, and the cost according to the rate actually paid for the Commerce and Industry Secretariat built under the supervision of the Public Works Department. The difference in the two rates is shown in the annexed statement. It will be seen that according to Messrs. _____'s estimates the total costs work out at Rs. 2,15,331, and according to the Commerce and Industry building rates it is Rs. 2,17,293. At first sight the difference appears to be small, but it must be remembered that the Public Works Department rates do not cover the cost of supervision which according to Mr. Finnimore amounts to about 10 per cent. in Calcutta and 17 per cent. in the whole province. The cost to Government would therefore be represented by—

Rs.
2,17,293
21,729
<hr/>
2,39,022

On the other hand, Messrs. _____'s estimate re-

present a considerable margin of profit besides supervision charges. Taking the profit to be about 10 per cent. the actual cost to Messrs. _____ including supervision and establishment charges must have been about Rs. 1,93,798. Thus the cost to Government according to the Public Works Department rates are roughly about 23 per cent. higher. It may, however, be noted that the cheaper rates and smaller weights for steel joists and tees have led to a reduction of Public Works Department estimates by Rs. 3,413. This reduction in the price of imported articles is probably due to a fluctuation of the metal market which is more or less a matter of chance. If this difference is taken out of consideration, the rates payable by Government for the Commerce and Industry building would be found nearly 25 per cent. higher than the rates actually paid by Messrs. _____. The possibility of economy, therefore, seems to be well established. It is possible that I have over-estimated the margin of profit included in the rates of Messrs. _____, but as to this we have no alternative but to speculate. If an enquiry were held these could be cleared up, and I would strongly suggest such an enquiry. It should also be remembered that the 10 per cent. additional cost of supervision to Government does not include the pay of the Secretariat establishment of the Public Works Department.

The 11th May 1914.

S. HUDA.

Description of work.	Messrs. _____'s rate.	Rate paid in Commerce and Industry Secretariat.	Difference between columns 2 and 3.
	1	2	3
	Rs. A.	Rs. A. P.	Rs. A. P.
Concrete	30 0 per cent.	33 14 0 per cent.	3 14 0
Brick-in-lime in floor and plinth	31 0 "	35 13 8 "	4 13 8
in ground floor	32 0 "	36 7 0 "	4 7 0
in first "	33 0 "	36 7 0 "	3 7 0
in second "	34 0 "	36 7 0 "	2 7 0
in third "	35 0 "	36 0 0 "	1 0 0
in fourth "	36 0 "	40 0 0 "	4 0 0
Rolled steel joists	7 0 per cwt.	6 5 0 per cwt.	0 11 0
Steel tees	7 8 "	5 11 5 "	1 12 7
Roofing terracing fifth floor	33 0 per cent. "	33 0 0 per cent.	....
Ditto fourth "	33 0 "	33 0 0 "	....
Ditto third "	33 0 "	33 0 0 "	....
Ditto second "	33 0 "	33 0 0 "	....
Ditto first "	33 0 "	33 0 0 "	....
Ditto maxsanine "	33 0 "	33 0 0 "	....
1" Indian patent-stone	26 0 "	26 0 0 "	....
Venetian sashes and frames	2 10 per s. ft.	3 1 9 per s. ft.	0 7 9
Swing doors and frames	1 12 "	1 11 0 "	0 0 6
Panel ditto	1 12 "	1 11 6 "	0 0 6
Batten ditto	1 6 "	1 6 0 "	....
Fanlight and frames	1 6 "	1 9 2 "	0 1 2

ANNEXURE B.

Qualifications of candidates for employment as District Engineers, Bengal.

Rule 2.—A candidate for first employment as District Engineer must be qualified in one of the manners following that is to say, he must—

(a) be at the time of seeking the employment, or have previously been, a member of the permanent establishment of the Public Works Department in the grade of Executive or Assistant Engineer or Sub-Engineer or Supervisor ;

(b) hold the degree of Bachelor of Engineering or be a Licentiate of Engineering of the Calcutta University, or have passed the final examination of the Engineering Department of the Civil Engineering College at Sibpur,

or the final examination of the Engineering Department of the Colleges of Engineering of Roorkee, Madras or Poona ;

(c) have served an apprenticeship of not less than three years in the United Kingdom with some recognized firm of Civil Engineers of high standing ; or

(d) have passed satisfactorily through a full course of instruction at a recognized School of Engineering in the United Kingdom ;

Provided that in all cases the candidate must have held charge of important works for not less than five years and must produce a certificate from his immediate superior during such employment that his conduct and work were satisfactory. The candidate must also produce evidence that his knowledge of the vernacular is such as to qualify him for employment as a District Engineer.

APPENDIX VI—continued.

District Engineers in Bengal.

District.	Class.	Grade.	Name.	Pay.
				Rs.
Bakarganj	I	1st	H. O'Brien, C.V., M.S.E.	800—25—800
Bankura	III	5th	Suresh Chandra Chatterji, B.C.E.	250—10—300
Birbhum	III	5th	Saradinda Roy, B.E.	250—10—300
Bogra	III	5th	Purna Chandra Bhattacharji, M.A., B.E.	250—10—300
Burdwan	I	2nd	Jatindra Nath Mullick, B.E.	500—20—600
Chittagong	I	1st	F. E. Hodgkins	800—25—800
Chittagong Hill Tracts			G. A. Bell	300—300
Dacca	I	1st	R. B. McKeown, C.E., C.N.	800—25—800
Dinajpur	I	2nd	Jamini Kanta Sen Gupta, B.E.	500—20—600
Faridpur	II	4th	Nani Gopal Mukharji	400—20—500
Hooghly	II	3rd	Sukhendra Nath Ghosh, P.A., B.Sc. (Glasgow), M.R. S&W. I. (London)	400—20—500
Howrah	III	5th	Gyanendra Nath Ganguli, L.E.	250
Jaipalguri	I	2nd	A. D. Hickley	500
Jessore	II	4th	Kshiti Nath Ghosh, M.A., B.E.	300—20—400
Khulna	II	4th	Rasik Lal Hal, B.A., B.E.	400—20—500
Malda	III	5th	Burendra Nath Banarji, B.A., B.E.	250—10—300
Midnapore	I	2nd	N. N. Bose, A.M.I.C.E., M.E.S.I.	500—20—600
Murshidabad	II	4th	L. C. Sen Gupta, B.E.	300—20—400
Mymensingh	I	1st	R. K. Cox	800—25—800
Nadia	III	5th	Satish Chandra Chatterji, B.E.	400
Naokhali	II	4th	Aswini Kumar Sen	300—20—400
Pabna	III	5th	J. K. Das Gupta, B.Sc. (Glasgow), A.M.I.C.E., A.M.S., M.E.C.W. B.	250—10—300
Rajshahi	II	3rd	Frankumar Gupta	500
Rangpur	I	1st	B. K. Dutta, B.Sc. (Viet.), C.E., M.S.E.	625
Tippera	II	4th	Pyari Charan Gupta, L.E.	300—20—400
24-Parganas	I	1st	Karuna Kumar Dutta Gupta, M.A., B.E.	800—25—800

All districts in which the Local Self-Government Act is in force are divided into three classes—

Class.	Grade	Pay.
		Rs.
I	1st	600—25—800
I	2nd	500—20—600
II	3rd	400—20—500
II	4th	300—20—400
III	5th	250—10—300

ANNEXURE C.

Note by the Chief Engineer explaining the existing organization and methods followed in the execution of works in Bengal.

1. The memorandum prepared by the Government of India gives full information of a general character on the organization and procedure of the Buildings and Roads Branch of the Public Works Department in India. The following note therefore deals only with the existing organization and methods of the Public Works Department in the Buildings and Roads Branch in Bengal.

2. Existing organization.—A tabular statement (No. I) has been prepared showing the number of Imperial and Provincial officers now employed in the province. The superior staff of the Irrigation Department are entered in bold type.

The sanctioned cadre is 49 officers, viz. :—

Chief Engineers	2
Superintending Engineers	5
Executive Engineers	22
Assistant Engineers	20
TOTAL	49

Of the Executive Engineers, two hold the posts of Under-Secretary, one in the Roads and Buildings Branch and one in the Irrigation Branch. Of the Assistants, one is employed under the Sanitary Engineer's Department and one under the District Board of Burdwan as District Engineer.

Superintending Engineers perform the duties of Inspectors of Local Works under the Bengal Local Self-Government Act, III of 1885. In addition to the above regular establishment, the following special officers are employed whose salaries and those of their establishment are charged against the provision for establishment made in the yearly Public Works Department Budget :—

- (a) Sanitary Engineer and two assistants.
- (b) Electric Inspector.
- (c) Electrical Engineer.
- (d) Consulting Architect and two assistants.
- (e) Plumbing Expert.
- (f) Superintendent of Governor's Estates.

All sanitation work is done under the administration of the General Department, and such work is carried out under the supervision of the Sanitary Engineer and his establishment. The Public Works Department has no connection with such work except in the rare cases when a work of this class is entrusted to them. In such a case the work is treated as a contribution work.

The Electric Inspector carries out the duties necessary under the Electricity Act, IX of 1910. He also acts as adviser to the Local Government when advice is required on proposals for electrical installations outside Calcutta. He is not otherwise concerned with work carried on by the Public Works Department.

The other special officers are intimately connected with the preparation and construction of projects undertaken by the department and form an integral part of the department.

There are five circles consisting of 16 divisions, containing 65 sub-divisions. Sub-divisions are nearly all held by members of the Upper Subordinate Service. Statement No. II shows the constitution of the circles and divisions and the extent of each.

3. The Buildings and Roads Branch deals with all matters connected with buildings and roads only, but there are very few roads in charge of the Public Works Department. Certain buildings and roads are under the charge of divisions which are considered to be "Irrigation Divisions." For the supervision of work on such the Irrigation Department is credited with 16 per cent. of the outlay on the works.

4. Method employed in the execution of works.—The procedure to be followed before the construction of a work is commenced, and the various rules on the subject are detailed in Chapter VII of Volume I, Public Works Department Code, and summarised in the Government of India memorandum. On receipt of final or technical sanction to an original work, the Executive Engineer invites tenders for the work either through the medium of the press in the case of important works or from well-known contractors. In the case of works of minor importance, the work is given out to local contractors, a list of whom in Calcutta is kept by each Executive Engineer. In the *mufassal*, notices inviting tenders for such works are put up in the local courts or in the offices of local bodies. A similar procedure is followed in the case of repairs. All works are then carried out through contractors and none by actual departmental agency.

To ensure that only the best materials are used on works, bricks are in many instances manufactured by

APPENDIX VI—continued.

contractors for the department and issued to the building contractor. In Calcutta there is a Government brickfield, in which bricks are manufactured under contract allowing for a large reserve to be kept in order to be prepared to commence work immediately a work is sanctioned. The department also, in the past, largely obtained steel joists and sections from England. By these means it has been possible to keep rates down. Statement No. III shows the total outlay incurred on works and on establishment and the percentage of the cost of the establishment to the outlay incurred during the period 1906 to 1916.

5. *Conditions under which work is done.*—In Calcutta there is no difficulty in obtaining suitable contractors,

but in the *mufassal* there is the greatest difficulty in many places. Local labour, especially in Eastern Bengal is not obtainable, and contractors have to depend on imported labour. In Eastern Bengal communications, except by water, are either non-existent or very inefficient, so that carriage of materials is difficult. The execution of work under such conditions requires constant and close supervision and is necessarily more expensive than in large towns, such as Calcutta, Dacca and Chittagong.

H. H. GREEN.

Accompaniments.

Three statements.

STATEMENT No. I.

Statement showing the constitution of the Public Works Department, Bengal.

APPOINTMENT.	Sanctioned scale.	IMPERIAL.		PROVINCIAL.		Roads and Buildings.	Irrigation.
		Europeans from England.	From Indian Colleges.	From Indian Colleges.	Promoted Upper Subordinates.		
Chief Engineer	2	2	..	..	..	1	1
Superintending Engineers	5	5*	2 (offg.)	..	..	3	3
Executive Engineers	22	12	7	3	1	15	8
Assistant "	20	10†	..	6	3‡	11	7
TOTAL	49	29	7	9	4	30	18
Upper Subordinates	71	..	..	71	..	48	23
Lower "	153	..	..	153	..	73	80
TOTAL	224	..	..	224	..	121	103
GRAND TOTAL	273	29	7	233	4	151	121

* One Armenian.

† Includes Mr. Subarwal.

‡ One seconded.

STATEMENT No. II.

Distribution list of Public Works Circles in Bengal.

CIRCLE.	DIVISION.		
	Name.	Area in square miles.	Number of subdivisions.
1	2	3	4
Presidency	First Calcutta	Presidency town of Calcutta.	3
	Second "	Presidency town of Calcutta, including Alipore and Barrackpore.	5
	Third "	Presidency town of Calcutta including Howrah.	3
	Electrical . . . . .	.....	3 Under an Electrical Engineer.
Northern	Darjeeling	1,184	4
	Jalpaiguri	7,750	4
	Rajshahi	8,415	4
	Duars Road	1,906	3 Construction.
Eastern	Dacca	10,182	3
	Chittagong	8,635	3
	Bakarganj	7,218	2
	Chittagong Hill Tracts	5,138	Under a District Engineer.
Central F	Burdwan	11,177	6
	Nadia Rivers	12,301	7
South-Western.	Cossye	8,384	6
	Northern Drainage and Embankment.	10,985	4
	Circular and Eastern Canals	10,752	5

APPENDIX VI—concluded.

STATEMENT No. III.

Statement showing the percentage of outlay on establishment to the outlay incurred on all works carried out by each establishment in Bengal during the years 1906-07 to 1915-16, inclusive.

YEAR.	Outlay on works and repairs.	COST OF ESTABLISHMENT AS IN SCHEDULE C OF THE FINANCE ACCOUNTS OF THE YEAR PREPARED BY ACCOUNTANT-GENERAL, BENGAL, INCLUDING ACCOUNTS, SANITARY ENGINEER AND ELECTRIC ENGINEER.								REMARKS.
		Direction.	Per-centage.	Construc-tion.	Per-centage.	Total of columns 3 and 5.	Per-centage.	Tools and plant.	Per-centage.	
1	2	3	4	5	6	7	8	9	10	11
	Rs.	Rs.		Rs.		Rs.		Rs.		
1906-07	82,02,400	3,28,107	4-00	8,10,077	9-98	11,47,144	13-98	1,00,038	1-25	} Including Military Works.
1907-08	83,07,576	3,38,713	4-07	9,29,753	11-18	12,67,466	15-25	88,438	1-06	
1908-09	64,62,872	3,74,611	5-79	8,60,375	13-31	12,34,986	19-10	97,528	1-50	
1909-10	50,75,847	3,98,510	7-85	7,90,070	15-56	11,88,580	23-41	46,417	-01	
1910-11	55,62,961	3,31,238	5-95	6,87,924	12-37	10,19,162	18-32	77,310	1-34	
1911-12	65,77,231	3,13,053	4-75	8,39,749	12-77	11,52,802	17-52	63,161	-06	
1912-13	67,21,700	3,14,121	4-67	8,27,091	12-30	11,41,212	16-97	66,598	-09	
1913-14	80,60,408	3,31,990	4-12	8,08,770	10-03	11,40,760	14-13	1,01,856	1-28	
1914-15	98,04,187	3,50,529	3-57	8,80,899	9-08	12,40,428	12-65	1,44,076	1-47	
1915-16	63,48,393	3,67,346	5-83	8,92,968	14-06	12,50,309	19-69	80,777	1-27	
TOTAL	7,11,23,329	34,38,218	4-83	83,44,671	11-73	1,17,82,689	16-54	9,26,312	1-30	

APPENDIX VII.

Memorandum prepared by the Government of Madras.

The Government of India have furnished with their letter No. 555-E.A., dated 15th November 1916, copies of a draft resolution and of despatches to and from the Secretary of State relating to the execution of Civil Works in British India, and have requested that a memorandum embodying the views of the local Government on the points referred to may be forwarded to the Committee by the middle of December. With a subsequent letter, No. 588-E.A., dated 29th November 1916, a revised resolution bearing No. 06-E.A., dated 24th November 1916, was received, and ordered to be substituted for the original draft resolution. In the following paragraphs, only the revised resolution is referred to.

2. Before dealing with the specific points referred to in paragraph 2 of the resolution, His Excellency the Governor in Council would make the following preliminary remarks.

3. The proposed reorganization is to be confined to the Buildings and Roads Branch, and the system under which irrigation works are at present carried out and maintained is not to be affected. Now in the Madras Presidency (as also in several other provinces of British India), there is no separation of the Engineering staff of the Public Works Department into Buildings and Roads, and Irrigation Branches, except in the case of the Chief Engineer for Irrigation and his staff in the Secretariat. The Superintending Engineers, Executive Engineers, Sub-Divisional Officers and subordinate staff all deal with the execution and maintenance both of irrigation works and of miscellaneous civil works. The Public Works Department Engineering staff could no doubt be divided into two branches (i) Irrigation and (ii) Buildings and Roads; but, so far as this Presidency is concerned, this division would involve considerable extra cost and waste of energy. A detailed estimate of the staff that would be required for irrigation works alone has been made with reference to the number and importance of the existing irrigation works. It shows that the requirements of the Irrigation Branch would be, besides the Chief Engineer, at least 4 circles, 24 divisions, 62 sub-divisions and 141 sections. A staff (suitably graded and providing for absentees) to man these charges would cost 19-81 lakhs, or say 20 lakhs as compared with the present total staff costing 34-29 lakhs, exclusive in each case of the contribution from irrigation revenue, which at present amounts to 9-4 lakhs. This estimate

of 20 lakhs provides for only four Superintending Engineers, whereas five may more probably be required. However whether the number be 4 or 5, there would be left for the supervision of all Civil Works only 3 or 2 Superintending Engineers (as the case may be), a number certainly inadequate. In regard to Executive Engineers, the number of those employed on the large delta systems could not be reduced, even if works other than irrigation were taken away from them; and it follows that *additional* officers for these other works would have to be appointed. The same result would follow in all other grades of the service. In non-deltaic areas also any division of the staff as suggested would lead to extra cost, in consequence of the scattered nature of the works, both Irrigation and Buildings, in this Presidency; so that the present system of giving an officer charge of all public works in his division is more economical both of men and money than any scheme of watertight sub-departments. Any such change would also lead to waste of energy, in that two officers instead of one would be covering the same ground. An irrigation officer would have no concern with buildings and other civil works that may lie in the neighbourhood of his irrigation works; while the officer in charge of buildings in the same area would do no inspection of irrigation works. The fact that the proposal is not to create a separate Buildings and Roads Branch, but to hand over the works of that branch to other agencies, does not affect the argument; for the new agencies, assuming that they could be found, would doubtless charge Government for the efficient supervision of buildings and roads works a considerable sum, which could hardly be less than the cost of maintaining a separate Buildings and Roads Branch. The extra expense would presumably fall in great measure on Provincial funds, which could not afford it. His Excellency in Council therefore considers the proposal to reorganise the Buildings and Roads Branch alone, in the manner proposed, leaving out of account the Irrigation Branch, to be unsuitable and unsound as regards this Presidency.

4. Moreover, several of the evils which the Government of India seek to remove have no application to the conditions obtaining in this Presidency. For example, in paragraph 9 of their despatch to the Secretary of State, the Government of India suggest the reorganization of the Buildings and Roads Branch with

APPENDIX VII—continued.

a view to the execution of work entirely paid for by local bodies being arranged for by the local bodies concerned. This is what already obtains in Madras both in the case of Municipalities and of District and Taluk Boards, except in the case of very large and important works. Again, it is suggested in the same paragraph that, after the proposed reorganisation, contribution works such as non-Government school buildings, hospitals and dispensaries for which Government give a grant, village and small urban sanitation schemes carried out partly or wholly from Government funds, might be designed and carried out by private practitioners. This is also what is already being done in this Presidency; and if the Public Works Department had to deal with all such petty works (as presumably must be the case in some other provinces that the Government of India had in mind when drawing up the despatch) an increased establishment would be necessary. In all cases where a Government grant is given, the designs are first passed by a Government officer as suitable, as suggested by the Government of India. In the above respects no reorganisation is necessary in this Presidency.

5. Coming now to the particular points referred to in paragraph 2 of the Government of India Resolution, clause (i) asks whether the methods at present adopted for the execution of civil works are economical and suitable for the purpose for which they were devised. As regard *economy*, His Excellency in Council considers that the methods at present adopted are suitable, and that any such change as that contemplated by the Government of India must result in greater expenditure for the same class of work or in inferior work for the same outlay. The question whether the actual rates for works (on which schedule rates are based) are not themselves unduly high has recently been examined more than once. The Government of India raised the question

Vide papers with letter
419 A.W., 21st February
1914.

*Late Chief Engineer,
Public Works Department.

in 1912 and Mr. S. D. Pears* was deputed specially to investigate the matter. The investigation showed that there was nothing extravagant or unreasonable in the building practice in this Presidency; that the cheaper kinds of materials, such as brick-in-mud, country wood, etc., were being used for minor buildings; and that estimates prepared by non-government agency for educational buildings, which came before the Chief Engineer for scrutiny, showed that the rates allowed in those estimates were very much the same as those which obtained in the Public Works Department. Sundry cases where the cost of construction by a private body seemed to be markedly low have also been investigated from time to time. For instance, a Mission Church at — had been erected at an exceptionally low cost; but upon enquiry it was found that the building was structurally unsound owing to insufficient foundations, that almost all the materials used, concrete, sand, stone and wood, were of very inferior quality, and that the mission had found it possible to engage *coolies* for this work at a very low rate. A comparison between the schedules of rates of the Public Works Department and of the Southern Mahratta Railway Company was also made in December and January last, and it was found that the Public Works Department rates compared favourably with the railway rates. The Committee will perhaps have data which will enable some comparison of Madras rates with those of other provinces to be made; but it will obviously be difficult to differentiate between higher rates due to unsuitable or uneconomical methods, and those due to higher market rates for materials or other conditions beyond control. In 1907, the Government of India stated—*vide* letter from the Government of India No. 985 B., dated 27th June 1907—that the Madras rates for buildings were low compared with those of other provinces, and there are no grounds for supposing that the relative position has changed since then. Another indication that Madras Public Works Department rates are not uneconomical is afforded by the fact that big engineering firms have not been attracted to Madras, by the prospect of large profits to be made.

6. As regards the cost of superior supervision not charged to works, represented by the salaries, travelling allowances, etc., of the regular establishment ranging from the sub-overseer up to the Chief Engineer, there is probably room for difference of opinion. The Government of India seem to consider that there might be more economy, and that simple and unimportant works which are now undertaken and supervised by highly salaried officers of Government could, if private agency were available, be carried out at reduced cost under contract by that agency, subject to the supervision of Inspectors. It may, however, be observed that the Public Works officers have always aimed at the gradual extension of the system of regular contracts to the fullest possible extent, as by so doing the accounts kept by disbursing officers are shortened and simplified. But the so-called "contractors" in this Presidency, with possibly one or two exceptions in the Presidency town, are little more than providers of labour and suppliers of materials. Their work requires close supervision, and they have to be instructed at every stage. A large number of Government *matrisies* and subordinates are therefore necessary, and the work of these men themselves requires close supervision, as mentioned in paragraph 7 of the Government of India letter to the Secretary of State. Accounting is also more than ordinarily complicated, owing to the contractors being mostly comparatively poor men with small capital, who require to be paid frequently to keep them going. The administrative duties incidental to a large department are also responsible and heavy. Under the circumstances it does not appear that there is redundant supervision or that effective supervision could be secured with a lesser number of officers.

7. The present methods, which are the outcome of gradual development and long experience, have been found to be quite suitable for the execution and maintenance of Government works.

8. In clause (ii) of their Resolution the Government of India enquire whether under the existing system private enterprise is sufficiently encouraged. His Excellency the Governor in Council considers that private enterprise is given every opportunity of undertaking contracts, but that large contractors are probably deterred from entering on the field by the fact that Madras rates are not sufficiently tempting. Tenders are invited for most works, large and small, and suitable contractors are always welcome; but contractors, properly so termed, that is to say firms or individuals having their own technical staff and plant, and competent to work from plans and specifications without constant guidance from Public Works officers and subordinates, are practically non-existent in this Presidency. The great majority of Madras contractors are merely petty piece-workers with a moderate command of capital and labour and no professional qualifications. The absence of large contractors may of course be partly due to the presence of the Public Works Department, but works carried out by them, would in the opinion of this Government cost considerably more than under the present system. Private Civil Engineering enterprise and larger contractors are not likely to be attracted to this Presidency unless the rates for work are increased with this specific object. Such increase of rates would have to be substantial, say, 15 to 20 per cent. and even then the desired result is not likely to be obtained for many years, during which period an unnecessary addition will be made to the profits of existing contractors, or of the money-lenders who finance them. With increased rates, it is possible that in the course of years qualified men or firms may set up in this Presidency, with their own Engineering staff and their own plant and workshops, but there is no sign of such a result under existing conditions, and it seems premature to consider radical changes in organisation that depend essentially upon the establishment of such a class of contractors. As already mentioned the first and most important step necessary for attainment of the desired end will be to increase all rates and make the execution of contract works more profitable than at present. The next step

APPENDIX VII—continued.

will be to discourage small contractors by grouping works as far as possible into large contracts, by withholding the financial assistance now given to small piece-workers (by frequent payments on account, for example), by requiring more rapid execution under heavy penalty, and perhaps by insisting upon the provision and use of plant and machinery that no small contractor could afford to obtain.

Against these increased charges, the only set-off would be the savings due to any reduction of the Public Works Department staff that it might be found possible to effect.

9. In the second portion of clause (ii) of their resolution, the Government of India direct enquiry as to whether it is possible and desirable to entrust the construction and upkeep of certain classes of Public Works to agency other than departmental, and, if so, upon what lines such change should be effected. The only agency available at present is the Local Fund Engineering establishment; but this establishment would have to be very largely increased, if it were to take over any appreciable number of Public Works, seeing that, as a general rule, the time of the District Board Engineering staff is so fully occupied with their legitimate duties that employment on Government work would very seldom be practicable. Local boards certainly would not provide from their own funds for this increased staff, and the cost would have to be met by Government. Moreover there would probably be constant trouble and delay due to the Engineers having to carry out ordinary Government works in addition to works for the local bodies under whom they were serving. Local boards would not favour the change, as they would lose their present full control over the District Board Engineer and his staff, and would be apprehensive that he might give undue preference to Government works, to the detriment of local fund works. From the District Board Engineer's point of view also, the position would be unsatisfactory, as he would have to serve two masters. For the above reasons, this Government considers it undesirable to entrust the execution of Government works to the local boards' engineering staff.

There is, however, no objection to local boards being required to carry out buildings and bridges with their own agency to a larger extent than hitherto. The preparation of schemes for major sanitary works is a matter which requires special training and which cannot at present be undertaken by the engineering staff of local bodies. But this designing work is now ordinarily done by the Sanitary Engineer and his subordinates, and the execution of the sanctioned schemes might more frequently be entrusted in the case of rural areas to the agency employed by local boards. The major sanitary schemes, however, have generally to be carried out in municipal areas by the Public Works Department as the prospects of municipal service are not sufficiently tempting to attract men of the same calibre and qualifications as in the local fund service. Municipalities would have to employ in such cases special temporary engineers, if the execution is no longer to be entrusted to the Public Works Department.

In this connection, it may be noted that the observations of the Government of India in paragraph 9 of their letter to the Secretary of State regarding the qualifications of the engineering staff of local bodies, have no application to this Presidency. Several District Board Engineers who are Indians have been promoted from the rank of Assistant Engineer in the local fund service, and are men with high professional qualifications, belonging to the same class from which Executive Engineers of the Provincial branch of the Public Works Department are recruited.

10. The question whether the Public Works Department meets the needs of other departments of the administration, raised in clause (iv) of the resolution, is being investigated; but so far as information has been received the needs of other departments appear to be fully and satisfactorily met. As regards the second portion of paragraph 2 (iv) of the resolution it is considered that the relations *inter se* of the various sub-

divisions of the Buildings and Roads Branch are satisfactory. The Sanitary Engineer, Consulting Architect and Electrical Inspector to Government, are in this Presidency all technical assistants to the Chief Engineer, Buildings and Roads Branch, and have no executive duties.

11. *Clause (r) of the Resolution.*—The question of further decentralisation within the Public Works Department itself may be considered under three different heads:—

- (1) powers of technical sanction to detailed estimates,
- (2) powers to enter into contract agreements, and
- (3) powers to reappropriate funds.

As regards (1) Superintending Engineers have powers of technical sanction of original works up to Rs. 20,000 generally and to Rs. 50,000 in certain cases, while under "Repairs" there is no limit imposed. These powers of technical sanction are considered sufficient. Executive Engineers as a class are authorized to accord technical sanction to detailed estimates for original works, or special repairs not exceeding Rs. 200, while certain selected officers exercise such powers up to Rs. 500, and others up to Rs. 1,000. Under ordinary repairs, all Executive Engineers can exercise such powers up to Rs. 200 and selected officers within the limit of budget allotments; but in the case of buildings a further limit is imposed of 2 per cent. on the capital cost of each building, and in the case of roads to a sum per mile fixed by the Superintending Engineer. Executive Engineers have, however, no powers of administrative sanction, and it is under consideration whether this class of officers may not be granted these powers up to a certain limit, and increased powers of technical sanction.

12. *Powers to enter into contract agreements.*—These powers are governed by paragraph 757 of the Public Works Department Code. Superintending Engineers may accept tenders up to the limit of their powers of technical sanction (Rs. 20,000 or Rs. 50,000 as the case may be) and Executive Engineers up to Rs. 5,000. These powers are considered sufficient.

13. *Powers to reappropriate funds from one work to another.*—This is a question more of administration than of execution, and it is held undesirable to delegate to Superintending Engineers any greater powers than they at present possess.

14. *Clause (vi) of the Resolution.*—The provisions of the Public Works Department Code are in some respects unduly restrictive, but this is more with regard to accounts audit than to actual execution. There has not been time to obtain full particulars from officers of the department, but the officers selected to give oral evidence before the Committee are being asked to give details in their written memoranda. It seems absurd, for example, that an Executive Engineer should have to obtain the sanction of the Superintending Engineer (*vide* paragraph 908 of the Public Works Department Code), to auction a temporary shed put up during the construction of a new work, which has to be removed when clearing the site. As regards the actual execution and maintenance of civil works the Code, if interpreted by audit officers in a reasonably liberal spirit, does not appear to be unduly restrictive.

15. As regards clause (vii) of the resolution, a note by Mr. James, Principal of the Madras Engineering College, on the system of education in that college is attached* and his conclusions are accepted by this Government. As pointed out by him it does not appear that any alteration in the system of engineering education at the Madras college would have the effect of attracting a different or a superior class of students. We already get students of average ability, and if we want the very best they must be attracted by the prospects of an improved career, which of course connotes higher pay for those who take up appointments under Government, under local bodies, and higher rates for work, so as to provide increased profits, for those who may take up the profession of engineering contractors. This increased

APPENDIX VII—continued.

outlay on civil works of all kinds would probably have to be continued for many years before having any permanent effect, and it is hardly likely that the eventual saving in Public Works Department establishment charges would compensate for it. The position in this country is, moreover, entirely different from that in England. There the youngster starts from the bottom and rises by sheer merit; if he has no merit, he remains in the subordinate ranks for the whole of his life. Here in India the young Indian thinks manual labour beneath his dignity, and commences his study of engineering with his college training. On completing that training he is put into a position of considerable trust before his superiors can judge of his capacity for the work. If private firms come into the field, they will have to take their Indian assistants from the same class and are likely to treat the failures with much less compunction than Government do. The probable effect on Indian public sentiment deserves consideration.

16. As regards provision for practical training on works referred to in clause (viii) of the resolution, adequate provision is made for the practical training on works of students who have passed through the Madras College of Engineering, and they are required to complete satisfactorily a year's course of practical training before receiving the college diploma. During this practical training they receive subsistence allowance. Provision is also made for practical training at (1) the Railway Workshops at Perambur, (2) the Electric Supply Corporation, (3) the Madras Harbour Works and (4) the Madras Water-supply and Drainage Works. In the case of (1) and (2) the premium payable is Rs. 250 per student for the one year's course, and in the case of (3) and (4) Rs. 200. The premia are paid by the students themselves in the first instance, but 50 per cent. thereof is refunded to them if the reports of their progress while under training are satisfactory. No fees are charged for any training under the Public Works Department. There is no provision at present made for the practical training of students who have received their scientific education in English colleges but as the number of such students will always be limited, there would be little difficulty in arranging for their training on public works. A similar question was referred to this Government by the Government of India in November 1913 and a reply was sent in April 1914 (*vide* letter No. 834 W., dated 20th April 1914) that the Madras Government would be prepared to allow Executive Engineers to take selected Indian engineer students of English Universities, for practical training under them on payment of premia. It was suggested that Rs. 600 per annum would be a reasonable sum, and that this might be made payable in the first instance to Government, to be passed on eventually in the form of a monthly allowance to the engineer who actually gives the instruction. The Local Government considered that the demand of a premium was essential in order to ensure, on the one hand, that those who are selected, are properly looked after, and on the other that those who are not in earnest about learning their profession are kept out. They also considered that the students were hardly likely to object to the payment of the premia, since nowhere else could they get similar training without payment,

ANNEXURE A.

Note by Mr. W. H. James, B.Sc., Principal, College of Engineering, Madras.

The policy of the several Governments in regard to the Engineering Colleges under their control has, it seems to me, been influenced naturally by the needs of the country, and up to now the main object has been the provision of qualified men for Government service, but I am inclined to agree with the suggestion that the time has now come when it is advisable to consider whether the whole system of technical education, particularly in its higher branches, may not be opened out

gradually and placed on a broader basis, and this specially in so far as admissions to colleges are concerned.

In other and technically more advanced countries it is possible for any youth who desires, provided he possesses the necessary preliminary educational qualifications, to enter on a course of engineering study, but he realises he does so on his own responsibility and does not consider that the possession of a diploma places him in a position of having exceptional claim on any class of appointment and most certainly not Government service and when he gets employment, it is to start with hardly ever on a living wage.

The very different conditions in some ways that obtain in this country I need not emphasize and I assume the reason for Government placing restrictions on the number of admissions to the engineer classes has been the knowledge that appointments are not available in Government or private service for large numbers of men with high technical qualifications, an attitude that can fully be justified by the fact that roughly about half the students who pass through our Engineer course have latterly taken Upper Subordinate appointments in the Public Works Department.

If more appointments are available, it obviously follows that the number of admissions may be increased but the country is far from ripe for doing away altogether with restrictions of this kind, though the normal line of progress points in that direction.

With reference to educational matters in particular the statements are made that—

(a) the better class of Indians is not attracted to Civil Engineering as a profession;

(b) the foregoing is due possibly to the system of education in Government Colleges not being organized on a sufficiently broad basis;

(c) the system further is inadequate possibly to provide qualified engineers to whom works could be entrusted by local bodies, etc.;

and I offer a few remarks on these "*seriatim*."

(a). A great deal depends on what precise meaning is to be attached to the description "better class," but in any case I do not think the statement can be accepted without qualification in so far as it applies to this Presidency. Our Engineer students come from much the same classes as, and intellectually are at least on a par with, the average of those who enter ordinary Government employ or join the Law College, but until the time when engineering as a career can offer prizes comparable to those that are to be gained in the practice of law, it must be the case that the great majority of the best and most promising students of the University will aim at joining the legal profession. The very limited prospects of remunerative employment must have deterred many an ambitious and able youth from entering the Engineering profession.

(b). This possibly has reference to the rules governing admission to and prosecution of the courses being somewhat rigid, but much freedom in this connection is impossible when a college diploma is regarded as a guarantee that the holder can be relied on as qualified in definite respects. In my experience further, there have been no demands from students worth considering for anything but a complete course but this I admit it is quite possible may be due to their knowledge of what is admissible under the rules.

I do not think that restrictions compelling students to take particular and specified courses have in any way affected the class of student attached to the college. Better the prospects of students after completing a course and the standard of the student desiring admission is at once raised correspondingly!

(c). This institution can and does train men fully qualified to take in hand works of the kind under consideration, so far as that is possible in a college. For architectural training there is no provision. Apart from the obvious advantage we have of familiarity with Indian conditions, materials, methods of working and requirements, I have no hesitation in saying that the standard on the theoretical side here in Civil Engineering is quite up to the level of colleges in Great Britain, as

APPENDIX VII—continued.

can amply be evidenced by a perusal of the syllabuses of the courses of instruction, time tables, and papers set in College and University Examinations.

The inadequacy of our provision for laboratory work has long been fully appreciated by Government and we shall have all that is wanted at Guindy.

The steps taken by Government in connection with the development and improvement of the efficiency of the college are all clearly set forth in the various Government Orders relating to the institution.

For the purposes of the memorandum perhaps, it will be convenient to deal with matters under the following heads:—

- (a). Courses of instruction.
- (b). Staff.
- (c). Accommodation and equipment.

Courses of instruction.—These were fully considered by the committee which was appointed in G.O. No. 723, Educational, dated 12th December 1904, "to consider the revision of studies and the curriculum," and on whose report final orders were passed in G.O. No. 657, Educational, dated 10th October 1906. From that and the previous connected G.O. No. 655, Educational, dated 3rd October 1906, it will be seen that very radical changes were made, and of considerable importance was the institution of separate courses for Civil and Mechanical Engineering, the latter covering also some instruction in Electrical Engineering.

Important modifications since introduced have reference chiefly to the formation of the Probationary Subordinate class, the change in the general education standard for admission, and the increase in the duration of the Engineer and Upper Subordinate courses from three to four years, regarding which reference may be made to G.O. No. 451, Educational, dated 8th July 1911.

An important feature of our courses is the attention devoted to and the stress laid on practical training in drawing office, laboratory and field, and this, apart from its inherent value as a method of teaching, is very necessary owing to the somewhat considerable demands made on young students completing the training directly they enter employment, which are greater than is usually the case in other countries.

Referring more particularly to the courses for the Engineer classes, the underlying idea of the committee was to provide a thorough grounding in general Engineering science on which afterwards could be based any desired specialisation. It should be appreciated that the majority of the students come to the college, for no fault of their own, with little or no notion of engineering, and the difference in this respect should not be lost sight of in connection with proposals for specialized courses based on what is being done in other countries under conditions which in other cognate matters also are very dissimilar.

It may be pointed out that these syllabuses were very carefully considered comparatively recently by the University Board of Studies in Engineering—a body of engineers familiar and closely in touch with the theory and practice of engineering both in this country and in Europe—and on their recommendation were adopted practically in their entirety by the Senate at its meeting on

Vide G.O. 1442, Educational, 18th December 1914.

November 18th, 1914, for incorporation in the revised regulations for the B.E. degree, which come into force next year for the University examinations.

A student after taking the college diploma is for the rest of his career as an engineer in much the position of post-graduate student, and after his training in both arts and professional colleges, should find no insuperable difficulty in taking up the study of and adapting himself for specialized work. It is conceded, however, that the provision of courses dealing with specialized branches of engineering practice might be of considerable assistance, and proposals in this connection were made by the committee whose recommendations are recorded in G.O. No. 1224, Education, dated 2nd November 1914, on the

lines of which it is hoped something will be done when we move to Guindy.

Developments in future should, in my opinion, proceed in the direction of providing such specialized courses. The rules governing admission to the courses, while not encouraging students to depart from the sound policy of getting a thorough initial grounding in the elements of engineering and the connected sciences, should be sufficiently elastic to permit of the attendance of persons who may not be qualified by the possession of a diploma, but whose desire is to gain what knowledge they can by taking the course.

Electrical engineering will later on call for more attention but just at present the post-collegiate course which the college can now offer seems to me sufficient. A sound and thorough training in mechanical engineering is in any case absolutely essential as a preliminary to entering on advanced studies in electrical engineering, and the demand for the highly trained electrical engineer being very small in this country, what ordinary appointments are available can very well be filled by our mechanical engineering students, who devote a fair portion of their time to electrical engineering.

Staff.—It is hardly necessary to remark that syllabuses of courses of study may mean much or comparatively little: what is of vital importance is the manner they are dealt with, in other words, the teaching agency.

It is a truism that it is impossible to turn out an engineer by only college training. The most that can be attempted is to give a sound groundwork of knowledge based on which experience of actual work will enable the young engineer to attain a fair measure of professional skill.

It is, however, essential, in view of what is demanded of students when they leave, to carry on their training in as close relation to practical conditions as possible, and one way of effecting this is to have practical men as their teachers. This end was to a very considerable extent achieved by the decision of Government, G.O. No. 414, Educational, dated 29th June 1911, and G.O. No. 55 W., dated 12th January 1912, that the staff of the College other than the Principal and Professors should be supplied from the cadre of the Public Works Department. The college junior appointments are accordingly now filled by sub-engineers, supervisors and overseers of the Public Works Department, and as our principle ordinarily is to retain no subordinate more than about three years, we have a staff always fresh from contact with actual work.

With the progressive increase in the number of students, Government have added to the number of assistants from time to time, and now we have twenty as compared with twelve less than ten years ago.

The most important addition to the staff within recent years was the appointment last year of a Professor of Electrical Engineering together with an Electrical Laboratory Assistant, G.O. No. 1052, Educational, dated 24th September 1915, which has greatly improved the efficiency of that department of college work and has made it possible for the Professor of Mechanical Engineering to devote his whole time to his particular branch of engineering.

The staff we have at present is adequate for the conduct of the classes under our existing arrangements, which mean that the whole time of the professors is taken up with direct teaching work, but on the transfer to Guindy and the provision there of adequate laboratory equipment, it will be expected that they will take advantage of the facilities afforded to undertake investigational work of a varied nature. If anything of this sort is to be possible, and its importance and necessity hardly needs emphasizing, it will be essential to have another professor to take over part of the work of the civil engineering department, and to make a new appointment of Professor of Engineering Chemistry.

For specialized courses, outside engineers with the necessary special experience must to a considerable extent be relied on, if the courses are to serve a really useful purpose.

Accommodation and Equipment.—The inadequacy of our laboratory accommodation and equipment was

APPENDIX VII—concluded.

recognized by Government as far back as 1906 (G.O. No. 657, Educational, dated 10th October 1906, page 6, paragraph 2), when it was decided that plans and estimates should be prepared for new buildings to be located at Saidapet. Some time afterwards there were further developments based on proposals emanating in the first place from the Ootacamund Industrial Conference of September 1908, the acceptance of which in principle meant a substantial advance on what was intended at Saidapet and calling for more space than that site provided. It was finally decided to locate the new college

at Guindy (G.O. No. 132, Educational, dated 8th March 1909) and plans worked out in detail for that site were finally approved and work commenced in 1914.

The estimate of expenditure comes to about Rs. 17,75,000 and a note giving a fairly full description of what is intended goes with G.O. No. 1878 W., dated 23rd September 1913, from which can be taken what is required. If detailed figures of cost are quoted, some revision may be called for in connection with the estimate for the power house in view of the larger scheme now being prepared in the Public Works Department.
