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MADRAS RECORD OFFICE.

Government of Madras.

DEPARTMENT.

Public Works - En 878/5

G.O. No.

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Not to be folded or roughly handledCAD
11.5.38

Read the following papers.

No. 75. From Colonel A. COTTON, Commandant of Engineers; to J. D. BOURDILLON, Esq., Secretary to Government, dated 27th April 1859, No. 171.

SIR,

I have the honor to transmit my Memo. on the Repairs of Fort Saint George, called for in Extract Minutes of Consultation, dated 19th February 1858, No. 288.

*Memorandum on the Repairs of the Works in the Sea Face of Fort Saint George
by Colonel A. Cotton, Commandant of Engineers.*

Parts of this line of works having actually fallen down through the failure of the foundations, and other parts being cracked, it has been determined to put them in thorough repair. Estimates have been prepared and sanctioned and the removal of the ruins is in progress, part having been cleared away to the bottom of the foundations. My instructions received from His Excellency the Governor direct me to report upon the subject, and especially with reference to the substitution of a single Tier of the heaviest Guns, with an earthen Rampart and Embrasures, for the present double Tier, one in Barbette, and one in Casemates.

After laying the subject before His Excellency the Commander-in-Chief as directed, Sir Patrick directed me to accompany him over the whole line of the Sea Face as far as the north extremity of Black Town, which I accordingly did, and heard on the spot His Excellency's views respecting the various points. After further personal examination and enquiry in communication with Captain Rawlins, I again waited upon Sir Patrick, and am authorized by him to say that he concurs in the following remarks.

The result of my consideration of the subject as to the main point, viz., the principle upon which the works should be re-constructed, is entirely in favor of the single Tier of Guns, with an earthen Rampart, on the following grounds:

1st. The first point of course is to endeavour to establish a thoroughly efficient defence, and the cost must be held subordinate to this, though in fact this mode is also the least expensive. The present kind of Batteries seem quite unsuited to present times. The upper Tiers, fired in Barbette over a thin parapet of masonry would be quite untenable under a very moderately effective fire from Seaward, and it was undoubtedly calculated to meet the demands of a time when Gunnery was in a very different state from the present. Not only would the Gunners be entirely exposed to shot, but to the splinters from the masonry parapet, and a very few Guns at a long range on the Beach either north or south would effectively enfilade the whole Battery. There must of course also be a question whether under continued firing from the heavy Ordnance that must now be used, the masonry arches which cover the lower Tier would not be shaken.

2nd. The lower Tier in Casemates probably could not be fired continuously on account of the smoke and heat, especially when heavy Guns are used.

3rd. The greater part of the Cisterns for water for the Garrison are placed under these Batteries and if the masonry is seriously shaken, they would be rendered leaky.

4th. All these objections would be met by having a low earthen Rampart with Embrasures and the Guns placed on platforms on the level of the present ground, and in rear of the line of the Cisterns. They would be in a great measure protected from enfilade by the works of the north and south faces, and a few traverses might be added.

5th. A considerable though minor additional advantage would be obtained by the lowering of this line of works, in the more free admission of the Sea-breeze, which is by no means a small matter, where a European Regiment is in Garrison.

6th. There would certainly be an objection in the greater exposure of the interior of the Fort to fire, from the lowering of the Sea Face, 6 feet; besides the parapet of 3 feet, but I consider this far more than compensated by the great increase of efficiency of the fire, and further, as I have said, the alteration seems essential as the only way of establishing an effective Battery.

7th. A great recommendation of the plan is, that as there will be no arch resting on the Scarp wall, a settlement in the foundations will be of very little consequence compared with the effect of such a thing in the present works.

8th. Such a Battery, covered by a Rampart, and consisting of about 80 of the new Armstrong Guns, with hot shot, would be a powerful means of defence; and it must be remembered that the swell in the Roads is almost constant, so that the land Batteries would always have a great advantage over those of Ships.

Upon these grounds I cannot see any room for doubt as to the advisableness of this arrangement, as necessary for the effective defence of this place from the fire of shipping.

While on this point I may state that I would certainly add not less than 100 Guns, in different Batteries on the north and south Beach, so as

1st. To distract the fire of an Enemy, and prevent their concentrating their fire on the Fort; 2nd, to command effectively the whole line of anchorage opposite the City; and 3rd, because I think we can hardly accumulate too great a mass of fire, and of course the great object is not merely to beat off an enemy but to deter from the attempt. The external Batteries will not be very expensive. I would propose one beyond Clive's Battery, which latter should of course also be armed; one the present Abercrombie's Battery; one North of the Light-house; one the present Saluting Battery; and one near Chepauk. I would certainly not have less than 100 of the heaviest or most effective Guns thus distributed.

One important point to be considered with respect to the Sea Face, is the state of the Beach outside of it.

It is now well ascertained that by running out Groynes, to intercept the stream of sand passing along the Coast, any addition of land to Seaward can be obtained in time. But it is certain that the amount of sand passing along in the course of a year is not so very great, and that long Groynes will not immediately collect the sand to their extremities. After a few years however, a great additional breadth may be obtained, as has been proved both at Vizagapatam and on the South Beach here. The progress on the Black Town Beach has been very slow, because the sand was intercepted by so many Groynes to the South. It is therefore in our power to widen the Beach in front of the Sea Face, but I think it is quite undesirable to have a large space there, I think it is already too great near the S. E. angle. Towards the N. E. angle, at one point it is so narrow that the road is endangered, and I would somewhat lengthen one of the Groynes there.

I may just mention here Captain Rawlins' suggestion that all possibility of Boats being beached by an Enemy there could be effectually prevented by driving a few scattered piles all along, leaving their tops low, so that Boats would be endangered, if there was the least swell.

I do not think I ought to go into much detail in this paper, and indeed most of the details in the question can only be settled by the Officer who executes the works, as they will require much more time than seems compatible with my other duties. There are of course many minor points which will require much consideration.

I will only mention here that two parts have already been cleared away to the bottom of the foundations and must therefore be entirely re-built, that is to the new level proposed. For a great part of the rest I am in hopes the Officer may find, that considering that there will now be no arch depending upon the Scarpwall, it may be possible to re-build without removing the foundation. And respecting the Counterscarp wall, I think, that as it is a simple wall supporting nothing but the earth or stones behind it, only a small portion of it need be renewed. It is a very thick mass of masonry, (14 feet thick $\times$ 16½), with a great slope on the ditch side, so that though the foundation has sunk on that side, it is not out of the perpendicular. I would lighten the pressure from behind by removing a portion of the stones of the old bulwark which rests against it, making a slope from the masonry to the road-way.

I beg to express my entire concurrence in His Excellency the Governor's opinion that these works should be entrusted to one of our best Engineers of considerable experience, and that it should be considered a special duty, and the salary made up to such an amount as the standing of such an Officer will require. I am also of opinion that he should have an Assistant of not less than 5 or 6 years standing, as the works will require besides careful planning, very constant supervision. And there can be no doubt that if an experienced Officer is fixed in the Fort, there will be many other Engineering questions to refer to him, upon which his time would be much better employed than upon that part of the duty which properly belongs to an active young Officer.

I may here record that Captian Rawlins, the present Officer employed as Garrison Engineer has done excellent service under my orders in charge of the Quarries at Dowlaishweram, and under Captain Orr at Bezoarah, and he has also performed his duties in a most satisfactory manner here; and there seems no doubt that his present poor health is in a great measure owing to the severe duty and exposure to the intense heat in the Quarries, so that he seems most fully entitled to as good an in door appointment as could be found for him, as his Medical Officer considers it quite necessary for his health, that he should not longer continue in duties which require much exertion and exposure.

With respect to the Estimate, it appears that the total amount for the repair of the works is 14½ lacks, of which that for the Sea Face was about 4,60,000 Rupees. The rough Estimate which I have had prepared for restoring the works in the manner here proposed is 1,80,000; making a difference of 2,80,000, but some of the points must, as I have stated, be considered more at leisure by the Officer placed in charge.

Of the remaining 10 lacks, being the amount for the Land Faces, 1,60,000 Rupees is for the re-building of the works near the Saint Thomé Gate, which are in a state of entire ruin, and must be re-built at once. The rest are of far less importance, and it will be quite sufficient to

decide about them in their turn, as the whole cannot be done at once, and probably the above works 3,40,000 Rupees, will require more than a year to complete.

15 With respect to the question of foundations in this locality, the following points should be recorded. One of the works that has fallen to ruin was found to have properly speaking no foundation, that is, the bottom of the masonry was at about mean Sea-level; and the superstructure consisted of irregular portions of brick in chunam with the greater part of brick in mud. Another part had deeper foundations, but no piles are found. On the other hand it is remarkable that some additional means have been used to give sound foundations to the part of the Sea Face where the Cisterns are, which have been perfectly successful, for there is not the least appearance of any settlement there. Of course we cannot ascertain how these foundations are formed.

16 These seem to be all the points which it is necessary for me to enter upon in the present report.

17 I append a Section of the proposed Battery.

18 The amount expended up to the present time is 35,000, Rupees of which about 15,000 Rupees is on hand in materials, &c.

(Signed) A. COTTON, Colonel,
Commandant of Engineers.

Note by Sir P. Grant, Commander-in-Chief.

I desire to express my entire concurrence in the views set forth in the Memo. by Colonel Arthur Cotton, Commandant of Engineers. If, as I hope they will be, his suggestions are carried out, instead of a positive weakness we shall have in Fort Saint George, a real stronghold—the free admission of air and Sea-breeze which will be ensured by cutting down the Rampart on the Sea Face, cannot fail of favorable effect on the health of the Garrison, and a very considerable pecuniary saving will be effected.

I most strongly recommend that immediate effect may be given to all the measures Colonel Cotton proposes in this Paper.

(Signed) P. GRANT, Lieut.-General,
Commander-in-Chief.

No. 76. Minute by the Honorable the President, dated 2nd May 1859.

On my arrival at Madras, I found that the Sea Face of Fort St. George was cracked in many places to the foundation, and that it had been resolved to rebuild it according to the same antiquated model at a cost of 4,60,000 Rupees. The result of this seemed likely to be, that, after a few discharges, the Fortifications would be in as bad a state as ever—while, on the other hand, the opportunity appeared to be a valuable one for at once saving a considerable sum of money, for constructing a solid earth-work which would bear the heaviest Armament, and for removing a portion of the screen which intercepts the sea-breeze from the Barracks of the European Regiment stationed in Fort St. George.

2. Although it is only incidental to the subject now in hand, this last is a point of no slight importance. As the Citadel of this City and Presidency, Fort Saint George ought to be garrisoned by an European Regiment—and situated, as it is, on a dry plain on the shore of the Ocean, there is no reason why, with ordinary care, it should not be as healthy as any station in Her Majesty's dominions. The local conditions of health are, however, all in an imperfect state. The Troops have not room enough; the drainage is bad; the sea-breeze is shut out; and sufficient means of mental improvement and recreation do not exist. All this will, I hope, before long be remedied, and the European Barracks in Fort Saint George will become a model for the whole Presidency Army.

3. On becoming aware of the state of the Sea Face of the Fort, after consulting with the Commander-in-Chief, I requested Colonel Arthur Cotton, Commandant of Engineers, to report upon the works—and he has submitted a comprehensive concise Memorandum, the recommendations contained in which are supported by the high authority of His Excellency the Commander-in-Chief. I also entirely agree; and as the works now proposed are of the kind sanctioned both by the theory and experience of the age in which we live, and their estimated cost is 2,80,000 Rupees less than that of the works previously determined upon, while it is altogether improper that Fort Saint George should be left in its present delapidated condition, a commencement should be made without any delay.

4. As these works are entirely of a Military character, they must be entrusted to an experienced Military Engineer; and they will occupy so prominent a position in reference to our national safety and reputation, that no pains should be spared to secure the services of the most highly qualified Officer at our disposal. Fortunately Major Horsley of the Madras Engineers, who is considered by Colonel Cotton and the Commander-in-Chief to unite every requisite qualification for this duty, has just returned from England; and I propose that he should take charge of these Works as Garrison Engineer of Fort Saint George, and should have such allowances assigned to him in that capacity as on full consideration may appear suited to the nature of his duties and to his position in his Corps.

5. Captain Rawlins the present Garrison Engineer, is a highly deserving Public Officer, who has done excellent service in connection with the Irrigation Works in the Godavery; but being an Infantry Officer, without the scientific education and experience which would qualify him for this particular duty, he could not be charged with it. I therefore, propose that he should retain his present pay and allowances as Assistant to Major Horsley until other suitable employment can be found for him.

6. Lastly, I strongly recommend that at least three hundred Armstrong Guns of various, but chiefly of the largest calibre should be sent from England for the defence of the Coast of this Presidency. According to Colonel Cotton's estimate one hundred and eighty will be wanted to be placed in Battery at Madras, and there ought to be a reserve. As this Presidency has no Naval Force of its own, nor any upon the constant presence of which it can rely; while, on the other hand, it has a sea-board of upwards of 1,500 miles, and the largest proportion of its principal Towns are on the Coast, we must chiefly rely upon Guns in position for securing this portion of the Queen's dominions from insult and injury—and as no Canon are to be compared with those which have been lately invented under the name of "Armstrong Guns," a sufficient supply of them should be sent to Madras as soon as possible, in order that our Artillery Force may acquire that familiarity with their use without which the excellence of the weapon would be of no avail.

(Signed) C. E. TREVELYAN.

No. 77.

ORDER THEREON, 3rd May 1859, No. 1036.

1. Resolved that the measures proposed in this Minute be adopted, and be ordered to be carried into immediate effect.

2. Resolved also that Major Horsley be appointed Garrison Engineer with the Staff Salary of 800 Rupees a month, and that Captain Rawlins be appointed Assistant to the Garrison Engineer on the Salary of 500 Rupees a month, with the view of relieving Major Horsley from the multifarious details connected with the ordinary duties of the Office, and leaving him time available for the many important questions which will need attention in carrying out the new works.

3. Resolved also that the present order be reported immediately for the information of the Home Government, and that they be requested to send out a large number of Armstrong Guns, with the least possible delay.

(Signed) J. D. BOURDILLON,

Secretary to Government.

On my arrival at Madras, I found that the Sea Face of Fort St. George, was cracked in many places to the foundation, and that it had been resolved to rebuild it according to the same antiquated model, at a cost of 4,60,000 Rupees. The result of this seemed likely to be, that, after a few discharges, the fortifications would be in as bad a state as ever—while, on the other hand, the opportunity appeared to be a valuable one for at once saving a considerable sum of money, for constructing a solid earth work which would bear the heaviest armament, and for removing a portion of the screen which intercepts the sea-breeze from the Barracks of the European Regiment stationed in Fort St. George. ^{it is only} Although incidental to the subject now in hand, this last is a point of no slight importance. As the Citadel of this City and Presidency, Fort Saint George ought to be garrisoned by an European Regiment—and situated as it is, on a dry plain on the shore of the ocean, there is no reason why, with ordinary care it should not be as healthy as any station in Her Majesty's dominions. The local conditions of health are, however, all

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Wm. Murray

Madras 2nd May 1853.

I most entirely concur

Wm. O.

114
 Recd the following from
 Comd^t of Eng^rs Office
 No 171.

From
 Colonel A Cotton
 Comd^t of Eng^rs

To
 J. Bourdillon Esq
 Secretary to Gov^t & M^t
 Sir,

I have the honor to
 transmit my Memo on the
 repairs of Fort Saint George
 called for in Extract Minutes
 of Consultation dated 19th Feb^y
 1858. No 200. —

Fort St George I have the honor to
 27th April 1859 your most obed^t serv^t
 A. Cotton Col
 Comd^t of Eng^rs

Cotton in a L^r to E.
 31st May 1859. No 9

131st Nov 1859 Ch^rphant
 Comd^t of Eng^rs

Transmitted by Mr. P^rson
 the President

Obtained 2^d }
 March 3^d } June 1859

1856-
 Proposing Ingot
 generally and the Garrison
 Comd^t of Fort Saint
 George with the consent
 of the Committee

Memorandum on the Repairs of the Works in the Sea-face of Fort St. George, by Colonel A. Cotton, Commandant of Engineers.

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Copy in a Lt to C
27 32 May 1859, No 9

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27 32 May 1859

From

Colonel A. Cotton
Commandant of Engineers

St. Bourneillon Regt

Order of 27th April 1859.
Recd 28th

Enclosed
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will be many other engineering questions
to refer to him, upon which his time would
be much better employed than upon
that part of the duty which properly
belongs to an active young officer.

I may here record that Capt
Rawlin, the present officer employed
as Garrison Engineer has done excellent
service under my orders in charge of the
Quarries at Dowlaishwarum, and
under Captain Orr at Bezwarrath,
and he has also performed his duties
in a most satisfactory manner here,
and there seems no doubt that his
present poor health is in a great
measure owing to the severe duty and
exposure to the intense heat in the
Quarries, so that he seems most fully
entitled to as good an appointment as
could be found for him,
as his Medical Officer considers it
quite necessary for his health, that
he should not longer continue in duties
which require much exertion and exposure.
With respect to the estimate,
it appears that the total amount for
the repair of the works is Rs 2 Lacs, of

which that for the Sea-face was about 4,60,000 Rupees. The rough estimate which I have had prepared for restoring the works in the manner here proposed is 1,80,000, making a difference of 2,80,000, but some of the points must as I have stated be considered more at leisure by the Officer placed in Charge. —

Of the remaining 10 Lacs, being the amount for the Land faces, 1,60,000 Rupees is for the rebuilding of the works near the Saint Thomas Gate, which are in a state of entire ruin, and must be rebuilt at once. The rest are of far less importance, and it will be quite sufficient to decide about them in their turn, as the whole cannot be done at once, and probably the above works 3,40,000 Rupees, will require more than a year to complete. —

With respect to the question of foundations in this locality, the following points should be recorded. — One of the Works that has fallen to ruin was found to have properly speaking no foundation that is the bottom of the masonry was at about mean

mean sea level, and the superstructure consisted of irregular portions of brick in Chunan with the greater part of brick in mud. — Another part had deeper foundations, but no piles are found. On the other hand it is remarkable that some additional means have been used to give sound foundations to the part of the Sea-face where the castings are, which have been perfectly successful for there is not the least appearance of any settlement there. Of course we cannot ascertain how these foundations are formed. —

These seem to be all the points which it is necessary for me to enter upon in the present report. —

I append a section of the proposed Battery. —

The amount expended up to the present time is 5500 Rupees, of which about 1500 Rupees is on hand for materials &c.

Fort St. George, N. India. Colonel
27th April 1859. Command of Engineers

Note by Sir P. Grant Commander
in Chief

I desire to express my
entire concurrence in the views set
forth in the Memo by Colonel
Arthur Cotton, Commandant of
Engineers - If, as I hope they will
be, his suggestions are carried out,
instead of a positive weakness
we shall have in Fort Saint George
a real stronghold - the free ad-
mission of air and sea breeze,
which will be ensured by cutting
down the rampart on the sea-face
cannot fail of favorable effect
on the health of the Garrison, and
a very considerable pecuniary saving
will be effected.

I most strongly recommend
that immediate effect may be
given to all the measures Colonel
Cotton proposes in this paper.

Madras. Signed P. Grant at Genl
23rd April 1853, Comd. in Chief
J. D. S. P.
A. Cotton
Comd. of Engs.

2nd D. M.

No 1036.

Proceedings of the Madras Government
Under date, the 3rd May 1859.

Read the following
Papers.

From Col A. Cotton
Comd^r of Engineers

(Here enter 27 April 1859)

Minute by the Honble
the President.

(Here enter 2nd May 1859)

* measures proposed
in this Minute be
adopted, and be ordered
to be carried into
immediate effect.

1. Resolved that the
2. Resolved also
that Major Horsley be
appointed Garrison Engineer
with the staff salary
of 800 Rupees a month,
and that Captain
Gawlin be appointed
Assistant to the Garrison
Engineer on the salary
of 500 Rupees a month,
with the view of relieving
Major Horsley from the
multiparious details
connected with the
ordinary duties of the
Office.

Mr. Ch. -
H. S.
Full

Copy in a L^{ts} to L^{ts}
of 32 May 1859. 1859

Memorandum on the
Expense of the works in
the basin of Fort St. George
by Col A. Cotton
Commandant of Engineers.

3rd May 1859
Comm 3 May 1859. 1859

Office, and leaving him time
available for the many im-
portant questions which
will need attention in
carrying out the new works.

Resolved also that
the present order be
reported immediately
for the information of
the Home Government,
and that they be re-
quested to send out
a large number of
experienced men, with
the least possible de-
lay.

Philip H. H. 1859 Sept 10

Case: 3 May

No. 1836.

Pro: of the Christians for it

27 Oct May 1859.

No. of Ac with Smith & Co
At New York City 142, inc 10.
No. of Ac with Smith & Co
At New York City 142, inc 10.
No. of Ac with Smith & Co
At New York City 142, inc 10.
No. of Ac with Smith & Co
At New York City 142, inc 10.

in the chambre by the Port, the Pier,

• evident in the best means of
restoring the true state of God-
head's affluence, and universal

into effect - layers - Thursday after

fronted Garrison Eng. and

Sept. on Delaware 89 4579 24

her month perfectly - this morning

referred to the House Govt. with a res.

of Armstrong guns.

of Chunshong Guns.