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MADRAS RECORD OFFICE.

Government of Madras.

Public Works DEPARTMENT.

G.O. No. 276 W Press Mis

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Dated 24.1 1866

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Proceedings of the Madras Government, Public Works Department, 24th January 1866.

No. 571. Read the following Endorsement of the Superintending Engineer of the 4th Division, dated Madras, 18th December 1865, No. 3,263 :—

Read the following letter from the Executive Engineer, Presidency, to the Superintending Engineer, 4th Division, dated Madras, 9th December 1865, No. 40.

Original Plans.
Do. Estimate.
Working Drawings.
Detailed Estimate.

1. I have the honor to forward you the papers noted on the margin, relating to the new Presidency College.

2. The working drawings differ from the original drawings as regards the following points, viz :—

1st.—The whole of the east, north, and south facades to the level of the impost is faced externally with stone. In the original this was stucco.

2nd.—The quoins, voussoirs, cornice blocks and other mouldings to the above-mentioned facades are of cut stone. In the original these mouldings were of stucco.

3rd.—The details have been altered to suit the nature of the materials. The face work generally is of Sholingar grey granite, and Cuddapah blue lime stone in alternate bands, rock faced, with stroked edges. The mouldings simple and deeply cut. The four columns over the entrance (the only columns retained,) are polished Pallaweram trap, as well as the small columns in the jambs of the wings.

4th.—The details of the central tower have been altered to harmonize with the mansard turrets.

5th.—The turrets have been projected from the face with the view of accentuating more forcibly the several compartments.

6th.—The wings have been brought forward and a central entrance and porch added to the north and south facades.

7th.—TheClass-rooms are 33 feet 6 inches × 20 feet in place of 30 × 20 feet, and the window openings so increased from 5 to 6 feet, and the building lengthened.

8th.—The Reading-room is placed at the back of the building protected by verandahs. The original arrangement being somewhat objectionable.

9th.—The roofs and floors consist of hallow brick arches resting on the inner flanges of wrought iron girders. In the original the roofs were of the ordinary construction.

3. Other alterations will become apparent on inspection of the plans.

4. As I have had ample time to prepare these drawings, I have spared no pains in designing any portion of them. The whole of the details I have endeavoured to render simple and effective. The ornamentation, both internally and externally, (with the exception of the polished columns in the wings) is obtained solely by the accentuation of the constructive features. The polished columns are treated as ornaments and recessed in the jambs as "gems," and in the several parts I have avoided to the best of my ability the incongruity which generally results from adopting a style foreign to the country.

5. The stone-work will of course greatly augment the cost. The flooring I believe, from repeated calculations I have made on reliable data, can be executed for less cost than floors constructed with the ordinary perishable materials, but to be in the safe side I have allowed a good margin.

6. With regard to the face bricks I have inspected the exposed brick-work on the Railway which has been built some five or six years, and I find *that the well-burnt bricks are not affected by the atmosphere*, while all those in the least degree under dome are crumbling away. I am of opinion, therefore, that bricks

Views were Concurred in by the Chief Engineer
Govt

selected from well-burnt bricks delivered on the work, would resist the decaying effects alluded to. I would propose to expose the surface and tuck point all parts not faced with stone, and if it was found that the face began to crumble, either painting or the water glass (silicate of potass) might be applied to arrest decay, plaster is too porous to be of the least use as a protective agent in a saline atmosphere.*

* See Note Appendix No. 1.

7. The works can be let out by contract by publicly advertizing for tenders, or executed in the usual way by petty contract on the Government rates. Of the two courses, I would strongly recommend the former, and it was with the view of making this recommendation that I prepared the drawings and specification in as complete a manner as possible. It is unnecessary to enumerate the many advantages which the contract system would seem to possess over the ordinary system of working, and the present appears to furnish a most favorable opportunity for thoroughly testing it. The great drawback generally is the want of proper competition. I do not anticipate any paucity in the present case, as I have already received intimation of a desire to undertake the work from the several gentleman whose names are entered on the margin, and also from Natives whose names I cannot call to mind. I have no doubt a public advertisement would double the number.

Mr. Johnson, C. E.
,, Sowerby, C. E.
,, Fitzgerald.
,, Horgan.
,, Hawkins.

8. I would require the following establishment, if the works are let to a Contractor :—

1 Assistant Engineer (Clerk of works.)
1 Inspector of masonry.
1 Do. carpentry.
1 Draughtsman.
2 Clerks for calculating measurements and copying papers.

9. This establishment would be well able to carry forward the works to completion, and would leave me the greater portion of my own time to devote to other purposes. In the absence of eligible tenders, it may be that the Government will come to the decision to execute the work by daily labor and petty contract, were such to be the case, I should mention that the existing arrangements in the Department for obtaining supplies of bricks seem to be objectionable. The bricks are small, very badly burnt, and the supply and prices regulated by the caprices of a few Native dealers. I would recommend the establishment of a Government Brick-yard, to be placed in charge of a well-paid English Brick-maker, a man who could not earn nearly so much money in any other capacity, and who consequently would feel greatly interested in the result. The man in charge of the Ackra brick-field in Calcutta, an English Brick-maker, brought out expressly by the East Indian Railway Company to make bricks for the Soane bridge-works is in receipt, I believe, of 450 Rs. per mensem, and no expense was spared at the outset: the result as might have been anticipated is a perfect success. The Government of Bengal are enabled to sell their bricks (which are greatly in demand), at a profit to private individuals and firms with proper arrangements—I should anticipate a similar result in Madras.

10. In connection with this matter I take the opportunity of returning the papers relating to a Patent Brick Kiln, which you kindly lent me for perusal. I would suggest that Lieutenant Pennycuick's report, and the public journal accompanying it, be submitted to Government, with this letter. Lieutenant Pennycuick has gone very carefully into the question, and from a perusal of the papers placed at his disposal, I fully concur with him in his conclusions.*

* See Appendix No. 2.

11. The drawings forwarded will convey a very poor idea of the general effect of the building. The perspective view I hope to have finished by the end of this week, and a companion of the two perspective views will at once render the improvements apparent.

12. Before taking up the drawings of the Senate house, I would beg to offer a few remarks on this building and the College considered as one architectural group and as separate and distinct structures.

13. Multiplying the dimensions of the rooms given in the printed, conditions for each building into proper proportional heights, I found, before commencing the original plans, that the Senate House contained a greater number of cubic feet, than the College, so that I had to adopt the cheapest possible form of construction and materials for the Senate House to bring it within the stipulated amount, *hence the form of construction and the materials of the College were regulated by the Senate house.* Again, the College being of two stories, it became necessary to mark the Senate House horizontally in the same way so that the general architectural effect of the Senate House was regulated by the College, and in fact to preserve a local tint and to prevent incongruity it is possible that both buildings suffered by being designed for contiguous sites.

14. I believe it is now the intention of Government to erect the Senate House on a site distant from that of the College, the necessity for enforcing the instructions as regards style may consequently be removed and same degree of latitude allowed me in the preparation of the detailed drawings. I would also beg to notice the materials I do not think brick and stucco either a cheap, elegant, or appropriate method of facing so large a public building, and it should, I think, be taken into consideration that a building apparently twice as costly as another of similar dimensions is only twice as costly in the item of superficial surface exposed. With these points in view, I would respectfully submit that the restriction as regard the amount of the estimate be also removed.

APPENDICES.

Note No. 1.

On Preserving the exposed surfaces of Buildings.

1. The question of obtaining a good durable facework of brick in Madras is a very important one, and a question which affects a very large proportion of Public Works expenditure; but I trust it will be found that too much stress has been laid on the evil effects of a saline atmosphere.

2. It was thought for a long time in England that stone suffered more from this cause in sea-port towns than in towns situated inland, as at many places, such as Brighton, the disintegration of the surface appeared to be more than that due to the extra exposure to the elements; the received opinion, however, was subverted when it was shown that in inland towns also, where bad stone was used, such as Oxford, the result was similar; good stone, on the contrary, will stand well in any atmosphere, and I trust it will be found good brick also; at the same time it should be known what there is to fall back upon as a protective coating if the surface eventually suffers. Unfortunately all plastered inventions, supposed, to be efficacious are modern, and although they lay a protective coat over the surface temporarily, time has not shown whether such a coat may not eventually prove an element of destruction.

3. Setting aside all such impracticable inventions in which the process commences with "baking in an oven" or forming a vacuem in the molecular structure of the material, there appears to be three inventions worthy of notice.

4. The first is an application with a brush of a mixture composed of bees' wax dissolved in coal tar naphtha applied so long as the surface is capable of absorbing it.

5. The second is a solution known as "water glass" made by dissolving a flinty sand and potass in boiling water applied either with a brush or syringe.

6. The third is that known as "Ransome's Patent" in which two separate solutions by acting on each other cause a mineral precipitate within the pores of the material. One process is to saturate the surface with a weak solution of silicate of soda or potash, and again with a solution of chloride of calcium or barium. The precipitate will be an insoluble silicate of lime or baryta.

7. Of the three processes I conceive the "water glass" to be the simplest and cheapest, hence I have advised a trial but, of the ultimate effect or the remaining texture I cannot of course speak.

8. The outer face of the east wall, the north wall of the Library, and the south wall of the Examination Hall, may be faced with English brick in alternate bands of drab and red for about 5,000 Rupees extra.

NOTE No. 2.

Memorandum on a new Patented Lime Kiln.

1. The theory of the patent kiln is perfect, and full and apparently reliable information given of the practical results. The drawing is as complicated as the process is simple.

2. If we conceive first an extremely long kiln thus:

open only at the ends and burning in the direction of a strong draught

and that the bricks having been lighted at A have gradually burnt to B it will at once become apparent that the air in passing through the burnt and cooling bricks from A to B, is gradually raised to the temperature of the kindled portion B, and again in passing from B to C through the unburnt, bricks is gradually cooled by imparting its heat to them. At this particular stage of the process then (with the exception of a small amount due to radiation) the whole effect of the fire generated at B is obtained *minus* the latent heat, which will not be utilized until the fire has reached C. We have only now to conceive this long kiln linked together at the ends with divisions for cutting off the draught thus:

and we have the Patent Kiln. D is being loaded, and E unloaded; in the next stage of the process, F is the fire, G the entrance, and D the exit of the air.

W. C.

From the Assistant Engineer, Presidency Northern Range, to the Superintending Engineer, 4th Division, dated Fort Saint George, 7th April 1865, No. 691.

1. As desired in your No. 6,236 of the 27th ultimo, I have the honor to submit the following remarks upon the supply of bricks for the various Public Works at the Presidency.

Enclosures 18.

2. For several years the inferior quality and uncertain supply of bricks has been a source of serious annoyance to the Executive Officers of this Department, and various efforts have been made from time to time to overcome these difficulties, but without success.

3. I find that in July 1859, Colonel Hitchins, then the Civil Architect at the Presidency,* and Captain Rawlins, the Garrison Engineer of Fort St. George,† having been called upon for their opinions on the subject of the execution of work at the Presidency, suggested the establishment of a Government Brick-field, as the only means of rendering the Department independent of the local market, and ensuring a constant supply of bricks of a respectable quality; and as far as I can infer from the correspondence before me, their views were concurred in by the Chief Engineer. Government, however, appear to have taken a different view of the case, for in their Order‡ reviewing the correspondence, they decline to consent to the establishment of a regular brick field, and direct that "the materials and other articles required should be obtained by contracts entered into after advertisements in the Government Gazette, in which a careful specification should be given of what is wanted."

* Letter to Deputy Chief Engineer Central Circle No. 569 of 13th July 1859.

†Do to Deputy Chief Engineer Central Circle No. 273 of 12th July 1859.

‡No. 285 of 31st August 1859.

4. This course has accordingly been followed for the last six years, but without much success. The standard dimensions originally fixed by the Department authorities were those of a very low class of brick ($8\frac{1}{4}'' \times 4\frac{1}{4}'' \times 1\frac{3}{4}''$ the English standard being $9'' \times 4\frac{1}{2}'' + 2\frac{1}{2}''$) and even these have been continually diminishing, until, instead of 1,000 bricks making 65 cubic feet of brickwork, as they should do according to the standard dimensions, they do not now make more than 48 or 50 cubic feet, and the quality of the bricks has also deteriorated very much within my own recollection. The Executive Officers are forced to put up with these inferior bricks, no others being procurable; but it is evident that anything like good workmanship under such circumstances is entirely out of the question. Moreover, the supply furnished by the local market is so much below the demands of the Department, that, as I believe you are aware, important works are frequently much delayed for want of an adequate supply of bricks, and this evil is almost as great as that of the inferior quality of the bricks themselves.

5. I do not mean to say that bricks of a better class than those now alluded to are not obtainable in Madras. Bricks of very fair quality and good size may always be obtained by making special arrangements with Contractors, and a Company was in existence here for a short time for supplying machine-made bricks. The buildings for the Steam Incorporating Mills at the Gunpowder Manufactory which were lately erected, and into which it was absolutely necessary that none but the very best work should be allowed to enter, were built partly with bricks supplied by the Brick making Company, and partly with some purchased from a Native Contractor, and both kinds were remarkably good, and gave full satisfaction.

6. The objection to the general introduction of such bricks as these is their enormous cost the ordinary country bricks cost Rupees 3 3-0 per 1,000, while those purchased from the Brick-making Company cost Rupees 12, and those supplied by the Native Contractor (which were ground-made) Rupees 11 per 1,000; and the cubic foot of brickwork executed with these three kinds of bricks cost Annas 2-5, Annas 4-3, and Annas 4 respectively. It is this great difference in cost which has hitherto prevented any general introduction of superior bricks, or, in the words of Colonel* Bell—"The cost of Machine-made bricks is, in my opinion, far too great, considering the nature of the work for which they are required, and further, that the external faces of the same is invariably covered with one or more coats of common plaster, to warrant so large an expenditure as the use of such superior bricks will involve. Indeed, I consider that even the table-made bricks are more expensive than we can afford without raising the rates for brickwork considerably."

* Letter to Government, No. 8,104 of 8th December 1859.

7. Until, therefore, we can find some means of reducing the cost of these super or bricks so as to bring the cost of the brickwork executed with them down to something like that of what is executed with the common bricks, we cannot hope for their general introduction.

8. I say, *something like* that of what is executed with the common bricks; for even if the work executed with good bricks cost a little more per cubic foot, it would still be good economy to employ them.

9. By their use a great reduction can be made in the thickness of the walls of all our buildings. As an instance of this I may mention that the walls of the boiler houses of the Incorporating Mills before referred to, are only 1 foot 2 inches in thickness, the rooms being 33 feet × 28 feet and 15 feet high, with heavy trussed roofs. Again, the masonry of the upper 25 feet of the chimneys of these same mills (which are 100 feet high) is only 9 *inches* thick. We could never venture to use such dimensions as these with our common brickwork. I have no doubt that from 15 to 20 per cent. of the brickwork now required for a building might be saved by the use of better bricks.

10. I believe also that it will be found that we shall be able to dispense with the external coat of plaster now applied to all our buildings, which not only forms an addition to the first cost of a building, but one of the most serious items in subsequent repairs. I do not like to reckon too confidently on any saving from this source, as I am aware that many Officers consider that the effect of the sea air at Madras is such that we shall never be able to dispense with plaster, whatever the nature of the brickwork used. This opinion was, I remember, expressed by Colonel Carpendale, then acting as Deputy Chief Engineer of the Central Circle, in a letter to Government (I have not the letter before me, but it must have been written somewhere about April 1862,) on the subject of the bricks to be used for the Incorporating Mills already referred to. There are, however, two or three instances in Madras, *e. g.*, several small buildings at the Gunpowder Manufactory, of buildings without external plaster which do not appear to have suffered from the want of it. I am inclined, therefore, to think that the effect of the sea air is not such as has been supposed; at all events, the experiment will be worth a trial, when we get our improved bricks.

11. We may, therefore, fairly consider that if we can get really good bricks of the English standard size, at such prices that we can work with them at not more than 20 per cent. above our present rates for brickwork (or say 3 Annas per cubic foot, our present rate being Annas 2-6), it will be good economy to use them, putting aside all considerations of durability and appearance.

12. We have then two points to provide for in order to meet the evils now existing —

1st.—To obtain good bricks, at such a price per 1,000 that the brickwork executed with them will not cost more than 3 Annas per cubic foot.

2nd.—To make such arrangements as shall ensure a constant supply of these bricks, and avoid the delays which now constantly arise from the insufficiency of the supply furnished by the local market for the wants of the Department. These two points are quite distinct from one another, and may be considered separately.

13. The invention which I now wish to bring to your notice will, I think provide for the first requisite most effectually. At page 181 of the "Practical Mechanics' Journal" for October 1864, is found a description of a new brick-kiln or oven, invented by Messrs. Hoffmann and Licht. The description is so long that I do not care to transcribe it, and I therefore forward the periodical itself for your perusal.

14. The principle of this kiln appears perfect, and the details given of the actual results of working it are so clear and explicit that I think we may fairly conclude that it really posses es the advantages claimed for it in the paper.

15. These appear to be —

1st.—A saving of upwards of 80 per cent. in the fuel used.

2nd.—A saving of upwards of 60 per cent. in the labor employed in burning.

3rd.—A considerable reduction in the wastage of the bricks themselves.

16. From data furnished me by one of the Contractors most extensively employed in this Range, I find the cost of making large bricks, such as those used for the Incorporating Mills, to be as follows :—

	Rs.
Cutting and piling 140,000 bricks...	100
Fuel for burning	700
Packing into kiln and burning	45
Cost of earth (this includes the rent paid to the owners of the land for the privilege of taking the clay) ..	130
Water for tempering	14
Total ...	989

The outturn being 100,000 good bricks, and the remainder in clinkers and third sort bricks which fetch about Rupees 100.

17. Now by the use of Hoffmann and Licht's kilns, the cost of the fuel would be reduced (allowing a saving of 75 per cent.) to Rupees 175. The labor employed in burning will also be reduced, but it is difficult to say by how much, as the arrangement of the kilns at present used in this country is somewhat different from that adopted in England. I will, therefore, allow a saving of only one-third, or Rupees 15 instead of two-thirds. The wastage in burning appears to be reduced in England to nothing at all, but to be on the safe side we will allow one-tenth or 11,000 bricks out of the 110,000, for wastage.

18. The cost of 126,000 bricks burnt in the new kilns will then be as follows :—

	Rs.
Cutting and piling 140,000 bricks, as before	100
Fuel	175
Packing into kiln and burning	30
Cost of earth, as before	130
Water for tempering, as before	14
Total...	449

or Rupees 3-9-0, say Rupees 4 per 1,000. This would enable us to execute brickwork at Annas 2-6 per cubic foot, exactly the same price as we are now paying for the common country brick-work. I do not think anything more need be said to show the advisability of taking advantage of this invention as soon as possible.

19. The cost of a kilns similar to that given as an illustration to the description would be about Rupees 15,000. Its annual outturn would be six millions of bricks, and the interest on

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the first cost and subsequent repairs, which may be taken at 10 per cent. per annum on the first cost, would be Rupees 1,500, or 4 Annas per 1,000 of the bricks turned out.

20. It may be said that it would be still better economy to keep to the present style of brickwork, reducing its cost by the use of these kilns; and so it would, to a certain extent. We could reduce the cost of the bricks now used from Rupees 3-3-0 to about Rupees 1-8-0 per 1,000 (the reduction is less proportionately in these bricks than in the large ones, as the fuel, which is the principal item of saving, forms a smaller part of the total cost), and that of the brickwork executed with them from Annas 2-6 to Annas 1-11 per cubic foot, which, allowing for the advantages mentioned in paragraphs 9 and 10, would correspond to about Annas 2-4½ per cubic foot for large bricks, or 1½ Pie per cubic foot less than the rate we can actually work at with them. This saving is very trifling, and I believe that Government, though unwilling to incur any great additional expense in order to introduce a superior class of bricks, would rather pay the present price for them than effect a trifling saving by keeping to the inferior ones now in use.

21. I cannot help thinking, however, that a still further reduction in the cost of the large brick might be made by the use of machines for moulding them. I am aware that hitherto all attempts to introduce machine-made bricks into Madras have failed, but that has been because they were unable to compete, not with bricks *of the same size moulded by hand*, but with the *small* country bricks, which could be produced more cheaply by reason of the smaller cost of burning them. The machine-made bricks supplied by the Brickmaking Company for the Incorporating Mills cost only one Rupee per 1,000 more than the hand-made ones supplied by the Native Contractor, and there were two causes that increased their price. In the first place they were supplied by a Joint Stock Company, with a Secretary, &c., and an European Manager to the works, which, unless the Company's operations were very extensive (which, I believe, they were not), could not fail to enhance very seriously the cost of the articles produced by them. In the second place the machinery used by this Company was worked by steam power, which, except where great power or high speed is required, is in this country much more expensive than cattle, or even hand-power. I believe, therefore, that *ceteris paribus*, machine-made bricks will be found cheaper than those made by hand. I may mention that on the Lanore and Mooltan Railway line, which was in course of construction when I rode down it rather more than a year ago, all the bricks used were being made by Clayton's large machines, worked by bullocks, and the Engineers on the Railway were unanimous in their opinion that these bricks were much cheaper than similar ones moulded by hand.

22. With regard to the second point mentioned in paragraph 12, namely, the ensuring of a constant supply of bricks, I have come to the conclusion that the only really satisfactory course will be the establishment of a Government Brick-feld.

23. The cry of the day is all for contracts and private enterprise, and against direct Government agency, and it may be said that to set up a Government Brickmaking establishment is a retrograde step, and in opposition to the principles which are popularly supposed to be the true ones in matters of this nature.

24. This may be; I have no great belief in the "contract system" myself, and believe most of the advantages claimed for it to be entirely illusory, and the staple arguments in its favour fallacious, but into the general question of contracts we need not enter now. What we have to consider is the same question with reference to the particular case of the supply of bricks. We have in this case the experience of six years to go by. Advertisements have been issued and tenders received, in accordance with the most approved principles, as enunciated in the Order of Government* previously quoted; and the result is the state of things already described. The one plan having been tried and having failed so signally, would it not be well to give the other a fair trial? which it has never yet had.

* No 2,945 of 31st August 1859, paragraphs 5 and 6.

25. It may be useful to calculate what Government are paying in the way of profit to Contractors. At paragraph 16 is given a statement of the actual cost (to the Contractors) of making the bricks supplied to the Incorporating Mills. This cost amounts to Rupees 989 for 140,000 bricks, of which 100,000 turn out good, and the remaining 40,000 clinkers, &c., which fetch about Rupees 100. We have then :

		Rs.
Cost of 140,000 bricks		989
Result.		
100,000 bricks at Rupees 11 per 1,000	1,100	
Clinkers and 3rd sort bricks	100	
		1,200
Net profit...		211

or about 21 per cent. on the outlay.

26. I find also that the cost of moulding, burning, &c., 12,000 common bricks is about Rupees 263, and the return is 100,000 good bricks at Rupees 3-8-0 per 1,000 = Rupees 318, and Rupees 50 for makers and 3rd sort bricks, or Rupees 368 in all, showing a net profit of Rupees 105 or 40 *per cent.* on the original outlay.

27. Considering that the prices above quoted had to be paid by the Department after every effort had been made, by public advertisement, and otherwise, to invite competition, does it not seem that the effect of this competition in reducing price and increasing supply is less than is generally supposed?

28. I must mention that the figures above quoted were furnished me by one of the most intelligent and respectible Contractors employed in this Range, and one whose turnover has for some years been the chief supplier of materials for the District, so that they may be considered as tolerably accurate. At all events, if fallacious at all, the tendency would be to understate rather than over state the seller's profits.

29. Before quitting this question I will refer to an instance wherein Government manufacture has had a fair trial, and I ask the results to speak for themselves. In former years the same annoyance was felt with regard to lime as now with regard to bricks (until in 1858) the Government lime-kilns were established. Since that time there has never been the slightest difficulty with regard to supply, the quality of the lime supplied from the Government kilns is very much better than that to be got in the market, and the cost per cask on the works varies from Annas 3-1½ to Annas 3-6 per cask according to distance, whereas the market price varies from Annas 4 to Annas 4-8 per cask. During the last year about 68,000 casks were supplied from these kilns, showing a saving to Government of upwards of Rupees 4,000.

30. Taking all things into consideration, I believe that the best way of meeting the present difficulty with regard to bricks would be to establish a Government brick-field at some convenient place in the neighbourhood of Madras, to be superintended by one of the Executive Officers at the Presidency, in the same way as the chunam kilns are at present. The brick field should be provided with one of Hoffmann and Licht's Brick Ovens, lately erected by ——, to turn out 40,000 bricks per diem, or to turn out 20,000, whichever might be considered best; and three of Clayton's Brickmaking Machines, each for 15,000 bricks per diem, to be worked by bullocks.

31. I must, however, remark that it is absolutely necessary for success that whoever is put in charge of these works should have some *practical* knowledge of the subject. Either a man must be brought out from England to superintend the establishment, or an Officer sent home for a time to study the art of brickmaking. The latter would probably be the cheaper course, as it would hardly be worth while to pay an European Superintendent solely for looking after the brick-field.

32. When it is considered that at the Presidency alone we spend Rupees 50,000 annually upon this one item, you will not, I trust, consider that I am attaching more importance to the subject than it deserves.

Enclosures 4.

Estimates.
Specification.
Plans.
Practical Mechanics' Journal.

1. Submitted to Government for the sanction of the plans and estimates.

2. The time seems now to have arrived for the establishment of a Government Brick-yard under Mr. Chisholm's general management, aided by such establishment as he may require. A Patent Annular Oven, such as that described on pages 181 and 182 of the October 1864 number of the Practical Mechanics' Journal (herewith forwarded), might therein be constructed.

3. Should, however, the buildings be undertaken by contract, the Government Brick field, though necessary for other buildings, need not be considered in connection with the new Presidency College.

4. On the whole, it seems advisable to give the College out on contract, and to this end authority is requested to call for tenders by means of advertisements in all the principal Journals in India.

(Signed) A. J. M. BOILEAU, Colonel, R. E.,
Superintending Engineer, 4th Division.

No. 572. ORDER THEREON, 24th January 1866, No. 276.

CIVIL WORKS, No. 99.

1. With his endorsement which is above recorded the Superintending Engineer of the 4th Division submits the plans and estimates for the new Presidency College which is proposed to be erected at Madras.

2. The Government approve of the alterations which are recommended of the original drawings, and sanction the estimate amounting to Rupees 2,05,000.

3. The Superintending Engineer of the 4th Division will make arrangements, in communication with Mr. Chisholm, for the commencement of the work, the cost of which will form a charge against the Educational Building Fund.

4. Authority is granted for tenders for the construction of the College being invited (by advertisement) in the principal Indian Journals.

5. The experience of the past six or seven years having shown that the system of obtaining bricks for Public Works at the Presidency by contract, or in the open market, has tended in no way to effect an improvement either in the supply of the article or in the character of the material used in its manufacture, His Excellency in Council concurs in opinion with the Superintending Engineer that it is advisable to establish a Government Brick-field in the neighbourhood of Madras with as little delay as possible. Colonel Boileau will report, in communication with Mr. Chisholm, on the site which is best adapted for the proposed brick-field, and he will at the same time submit an estimate of the probable cost of establishing it, and report the financial as well as structural advantages likely to be derived therefrom.

(True Extract.)

(Signed) CHARLES A. ORR, Colonel, R. E.,
Secretary to Government.

To the Superintending Engineer, 4th Division, with four Enclosures.
,, Educational Department.
,, Controller of Public Works Accounts.
,, Accountant General.

Exd. T. O'Connor.

No. 691.

From

Lieut. John Pennycuick R.E.
Asst. Engineer Pres. No.

To

The Superintending Engineer
1, Div. Sec.

Sir

As desired in your No. 6236 of 1
27th ultimo, I have the honour to submit th
following remarks upon the supply of brick
for the various public works at the Presidenc

Encls Lines 15-

2. For several years the inferior quali
and uncertain supply of bricks has been a
source of serious annoyance to the executive
officers of this Department, and various efforts
have been made from time to time to overcome
these difficulties, but without success.

3. I find that in July 1859, Colonel Hitchin
then the Civil Architect at the Presidency,*
Capn. Powlins, the Garrison Engineer of Fort St
George†, having been called upon for their opinions
on the subject of the execution of work at the
Presidency, suggested the establishment of a
Government brick field, as the only means of
rendering the Department independent of the local
market, and ensuring a constant supply of
bricks of a respectable quality; and as far as
I can infer from the correspondence before me, the
views were concurred in by the Chief Engineer —

Govt.

* Letter to S.C.E. C.C.
No 569 of 18th July /59

† Letter to S.C.E. C.C.
No 473 of 12th July /59

Government however appear to have taken a different view of the case, for in their order* receiving the correspondence they decline to consent to the establishment of a regular brick field, and direct that "the materials and other articles required should be obtained by contracts entered into after advertisements in the Government Gazette, in which a careful Specification should be given of what is wanted".

*Rec.d 15th 31st August 1854

4. This course has accordingly been followed for the last 6 years, but without much success. The standard dimensions originally fixed by the departmental authorities were those of a very low class of brick, ($8\frac{1}{4}$" × $4\frac{1}{4}$" × $1\frac{3}{4}$"- the English Standard being 9" × $4\frac{1}{2}$" × $2\frac{1}{2}$") and even these have been continually diminishing, until, instead of 1000 bricks making 55 Cubic feet of brickwork, as they should do according to the standard dimensions, they do not now make more than 48 or 50 Cubic feet, and the quality of the bricks has also deteriorated very much within my own recollection. The executive officers are forced to put up with these inferior bricks, no others being procurable, but it is evident that anything like good workmanship under such circumstances is entirely out of the question. Moreover, the supply furnished by the local market is so much below the demands of the Department, that, as I believe you are aware, important works are frequently much delayed for want of an adequate supply of bricks, and this evil is almost as great as that of the inferior quality of the bricks themselves.

5. I do not mean to say that bricks of a better class than those now alluded to are not obtainable in Madras. Bricks of very fair quality and good size may always be obtained by making special arrangements with Contractors, and a company was in existence here for a short time for supplying machine made bricks. The building for the Steam Incorporating Mills at the Gunpowder Manufactory which were lately erected, and into which it was absolutely necessary that none but the very best work should be allowed to enter, were built partly with bricks supplied by the Brickmaking Company, and partly with some purchased from a native Contractor, and both kinds were remarkably good and gave full satisfaction.

6 The objection to the general introduction of such bricks as these is their enormous cost; the ordinary Country bricks cost Rs. 3-3-- per 1000 while those purchased from the Brickmaking Company cost Rs. 12---, and those supplied by the

the Native contractors (which more frequently made) Rs. 11—"—" per 1000— and the Cubic foot of brick work executed with these three kinds of bricks cost Rs 2-5, Rs 1-3 and Rs 1-"- respectively— It is this great difference in cost which has hitherto prevented any general introduction of superior bricks, or, in the words of Colo. Bell.* The cost of machine made bricks is, in my opinion, far too great, considering the nature of the work for which they are required; and further, that the external face of the same is invariably covered with one or more coats of Chunam plaster, to warrant so large an expenditure on the score of such superior bricks will involve— Indeed I consider that even the Table made Bricks are more expensive than we can afford without raising the rates for brickwork considerably."

Until, therefore, we can find some means of reducing the cost of these superior bricks so as to bring the cost of the brickwork executed with them down to something like that of what is executed with the common bricks, we cannot hope for their general introduction—

I say, Something like that of what is executed with the Common bricks, for even if the work executed with good bricks cost a little more per Cubic foot, it would still be good economy to employ them—

*Letter to Government No 8104 of 8th December 1857—

By

9. By their use a great reduction can be made in the thickness of the walls of all our buildings; as an instance of this I may mention that the walls of the boiler houses of the Incorporating Mills before referred to, are only 1'2" in thickness, the rooms being 33'X28' and 15' high, with heavy trussed roofs Again, the masonry of the upper 25' of the chimney of these same Mills (which are 100 feet high) is only 9 inches thick— We could never venture to use such dimensions as these with our common brickwork— I have no doubt that from 15 to 20 per cent of the brickwork now required for a building might be saved by the use of better bricks—

10. I believe also that it will be found that we shall be able to dispense with the external coat of plaster now applied to all our buildings, which not only forms and addition to the first cost of a building, but one of the most serious items in subsequent repairs— I do not like to reckon too confidently on any saving from this source, as I am aware that many Officers consider that the effect of the Sea air at Madras is such that we shall never be able to dispense with plaster, whatever

the

the nature of the brickwork used - This opinion was, I remember, expressed by Colonel Cornwallis, then acting as Deputy Chief Engineer of the Central Circle, in a letter to Government (I have not the letter before me, but it must have been written somewhere about April 1862) on the subject of the bricks to be used for the Incorporating Mills already referred to - There are however two or three instances in Madras, e.g., several small buildings at the Gunpowder Manufactory, of buildings without external plaster which do not appear to have suffered from the want of it - I am inclined therefore to think that the effect of the Sea air is not such as has been supposed; at all events the experiment will be worth a trial, when we get our improved bricks -

11. We may therefore fairly consider that if we can get really good bricks of the English standard size, at such prices that we can work with them at not more than 20 per cent above our present rates for brickwork, (or say 3 annas per cubic foot, our present rate being as 2-6) it will be good economy to use them, putting aside all considerations of durability and appearance -

We

12. We have then two points to provide for in order to meet the evils now existing -

1st To obtain good bricks, at such a price per 1000 that the brickwork executed with them will not cost more than three annas per cubic foot

2nd To make such arrangements as shall ensure a constant supply of these bricks, and avoid the delays which now constantly arise from the insufficiency of the ~~unremunerative supply~~ supply furnished by the local market for the wants of the Department - These two points are quite distinct from one another, and may be considered separately -

13. The invention which I now wish to bring to your notice will I think provide for the 1st requisite most effectually - At page 181 of the "Practical Mechanics' Journal" for October 1864 is found a description of a new brick kiln or oven, invented by Messrs Hoffmann and Licht. The description is so long that I do not care to transcribe it, and therefore forward the periodical itself for your perusal -

14. The principle of this kiln appears perfect, and the details given of the actual results of working it are so clear and explicit that I think we may fairly conclude that it really possesses the advantages claimed for

for it in the paper.

15. These appear to be,

1st A saving of upwards of 80 per cent in the fuel used.

2d A saving of upwards of 60 per cent in the labour employed in burning.

3d A considerable reduction in the wastage of the bricks themselves.

16. From data furnished me by one of the Contractors most extensively employed in this range, I find the cost of making large bricks, such as those used for the Incorporating Mills, to be as follows.

	Rs
Cutting and piling 110,000 bricks	100
Fuel for burning	700
Packing into kiln and burning	45
Cost of earth (this includes the rent paid to the owners of the land for the privilege of taking the clay	130.
Water for tempering	14
Total Rupees.	989

The outturn being 100,000 good bricks, and the remainder in clinkers and 3d Sort bricks which fetch about Rs 100.

17. Now by the use of Hoffmann and Lichts Kilns, the cost of the fuel would be reduced (allowing a saving of 75 per cent) to

to Rs 175. The labour employed in burning will also be reduced, but it is difficult to say, by how much, as the arrangement of the kilns at present used in this country is somewhat different from that adopted in England. I will therefore allow a saving of only $\frac{1}{3}$ or Rs 15 instead of $\frac{2}{3}$. The wastage in burning appears to be reduced in England to nothing at all, but to be on the safe side we will allow $\frac{1}{10}$, or 11,000 bricks out of the 110,000, for wastage.

18. The cost of 126000 bricks burnt in the new kilns will then be as follows.

	Rs
Cutting and piling 110000 bricks, as before	100
Fuel	175
Packing into kiln and burning	30.
Cost of earth, as before	130.
Water for tempering, as before	14.
Total Rupees.	449.

or Rs 3-9-0, say Rs 4, per 1000. This would enable us to execute brickwork at As 2-6 per cubic foot, exactly the same price as we are now paying for the common country brickwork. I do not think anything more need be said to show the advisability of taking advantage of this invention as soon as possible.

19. The cost of a kiln similar to that given as an illustration to the description would be about Rs 15,000. Its annual outturn would be

be six millions of bricks, and the interest on the first cost and subsequent repairs, which may be taken at 10 per cent per annum on the first cost would be Rs. 1500, or 4 annas per 1000 of the bricks turned out -

20. It may be said that it would be still better economy to keep to the present style of brickwork, reducing its cost by the use of these kilns; and so it would, to a certain extent - We could reduce the cost of the bricks now used from Rs. 3-3- to about Rs. 1-8- per 1000 (the reduction is less proportionately in these bricks than in the large ones, as the fuel, which is the principal item of saving, forms a smaller part of the total cost) and that of the brickwork executed with them from As. 2.6 to As. 1.11 per cubic ft, which, allowing for the advantages mentioned in paras. 9 and 10, would correspond to about As. 2.4½ per cubic foot for large bricks, or 1½ P. per cubic foot less than the rate we can actually work at with them - This saving is very trifling, and I believe that Government, though unwilling to incur any great additional expense in order to introduce a superior class of bricks, would rather pay the present price for them than effect a trifling saving by keeping to the inferior ones now in use -

21. I cannot help thinking however that a still further reduction in the cost of the large bricks

bricks might be made by the use of machines for moulding them - I am aware that hitherto all attempts to introduce machine made bricks into Madras have failed, but that has been because they were unable to compete, not with bricks of the same size moulded by hand but with the small country bricks, which could be produced more cheaply by reason of the smaller cost of burning them - The machine made bricks supplied by the brickmaking company for the Incorporating Mills cost only one Rupee per 1000 more than the hand made ones supplied by the native contractor, and there were two causes that increased their price - In the first place they were supplied by a joint Stock Company, with a Secretary &c and one European manager to the works, which, unless the Company's operations were very extensive (which I believe they were not) could not fail to enhance very seriously the cost of the articles produced by them - In the second place the machinery used by this company was worked by steam power, which except where great power or high speed is required, is in this Country much more expensive than cattle, or even hand power - I believe therefore that ceteris paribus, machine made bricks will be found cheaper than those made by hand - I may mention that on the Lahore and Moultan railway line, which

was

was in course of construction when I rode down it rather more than a year ago, all the bricks used were being made by Clayton's large machines, worked by bullocks, and the Engineers on the railway were unanimous in their opinion that these bricks were much cheaper than similar ones moulded by hand.

22. With regard to the second point mentioned in para. 12, namely the insuring of a constant supply of bricks, I have come to the conclusion that the only really satisfactory course will be the establishment of a Government brickfield.

23. The cry of the day is all for contracts and private enterprise, and against direct Govt. agency, and it may be said that to set up a Government brickmaking establishment is a retrograde steps, and in opposition to the principles which are popularly supposed to be the true ones in matters of this nature.

24. This may be; I have no great belief in the "Contract System" myself, and believe most of the advantages claimed for it to be entirely illusory — and the staple arguments in its favour fallacious, but into the general question of contracts we need not enter now. What we have to consider is the same question with reference

reference to the particular case of the supply of bricks. We have in this case, the experience of 6 years to go by. Advertisements have been issued and tenders received, in accordance with the most approved principles, as enunciated in the Order of Government* previously quoted; and the result is the state of things already described. The one plan having been tried and having failed so signally, would it not be well to give the other a fair trial? which it has never yet had.

*No 2085 of 31st August 1859, paras. 5 and 6.

25 It may be useful to calculate what Government are paying in the way of profit to contractors. In para 16 is given a statement of the actual cost (to the contractors) of making the bricks supplied to the Incorporating Mills. This cost amounts to Rs. 989 for 140,000 bricks, of which 100,000 turn out good, and the remaining 40,000 clinkers &c. which fetch about Rs. 100. We have then,

Cost of 140,000 bricks ——— 989.

Result

100,000 bricks at Rs. 11 per 1000 — 1100.
Clinkers and 3d Sort bricks ——— 100 1,200.

Net profit 211.

or about 21 per cent on the outlay.

26. I find also that the cost of moulding burning &c. 120,000 common bricks is about Rs. 263, and the return is 100,000 good bricks at

at Rs 2-8-0 per 1000 = Rs 315 and Rs 50
for clinkers and 3% for breakage, or Rs 365 in all, showing a net profit of Rs 165 or
10 per cent on the original outlay.

27. Considering that the prices above quoted had to be paid by the Department after every effort had been made by public advertisement, and otherwise, to induce competition, does it not seem that the effect of this competition on reducing price and increasing supply is less than is generally supposed?

28. I must mention that the figures above quoted were furnished me by one of the most intelligent and respectable contractors employed in this Range, and one whose practice has for some years been the chief supplier of materials for the district; so that they may be considered as tolerably accurate - At all events, if falsified at all, the tendency would be to understate rather than overstate the Seller's profits -

29 Before quitting this question I will refer to an instance wherein Government manufactories had a fair trial, and leave the results to speak for themselves - In former years the same complaint was made with regard to lime as is now felt with regard to bricks; until (in 1858) the Government lime kilns were established - Since that time there has never been the slightest difficulty with regard to supply, the quality of the lime supplied from the Government kilns is very much better than that to be got in the market, and the price at which it is delivered on the works varies from As. 3-1½ to As 3-6 per parah according to the price of charcoal) whereas the market price varies from As 4-0 to As 4-8 per parah. During the past year (1864) about 68000 parahs were supplied from these kilns, showing a clear saving to Government of upwards of Rs 1,000 -

30. Taking all things into consideration, I believe that the best way of meeting the present difficulty with regard to bricks would be to establish a Government brickfield at some convenient place in the neighbourhood of Madras, to be superintended by one of the Executive Officers at the Presidency, in the same way as the Chunam Kilns are at present - The brickfield should be provided with one of Hoffmann and Lights brick ovens large enough to turn out 40000 bricks per diem, or two to turn out 20000 whichever might be considered best; and three of Clayton's brickmaking machines, each

for

for 15000 bricks per diem, to be worked by bullocks.

31. I must however remark, that it is absolutely necessary for success that whoever is put in charge of these works should have some practical knowledge of the subject. Either a man must be brought out from England to superintend the establishment, or an officer sent home for a time to study the art of brickmaking. The latter would probably be the cheaper course, as it would hardly be worth while to pay an European superintendent solely for looking after the brickfield.

32. When it is considered that at the Presidency alone we spend Rupees 50,000 annually upon this one item, you will not, I trust, consider that I am attaching more importance to the subject than it deserves.

I have the honour to be
Sir
Your most Obed^{t} Serv^{t}

John Penny Lieu^{t} R.E.
Asst Engineer Pres^{y} N.B.

A^{t} Asst Insp^{r} Office Pres^{y}
Fort St George
7th April 1856

Appendix.

No. 1. Abstract.

Of Correspondence respecting the expediency of erecting the expensive machinery for the manufacture of bricks at the Presidency.

1. The question of obtaining a good durable description of brick in Madras is a very important one, and a question which affects in a very large proportion the public works of that Presidency, but I would be pound that the success attending the manufacture of bricks at Madras depends entirely on the good effects of the machinery employed.

2. It was thought for a long time in England that stone sufficiently near the surface could not be procured to be more than one cause for the extra expense of this description of building, but experience has shown that the reverse is the case, and that stone can be procured at a much less cost than bricks, and that the latter are more expensive in the end.

3. Should however the buildings be undertaken by Contract, the Fort Brickfield, though necessary for other buildings, need not be considered in connection with the New Presidency College.

4. On the whole it seems advisable to give the College out on Contract, & with this end authority is requested to call for Tenders by means of advertisements in all the principal journals in India.

A Bourdillon Lt Col
Sub Engr 4th Dn
18th Dec 1865.

3 Inclosures

No 3263

From

Chief Engr & Secy to Govt

To

Secy to Govt

Dated 7th April

Rec'd 1865

No 691

Enclosure 18.

Returning certain Correspondence and submitting certain remarks upon the supply of bricks for the various Public works at the Presidency

F.W. From 24th Sept 1864 to 1871

Enclosure 4
Estimates
Specification
Plans
Practical Mechanics Journal

Submitted to Government for the sanction of the Plans & Estimates.

2. The time seems now to have arrived for the Establishment of a Government Brick-yard under Mr Chisholm's general management, aided by such establishment as he may require. A Patent Annular Oven such as that described on Pages 181 & 182 of the October 1864 Number of the Practical Mechanics Journal (herewith forwarded) might therein be constructed.

as a protective coating if the surface eventually suffers. Unfortunately all patented inventions supposed to be efficacious are modern, and although they lay a protective coat over the surface temporarily, time has not shown whether such a coat may not eventually prove an element of destruction.

3 Setting aside all such impractical inventions in which the process commences with "baking in an oven" or forming a vacuem in the molecular structure of the material there appears to be three inventions worthy of notice.

4 The first is an application with a brush of a mixture composed of Bees wax dissolved in coal tar kaphtha applied so long as the surface is capable of absorbing it

5 The second is a solution known as "water glass" made by dissolving a flinty sand and potass in boiling water applied either with a brush or syringe.

6 The third is that known as "Ransomes "patent" in which two separate solutions by acting on each other cause a mineral precipitate within the pores of the material one process is to saturate the surface with a weak solution of silicate of soda or potash and again with a solution of chloride of calcium or barium

The precipitate will be an insoluable silicate of Lime or baryta

Of the three processes I conceive the "water glass" to be the simplest and cheapest hence I have advised a trial but of the ultimate effect on the remaining texture I cannot of course speak.

5 The outer face of the East wall the north wall of the Library and the south wall of the Examination Hall may be faced with English brick in alternate bands of drab and red for about 5000/- extra.

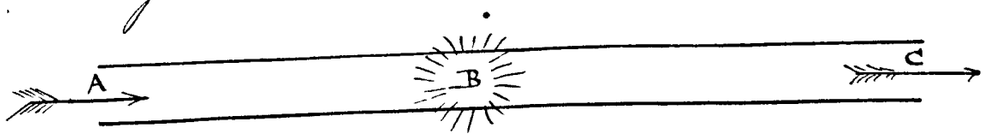
W.

Note N 2 Appendix

Memo: On a new patented Lime kiln

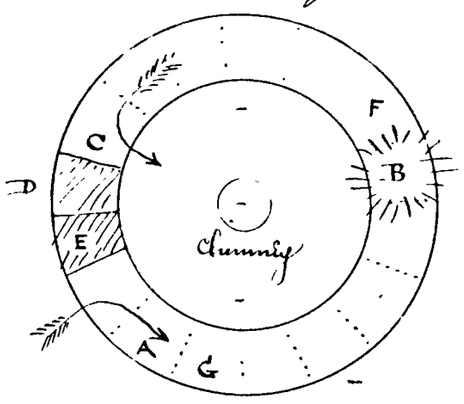
1. The theory of the patent kiln is perfect, and full and apparently reliable information given of the practical results. The drawing is as complicated as the process is simple.

2 If we conceive first an extremely long kiln thus;



open only at the ends and burning in the direction of a strong draught → and that the bricks having been lighted

at A have gradually burnt to B it will at once become apparent that the air in passing through the burnt and cooling bricks from A to B is gradually raised to the temperature of the kindled portion B, and again in passing from B to C through the unburnt bricks is gradually cooled by imparting its heat to them. At this particular stage of the process then (with the exception of a small amount due to radiation) the whole effect of the fire generated at B is obtained minus the latent heat, which will not be utilized until the fire has reached C. We have only now to conceive this long kiln linked together at the ends with divisions for cutting off the draught thus,



, and we have the patent kiln. D is being loaded, and E unloaded, in the next stage of the process F is the fire, C the entrance, and D the exit of the air.

M.

No. 40

From. R. F. Chisholm. Esq. Engineer Port

To Col. A. J. St. Bilcan R.E.
Supt. Engineer 4th Div.

9th December 1863.

Sir.

I have the honor to forward you the papers noted on the margin relating to the New Presidency College.

Original Plans
Original Estimate
Working Drawing
Detailed Estimate

2 The working drawings differ from the original drawings as regards the following points viz:-

1 The whole of the East, North, and South facades to the level of the impost is faced externally with stone. In the original this was stucco.

2d The quoins, ~~cornice~~ cornice blocks and other mouldings to the above mentioned facades are of cutstone. In the original these mouldings were of stucco.

3d The details have been altered

to suit the nature of the materials. The face work generally is of Sholingar grey granite and Cuddapah blue trap stone in alternate bands, rock faced, with stroked edges. The mouldings simple and deeply cut. The four columns over the entrance (the only columns retained) are polished Pallaveram trap, as well as the small columns in the jambs of the wings.

4th The details of the central tower have been altered to harmonize with the mansard turrets

5th The turrets have been projected from the face with the view of accentuating more forcibly the several compartments

6th The wings have been brought forward and a central entrance and porch added to the North and south facades

7th The class rooms are 33'-6" x 20' in place of 30'x20' and the window openings so increased from 5 to 6 feet, and the building lengthened.

8 The reading room is placed at the back of the building protected by verandahs. The original arrangement being somewhat objectionable.

9th The roofs and floors consist of hollow brick arches resting on the ~~inner~~ outer flanges of wrought iron girders. In the original the roofs were of the ordinary construction

3 3 Other alterations will become apparent on inspection of the plans.

As I have had ample time to prepare these drawings I have spared no pains in designing any portion of them The whole of the details I have endeavoured to render simple and effective, The ornamentation both internally and externally (with the exception of the polished columns in the wings) is obtained solely by the accentuation of the constructive features. The polished columns are treated as ornaments, and recessed in the jambs as "gems" and in the several parts I have avoided to the best of my ability the incongruity which generally results from adopting a style foreign to the country

5 The stonework will of course greatly augment the cost. The flooring I believe from repeated calculations I have made on reliable data, can be executed for less cost than floors constructed with the ordinary perishable materials but to be on the safe side I have allowed a good margin.

6 With regard to the face bricks I have inspected the exposed brick work on the Railway which has been built some 5 or 6 years and I find that the well burnt bricks are not affected by the atmosphere while all those in the least degree under done are crumbling away. I am of opinion

the sooner that bricks selected from well burnt bricks delivered on the work, would result the decaying effects alluded to. I would propose to expose the surface, and tuck point all parts not faced with stone, and if it was found that the face began to crumble, either painting or the water glass (silicate of potash) might be applied to arrest decay, plaster is too porous to be of the least use as a protective agent in a saline atmosphere—

See note Appendix No 1.

The works can be let out by contract or executed by publicly advertizing for Tenders, in the usual way by petty contract on the Government rates. Of the two courses I would strongly recommend the former, and it was with the view of making this recommendation that I prepared the drawings and specifications in as complete a manner as possible.

It is unnecessary to enumerate the many advantages which the contract system would seem to possess over the ordinary system of working, and the present appears to furnish a most favorable opportunity for thoroughly testing it. The great drawback generally is the want of proper competition. I do not anticipate any paucity in the present case, as I have already received intimation of a desire to undertake the work from the several Gentlemen whose names are entered on the margin and also from natives whose names I cannot call to mind. I have no doubt a public advertisement would double the number.

Messrs Johnson & Co.
" Sowerby & Co.
" Fitzgerald
" Morgan
" Hawkins.

8 I would require the following Establishment if the works are let to a contracter

1 Assistant Engineer (Clerk of works)
1 Inspector of Masonry
1 " " Carpentry
1 Draughtsman
2 Clerks for calculating measurements and copying papers

9 This establishment would be well able to carry forward the works to completion and would leave me the greater portion of my own time to devote to other purposes— In the absence of eligable tenders, It may be that the Government will come to the decision to execute the work by daily labor and petty contract. In such case I should mention that the existing arrangements in the department for obtaining supplies of bricks seem to be objectionable. The bricks are small, very badly burnt, and the supply and prices regulated by the caprices of a few native dealers. I would recommend the establishment of a Government brick yard to be placed in charge of a well paid English brickmaker, a man who could not earn nearly so much money in any other capacity and who consequently would feel greatly interested in the result. The man in charge of the Ackra brick field in Calcutta an English brickmaker brought out expressly by the East Indian Railway

Company to make bricks for the Soane bridge works is in receipt I believe of 450/ per mensum, and no expense was spared at the outset: the result as might have been anticipated is a perfect success. The Government of Bengal are enabled to sell their bricks (which are greatly in demand at a profit to private individuals and firms with proper arrangements I should anticipate a similar result in Madras.

10 In connection with this matter I take the opportunity of returning the papers relating to a patent brick kiln which you kindly lent me for perusal. I would suggest that Lieutenant Pennycuick's report, and the public journal accompanying it be submitted to Government with this letter. Lieutenant Pennycuick has gone very carefully into the question and from a perusal of the papers placed at his disposal. I fully concur with him in his conclusions

Appendix No 2

11 The drawings forwarded will convey a very poor idea of the general effect of the building. The perspective view I hope to have finished by the end of this week and a companion of the two perspective views will at once render the improvements apparent

12 Before taking up the drawings of the Senate House I would beg to offer

a few remarks on this building and the College considered as one Architectural group and as separate and distinct structures.

13 Multiplying the dimensions of the rooms given in the printed conditions for each building into proper proportional heights, I found before commencing the original plans, that the Senate House contained a greater number of cubic feet than the College, so that I had to adopt the cheapest possible form of construction and materials for the Senate House to bring it within the stipulated amount, hence the form of construction and the materials of the College were regulated by ~~that of~~ the Senate House. Again the College being of two stories it became necessary to mark the Senate House horizontally in the same way so that the general Architectural effect of the Senate House was regulated by ~~that of~~ the College, & in fact to preserve a local tint and to prevent incongruity it is possible that both buildings suffered by being designed for contiguous sites

14 I believe it is now the intention of Government to erect the Senate House on a site distant from that of the College the necessity for enforcing the instructions as regards style may consequently be removed and same degree of latitude allowed me in the preparation of the detailed drawings I would also beg to notice

the materials, I do not think brick and stucco either a cheap, elegant or appropriate method of facing so large a public building and it should, I think be taken into consideration that a building apparently twice as costly as another of similar dimensions is only twice as costly in the item of superficial surface exposed. With these points in view I would respectfully submit that the restriction as regards the amount of the estimate be also removed.

I have the honor to be
Sir
Your most Obedient Servant

[illegible]

1/4/63

the material, I do not
stucco either a cheap, sl
method of facing so la
building and it should
into consideration that a

No 4614

From
R. G. Chisholm.
Ex. Engineer
Presidency

To
Col. A. J. M. Pereira R.E.
Supt Engineer & Ex.
Madras.

Dated 6th December 188-

Rec'd

Forwards detailed Estimate and working drawings for the Presidency College.

3/1-2755-23

Public Works Department

No 276. 45

Proceedings of the Madras Government

Under date the 24th January 1866

Read the following

From The Supg Engineer 1st & 4th Divn

Submitting correspondence with Plans, Estimates &c. for the new Presidency College &c. for sanction and that the work may be given out on contract (Recommending an Establishment of a Govt Brick yard under Mr Chisholms general management aided by such Establishment as he may require.

R. P. W. D. 18th December 1865 No 3263.

With his endorsement which is above recorded the Superintending Engineer of the 4th Division submits the plans and estimates for the new Presidency College — which is proposed to be erected at Madras.

2. The Government approve of the alterations which

Rec'd 18th December 1865 No 3263.

Read 19th Ditto

Ordered Plans, Estimates &c. for the new Presidency College be sanctioned and that the work may be given out on contract. Recommending an Establishment of a Govt Brick yard under Mr Chisholms general management aided by such Establishment as he may require.

To The Secretary to Government P. W. D.

Dated 18th December 1865

Rec'd 19th " " No 3263.

Submitting correspondence with Plans, Estimates &c. for the new Presidency College &c. for sanction and that the work may be given out on contract. Recommending an Establishment of a Govt Brick yard under Mr Chisholms general management aided by such Establishment as he may require.

From The Supg Engineer 4th Divn

No 276. 24th January 1866.

2. 6th January 1866. R. 1st.

which are recommended by the original drawings, and sanction the estimate amounting to Rs. 2,05,000

3 The Superintending Engineer of the 4th Dn. will make arrangements, in communication with Mr. Chisholm, for the commencement of the works, the cost of which will form a charge against the Educational Building fund.

4 Authority is granted for tenders for the construction of the College being invited, (by advertisement) in the municipal Madras Journals.

The

5 The experience of the past six or seven years having shown that the system of obtaining Bricks for Public Works at the Presidency by contract, or in the open market, has tended in no way to effect an improvement either in the supply of the article or in the character of the material used in its manufacture, His Excellency in Council concurs in opinion with the Superintending Engineer that it is advisable to establish a Government brick field in the neighbourhood of Madras

with as little delay as possible - Colonel Boileau will report in communication with Mr. Chisholm, on the site which is best adapted for the proposed Cricket field, and he will at the same time submit an estimate of the probable cost of ~~the work~~ establishing it, and report the financial as well as structural advantages likely to be derived therefrom.

Dec 1871

To
C. E. Engr. L.H.D. with Mr Engr.
" Educational Dept.
" Controller.
" Asst. Genl.

Sept. 25 Dec. 15

571. 572

Sept. 25 Dec. 15

25-7-36 III

P. P. V. 1866 Deptt
Pro. of Govt for Jan
No 276
Pro. of the Mr Govt
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Presidency College at Madras.

The alterations recommended in the original drawings &— approved and the estimate amounting to Rees 2,05,000 for the construction of —, sanctioned.

No 671.672