

(1) Number of pages 42

(2) Date of repair _____

(3) Initials of the Referencer J**MADRAS RECORD OFFICE.****Government of Madras.***Public Works* **DEPARTMENT.***Cons. 20.11.1859*

G.O. No.	2635	Press Mis.
3-4	Dated	11-11-1859.

Not to be folded or roughly handled

No. 3. Read the following letter from Lieutenant-Colonel J. H. BELL, Chief Engineer ;
to J. D. BOURDILLON, Esq., Secretary to Government, dated 15th October 1859,
No. 6197.

Agreeably to the instruction in paragraph 6 of the order of Government of the 26th Sep-
tember 1859, No. 2304, I have the honor to submit further ob-
servations on the subject of the proposed certificate for large
works, with reference especially to the memorandum of the Se-
cretary to Government accompanying the order.

2. The Secretary says that the Commissioners' intention was, that each successive certi-
ficate should exhibit the actual quantity of work done, and the actual amount expended within
the time covered by the document. He adds "so prepared, the certificate would cost little time
or trouble: it would be little more than to take and enter the measurements, and then to trans-
fer the expenditure to the cash book."

3. By this, I understand, that in the Commissioner's certificate, there is to be no definite
relation shown between "the actual quantity of work done" and "the actual amount expended"
at any given time. I could wish that the Commissioners, or Mr. Peachey for them, had given
Mr. Bourdillon an example to illustrate the certificate according to this description of it, for the
forms in Appendix I of the Commissioners' report, do not at all answer this description, though
they perfectly agree with the description in the body of the report.

4. The forms in question shew the quantity and the value of each description of work in
juxta position. In the first form of earth work estimated as follows:—

10,000 cubic yards at 1 anna, Rupees 625, 2,000 cubic yards are said to have been "executed
as per this certificate," and the value (at the estimated rate) is set down at Rupees 125.
Now here there is an exact relation between the quantity of work and the amount expend-
ed, and if the earth work had been done for 9 pice the cubic yard, instead of for 1 anna, the
value of the 2,000 cubic yards would have been altered accordingly, while the relation of
money expended to work done would have been strictly preserved.

5. In the second form we have "executed as per last certificate."

	Rs.	Rs.
Earth work.	2,000	125
"Executed as per present certificate."	3,000	187-8
		<u>312-8</u>

here again quantity of work and corresponding value are preserved; and the same rule is followed
in entering an item of rough stone, of which 200 cubic yards are said to have been executed for
87-8, being at the estimated rate of 7 annas the cubic yard.

6. Column 7 in each certificate shews the quantity and value of each successive portion of
work done, and the total amount is necessarily the bill for the work. Advances are entered at the
foot of the certificate, but in a mere memorandum, which bears no relation whatever to the
body of the certificate. These advances may either represent the whole disbursement, or more
probably the disbursement, in addition to the value of work measured and paid for. It does not
at all signify for the purpose of my argument, whether they represent the one or the other. If
they represent the whole disbursement, then their amount, minus the value of work done, has to
be accounted for. If they represent only disbursement for work yet to be valued, then they have
to be accounted for without deduction. When all the work is measured and valued, the advances
must be cancelled, and the "difference in hand," will represent the difference between the ad-
vances and the valuation of the work. Thus it appears that the advances are brought to account
only by the valuation of the work, and have, therefore, nothing to do with the preparation of the
bill.

7. The remaining items in the two forms are "rough stone in chunam." "Upright stones" and "brick in chunam." The upright stones would be disposed of without any more difficulty than the earth and stone work, because all alike would be done according to a certain rate. The stone and brick in chunam might also be done at a certain rate, but they also might not. In a great many instances they are not, and when they are not what would be the consequence as to the certificate? To fill up columns 6 and 7, the number of bricks, the quantities of chunam, sand and jaghery, the numbers of bricklayers and of men and women or boy coolies, and lastly, the sundries must be all entered according to their actual cost, and the amount in money with the actual quantity in cubic yards will be entered in columns 6 and 7. In this way and in this only, could these columns be filled up. To enter the "amount expended" without knowing on what it had been expended, would be a mere delusion; for while the amounts for earth and stone work, &c., would represent the cost of those works, the amount for brick in chunam would represent nothing at all.

8. The supposed example given by Mr. Bourdillon, would not exist in practice. The 10,000 Rupees supposed to be expended on materials would not appear at all in the body of the certificate, which is a document representing work done. It would appear at the foot of the certificate as an advance. It might not be an advance for materials; for the materials might have been delivered and paid for, but it would be an advance for work to be done, and on the work being done and its quantity and value entered in the body of the certificate, the advance for work to be done in other words, the 10,000 Rupees paid for materials would be cancelled. There would thus be no such disproportion, as the Secretary contemplates, because the work done, and the amount expended for materials would appear in distinct parts of the certificate. The entries at the foot of the certificate would be only provisional, and if they were 1,000 to 1 of the value of the work performed, would not in the least affect the utility of the certificate. They would have their proper use in shewing what advances had taken place, and for what purpose, and in thus enabling the Inspecting officer to judge of the propriety of such advances, with reference to the species and value of the work to be done.

9. It is no part of my plan, as the Secretary supposes that a rate should be struck from the valuation of the work. I adverted to the rate as an element of the work exhibited by the certificate, on the authority of the report. At that time I had not seen the forms of the Commissioners, but I learned from their textual description that column 6 would show "the quantity, rate and value which is submitted to be passed;" and I argued that this "rate," when the work was not done at a certain rate, could be derived only by means of a troublesome calculation.

10. In the form column 6 contains no rate; but this omission does not prove that I made any mistake, for a rate as part of column 6, is expressly mentioned in the text. The omission, I have no doubt, was simply owing to the assumption that the work would be executed at the estimated rate. Were the rate to differ it would certainly appear in column 6. According to my plan, and according to the old Maramut Department bill, there would be no rate entered, but only the valuation of the work. But it is not the derivation of the rate from the valuation but the valuation itself, (a matter of absolute necessity whether a rate is struck or no), which would give trouble and occupy time. The derivation of the rate is only a sum in compound division, which would not detain a tyro in arithmetic five minutes. The valuation of the work by aggregating its element of cost, would be a work of more or less difficulty, according to the experience and aptitude of the computer.

11. I must not be understood to mean that the rate should not be struck. It ought to be struck, but there is no positive necessity for its being struck by the person who prepares the certificate. He would most probably be glad to know from the valuation of the work, the rate at which it was performed; but the person who ought to know this is the Inspecting officer, and he can know it at any time, by a brief calculation from the given valuation of the work.

12. If the description of the certificate given by Mr. Bourdillon be correct what, I should like to know, is the meaning of the Commissioners in twice calling the certificate a bill? a more inexact description of a bill than the Secretary's description of the certificate, cannot be ima-

gined. In fact, it would be contrary to reason to speak of a bill as "exhibiting the actual quantity of work done, and the actual amount expended within the time covered by the document," while there was no definite relation between the one and the other, but on the contrary, according to Mr. Bourdillon's own example, often a violent "disproportion," which would disappear only at the completion of the work, and then too, without any clearing up of the relation between the work done and the expenditure.

13. I have above called column 7 the bill. The Commissioner's call column 6 the bill. There is no real difference between us, as their description speaks of each successive entry in column 6 as "quantity, rate and value submitted to be passed," that is, passed for the "payment" to be made at each stage of the work done, exhibited in the certificate. Column 7 is the aggregate of all the entries in column 6 in each certificate, and is, therefore, the bill not to be passed for payment, but to be submitted for audit.

14. It is clear to me that the Commissioners' in recommending the certificate, never thought of its possible application to works done otherwise, than at a certain rate; and hence it is no wonder, that their representative has failed to explain such an application. I consider that the Government is much indebted to the Commissioners for the suggestion of the certificate, but I affirm, that the value of the certificate will be very far greater for works directly executed by the purchase of materials and the hiring of workmen, than for those contemplated by the Commissioners.

15. The reason of this opinion will be plain when the examples of excess above estimates and the fruitless discussions originated by them are remembered. What is wanted when an excessive expenditure is reported, but an explanation of its cause? Now, such an explanation is seldom, if ever satisfactorily afforded for important works under the present system of bills; for if no one can shew clearly on what part of the work the excess has occurred, certainly no one can shew its cause. When bills do not exceed estimates, it is thought a matter of little concern, whether or no the relation between estimated and actual expenditure is shewn in the bill, simply because there are no discussions with the Government, and because there is no trouble in auditing a bill which affords no useful information. But for the purpose of true audit and of the analysis recommended by the Commissioners, the old Maramut department bill is, I maintain, far superior to the one in present use. Mr. Bourdillon will, I dare say, remember that in our personal discussions about the bill, I entirely denied the necessity of the "fictitious calculations," which the Public Works Commissioners "pointed out," but never proved or could prove. When their second report was prepared, their Engineer member had left them altogether, and I believe had little or nothing to do with the document or the doctrines laid down in it. It therefore, rests upon the authority of the remaining Commissioners, who were actuated in their judgment, of the requirements of the proposed executive system by the precedents of the road department. But the operations of the road department had then been very limited; and its executive officers being only two or three altogether, it was an easy matter to keep a strict control over the expenditure, and to prevent excess above the estimates. Consequently the defects of its form of bill never became apparent. On the other hand, having personally examined every bill in the Maramut department for many years, I had abundantly proved the advantage of the form made general in the department by the Board of Revenue, and having also been an Executive officer in charge of works and accounts, under the Military Board for many other years, I believe that I possessed better means than most persons, of judging of the probability of fictitious calculations in the bills.

16. Those who assume that such fictitious calculations will be made to overlook the circumstance that if a man will make a false aggregate of his materials and workmen, he will be just as likely to enter their separate amounts untruly.

17. If however, that which is not absolutely accurate is assumed to be fictitious, I say that such accuracy is impossible in any bill whatever, for no one can put down the exact quantities of material that have been used.

18. As to the trouble of preparing the bill, the question is whether the object to be attained is worth the trouble or not. I think that it is; and if the bill is prepared in successive stages

according to the plan laid down in the Commissioners' report, I believe that so far from the new bill causing any delay, it would greatly promote expedition and punctuality. The Public Works Commissioners, when investigating the bill question, consulted among other persons, Mr. Bush, who had been an Overseer on the Cheyar annicut works, and who complained of the heavy task imposed on him in preparing the bills according to the prescribed form. But this task was self imposed, by his putting off the requisite calculations till the works were finished. It was just as if a merchant were to post his ledger only at the end of a year or of a longer period. Had Mr. Bush valued his work at its several stages, he would have taken a good deal of trouble, but it would have been so sub-divided as to be little felt, and each stage accomplished would have rendered the next one so much the easier.

19. The objection of the Secretary that the certificate which I recommend would not have any value, I have shown above to be grounded on the mistaken supposition that any amount paid for the purchase of materials would form part of the certificate. It would be only an appendix to the certificate, and would not affect its value in the least.

20. Having thus endeavoured to justify my previous reports on the subject of the certificate, I add, that when language has a definite meaning it is not allowable to any one to put another meaning upon it, and above all, it is not allowable to the person who has used the language. As I have come under the criticism of the Secretary to Government for my exposition of the Commissioner's language, I must remark, that the Secretary should have disproved my view from the Commissioners' report itself, and not from any other authority unless that authority had shewn from the document itself that I had misunderstood its language. Moreover, as the Secretary has stated, that he "carefully explained" to me what the Commissioners' "intended" he should have added that I objected to his explanation, and refused to admit that I had made any mistake. I profess to understand the language of the Commissioner's report, but I cannot be charged with a mistake for not divining their intentions.

21. I prefer the proposed certificate to additional columns in the progress report.

1st. Because, unless those columns supplied the very same information as that of the proposed certificate, namely, the true measurement and valuation of the work at any given stage, they would be useless for my purpose.

2nd. Because, if such a valuation is made, it will be much more conveniently referred to and checked in a separate document, than in a progress report.

3rd. Because, the certificate when complete, will be the bill which must always be a separate document.

22. The decisive advantages of the certificate will be these. The certificate will truly represent the cost of the work at any stage, and will be an immediate check upon excess of expenditure.

It will take trouble to prepare; but that trouble will be sub-divided, and there will be no eventual delay but the reverse, since when the last calculation is made, the bill will be complete, and will only require to be copied.

It will afford the best possible means of true audit and analysis.

23. Since writing the foregoing paragraphs of this letter, I have received the accompanying memorandum from Major Horsley, who agrees with me as to the necessity of the certificate for works above Rupees 2,000, and would also adopt Mr. Bourdillon's proposition for additional columns in the progress report for works between Rupees 50 and 2,000.

24. I also desire to remind the Government that Colonel Lawford, when officiating Chief Engineer, submitted a proposition so greatly resembling mine, that it would seem as if I must have borrowed his views. I, however, had never seen or heard of the letter when I wrote my report of 9th of June; and as Colonel Lawford was then absent on duty, I knew nothing of his views. It is only since the

receipt of the last order of Government on the subject, that the letter has been brought to my notice; and I must express my satisfaction at finding that an officer of Colonel Lawford's experience, both in the provinces and in this office, has felt the necessity of reforming the present system of accounts for large works, and has preceded me in representing that necessity to Government.

25. I adopt Major Horsley's recommendation, that the works for which the certificate is prepared shall be divided into three stages, as far as may be practicable, and that each certificate shall be a part bill to be submitted for audit. At the end of the official year, it will of course be necessary to value an incomplete work, whatever may be its stage of progress, and to prepare a fresh certificate accordingly.

26. Major Horsley does not anticipate so much trouble in the preparation of the certificate as I have done, and if he is right, we have an additional argument in its favor.

27. I also support his recommendation, that for the present works between 50 and 2,000 Rupees shall be entered in the progress report, in the manner proposed by the Secretary to Government.

28. I have requested Captain Shaw Stewart to draw up rules in conformity with these views, with the intention that they shall be embodied in the Code, should the Government, on further consideration approve of the introduction of the certificate into the department, upon the plan described in my reports and in Major Horsley's memorandum. These rules will, of course, be submitted for special sanction, should the general approval of the new system be granted.

29. On the subject of drawing cash for public works, I have submitted in my letter of the 22nd September 1859 No. 5318, a proposition similar in principle to that of the Commissioner's, in paragraphs 42, 43 and 44 of their report; and I trust that the early decision of Government may be given upon this subject, as well as upon that which forms the chief topic of this letter.

Memorandum by Major HORSLEY, Deputy Chief Engineer, Northern Circle dated 11th October 1859.

The Chief Engineer having requested me to put on paper my opinion in reference to the desirableness or otherwise of introducing the "certificate," suggested in the proceedings of the Commission for investigating public establishments, whether in the form of an abstract return of work executed, and of the total expenditure thereon, in the manner explained by the Secretary to Government Public Works Department, or in the more elaborate and correct form given in Appendix I of the report of the above Commission, dated 12th March 1859, with a view to the more speedy and certain check upon the progress of and expenditure on works, and especially large works, I beg to offer the following remarks for his consideration.

2. First as respects the kind of certificate recommended by Mr. Bourdillon, viz. that each successive certificate should exhibit the actual quantity of work done, and the actual amount expended within the time covered by the document. "Information of this kind is, I think, very desirable, and might be introduced in the progress reports of District Engineers and their Assistants, as suggested by Mr. Bourdillon in the 10th paragraph of his memorandum, dated 9th July 1859. But it will not supply the whole, or any thing like the whole, of the information required by the Commissioners, as described in the 31st and 32nd paragraphs of their report, and exemplified in the form given in Appendix I.

3. This latter "certificate" is bonâ fide a part bill, and a far better one in my opinion than that now in use. It is, in fact, essentially the same as that formerly in use in the Maramut department, and in the preparation of which I never experienced any difficulty, nor did the Collector's department that I am aware of. I would here refer to my diaries of former years in the 8th division, which will shew that on every inspection of work, an account, similar in all essentials to that suggested by the Commissioners, was entered therein for the information of the Board of Revenue, Department Public Works, and of the Collectors. These accounts were examined in the Collector's office and any errors in calculation corrected, after reference to the

Civil Engineer. The bill was prepared from these accounts in the Collector's office after the completion of the work, and if there had been any expenditure after the last inspection by the Civil Engineer's Department, the reason of it was explained by the Collector in transmitting the bill for sanction. Diaries having been done away with, this kind of voucher or "certificate" no longer exists, and the information obtainable from the monthly progress reports and inspection lists is, in general, very meagre, and affords little or no check upon the expenditure.

4. I am of opinion that the amount of information contained in Mr. Boudillon's proposition should be given in the monthly progress reports, opposite the *last monthly* inspection of each work, exceeding Rupees 50 estimated cost; and that a certificate of the form given in Appendix I, and containing *all* the particulars therein shown, should be furnished by executive agents in charge of works of Rupees 2,000 estimated cost and upwards, at least three times during the progress of each work; for instance, in the case of a building or bridge, the first certificate should be furnished after the foundations are laid; the second, when the walls, or piers, are raised to the required height; and the third, on the completion of the work. The expenditure on a work of irrigation could be separated, in like manner, into these parts, and similarly accounted for. These certificates will thus form three part bills, each of which should be submitted as soon as received from the Executive agent (countersigned by the officer in charge of the range, and again by the District Engineer, with the date of last inspection duly entered), to the Central office to be finally audited and passed. Every considerable work will thus be divided into three distinct and convenient stages, and the expenditure on each will come under review in sufficient time to check any excess or fraud in the accounts. These "certificates," or part bills, will also shew at a glance whether the work has been done in accordance with the estimate or otherwise, and also the rate for each description of work; information which cannot possibly be gained from the bill now in use with the Department Public Works.

5. Much has been said about the extra labour involved in preparing the certificates in the form suggested by the Commission, but I really cannot see how this can be. The principal part of the labour, that of making out a list of materials and workmen with their cost, is already gone through, and it is only necessary to add up the cost of these to date, and to distribute them under their proper heads, and the certificate may be filled in at once. In keeping the daily account of works, the number of coolies employed on each description of work should be entered separately, for instance, so many in baling, and so many in assisting bricklayers, or stone masons, as the case may be, and it will then be an easy matter to ascertain the rate at which each has been executed. I believe myself, that bills thus prepared will be far less fictitious than the present bill, and involve much less labour in the preparation and copying out, inasmuch as there will be but one line for each description of work, and probably not more than four or five lines in all for most works, instead of a whole page of different kinds of materials and workmen, from which little or nothing can be learnt as respects the work itself.

6. In the first and second "certificates," all advances should be entered at foot in the manner shewn in the form Appendix I.

7. I have confined my recommendation of the Commissioners "certificate" to works of Rupees 2,000 and upwards, not because I think that it is not applicable, or that the same information is not needed in the case of smaller works, but because I think it desirable that District Engineers and their subordinates, should first accustom themselves to the change in the larger and less numerous description of works, and when it is thoroughly understood and appreciated, as I feel sure it will be, in these, it can be introduced generally for all works exceeding fifty Rupees. In the case of these latter works, however, probably one certificate or bill will be sufficient on the completion of the work, if completed within the same official year in which it is commenced, if not, a separate certificate for each year.

8. The audit of the Central office in the case of bills prepared according to the form now in use is of no practical value for want of the "analysis and exact comparison, i. e., statistics," spoken of in the 36th paragraph of the report of the Commission above referred to. The District Engineer's audit is the only professional audit practicable at present, and this, I fear, is not sufficiently attended to. The necessity for it has, however, been lately impressed upon them in Circular No. xcviij, dated 16th September 1859.

9. In adopting the present form of bill, which is the same that was in use for military works, in the time of the Military Board, it seems to have been forgotten; that for all such works the report of a committee of officers was required; 1stly, on the foundation, 2ndly, when the walls above were raised to the required height, (and without these report, no further advances of money were authorized to be made to the Engineer officer); and finally, when the work was completed, to accompany the bill of the Superintending or Executive Engineer. The final report certified that the work executed corresponded in every respect with the sanctioned plan, and that the materials used therein were of good quality. The Military Board, therefore, had this voucher at all events to go upon and it did not signify much in what form the bill was submitted, provided they were satisfied that the work was executed in accordance with the estimate and with good materials. But no such voucher is now forthcoming, and in very many cases there is no information whatever in the Central office, from which the above important particulars can be gathered. The bills are prepared and signed by the executive agent in charge of the range, and submitted for sanction by the District Engineer with his countersignature attached, but without any report, except in cases where the expenditure considerably exceeds the estimate. It is thus seen that the audit of the central office as respects bills for works executed is necessarily most imperfect.

No. 4. ORDER THEREON, 11th November 1859, No. 2635.

In this letter the Chief Engineer submits with reference to paragraph 6 of the order of September 26 No. 2304, further and more detailed reasons for still advocating the introduction into the Public Works Department of the "certificate" recommended by the North Arcot Commissioners, in place of the form of bill now in use, in the case of works estimated to cost more than 2,000 Rupees. He encloses also a memorandum by Major Horsley, Deputy Chief Engineer, to a similar purport; and supports that officer's recommendation that in the case of works of an estimated cost of from 50 to 2,000 Rupees, certain additional particulars shall be included in the monthly Progress Reports, so as to make these reports in some respects serve the purposes of the "certificate."

2. Under the explanation offered by the Chief Engineer as to the mode of preparing the certificate, and the decided opinion expressed both by him and by Major Horsley, and also on a former occasion by Colonel Lawford,* the Government assent to the adoption of the certificate to the extent proposed. The united judgment of three officers of so great experience, induces the Government to entertain the belief that this change will promote the important objects of a real check over the expenditure, and an effectual audit.

3. In one particular it appears to the Governor in Council that the plan now proposed may be amended. Adopting a suggestion by Major Horsley, the Chief Engineer proposes that three successive certificates shall be prepared for every work for which the certificate is to be used. In the case of a building, the first certificate is to be submitted when the foundations are laid, the second when the walls are raised to the full height, and the last when the work is completed. In the case of a bridge, the three stages are to be the completion of the foundations, of the piers, and of the whole structure; for irrigation works and for roads, it is not specified how the certificates are to be divided. At the end of the official year, a certificate is to be submitted in every case, whatever may be the state of advancement of the work at the time.

4. In the opinion of Government it will be better to have periodical certificates only. In two large classes of works, viz. ordinary irrigation works and roads, no natural threefold division appears to exist. In the case of a bridge of considerable length, it often happens that some piers are completed before the foundations are laid of others, and that some arches are turned at one end of the structure while a number of piers remain unfinished at the other. And the same may often be true of extensive buildings; all parts will not necessarily proceed at equal speed, and the periods proposed to be marked by the certificates can only in fact be observed, by interfering with the ordinary and convenient method of proceeding in the execution of the work.

8 *Proceedings of the Madras Government, Public Works Department,
for the month of November 1859.*

5. Again under the proposed arrangement there would be no known and fixed time when the certificate must be due; and the Chief Engineer would thus be unable to insist on punctuality. On the other hand, the Government are of opinion that the very fact of periodical recurrence of reports is of use, provided only punctuality is enforced, in inculcating habits of regularity.
6. For the foregoing reasons the Governor in Council is decidedly of opinion that the certificates should be periodical for all works for which they are used. The length of the period may properly vary with the size of the work. For very large works they should be monthly; for those of smaller size they may perhaps properly be quarterly. The final certificate to be always sent in immediately after the completion of the work.
7. With regard to the details of the preparation of the certificates, the Government are of opinion that a column for the rate of cost should be inserted in every certificate; and that the advances entered should be the whole advance made for the work.
8. The Government approve the proposal to introduce some additional columns into the Progress Report, in the case of works of an estimated cost between 50 Rupees and 2,000 Rupees.
9. The Chief Engineer will as proposed in paragraph 28 of his letter, submit for approval a draft of detailed rules for giving effect to the provisions of this order.

(Signed) J. D. BOURDILLON,
Secretary to Government.

*Enclosure one
Memo by Major
Hosley Dy Chief
Engr. H. Wicks
dated 11 Oct/59*

*para 6 of the Order of Government of the 26th September
1859, No. 2304, I have the honor to submit further
observations on the subject of the proposed Certificate
for large works with reference especially to the Memo.
of the Secretary to Government accompanying the order.*

*2. The Secretary says that the Commission-
er's intention was that each successive Certificate
should exhibit the actual quantity of work done, and
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and

Commissioner,

913

*Central Office of
Fort St. George
15th October 1859.*

No. 6197.

*From, The Chief Engineer
To, The Secretary to Government
Public Works Department.*

Sr,

Public

and then to transfer the expenditure to the Cash book.

3. By this I understand that in the Commissioners' Certificate there is to be no definite relation shown between "the actual quantity of work done" and "the actual amount expended" at any given time. I could wish that the Commissioners, or Mr. Peachey for them, had given Mr. Bourdillon an example to illustrate the Certificate according to the description of it, for the Forms in Appendix I of the Commissioners Report do not at all answer this description, though they perfectly agree with the description in the body of the Report.

4. The Forms in question shew the quantity and the value of each description of work in juxtaposition. In the first Form, of Earth work estimates as follows.

10,000 Cubic Yards at 1 Anna. Rupees 625, --
2000 Cubic Yards are said to have been "executed as per this Certificate," and the value (at the estimated rate) is set down at Rupees 125. Now here there is an exact relation between the quantity of work and the amount expended, and if the earth work had

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had been done for 9 pice the Cubic Yard, instead of for 1 Anna, the value of the 2,000 Cubic Yards would have been altered accordingly, while the relation of money expended to work done would have been strictly preserved.

5. In the second Form we have "executed as per last Certificate."

Earth work ————— 2,000 — Rupees — 125.

"Executed as per present
Certificate" ————— 3,000 — " — 187-8
312-8.

Here again quantity of work and corresponding value are preserved; and the same rule is followed in entering an item of Rough Stone, of which 200 Cubic Yards are said to have been executed for 87-8, being, at the estimated rate of 7 Annas the Cubic Yard.

6. Column 7 in each Certificate shews the quantity and value of each successive portion of work done, and the total amount is necessarily the Bill for the work. — Advances are entered at the

foot

foot of the Certificate, but in a mere Memorandum which bears no relation whatever to the body of the Certificate. These advances may either represent the whole disbursement, or more probably the disbursement in addition to the value of work measured and paid for. It does not at all signify for the purpose of my argument whether they represent the one or the other. If they represent the whole disbursement then their amount, minus the value of work done, has to be accounted for. If they represent only disbursement for work yet to be valued then they have to be accounted for without deduction. When all the work is measured and valued the advances must be cancelled; and the "Difference in hand" will represent the difference between the advances and the valuation of the work. Thus it appears that the advances are brought to account only by the valuation of the work, and have therefore nothing to do with the preparation of the Bill.

7 The remaining items in the two forms are "Rough Stone in Chunam". "Upright stones" and

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and "Brick in Chunam". The Upright stones would be disposed of without any more difficulty than the Earth and stone work because all alike would be done according to a certain rate. The stone and Brick in Chunam might also be done at a certain rate, but they also might not. In a great many instances they are not, and when they are not what would be the consequence as to the Certificate? To fill up Columns 6 and 7 the number of bricks, the quantities of Chunam, sand and jughery, the numbers of bricklayers and of men and women or boy coolies and lastly the Sundries must be all entered according to their actual cost, and the amount in money with the actual quantity in cubic Yards will be entered in Columns 6 and 7. In this way and in this only could these Columns be filled up. To enter the "amount expended" without knowing on what it had been expended would be a mere delusion; for while the amounts for earth and stone work ~~it~~ would represent the cost of those works the amount for brick in Chunam would represent nothing at all.

The
Surveyor

8. The supposed example given by M.
Bourdillon would not exist in practice. The
10,000, Rupees supposed to be expended on ma-
terials would not appear at all in the body of the
Certificate, which is a document representing work
done. It would appear at the foot of the Certificate
as an advance. It might not be an advance
for materials; for the materials might have been
delivered and paid for, but it would be an
advance for work to be done, and on the work
being done and its quantity and value entered in
the body of the Certificate the advance for work to
be done in other words the 10,000 Rupees paid for
materials would be cancelled. There would thus be
no such disproportion as the Secretary contemplates,
because the work done, and the amount expended
for materials would appear in distinct parts of
the Certificate. The entries at the foot of the Certificate
would be only provisional, and if they were 1,000 to
1 of the value of the work performed, would not in the
least affect the utility of the Certificate. They would
have their proper use in shewing what advances had

taken

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taken place, and for what purpose, and in thus
enabling the Inspecting Officer to judge of the
propriety of such advances with reference to the
species and value of the work to be done.

9. It is no part of my plan, as the Secretary
supposes that a rate should be struck from the value-
tion of the work. I adverted to the rate as an element
of the work exhibited by the Certificate on
the authority of the Report. At that
time I had not seen the Forms of the
Commissioners, but I learned from their
textual description that Column b would
show "the quantity, rate and value
which is submitted to be passed;" and
I argued that this "rate", when the work
was not done at a certain rate, could
be derived only by means of a troublesome
calculation..

10. In the Form Column b contains

no.

no rate, but this omission does not prove that I made any mistake, for a rate as part of Column b is expressly mentioned in the text. The omission, I have no doubt, was simply owing to the assumption that the work would be executed at the estimated rate. Were the rate to differ it would certainly appear in Column b. According to my plan and according to the old Maramut Department bill there would be no rate entered, but only the valuation of the work. But it is not the derivation of the rate from the valuation but the valuation itself (a matter of absolute necessity whether a rate is struck or no) which

would

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would give trouble and occupy time. The derivation of the rate is only a sum in compound division which would not detain a tyro in arithmetic five minutes. The valuation of the work by aggregating its Element of Cost would be a work of more or less difficulty according to the experience and aptitude of the Computer.

" I must not be understood to mean that the rate should not be struck. ^{It ought to be struck,} but there is no positive necessity for its being struck by the person who prepares the certificate. He would most probably be glad to know from the valuation of the work the rate at which it was performed; but the person who ought to know this is the Inspecting Officer, and he can know it at any time by a brief calculation from the given valuation of the work.

12. If the description of the Certificate given by Mr. Birrellon

be

be correct what, I should like to know,
is the meaning of the Commissioners
in twice calling the Certificate a Bill?

A more incorrect description of a Bill
than the Secretary's description of the
Certificate cannot be imagined. In
fact it would be contrary to reason
to speak of a Bill as "exhibiting"
the actual quantity of work done and
the actual amount expended within
the time covered by the document",
while there was no definite relation
between the one and the other, but on
the contrary according to Mr. Bourdillon's
own example often a violent "disproportion"
which would disappear only at the
completion of the work, and then too
without any clearing up of the
relation between the work done and
the expenditure.

13. The one above called
column 7 of the Bill. The Commissioners
call column 1 the Bill. There is no

real

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real difference between us, as their
description speaks of each successive
entry in column 6 as "quantity, rate
and value submitted to be passed"
that is passed for the "payment" to be
made at each stage of the work done
exhibited in the Certificate. Column 7
is the aggregate of all the entries in
column 6 in each Certificate, and is
therefore the Bill not to be passed for
payment, but to be submitted for
audit.

14. It is clear to me that
the Commissioners in recommending the
Certificate never thought of its possible
application to works done otherwise
than at a certain rate; and hence
it is no wonder that their representa-
-tive has failed to explain such an
application. I consider that the
Government is much indebted to the
Commissioners for the suggestion of the
Certificate, but I affirm that the value of
the

the certificate will be very far greater for works directly executed by the purchase of materials and the hiring of workmen, than for those contemplated by the Commissioners.

15 The reason of this opinion will be plain when the examples of excess above Estimates and the fruitless discussions originated by them are remembered. What is wanted when an excessive expenditure is reported but an explanation of its cause. Now such an explanation is seldom if ever satisfactorily afforded for important works under the present system of Bills; for if no one can show clearly on what part of the work the excess has occurred, certainly no one can show its cause. When Bills do not exceed Estimates it is thought a matter of little concern whether or no the relation between Estimated and actual expenditure is shown in the Bill, simply because there are no discrepancies with the Government,
and

and because there is no trouble in auditing a Bill which affords no useful information. But for the purpose of true audit and of the Analysis recommended by the Commissioners the old War and Department Bill is, I maintain, far superior to the one in present use. Mr. Boudillon will, I dare say, remember that in our personal discussions about the Bill I entirely denied the necessity of the "fictitious calculations" which the Public Works Commissioners pointed out but never proved or could prove. When their second report was prepared their Engineer Member had left them altogether, and I believe had little or nothing to do with the document or the doctrines laid down in it. It therefore rests upon the authority of the remaining Commissioners, who were actuated in their judgment of the requirements of the proposed execution system by the precedents of the Road Department. But the operations of the Road Department had then been very limited, and its Executive Officers being only two or three altogether, it was an easy matter to keep

Commissioners,

Keep a strict control over the expenditure, and to present except above the Estimates. Consequently the defects of its Form of Bill never became apparent. On the other hand having personally examined every Bill in the Warrent Department for many years, I had abundantly proved the advantage of the form in a general in the Department by the Board of Revenue, and having also been an Executive Officer in charge of works and accounts under the Military Board for many other years I believe that I possessed better means than most persons of judging of the probability of fictitious calculations in the Bills.

16 Those who assume that such fictitious calculations will be made overlook the circumstance that if a man will make a false aggregate of his materials and workmen, he will be just as likely to enter their separate accounts truthfully.

17 It is however that which is not absolutely accurate is assumed to be fictitious. I say that such accuracy is impossible in any bill whatever, for no one can put down the exact quantities of material that have been used.

As.

18 As to the trouble of preparing the bill the question is whether the object to be attained is worth the trouble or not. I think that it is; and if the bill is prepared in successive stages according to the plan laid down in the Commissioner's report I believe that so far from the new bill causing any delay it would greatly promote expedition and punctuality. The Public Works Commissioners when investigating the Bill question consulted among other persons Mr. Bush who had been an Overseer on the Chicago Amint works, and who complained of the heavy task imposed on him in preparing the Bills according to the prescribed form. But this task was half imposed by his putting off the requisite calculations till the works were finished. It was just as if a Merchant were to post his ledger only at the end of a year or of a longer period. Had Mr. Bush valued his work at its several stages he would have taken a good deal of trouble, but it

Commissioners,

Keep a strict control over the expenditure, and to prevent excess above the Estimates. Consequently the defects of its Form of Bill never became apparent. On the other hand having personally examined every Bill in the Warrent Department for many years, I had abundantly proved the advantage of the form in a general in the Department by the Board of Revenue, and having also been an Executive Officer in charge of works and accounts under the Military Board for many other years I believe that I possessed better means and than most persons of judging of the probability of fictitious calculations in the Bills.

16 Those who affirm that such fictitious calculations will be made overlook the circumstance that if a man will make a false aggregate of his materials and workmen, he will be just as likely to enter their separate accounts truthfully.

17 If however that which is not absolutely accurate is affirmed to be fictitious, I say that such accuracy is impossible in any bill whatever, for no one can put down the exact quantities of material that have been used.

As.

18 As to the trouble of preparing the bill the question is whether the object to be attained is worth the trouble or not. I think that it is; and if the bill is prepared in successive stages according to the plan laid down in the Commissioners' report I believe that so far from the new bill causing any delay it would greatly promote expedition and punctuality. The Public Works Commissioners when investigating the Bill question consulted among other persons Mr. Birch who had been an Overseer on the Cheyar Ancient works, and who complained of the heavy task imposed on him in preparing the Bills according to the prescribed form. But this task was self imposed by his putting off the requisite calculations till the works were finished. It was just as if a Merchant were to post his ledger only at the end of a year or of a longer period. Had Mr. Birch valued his work at its several stages he would have taken a good deal of trouble, but it

Commissioners,

27. I also support his recommendation that for the present works between 50 and 2000 Rupees shall be entered in the Progress Report in the manner proposed by the Secretary to Government.

28. I have requested William Shaw Stewart to draw up Rules in conformity with these views, with the intention that they shall be embodied in the Code, should the Government on further consideration approve of the introduction of the Certificate into the Department upon the plan described in my reports and in Major Percival's Memo. These Rules will of course be submitted for special sanction should the general approval of the new system be granted.

29. On the subject of drawing Cash for Public Works I have submitted in my letter of the 22nd Sept 1859 - No 5318 - a proposition similar in principle to that of the Commissioners in paras 12, 43 & 44 of their Report, and I trust that the early decision of Government may be given upon this subject, as well as upon that which forms the chief topic of this letter.

Fort Saint George
15 October 1859

I have the honor to be,
Sir,
Your most Obedt Servant,
W. H. Lenth Colvel

To
The Secretary to Government
Chief Engineer
Public Works Department

Commissary,

Public Works Dept

No 2635
 Proceedings of the Madrid Government
 Under date 11th November 1859.

Read the following
 letter from the Chief Engineer.

Submitting with reference
 to the order of Government of
 the 26th October No 2504 further
 observations on the subject of
 the proposed Certificate for large
 works in connection with the
 local and provincial accounts
 of the D. P. W.

Entered 15th October 1859
 No 6197

In this letter the
 Chief Engineer submits with
 reference to Extra 6 of the
 order of September 26th No 2504,
 further and more detailed
 reasons for still advocating
 the introduction into the
 Public Works Department
 of the Certificate recommended
 by the North Arcob
 Commissioners,

Ly

will

Mr. 24 October 1859 No 426
 18th January 1859 No 112.

Madrid 1859
 January 20th 1859
 No 2728.

The Chief Engineer
 of the D. P. W. & Arcob
 D. P. W.

Dated 15th October 1859
 No 195
 1. No 2504-2-59/6197
 No 2635-11th November

Submitting with re-
 ference to the order of Govt
 of the 26th October No 2504,
 further observations on the
 subject of the proposed
 Certificate for large works
 in connection with the
 local and provincial ac-
 counts of the D. P. W.

cy Nov 1859

Commissioners, in place of the form of Bill now in use, in the case of works estimated to cost more than 2000 Rupees. He encloses also a Memo^r by Major Horsley, Deputy Chief Engineer, to a similar purport; and supports that Officer's recommendation that in the case of works of an estimated cost of from 50 to 2000 Rupees, certain additional particulars shall be included in the monthly progress Reports, so as to make these Reports in some respects serve the purpose of the "Certificate."

2. These papers have been carefully considered in Council; and under the explanation offered by the Chief Engineer as to the mode of preparing the Certificate

* Chief Eng^r letter
June 24.

33B
Certificate, and the decided opinion expressed both by him and by Major Horsley, and also on a former occasion by Colonel Lawford, the Government assent to the adoption of the certificate to the extent proposed. The united judgment of three Officers of so great experience induces the Government to entertain the belief that this change will provide the important objects of a real check over the expenditure, and an effectual audit.

3 In one particular it appears to the Governor in Council that the plan now proposed may be amended. Adopting a suggestion by Major Horsley, the Chief Engineer proposes that three

successive
three Certificates shall be
prepared for every work for
which the certificate is to
be used. In the case of
a building, the first
Certificate is to be sub-
mitted when the founda-
tions are laid, the
second when the walls
are raised to the full
height, and the last
when the work is
completed. In the
case of a bridge, the
three stages are to be
the completion of the
foundations, of the
piers, and of the
whole structure; for
irrigation works
and for roads, it
is

3513
it is not specified how
the Certificates are to be
divided. At the end
of the official year, a
Certificate is to be sub-
mitted in every case,
whatever may be the
state of advancement
of the work at the
time.

4 In the opinion
of Government it will
be better to have periodi-
cal Certificates only.
In two large classes of
works, viz ordinary
irrigation works and
roads, no natural
threefold division
appears to exist. In
the case of a bridge
of

of considerable length,
it often happens that
some piers are com-
-pleted before the founda-
-tions are laid of
others, and that
some arches are turned
at one end of the
structure while a
number of piers remain
unfinished at the
other. And the
same may ^{often} be true
of extensive build-
-ings; all parts
will not necessa-
-rily proceed
at equal speed,
and

3.
and the periods proposed
to be marked by the cer-
-tificates can only in fact
be observed, by interfering
with the ordinary and
convenient method of
proceeding in the execution
of the work.

5. Again under the
proposed arrangement
there would be no known
and fixed time when
the certificate must be
due; and the Chief
Engineer would ^{thus} be in-
-able to insist on punc-
-tuality. On the other
hand, the Government
are of opinion that the
very fact of periodical
-recurrence of Reports
is of use, provided only
punctuality is enforced,
in

in inculcating habits
of regularity.

b. For the foregoing
reasons the Governor in
Council is decidedly
of opinion that the
certificates should be
periodical for all works
for which they are used.
The length of the period
may properly vary
with the size of the work.

For very large works they
should be monthly,
for those of smaller
size they may perhaps
properly be quarterly.

The final certificate
to be always sent in
immediately after
the completion of the
work.

7. With regard to
the

The period of the
certificates should be
as long as possible
but not more than
monthly.

the details of the pre-
paration of the Certifi-
-cates, the Gov^t are of
opinion that a Column
for the rate of cost should
be inserted in every
certificate, and that
the advances entered
should be the whole
advance made for the
work.

8. The Government
approve the proposal
to introduce some ad-
ditional columns into
the progress Report,
in the case of works
of an estimated cost
between 50 Rupees
and 2000 Rupees.

9. The Chief En-
-gineers will be pleased,
as proposed in Para 28
of

of his letter, to submit
for approval a draft
of detailed rules for
giving effect to the pro-
visions of this order.

JAH

10 Copies
To the Chief Eng^r
Dis^y 12

Public Works Dept.
Recd of Govt 20th Nov.

No 2635.

Recd of the City and County of New York

Dec 11th 1859.
From Chief Clerk of the Court of Sessions
No 27 June 1860.
No 1357.

Assenting to the adoption
of the certificate recommended
by the North Street Commissioners
to the extent proposed, and
calling for draft rules for
carrying out this order.

No 3 & 4.

cy Nov 29th