GOVERNMENT OF MADRAS.

MILITARY DEPARTMENT.

---

23 July 1883, No. 4035

Defences—Forts.

Read the following paper :—

No. 265. *From Colonel R. C. STEWART, Officiating Quartermaster-General, to Colonel E. L. HANKIN, Secretary to Government, Military Department; dated Ootacamund, 28th June* 1883, *No.* 455.

I am desired, by His Excellency the Commander-in-Chief, to forward, for submission to Government, the report of the Annual Committee assembled in accordance with para. 218, Madras Army Regulations, on Fort St. George, with the correspondence as per margin, and with reference to para. 1 of this office letter, No. 336, dated 31st May 1882, I am to solicit the attention of Government to the proposal therein made to dismantle the outworks of the fort, and to fill in the ditches with the *débris* thereof, no orders regarding which have as yet been passed.

Copy of letter, No. 163, dated 28th February 1883, from the Officer Commanding 5/1st, Royal Artillery.
Copy of Annual Report by Colonel Burton, R.E., dated 6th February 1883.
Memo. by Colonel Burton, R.E., dated 24th February 1882, on the conservancy of Fort St. George.

2. With reference to para. 2 of the above-mentioned letter, I am desired again to express the recommendation of Sir Frederick Roberts that all the obsolete stores and guns be removed from the arsenal and from their present scattered positions about the fort, which, in the O.G., No. 2903, dated 15th June 1882, His Excellency the Governor in Council concurred in, but regarding which no orders have yet been issued. In reference to this important question Sir Frederick Roberts would suggest that the Inspector-General of Ordnance be called on to report on this measure, the expense attending it, and the mode in which he would propose to dispose of the obsolete stores.

3. Adverting to the remark in the O.G. above referred to relative to the cleansing of the main ditch, I am desired to remark that since submitting the annual report on Fort St. George for 1882, the experiment has been tried of cleansing a small section of the main ditch of the fort. This work was executed in the month of February at a cost of Rs. 1,123, and was twenty-eight days in progress.

Procs. of Govt., No. 5041, of 21st Sept. 1882.

4. The Officer Commanding Eastern District reported that the cleansing of the ditch was satisfactory, and that there were no bad results from it to the health of the garrison.

5. It seems therefore from this experiment that there need be no fear of sickness, should it hereafter be decided to continue the process of cleansing the ditch; but in His Excellency's opinion the work would be a costly one, and it seems more desirable to consider it hereafter in connection with the demolition of the outworks.

6. In the report which accompanies this letter Brigadier-General R. C. Stewart again recommends the removal of the arsenal from the fort, and comments on the utilization by the arsenal and some Government offices of the best buildings in the fort, whilst the British soldiers occupy the worst.

7. Sir Frederick Roberts does not agree with General Stewart as to the removal of the arsenal from the fort, but His Excellency is decidedly of opinion that the offices of the Accountant-General and the Controller of Military Accounts should be removed from the fort, and the buildings now occupied by these offices given up for the better accommodation of the troops of the garrison. I am desired to say that His Excellency will shortly address Government again on this very important question.

8. As regards the armament, I am desired to say that His Excellency has decided that it is not necessary to place one of the 80 R.M.L. guns on the seaface, but His Excellency urges strongly that six Nordenfelt guns be included in the armament for the defence of the seaface; these machine guns being admirably adapted for this purpose.

Procs. of Govt., No. 2931, of 22nd May 1883.
Vide Proceedings of Government, No. 3364, of 15th June 1883.

9. Sir Frederick Roberts is likewise of opinion that the best position for the guns forming the north-east group is on the Orillon demi-bastion, instead of on the interior demi-bastion at the north-east corner of the fort.

Procs. of Govt., No. 6854, of 29th Oct. 1880.

10. The report of the Officer Commanding the Royal Artillery seems to call for no remark from His Excellency, neither that officer nor Brigadier-General R. C. Stewart having apparently appreciated the fact that the question of the retention of the arsenal within the fort has already been definitely decided.

11. The recommendations of the Executive Engineer seem to be both practical and desirable, and Sir Frederick Roberts would hope that they may be considered in the Public Works Department at an early date. They are as follows:—

I. The north sea gateway should be permanently closed and blocked up.
II. The choultry gateway should be built up.
III. A bridge pit and drawbridge constructed at the north gate.
IV. All the outworks on the north-west and south fronts should be removed and the drawbridges to the gateways at the *enceinte* bastions put in order.
V. All the escarp walls of the *enceinte* to be pointed with cement and renewed.
VI. That new water-supply pipes should be laid on to the cisterns, and pipes for daily consumption attached to the cisterns.
VII. That certain changes should be made in the conservancy arrangements.

12. As regards the supply of water, I am desired to say that His Excellency Sir Frederick Roberts cannot too strongly condemn the old system under which the cisterns were never emptied, and he begs that Colonel Burton's recommendation may receive special consideration.

13. The conservancy arrangements are, I am desired to say, under the consideration of the Officer Commanding the Eastern District, and need not further be discussed here.

14. Besides the above works there are in connection with the armament—

I. The emplacements for the guns.
II. The shell and cartridge stores.
III. The completion of the laboratory.

15. As regards the retention or otherwise of certain buildings which would interfere with the fire of some of the guns, I am desired to say that while Sir Frederick Roberts is well aware of this undesirable obstruction at some points, it seems unnecessary at present to do more than to direct that buildings which obstruct the fire of the guns be not multiplied in future.

16. In conclusion, I am desired by His Excellency the Commander-in-Chief to say that he earnestly begs for an early decision on the future arrangements in connection with Fort St. George, which have been for a considerable period under discussion.

From Brigadier-General R. C. STEWART, C.B., Commanding Eastern District, to the Quartermaster-General, Fort St. George; dated Madras, 16th April 1883, No. 125½-G.

I have the honor to state that, in accordance with G.O., 12th October 1882, No. 2659-W., I made my annual inspection of Fort St. George, on the 12th instant, accompanied by the officers named in the margin.

Colonel Gloag, R.A., Commanding Royal Artillery, Eastern District.
Colonel Burton, R.E., Executive Engineer.
Major Atkinson, Deputy Assistant Quartermaster-General, Eastern District.

2. The poor condition of the fort is plainly shown in the accompanying reports of the Artillery and Engineer officers, and with regard to that of the latter, whilst advocating, as in former years, the demolition of the outworks, &c., I have only to express my hope that not a rupee may be spent on any of the works, either in "plastering" or in "pointing" until some reality is recognized in the schemes and propositions, &c., that periodically pass between this Government and the Government of India regarding the fate of this decayed fortress and the comfort of the soldiers who garrison it.

3. As I have, under different Commanders-in-Chief and latterly on my own account, been writing about Fort St. George for the last ten years, and now see matters worse than ever after much waste of money, I think I may conclude that it will be long before any plans are put into execution. Under these circumstances I would earnestly beg that, towards mitigating in some measure the discomfort of those who have to live night and day within these hot crumbling walls, in the meantime while the Government are deliberating, a few rupees may be laid out in making the interior of the place a little tidy and giving the occupants some more breathing room.

4. I allude to what is known in the fort as "ordnance rubbish," *i.e.*, old obsolete guns, old and broken carriages, broken iron wheels and old iron and wood of all descriptions, piles of old shot that have collected the dirt and dust of ages, and all such objectionable matter.

Several places that should be kept clear and clean for the healthful passage of the breeze are filled with heaps of this worthless material, that no one can be induced to accept and carry away. I think there is nothing unreasonable in the request that this "ordnance rubbish" be removed from the fort. It belongs to the arsenal. I would have the D.P.W. yard removed also.

5. In connection with this subject I would bring to notice that the Surgeon-General, Her Majesty's Forces, continually impresses on me that the soldiers in the fort are too crowded, and that to guard against any outbreak of sickness, this defect should be seen to. I can only answer him that, out of the many buildings he sees in the fort, there is only a certain amount of accommodation allotted to the battalion of infantry and half battery of artillery that forms the garrison, and that amount they have and, do what I will, that is all they are likely to get; but here I may urge upon His Excellency the necessity, in my opinion, of moving the question in Government, whether it is wise or desirable that the best buildings in the fort should be occupied by native writers and workmen for eight hours in the day, while many of the British soldiers have to exist in the worst for the twenty-four hours.

6. In the arsenal, which I believe has no *raison d'être* in the fort of to-day, there is the most suitable accommodation for troops that can be found in the presidency, and in this building some of the soldiers ought to be located.

Instead of this we see one grand apartment given up to the storing of obsolete small arms that never again can be used by us. They can be of service to no one but to a rebellious and successful mob, and yet we preserve them in our best house and entertain a body of men to clean and oil them periodically. Adjacent to this there is another splendid room where old arms, obsolete weapons of sorts and things called "curiosities" are kept, together with some equipment stores, while on the basement and other rooms different manufactures are carried on. These have some workshops built on to the escarp of the *enceinte*, and thus mark the flank defence of a large portion of the works, as the gas works do on the opposite side of the fort.

7. In a word, as regards the arsenal, I maintain that there is nothing there which cannot and which ought not to be done in buildings outside the fortress. If the old obsolete arms were got rid of and the ammunition and certain stores, equipments, &c., placed under charge of the soldiers in the place, there is nothing in the arsenal that requires greater guard than that commonly given to property in the different mercantile houses in the town.

8. Two other fine buildings are occupied for a few hours in the day by native writers of the accounts and other civil departments.

9. It can easily be imagined how the fort is fouled by the thousands of workmen and writers and their friends that enter daily; add to this the stench from the poisoned ground on which there have been stables since no one now knows when—such a state of things is, I am aware, not allowed in Fort William, and with good reason.

10. In conclusion, I would make a suggestion that I do not see in former reports, viz., that, should the crumbling outworks be demolished and decently arranged in their ditches, the bastions should come down also and the curtains (now greatly honeycombed with latrines) lowered and shortened and adapted for an artillery and infantry defence, proportionate to the strength of the garrison.

This would give much more room in the place and help in a measure towards making it a place of refuge, if this idea should continue to be entertained.

11. The delay in submitting the report was caused by the absence on duty of the Executive Engineer, Presidency.

I entirely concur in the opinions expressed by Brigadier-General R. C. Stewart, C.B., Commanding Eastern District.

2. I append reports from Major W. Bisset and Lieutenant Winter on the ordnance and the sites the guns are finally to occupy, from the latter of which it will be seen that unless the obstacles, &c., complained of are not removed, the fire of many of the guns will not only be rendered useless as against an enemy, but destructive to ordnance, troops, gas works, &c.

3. If so many pieces of ordnance are to be kept in position on the works, at least three batteries of garrison artillery would require to be located in the fort to look after them, their ammunition and stores, and cover would require to be placed over some of the more delicate guns, "Gatlings" for instance, to preserve them from the destructive effects of exposure to heat, rain, and sea air.

4. The batteries would require to be housed separately in different barracks, owing to the great distances between the several positions in which the ordnance is placed; otherwise the exposure of the men would only lead to sickness, and medical objections would be raised. In fact, the fort would have to be sub-divided into handy districts, as is the case in every modern work.

5. If the fort is only required as a place of refuge in case of local disturbance, all this is needless. The minor works only require to be levelled, the arsenal, a source of danger where it now is, and all its stores, curiosities, &c, should be removed elsewhere, then all the beautifully roomy buildings now occupied by it, and civil departments, after being cleared, could be given over to the military. At present there is no place where panic-stricken non-combatants, in case of a disturbance, could be housed; if the above suggestion were carried out there would be room for all Europeans at any rate who might require a refuge. Then a British regiment, a few artillery men with a few "Gatlings" and light rifled guns would suffice; or the fort might be cleared of the arsenal and all departments, thoroughly cleaned, and left as it is, with a few minor needful alterations it would then answer all purposes as a temporary refuge.

6. I am of opinion that nothing which might be done to the fort would ever render it of any use against modern artillery, nor cause it to become of any good in the defence of our commercial interests. I am confirmed in this opinion, long since formed, by the results of the late bombardment of Alexandria. I indeed believe that its works would not stand the firing of any armour piercing guns which might be placed on them. I therefore strongly deprecate the expenditure of a single rupee on its works with any such object in view. I hold an opinion that, if not levelled with the ground, the works should be allowed gradually to crumble away and subside into the ditches, like many other more celebrated fortresses.

ST. THOMAS' MOUNT,
24*th April* 1883.

(Signed) A. R. GLOAG, Colonel, R.A.,
Commanding Royal Artillery, Eastern District.

I dissent with the following portions of Brigadier-General's report. Para. 2, "that not a rupee may be spent on any of the works, either in plastering or pointing until some reality is recognised."

Rendering the walls of the escarp of the *enceinte*, viz., the portion of this fort which is intended by the Government of India to be retained—is, in my opinion, necessary to maintain the walls in a substantial condition and to keep them in good order. The neglect of this in bye-gone years has, in a great measure, led to the many adverse criticisms on this place. Of course I assume the intention of the Government of India has not been altered.

2. Also in para. 4, "the D.P.W. yard be removed also."

The present yard (viz., a portion of the berm of the main ditch in front of royal bastion and of the interior of this bastion) is necessary to the Executive Engineer having charge of the new works and repairs to military and civil buildings in the fort. He must have some such

establishment or place, or not do the work. In my own opinion the only reasonable objection which can be made to it is the use of it as a store yard for materials received from civil buildings outside the fort. This is inevitable whilst nearly all the works in Madras, civil and military, are under this one officer.

3. Para. 11. "The delay in submitting the report was caused by * * * Executive Engineer."

There must be some misapprehension as to my non-attendance on the Committee before 12th April, as I was ready to attend any day between 6th February and 12th April, but until a few days before 8th April I was not told I should have to attend it, and even then I said to Deputy Assistant Quartermaster-General I would attend "any day."

4. I also dissent with para. 3 of C. R. A.'s. report, so far as I have observed the practice of the Royal Artillery elsewhere. One garrison battery would suffice for the care, &c., of the armament proposed. One battery, I presume, in such a climate as this would perhaps be required to be assisted by about thirty of the fort lascars.

5. I also dissent from para. 4 as to "removal of all its stores," *i.e.*, stores of the arsenal. On the contrary I think as many of the present "authorised warlike stores" of the Government as possible (without prejudice to the barrack accommodation) should be stored in this fort. But it is in my opinion the use of an unusually fine large airy building as a store room for curiosities and obsolete arms and the use of the outworks for the manufacture of ordnance stores in the fort which is so objectionable and which should be stopped. No part of the limited space and buildings of this fort should be used as a museum and manufactory.

6. C. R. A.'s. para. 6 would lead one to suppose he was unaware of the intention Government to keep and maintain the fort only as a place of refuge in case of insurrection of the civil population. The civil population would not, in all probability, be in possession of modern artillery.

7. Further, as to my own report of 6th February 1883, the questions mentioned in paras. 4 and 5 of it have, since it was written, been settled by His Excellency the Commander-in-Chief.

I must modify the concluding sentence in para. 9 for reasons stated, and to the extent already described in my report No. 5820, dated 13th March 1883, to Deputy Assistant Quartermaster-General, Eastern District. The great leakage in the ditch renders it well nigh impossible to empty it.

BANGALORE,
26*th April* 1883.

(Signed) W. H. BURTON, Lieut.-Col., R.E.

From Major W. BISSET, R.A., Commanding 5/1st Brigade, Royal Artillery, Welsh Division, to the Adjutant, Royal Artillery, Eastern District; dated Saint Thomas' Mount, 28th February 1883, No. 163.

With reference to Deputy Assistant Quartermaster-General, Eastern District's letter, No. 237, dated 31st January 1883, and No. 205-R.A.,E.D., dated 6th February 1883, forwarding No. 5680-S.M.G., dated 21st October 1882, I have the honor to submit the following report on the armament of Fort St. George, Madras.

1. The armament consists of the following ordnance mounted on the works, viz. :—

Five 80-pdr. 5-ton R.M.L. guns.
Thirty-six 24-pdr. 37 cwt.
S.M. cast iron guns.
Six 18-pdr. 37 cwt. S.B. cast iron guns.
One 6-pdr. 15 cwt. S.B. do.
Three 10″ cast iron mortars.
Six 9-pdr. 10 cwt. S.B. bronze guns on Saluting Battery for saluting purpose only.

2. There are still two 24-pdr. cast iron guns to be mounted to complete the armament on the Royal Bastion. These two guns cannot be mounted in the place allotted for them, the wash-house of the military prison standing on the site.

3. Expense Magazine, No. 9, is not yet completed, the alterations to the window have not yet been carried out.

4. One 80-pdr. gun has fired 144 rounds since last examination; application has been made through head-quarters to the Inspector-General of Ordnance to have this gun examined. The remaining guns in position and the ammunition and stores for them are in good condition.

5. The carriages of the 80-pdr. guns will not run up properly, and the platforms will not traverse properly, owing to their being sprung, and they are therefore unserviceable.

6. There are now required at the following bastions :—

Wallajah	Racers for one 80-pdr. R.M.L. gun and embrasures for four 24-pdr. S.B. guns.
St. George's	Racers for one 80-pdr. R.M.L. gun.
Royal	Racers and emplacements for one 80-pdr. R.M.L. gun, and embrasures and platforms for two 24-pdr. S.B. guns.
N.E. Demi	Racers and emplacement for one 80-pdr. R.M.L. gun.
Flagstaff Battery	Racers and emplacement for one 80-pdr. R.M.L. gun.
S.E. Demi	Racers and emplacement for one 80-pdr. R.M.L. gun and embrasures for three 24-pdr. S.M. guns.

Forwarded to Deputy Assistant Quartermaster General, Eastern District.

R.A., EASTERN DISTRICT,
2nd *March* 1883.

(Signed) A. R. GLOAG, Colonel, R.A.,
Commanding R.A., Eastern District.

PART II.

ANNUAL REPORT ON FORT ST. GEORGE,

Madras.

Detailed description of every part of the Defences.—Fort St. George is a bastioned fort built on five fronts and nearly surrounded, *i.e.*, with exception of two outworks, by a wet ditch, the water in which is from 8 to 10 feet in depth according to the season of the year. The ditch is fed with fresh water from the watershed of the fort, and with salt water by percolation through the glacis (formed by the rapidly increasing breadth of land) on the seaface, and rises and falls perceptibly at times with the tide. The culvert built in 1857, for the better replenishment of sea water in the ditch, is now cut off from the sea owing to the accretion of sand on the foreshore due to the construction of the Madras Harbour Works, since the above date.

2. The escarp and counterscarp of all the ditches are rivetted with brickwork.

3. Upon the seaface, eastern front, there are no outworks. The ditch and ramparts are considerably less in section on this than on the other fronts. In these ramparts are 76 brick cisterns for storing water for use in case the fort is attacked. The North Sea Gateway, which has long since been disused, ought to be built up so as to render the protection of the adjacent shell and cartridge stores, proposed to be located on either side, easier; and the drawbridge removed. The drawbridge of the South Sea Gate ought to be put into working order.

4. It will still cost less to mount two $\frac{80}{65}$-pounder guns enbarbettee at the Redan position, *viz.*, one at salient of North Redan, and one on salient of South Redan, than one such gun as proposed by Government of India on the site of the old flagstaff.

5. On the North front, as defined by the salients of the Orillon Demi Bastion and the Royal Bastion, are the following outworks—

(*a*) Caponiere.
(*b*) North Ravelin.
(*c*) East Lunette of North Ravelin.
(*d*) West Lunette of North Ravelin.
N.B.—Each of these two last-mentioned outworks have dry ditches in front.
(*e*) Orillon Demi Bastion.
(*f*) N.E. Blind of Bastion.
(*g*) N.E. Counterguard of Bastion.

The proposal of the Government of India was to mount one $\frac{80}{65}$-pounder and five 24-pounder S.B. guns on the salient, &c., of the N.E. Demi Bastion, which involves the demolition of the Orillon Demi Bastion immediately in front of the N.E. Demi Bastion. In my opinion this arrangement should be modified, as it would be (when the N.E. Demi Orillon is demolished) impossible to find a convenient site in the fort for the laboratory and accommodation for warlike stores now located therein. Moreover, the expense of joining up the left flank and right face of the Orillon Bastion with the North curtain, and the left face of N.E. Demi Bastion must be considerably less than removing the great mass of casemates and ramparts of the Orillon Bastion.

The Orillon Demi Bastion affords also a more commanding and convenient position for the N.E. angle group of guns than does the N.E. Demi Bastion.

This question should be determined before the estimate for the emplacements of this group of guns on the N.E. Demi Bastion is approved. Further, the casemates of the Orillon Demi Bastion afford better means of providing dry shell and cartridge stores than do those of the N.E. Demi Bastion.

The Gas works will impede the fire of the two S.B. guns to be mounted whether on left flank of N.E. Demi Bastion or on the Orillon itself, and also of two on the right flank of Royal Bastion. Therefore the Gas works ought, in any case, be removed.

When a decision as regards the retention or otherwise of the Orillon Bastion has been definitely arrived at, it will be time to make a definite proposal as regards the main ditch on the north front.

The Choultry Gateway, long since disused as a gate, should be built up, and a drawbridge and bridge pit constructed at the North Gate.

6. On the N.W. front as defined by the sulients of the St. George's and Royal Bastions are the following outworks—

The St. George's Caponiere.
,, ,, Ravelin.
North Lunette of do.
South do. do.

These three latter outworks are in a state of disrepair, are almost useless—one affords very indifferent quarters for some few of the Governor's Bandsmen—in time of peace, and would be prejudicial to the defence in time of tumult, insurrection, &c.

The traverses on the covered way of the glacis on this and the other fronts are out of repair—their repair is not required; but the repair and maintenance of the palisades are necessary.

St. George's drawbridge should be put into working order.

7. On the S.W. face defined by the salients of Wallajah and St. George's Bastions are the following outworks—

The Wallajah Caponiere.
,, ,, Ravelin.
,, North Lunette of Ravelin.
,, South ,, ,,

The three latter outworks are best described as similar to those of the last-mentioned front.

The Wallajah drawbridge should be put into working order.

8. On the St. Thomé or southern face the outworks consist of the—

Caponiere,
Ravelin,
Counterguard or Bounette of the Ravelin,
West Lunette of Ravelin,
East Lunette,
S.E. Counterguard,

which are best described as similar to those of the former fronts.

There are two work sheds of the Ordnance Department on this face at foot of escarp of the curtain which ought to be removed, as they impede the flanking fire of 24-pounder S.B. on adjoining bastions.

The drawbridge should be put into working order.

9. It will be observed from the above, that I propose again this year, as last, to level the outworks, and fill in the ditches thereof with the *debris* of these works, involving, certainly, the completion of short pieces of counterscarp walls across the present junction of the outworks ditches with the main ditch. This will provide a large level space of ground under cover of the glacis and under command of the fire of the present *enceinte* in which to shelter refugees in tents, commissariat cattle, &c., whether it is accompanied or not by a cleansing of the main ditch is for consideration. I am still of opinion it should be so; in this month the sewage mud is in places commencing to be uncovered—the insanitary state of the ditch is very bad and requires the usual remedy for being full of sewage.

10. The escarp wall, as before stated, is built of brick work, in some places it is rendered over with line plaster, in others remote from the sea pointed with line mortar; and within the last few years portions near the Wallajah Gate and Redan have been rendered with Madras cement plaster.

I think that the whole of these walls should be either pointed with such cement or rendered according to description of work lately done on the Flagstaff Redan—the sea face walls being the first, generally speaking, required to be so protected from the weather.

11. The water-supply is detailed in the appendix to the plan: in my opinion it is most unfortunate, as regards the purity of the water stored in the cisterns, that the water drawn for daily consumption should not have been from those cisterns direct, instead of from the Seven Wells pipes supplying those cisterns: this of course results in the water in the cisterns being never changed, up till last year, 1882, when they were emptied and cleansed and refilled. No record is to be found when they were previously so emptied, and consequently the water stored was affected by stagnation.

All new water-supply pipes should be laid on to the cisterns, and pipes for daily consumption and those already laid on to the mains should be attached to the cisterns.

12. The proper conservancy of the fort depends of course upon the efficiency of the various establishments maintained for the purpose, and by a proper use of the sewers and cess-pit, and of the carts maintained for carrying away daily the contents of the latrines.

Up till last February, the Barrackmaster, the executive officer working the greater portion of the conservancy establishment, used daily to empty the sweepings of the streets down the cess-pit pipes leading into the sewers. He said he did so by orders received. From that misuse of these cess-pits and sewers and from inefficient supervision, it became the practice to empty the contents of the latrines also, in the same way, whereby these sewers have poured sewage into several parts of the main ditch—the rapid increase to the sewage bank in the main ditch at the St. George's and St. Thomé drawbridges makes me think this latter practice is still more or less taking place.

I enclose some printed instructions in regard to the proper use of the sewers.

The conservancy establishments ought to be amalgamated, paid and placed under the orders of an officer without any deputy, and the officer ought to have regard to this memorandum.

Work in progress on the defences.—Nil.

13. *Work considered necessary*—

(*a*) All the emplacements, ground platforms, embrasures, and parapets near the same, for such guns of the proposed armament as have not yet emplacements and embrasures and ground platforms—*vide* details of armament, &c., Part I, Rs. 9,630. Rs. 9,630.

(*b*) The work indicated in this report as required for the draw-bridges, Rs. 3,000. Rs. 3,000.

(*c*) The expense, shell and cartridge stores and artillery store for each of the six groups of guns in the proposed armament, Rs. 15,500. Rs. 15,500.

(*d*) The proper completion of the present laboratory in the Orillon Demi Bastion, Rs. 900. Rs. 900.

(*e*) The rendering bowl proof and proof against horizontal fire of the Grand Magazine, St. George's Magazine, Caldwell's Magazine—as in Part I on Magazines not yet estimated.

(*f*) The completion of counterscarp walls of main ditch, and demolition of the outworks other than the Orillon Demi Bastion into the outwork ditches not yet estimated.

(*g*) The rendering or the pointing of the escarp walls of the *enceinte* with Madras Portland cement, Rs. 5,000, proposed for 1883-84.

(*h*) The proper observance of the enclosed printed regulations for the conservancy of the fort as regards the sewers debouching into the main ditch.

Nothing extra to sanctioned establishment.

BANGALORE,
6*th February* 1883. (Signed) W. H. BURTON, Lieut.-Col., R.E.

Regulations for the Conservancy of Fort Saint George, so far as it is effected by means of the Sewers.

The sewers in Fort Saint George, the general direction of which is shown by the heavy square cast-iron gratings, are intended only for draining off storm-water and rain-fall in the

Fort: they are *not constructed* so as to carry off, or dispose of properly *any sewage*, or of any water or substance which can become sewage more foul and offensive than the waste water from cook-houses and bath-rooms.

On no account should *urine*, or the *emptyings* of *latrines*, be cast on the above-mentioned gratings, or put into the cess-pits under these gratings. These cess-pits are intended *to prevent* road sweepings, silt, &c., *passing into the sewers* under them.

No such sweepings, silt, rubbish, &c., can properly pass into the sewers if the cess-pit grating is lifted off and the silt, &c., taken out by means of an iron hand scoop (constructed for the purpose and obtained from the Executive Engineer) and put into a water-proof sewage barrow or cart, to be by it carried off to the sea beach and there buried in a sand pit, or to some other place appointed from time to time for the reception of such.

It being of great importance to sanitation that these cess-pits are not emptied oftener than necessary, the Barrackmaster will carefully discriminate when and how often to empty them, bearing in mind that *no silt, &c., must ever enter* the sewer.

In order that no *sewer gas* which is so fatal to human life generally, but especially at night, should escape from the sewer, the cess-pits are made water-tight and connected by a pipe with the sewer, the upper end of the pipe is trapped by an iron bell covering it, and so constructed that when water in the cess-pit is as high as the top of the pipe and the grating with bell is in its proper position, the water effectually seals the end of the pipe.

In case, therefore, any foul smell is perceived near one of these gratings and evidently comes from such grating, this smell will be due to one of the three following causes:—

(*a*) *Foul sewage having been improperly put into the cess-pit, or placed on the grating by which it has naturally fallen in.*

(*b*) *The water in the cess-pit having, by long stagnation, become foul.*

(*c*) *The water in the cess-pit, necessary for effectually sealing the upper end of the pipe connecting sewer and cess-pit, having by leakage or evaporation, &c., sunk below the level of the bottom of the iron bell.*

It follows, therefore, if the action of the various parts above described be carefully considered and remembered, and that the evil marked (*c*) has occurred, the remedy will be *to replenish the water*, and if advisable by reason of the otherwise foul state of this water *to entirely change it taking off the old water to the sea beach* or other place appointed in the sewage barrow or cart. No. I Remedy.

And that if either of the evils marked "*a*" or "*b*" has happened, the one and only remedy is *to empty the cess-pit* and *carry off* the contents to the *sea beach* or other place appointed in the sewage barrow or cart. No. II Remedy.

And whenever in either of the above cases the cess-pit is emptied to clean it out dry, freely sprinkle over it a bucket full of unslaked lime, and refill with water obtained from the sea face ditch, or other inodorous water, which of course need not be necessarily filtered water.

At the time when the iron grating is taken off for any of the above purposes, the end of the cess-pit sewer connecting pipe should be *closed by a tompion* provided for the purpose to *prevent* the *escape* of *sewer gas*.

As it would be injurious to health to empty the cess-pits oftener than is necesary for (1) keeping them inodorous, and (2) not too full of silt, the Barrackmaster will be able to judge when to empty them solely by the sense of smell and by measuring the height of silt—care being taken that the cess-pits are never emptied by passing the silt into the sewer, whether by hand or otherwise; for this would soon so choke these sewers that the well-nigh impossible but most costly work of clearing them out would be imposed upon the P. W. Department, that the iron box forming the cess-pit be on no account disturbed or removed except by the P. W. Department; and if it is found out of order, a Requisition for its immediate repair, &c., would be properly submitted to the Executive Engineer direct on Form No. M 7. Also that No. II remedy is never tried as a means of abating a bad smell until No. I remedy has been tried and found to fail.

CHEPAUK,
24*th February* 1882. (Signed) W. H. BURTON, Lieut.-Col., R. E.

No. 266. ORDER THEREON, 23 July 1883, No. 4035

Ordered that the foregoing papers be forwarded to the Government of India with the request that orders may issue on the proposal to dismantle the outworks of Fort St. George and to fill in the adjacent ditches, submitted last year.

Procs. of Govt., No. 2903, dated 15th June 1882.

2. The Inspector-General of Ordnance will report on the question raised in para. 2 of the Quartermaster-General's letter affording all the information desired by His Excellency the Commander-in-Chief.

3. In accordance with the recommendation in para. 5 no further action will be taken for the present in cleansing the main ditch.

4. It should now be understood by all concerned that the project of removing the Arsenal from Fort St. George has been abandoned.

5. The Government await the communication promised in para. 7 on the question of appropriating to the use of the troops certain buildings in the Fort, now otherwise occupied.

6. His Excellency's proposals in para. 8 to dispense with an 80-pdr. R.M.L. gun on the Flagstaff redan and to include six Nordenfelt guns in the armament on the seaface have already been separately dealt with.

Procs. of Govt., No. 2931, dated 22nd May 1883.
Do. „ 3364, „ 15th June „

Not Commtd.

7. The position recommended in para. 9 for the armament on the north-east face will be brought to the notice of the Government of India, with reference to Proceedings of Government, No. 6854, dated 29th October 1880.

From the Government of India, No. 1721-S.D. *(Defences—Fort St. George)*, dated 7th October 1880.

8. Paras. 11 to 15 will be communicated to the Public Works Department for early consideration and action.

No. 267 *To the Secretary to the Government of India, Military Department; dated 23 July* 1883, *No.* 4036

(True Extract.)

Colonel,
Secretary to Government.

To the Quartermaster-General.
„ Inspector-General of Ordnance.
„ Public Works Department. with 10 A copies
„ Adjutant-General, for information.

Exd. P. L. Pereira.

8/940

No 2154/W dy 6th Aug/83

Communicated to the Supdg Engr Fifth Circle who will see to the very early preparation of the necessary Estimates & the carrying out of the suggestions in para 11 to 15 of the Qr Mr Genl's letter

1017C 9/3/84

mis qo 2044 w 6.5.78
" " 245 w 25.10.80
" " 738 w 17.3.81
" " 1564 w 23.6.81
" " 2416 w 30.9.81
" " 1523 w 19.6.82
" " 1834 w 18.7.82
" " 2059 w 11.8.82
" " 2061 w 11.8.82
" " 2318 w 8.9.82
" " 2530 w 28.9.82
" " 2607 w 6.10.82
" " 2591 w 4.10.82
" " 2659 w 12.10.82
2178 C 28.11.82
mis qo 3150 w 30.11.82
90 C 11.1.83
119 C 12.1.83
mis 1528 w 31.5.83

S.S. Fifth Circle
Mily Dept

P.W.C. No 6280

Govt. of {1883} Madras.

MILITARY.

To THE QUARTERMASTER-GENERAL,
&c., &c., &c.

10 D.C

S.S.C

Dated July, 23rd

Issued

Recd. 25/7/83 Encl.

G.O., 23 July 1883, No. 4035

JULY.

Nos. 265–267.

Jte 2154/W dy 6-8-83

2 copies to Mily Dept 8-8-83

Defences—Forts.

Fort St. George.—Orders passed on the Annual Inspection Report on — for 1883, forwarded to the Government of India with the request that orders may issue on the proposal to dismantle the outworks of Fort St. George and to fill in the adjacent ditches; and the position recommended for the armament on the north-east face, brought to the notice of that Government.

Wd & O. Paper
with order
Subs. in Receipt Regr

GOVERNMENT OF MADRAS.

MILITARY DEPARTMENT.

23rd July 1883, No. 4035.

Defences—Forts.

Read the following paper:—

No. 265. *From Colonel R. C. STEWART, Officiating Quartermaster-General, to Colonel E. L. HANKIN, Secretary to Government, Military Department; dated Ootacamund, 28th June 1883, No. 455.*

I am desired, by His Excellency the Commander-in-Chief, to forward, for submission to Government, the report of the Annual Committee assembled in accordance with para. 218, Madras Army Regulations, on Fort St. George, with the correspondence as per margin, and with reference to para. 1 of this office letter, No. 336, dated 31st May 1882, I am to solicit the attention of Government to the proposal therein made to dismantle the outworks of the fort, and to fill in the ditches with the *debris* thereof, no orders regarding which have as yet been passed.

Copy of letter, No. 163, dated 28th February 1883, from the Officer Commanding 5/1st, Royal Artillery.
Copy of Annual Report by Colonel Burton, R.E., dated 6th February 1883.
Memo. by Colonel Burton, R.E., dated 24th February 1882, on the conservancy of Fort St. George.

2. With reference to para. 2 of the above-mentioned letter, I am desired again to express the recommendation of Sir Frederick Roberts that all the obsolete stores and guns be removed from the arsenal and from their present scattered positions about the fort, which, in the O.G., No. 2903, dated 15th June 1882, His Excellency the Governor in Council concurred in, but regarding which no orders have yet been issued. In reference to this important question Sir Frederick Roberts would suggest that the Inspector-General of Ordnance be called on to report on this measure, the expense attending it, and the mode in which he would propose to dispose of the obsolete stores.

3. Adverting to the remark in the O.G. above referred to relative to the cleansing of the main ditch, I am desired to remark that since submitting the annual report on Fort St. George for 1882, the experiment has been tried of cleansing a small section of the main ditch of the fort. This work was executed in the month of February at a cost of Rs. 1,123, and was twenty-eight days in progress.

Procs. of Govt., No. 5041, of 21st Sept. 1882.

4. The Officer Commanding Eastern District reported that the cleansing of the ditch was satisfactory, and that there were no bad results from it to the health of the garrison.

5. It seems therefore from this experiment that there need be no fear of sickness, should it hereafter be decided to continue the process of cleansing the ditch; but in His Excellency's opinion the work would be a costly one, and it seems more desirable to consider it hereafter in connection with the demolition of the outworks.

6. In the report which accompanies this letter Brigadier-General R. C. Stewart again recommends the removal of the arsenal from the fort, and comments on the utilization by the arsenal and some Government offices of the best buildings in the fort, whilst the British soldiers occupy the worst.

7. Sir Frederick Roberts does not agree with General Stewart as to the removal of the arsenal from the fort, but His Excellency is decidedly of opinion that the offices of the Accountant-General and the Controller of Military Accounts should be removed from the fort, and the buildings now occupied by these offices given up for the better accommodation of the troops of the garrison. I am desired to say that His Excellency will shortly address Government again on this very important question.

8. As regards the armament, I am desired to say that His Excellency has decided that it is not necessary to place one of the 80 R.M.L. guns on the seaface, but His Excellency urges strongly that six Nordenfelt guns be included in the armament for the defence of the seaface; these machine guns being admirably adapted for this purpose.

Procs. of Govt., No. 2931, of 22nd May 1883.

Vide Proceedings of Government, No. 3364, of 15th June 1883.

9. Sir Frederick Roberts is likewise of opinion that the best position for the guns forming the north-east group is on the Orillon demi-bastion, instead of on the interior demi-bastion at the north-east corner of the fort.

Procs. of Govt., No. 6854, of 29th Oct. 1880.

10. The report of the Officer Commanding the Royal Artillery seems to call for no remark from His Excellency, neither that officer nor Brigadier-General R. C. Stewart having apparently appreciated the fact that the question of the retention of the arsenal within the fort has already been definitely decided.

11. The recommendations of the Executive Engineer seem to be both practical and desirable, and Sir Frederick Roberts would hope that they may be considered in the Public Works Department at an early date. They are as follows:—

I. The north sea gateway should be permanently closed and blocked up.
II. The choultry gateway should be built up.
III. A bridge pit and drawbridge constructed at the north gate.
IV. All the outworks on the north-west and south fronts should be removed and the drawbridges to the gateways at the *enceinte* bastions put in order.
V. All the escarp walls of the *enceinte* to be pointed with cement and renewed.
VI. That new water-supply pipes should be laid on to the cisterns, and pipes for daily consumption attached to the cisterns.
VII. That certain changes should be made in the conservancy arrangements.

12. As regards the supply of water, I am desired to say that His Excellency Sir Frederick Roberts cannot too strongly condemn the old system under which the cisterns were never emptied, and he begs that Colonel Burton's recommendation may receive special consideration.

13. The conservancy arrangements are, I am desired to say, under the consideration of the Officer Commanding the Eastern District, and need not further be discussed here.

14. Besides the above works there are in connection with the armament—

I. The emplacements for the guns.
II. The shell and cartridge stores.
III. The completion of the laboratory.

15. As regards the retention or otherwise of certain buildings which would interfere with the fire of some of the guns, I am desired to say that while Sir Frederick Roberts is well aware of this undesirable obstruction at some points, it seems unnecessary at present to do more than to direct that buildings which obstruct the fire of the guns be not multiplied in future.

16. In conclusion, I am desired by His Excellency the Commander-in-Chief to say that he earnestly begs for an early decision on the future arrangements in

connection with Fort St. George, which have been for a considerable period under discussion.

From Brigadier-General R. C. STEWART, C.B., Commanding Eastern District, to the Quartermaster-General, Fort St. George; dated Madras, 16th April 1883, No. 125½-G.

I have the honor to state that, in accordance with G.O., 12th October 1882, No. 2659-W., I made my annual inspection of Fort St. George, on the 12th instant, accompanied by the officers named in the margin.

Colonel Gloag, R.A., Commanding Royal Artillery, Eastern District.
Colonel Burton, R.E., Executive Engineer.
Major Atkinson, Deputy Assistant Quartermaster-General, Eastern District.

2. The poor condition of the fort is plainly shown in the accompanying reports of the Artillery and Engineer officers, and with regard to that of the latter, whilst advocating, as in former years, the demolition of the outworks, &c., I have only to express my hope that not a rupee may be spent on any of the works, either in "plastering" or in "pointing" until some reality is recognized in the schemes and propositions, &c., that periodically pass between this Government and the Government of India regarding the fate of this decayed fortress and the comfort of the soldiers who garrison it.

3. As I have, under different Commanders-in-Chief and latterly on my own account, been writing about Fort St. George for the last ten years, and now see matters worse than ever after much waste of money, I think I may conclude that it will be long before any plans are put into execution. Under these circumstances I would earnestly beg that, towards mitigating in some measure the discomfort of those who have to live night and day within these hot crumbling walls, in the meantime while the Government are deliberating, a few rupees may be laid out in making the interior of the place a little tidy and giving the occupants some more breathing room.

4. I allude to what is known in the fort as "ordnance rubbish," *i.e.*, old obsolete guns, old and broken carriages, broken iron wheels and old iron and wood of all descriptions, piles of old shot that have collected the dirt and dust of ages, and all such objectionable matter.

Several places that should be kept clear and clean for the healthful passage of the breeze are filled with heaps of this worthless material, that no one can be induced to accept and carry away. I think there is nothing unreasonable in the request that this "ordnance rubbish" be removed from the fort. It belongs to the arsenal. I would have the D.P.W. yard removed also.

5. In connection with this subject I would bring to notice that the Surgeon-General, Her Majesty's Forces, continually impresses on me that the soldiers in the fort are too crowded, and that to guard against any outbreak of sickness, this defect should be seen to. I can only answer him that, out of the many buildings he sees in the fort, there is only a certain amount of accommodation allotted to the battalion of infantry and half battery of artillery that forms the garrison, and that amount they have and, do what I will, that is all they are likely to get; but here I may urge upon His Excellency the necessity, in my opinion, of moving the question in Government, whether it is wise or desirable that the best buildings in the fort should be occupied by native writers and workmen for eight hours in the day, while many of the British soldiers have to exist in the worst for the twenty-four hours.

6. In the arsenal, which I believe has no *raison d'être* in the fort of to-day, there is the most suitable accommodation for troops that can be found in the presidency, and in this building some of the soldiers ought to be located.

Instead of this we see one grand apartment given up to the storing of obsolete small arms that never again can be used by us. They can be of service to no one but to a rebellious and successful mob, and yet we preserve them in our best house and entertain a body of men to clean and oil them periodically. Adjacent to this there is another splendid room where old arms, obsolete weapons of sorts and things called "curiosities" are kept, together with some equipment stores, while on the basement and other rooms different manufactures are carried on. These have some workshops built on to the escarp of the *enceinte*, and thus mark the flank defence of a large portion of the works, as the gas works do on the opposite side of the fort.

7. In a word, as regards the arsenal, I maintain that there is nothing there which cannot and which ought not to be done in buildings outside the fortress. If the old obsolete arms were got rid of and the ammunition and certain stores, equipments, &c., placed under charge of the soldiers in the place, there is nothing in the arsenal that requires greater guard than that commonly given to property in the different mercantile houses in the town.

8. Two other fine buildings are occupied for a few hours in the day by native writers of the accounts and other civil departments.

9. It can easily be imagined how the fort is fouled by the thousands of workmen and writers and their friends that enter daily; add to this the stench from the poisoned ground on which there have been stables since no one now knows when—such a state of things is, I am aware, not allowed in Fort William, and with good reason.

10. In conclusion, I would make a suggestion that I do not see in former reports, viz., that, should the crumbling outworks be demolished and decently arranged in their ditches, the bastions should come down also and the curtains (now greatly honeycombed with latrines) lowered and shortened and adapted for an artillery and infantry defence, proportionate to the strength of the garrison.

This would give much more room in the place and help in a measure towards making it a place of refuge, if this idea should continue to be entertained.

11. The delay in submitting the report was caused by the absence on duty of the Executive Engineer, Presidency.

I entirely concur in the opinions expressed by Brigadier-General R. C. Stewart, C.B., Commanding Eastern District.

2. I append reports from Major W. Bisset and Lieutenant Winter on the ordnance and the sites the guns are finally to occupy, from the latter of which it will be seen that unless the obstacles, &c., complained of are not removed, the fire of many of the guns will not only be rendered useless as against an enemy, but destructive to ordnance, troops, gas works, &c.

3. If so many pieces of ordnance are to be kept in position on the works, at least three batteries of garrison artillery would require to be located in the fort to look after them, their ammunition and stores, and cover would require to be placed over some of the more delicate guns, "Gatlings" for instance, to preserve them from the destructive effects of exposure to heat, rain, and sea air.

4. The batteries would require to be housed separately in different barracks, owing to the great distances between the several positions in which the ordnance is placed; otherwise the exposure of the men would only lead to sickness, and medical objections would be raised. In fact, the fort would have to be sub-divided into handy districts, as is the case in every modern work.

5. If the fort is only required as a place of refuge in case of local disturbance, all this is needless. The minor works only require to be levelled, the arsenal, a source of danger where it now is, and all its stores, curiosities, &c, should be removed elsewhere, then all the beautifully roomy buildings now occupied by it, and civil departments, after being cleared, could be given over to the military. At present there is no place where panic-stricken non-combatants, in case of a disturbance, could be housed; if the above suggestion were carried out there would be room for all Europeans at any rate who might require a refuge. Then a British regiment, a few artillery men with a few "Gatlings" and light rifled guns would suffice; or the fort might be cleared of the arsenal and all departments, thoroughly cleaned, and left as it is, with a few minor needful alterations it would then answer all purposes as a temporary refuge.

6. I am of opinion that nothing which might be done to the fort would ever render it of any use against modern artillery, nor cause it to become of any good in the defence of our commercial interests. I am confirmed in this opinion, long since formed, by the results of the late bombardment of Alexandria. I indeed believe that its works would not stand the firing of any armour piercing guns which might be placed on them. I therefore strongly deprecate the expenditure of a single rupee on its works with any such object in view. I hold an opinion that, if not levelled with the ground, the works should be allowed gradually to crumble away and subside into the ditches, like many other more celebrated fortresses.

ST. THOMAS' MOUNT,
24th April 1883.

(Signed) A. R. GLOAG, Colonel, R.A.,
Commanding Royal Artillery, Eastern District.

I dissent with the following portions of Brigadier-General's report. Para. 2, "that not a rupee may be spent on any of the works, either in plastering or pointing until some reality is recognised."

Rendering the walls of the escarp of the *enceinte*, viz., the portion of this fort which is intended by the Government of India to be retained—is, in my opinion, necessary to maintain the walls in a substantial condition and to keep them in good order. The neglect of this in bye-gone years has, in a great measure, led to the many adverse criticisms on this place. Of course I assume the intention of the Government of India has not been altered.

2. Also in para. 4, "the D.P.W. yard be removed also."

The present yard (viz., a portion of the berm of the main ditch in front of royal bastion and of the interior of this bastion) is necessary to the Executive Engineer having charge of the new works and repairs to military and civil buildings in the fort. He must have some such

establishment or place, or not do the work. In my own opinion the only reasonable objection which can be made to it is the use of it as a store yard for materials received from civil buildings outside the fort. This is inevitable whilst nearly all the works in Madras, civil and military, are under this one officer.

3. Para. 11. "The delay in submitting the report was caused by * * * Executive Engineer."

There must be some misapprehension as to my non-attendance on the Committee before 12th April, as I was ready to attend any day between 6th February and 12th April, but until a few days before 8th April I was not told I should have to attend it, and even then I said to Deputy Assistant Quartermaster-General I would attend "any day."

4. I also dissent with para. 3 of C. R. A.'s. report, so far as I have observed the practice of the Royal Artillery elsewhere. One garrison battery would suffice for the care, &c., of the armament proposed. One battery, I presume, in such a climate as this would perhaps be required to be assisted by about thirty of the fort lascars.

5. I also dissent from para. 4 as to "removal of all its stores," *i.e.*, stores of the arsenal. On the contrary I think as many of the present "authorised warlike stores" of the Government as possible (without prejudice to the barrack accommodation) should be stored in this fort. But it is in my opinion the use of an unusually fine large airy building as a store room for curiosities and obsolete arms and the use of the outworks for the manufacture of ordnance stores in the fort which is so objectionable and which should be stopped. No part of the limited space and buildings of this fort should be used as a museum and manufactory.

6. C. R. A.'s. para. 6 would lead one to suppose he was unaware of the intention Government to keep and maintain the fort only as a place of refuge in case of insurrection of the civil population. The civil population would not, in all probability, be in possession of modern artillery.

7. Further, as to my own report of 6th February 1883, the questions mentioned in paras. 4 and 5 of it have, since it was written, been settled by His Excellency the Commander-in-Chief.

I must modify the concluding sentence in para. 9 for reasons stated, and to the extent already described in my report No. 5820, dated 13th March 1883, to Deputy Assistant Quartermaster-General, Eastern District. The great leakage in the ditch renders it well nigh impossible to empty it.

BANGALORE,
26th April 1883.

(Signed) W. H. BURTON, Lieut.-Col., R.E.

From Major W. BISSET, R.A., Commanding 5/1st Brigade, Royal Artillery, Welsh Division, to the Adjutant, Royal Artillery, Eastern District; dated Saint Thomas' Mount, 28th February 1883, No. 163.

With reference to Deputy Assistant Quartermaster-General, Eastern District's letter, No. 237, dated 31st January 1883, and No. 205-R.A.,E.D., dated 6th February 1883, forwarding No. 5680-S.M.G., dated 21st October 1882, I have the honor to submit the following report on the armament of Fort St. George, Madras.

1. The armament consists of the following ordnance mounted on the works, viz.:—

Five 80-pdr. 5-ton R.M.L. guns.
Thirty-six 24-pdr. 37 cwt.
S.M. cast iron guns.
Six 18-pdr. 37 cwt. S.B. cast iron guns.
One 6-pdr. 15 cwt. S.B. do.
Three 10" cast iron mortars.
Six 9-pdr. 10 cwt. S.B. bronze guns on Saluting Battery for saluting purpose only.

2. There are still two 24-pdr. cast iron guns to be mounted to complete the armament on the Royal Bastion. These two guns cannot be mounted in the place allotted for them, the wash-house of the military prison standing on the site.

3. Expense Magazine, No. 9, is not yet completed, the alterations to the window have not yet been carried out.

4. One 80-pdr. gun has fired 144 rounds since last examination; application has been made through head-quarters to the Inspector-General of Ordnance to have this gun examined. The remaining guns in position and the ammunition and stores for them are in good condition.

5. The carriages of the 80-pdr. guns will not run up properly, and the platforms will not traverse properly, owing to their being sprung, and they are therefore unserviceable.

6. There are now required at the following bastions :—

Wallajah	Racers for one 80-pdr. R.M.L. gun and embrasures for four 24-pdr. S.B. guns.
St. George's	Racers for one 80-pdr. R.M.L. gun.
Royal	Racers and emplacements for one 80-pdr. R.M.L. gun, and embrasures and platforms for two 24-pdr. S.B. guns.
N.E. Demi	Racers and emplacement for one 80-pdr. R.M.L. gun.
Flagstaff Battery	Racers and emplacement for one 80-pdr. R.M.L. gun.
S.E. Demi	Racers and emplacement for one 80-pdr. R.M.L. gun and embrasures for three 24-pdr. S.M. guns.

Forwarded to Deputy Assistant Quartermaster General, Eastern District.

R.A., EASTERN DISTRICT,
2*nd March* 1883.

(Signed) A. R. GLOAG, Colonel, R.A.,
Commanding R.A., Eastern District.

PART II.

ANNUAL REPORT ON FORT ST. GEORGE,

Madras.

Detailed description of every part of the Defences.—Fort St. George is a bastioned fort built on five fronts and nearly surrounded, *i.e.*, with exception of two outworks, by a wet ditch, the water in which is from 8 to 10 feet in depth according to the season of the year. The ditch is fed with fresh water from the watershed of the fort, and with salt water by percolation through the glacis (formed by the rapidly increasing breadth of land) on the seaface, and rises and falls perceptibly at times with the tide. The culvert built in 1857, for the better replenishment of sea water in the ditch, is now cut off from the sea owing to the accretion of sand on the foreshore due to the construction of the Madras Harbour Works, since the above date.

2. The escarp and counterscarp of all the ditches are rivetted with brickwork.

3. Upon the seaface, eastern front, there are no outworks. The ditch and ramparts are considerably less in section on this than on the other fronts. In these ramparts are 76 brick cisterns for storing water for use in case the fort is attacked. The North Sea Gateway, which has long since been disused, ought to be built up so as to render the protection of the adjacent shell and cartridge stores, proposed to be located on either side, easier; and the drawbridge removed. The drawbridge of the South Sea Gate ought to be put into working order.

4. It will still cost less to mount two $\frac{80}{68}$-pounder guns enbarbettee at the Redan position, *viz.*, one at salient of North Redan, and one on salient of South Redan, than one such gun as proposed by Government of India on the site of the old flagstaff.

5. On the North front, as defined by the salients of the Orillon Demi Bastion and the Royal Bastion, are the following outworks—

(*a*) Caponiere.
(*b*) North Ravelin.
(*c*) East Lunette of North Ravelin.
(*d*) West Lunette of North Ravelin.
N.B.—Each of these two last-mentioned outworks have dry ditches in front.
(*e*) Orillon Demi Bastion.
(*f*) N.E. Blind of Bastion.
(*g*) N.E. Counterguard of Bastion.

The proposal of the Government of India was to mount one $\frac{80}{68}$-pounder and five 24-pounder S.B. guns on the salient, &c., of the N.E. Demi Bastion, which involves the demolition of the Orillon Demi Bastion immediately in front of the N.E. Demi Bastion. In my opinion this arrangement should be modified, as it would be (when the N.E. Demi Orillon is demolished) impossible to find a convenient site in the fort for the laboratory and accommodation for warlike stores now located therein. Moreover, the expense of joining up the left flank and right face of the Orillon Bastion with the North curtain, and the left face of N.E. Demi Bastion must be considerably less than removing the great mass of casemates and ramparts of the Orillon Bastion.

The Orillon Demi Bastion affords also a more commanding and convenient position for the N.E. angle group of guns than does the N.E. Demi Bastion.

This question should be determined before the estimate for the emplacements of this group of guns on the N.E. Demi Bastion is approved. Further, the casemates of the Orillon Demi Bastion afford better means of providing dry shell and cartridge stores than do those of the N.E. Demi Bastion.

The Gas works will impede the fire of the two S.B. guns to be mounted whether on left flank of N.E. Demi Bastion or on the Orillon itself, and also of two on the right flank of Royal Bastion. Therefore the Gas works ought, in any case, be removed.

When a decision as regards the retention or otherwise of the Orillon Bastion has been definitely arrived at, it will be time to make a definite proposal as regards the main ditch on the north front.

The Choultry Gateway, long since disused as a gate, should be built up, and a drawbridge and bridge pit constructed at the North Gate.

6. On the N.W. front as defined by the salients of the St. George's and Royal Bastions are the following outworks—

The St. George's Caponiere.
" " Ravelin.
North Lunette of do.
South do. do.

These three latter outworks are in a state of disrepair, are almost useless—one affords very indifferent quarters for some few of the Governor's Bandsmen—in time of peace, and would be prejudicial to the defence in time of tumult, insurrection, &c.

The traverses on the covered way of the glacis on this and the other fronts are out of repair—their repair is not required; but the repair and maintenance of the palisades are necessary.

St. George's drawbridge should be put into working order.

7. On the S.W. face defined by the salients of Wallajah and St. George's Bastions are the following outworks—

The Wallajah Caponiere.
" " Ravelin.
" North Lunette of Ravelin.
" South " "

The three latter outworks are best described as similar to those of the last-mentioned front.

The Wallajah drawbridge should be put into working order.

8. On the St. Thomé or southern face the outworks consist of the—

Caponiere,
Ravelin,
Counterguard or Bounette of the Ravelin,
West Lunette of Ravelin,
East Lunette,
S.E. Counterguard,

which are best described as similar to those of the former fronts.

There are two work sheds of the Ordnance Department on this face at foot of escarp of the curtain which ought to be removed, as they impede the flanking fire of 24-pounder S.B. on adjoining bastions.

The drawbridge should be put into working order.

9. It will be observed from the above, that I propose again this year, as last, to level the outworks, and fill in the ditches thereof with the *debris* of these works, involving, certainly, the completion of short pieces of counterscarp walls across the present junction of the outworks ditches with the main ditch. This will provide a large level space of ground under cover of the glacis and under command of the fire of the present *enceinte* in which to shelter refugees in tents, commissariat cattle, &c., whether it is accompanied or not by a cleansing of the main ditch is for consideration. I am still of opinion it should be so; in this month the sewage mud is in places commencing to be uncovered—the insanitary state of the ditch is very bad and requires the usual remedy for being full of sewage.

10. The escarp wall, as before stated, is built of brick work, in some places it is rendered over with line plaster, in others remote from the sea pointed with line mortar; and within the last few years portions near the Wallajah Gate and Redan have been rendered with Madras cement plaster.

I think that the whole of these walls should be either pointed with such cement or rendered according to description of work lately done on the Flagstaff Redan—the sea face walls being the first, generally speaking, required to be so protected from the weather.

11. The water-supply is detailed in the appendix to the plan: in my opinion it is most unfortunate, as regards the purity of the water stored in the cisterns, that the water drawn for daily consumption should not have been from those cisterns direct, instead of from the Seven Wells pipes supplying those cisterns: this of course results in the water in the cisterns being never changed, up till last year, 1882, when they were emptied and cleansed and refilled. No record is to be found when they were previously so emptied, and consequently the water stored was affected by stagnation.

All new water-supply pipes should be laid on to the cisterns, and pipes for daily consumption and those already laid on to the mains should be attached to the cisterns.

12. The proper conservancy of the fort depends of course upon the efficiency of the various establishments maintained for the purpose, and by a proper use of the sewers and cess-pit, and of the carts maintained for carrying away daily the contents of the latrines.

Up till last February, the Barrackmaster, the executive officer working the greater portion of the conservancy establishment, used daily to empty the sweepings of the streets down the cess-pit pipes leading into the sewers. He said he did so by orders received. From that misuse of these cess-pits and sewers and from inefficient supervision, it became the practice to empty the contents of the latrines also, in the same way, whereby these sewers have poured sewage into several parts of the main ditch—the rapid increase to the sewage bank in the main ditch at the St. George's and St. Thomé drawbridges makes me think this latter practice is still more or less taking place.

I enclose some printed instructions in regard to the proper use of the sewers.

The conservancy establishments ought to be amalgamated, paid and placed under the orders of an officer without any deputy, and the officer ought to have regard to this memorandum.

Work in progress on the defences.—Nil.

13. *Work considered necessary*—

(*a*) All the emplacements, ground platforms, embrasures, and parapets near the same, for such guns of the proposed armament as have not yet emplacements and embrasures and ground platforms—*vide* details of armament, &c., Part I, Rs. 9,630. Rs. 9,630.

(*b*) The work indicated in this report as required for the draw-bridges, Rs. 3,000. Rs. 3,000.

(*c*) The expense, shell and cartridge stores and artillery store for each of the six groups of guns in the proposed armament, Rs. 15,500. Rs. 15,500.

(*d*) The proper completion of the present laboratory in the Orillon Demi Bastion, Rs. 900. Rs. 900.

(*e*) The rendering bowl proof and proof against horizontal fire of the Grand Magazine, St. George's Magazine, Caldwell's Magazine—as in Part I on Magazines not yet estimated.

(*f*) The completion of counterscarp walls of main ditch, and demolition of the outworks other than the Orillon Demi Bastion into the outwork ditches not yet estimated.

(*g*) The rendering or the pointing of the escarp walls of the *enceinte* with Madras Portland cement, Rs. 5,000, proposed for 1883-84.

(*h*) The proper observance of the enclosed printed regulations for the conservancy of the fort as regards the sewers debouching into the main ditch.

Nothing extra to sanctioned establishment.

BANGALORE,
6th February 1883.

(Signed) W. H. BURTON, Lieut.-Col., R.E.

Regulations for the Conservancy of Fort Saint George, so far as it is effected by means of the Sewers.

The sewers in Fort Saint George, the general direction of which is shown by the heavy square cast-iron gratings, are intended only for draining off storm-water and rainfall in the

Fort: they are *not constructed* so as to carry off, or dispose of properly *any sewage*, or of any water or substance which can become sewage more foul and offensive than the waste water from cook-houses and bath-rooms.

On no account should *urine*, or the *emptyings* of *latrines*, be cast on the above-mentioned gratings, or put into the cess-pits under these gratings. These cess-pits are intended *to prevent* road sweepings, silt, &c., *passing into the sewers* under them.

No such sweepings, silt, rubbish, &c., can properly pass into the sewers if the cess-pit grating is lifted off and the silt, &c., taken out by means of an iron hand scoop (constructed for the purpose and obtained from the Executive Engineer) and put into a water-proof sewage barrow or cart, to be by it carried off to the sea beach and there buried in a sand pit, or to some other place appointed from time to time for the reception of such.

It being of great importance to sanitation that these cess-pits are not emptied oftener than necessary, the Barrackmaster will carefully discriminate when and how often to empty them, bearing in mind that *no silt, &c., must ever enter* the sewer.

In order that no *sewer gas* which is so fatal to human life generally, but especially at night, should escape from the sewer, the cess-pits are made water-tight and connected by a pipe with the sewer, the upper end of the pipe is trapped by an iron bell covering it, and so constructed that when water in the cess-pit is as high as the top of the pipe and the grating with bell is in its proper position, the water effectually seals the end of the pipe.

In case, therefore, any foul smell is perceived near one of these gratings and evidently comes from such grating, this smell will be due to one of the three following causes:—

(*a*) *Foul sewage having been improperly put into the cess-pit, or placed on the grating by which it has naturally fallen in.*

(*b*) *The water in the cess-pit having, by long stagnation, become foul.*

(*c*) *The water in the cess-pit, necessary for effectually sealing the upper end of the pipe connecting sewer and cess-pit, having by leakage or evaporation, &c., sunk below the level of the bottom of the iron bell.*

It follows, therefore, if the action of the various parts above described be carefully considered and remembered, and that the evil marked (*c*) has occurred, the remedy will be *to replenish the water*, and if advisable by reason of the otherwise foul state of this water *to entirely change it taking off the old water to the sea beach* or other place appointed in the sewage barrow or cart. No. I Remedy.

And that if either of the evils marked "*a*" or "*b*" has happened, the one and only remedy is *to empty the cess-pit* and *carry off* the contents to the *sea beach* or other place appointed in the sewage barrow or cart. No. II Remedy.

And whenever in either of the above cases the cess-pit is emptied to clean it out dry, freely sprinkle over it a bucket full of unslaked lime, and refill with water obtained from the sea face ditch, or other inodorous water, which of course need not be necessarily filtered water.

At the time when the iron grating is taken off for any of the above purposes, the end of the cess-pit sewer connecting pipe should be *closed by a tompion* provided for the purpose to *prevent* the *escape* of *sewer gas*.

As it would be injurious to health to empty the cess-pits oftener than is necesary for (1) keeping them inodorous, and (2) not too full of silt, the Barrackmaster will be able to judge when to empty them solely by the sense of smell and by measuring the height of silt—care being taken that the cess-pits are never emptied by passing the silt into the sewer, whether by hand or otherwise; for this would soon so choke these sewers that the well-nigh impossible but most costly work of clearing them out would be imposed upon the P. W. Department, that the iron box forming the cess-pit be on no account disturbed or removed except by the P. W. Department; and if it is found out of order, a Requisition for its immediate repair, &c., would be properly submitted to the Executive Engineer direct on Form No. M 7. Also that No. II remedy is never tried as a means of abating a bad smell until No. I remedy has been tried and found to fail.

CHEPAUK,
24th February 1882.

(Signed) W. H. BURTON, Lieut.-Col., R. E.

No. 266. ORDER THEREON, 23rd July 1883, No. 4035.

Ordered that the foregoing papers be forwarded to the Government of India with the request that orders may issue on the proposal to dismantle the outworks of Fort St. George and to fill in the adjacent ditches, submitted last year.

Procs. of Govt., No. 2903, dated 15th June 1882.

2. The Inspector-General of Ordnance will report on the question raised in para. 2 of the Quartermaster-General's letter affording all the information desired by His Excellency the Commander-in-Chief.

3. In accordance with the recommendation in para. 5 no further action will be taken for the present in cleansing the main ditch.

4. It should now be understood by all concerned that the project of removing the Arsenal from Fort St. George has been abandoned.

5. The Government await the communication promised in para. 7 on the question of appropriating to the use of the troops certain buildings in the Fort, now otherwise occupied.

6. His Excellency's proposals in para. 8 to dispense with an 80-pdr. R.M.L. gun on the Flagstaff redan and to include six Nordenfelt guns in the armament on the seaface have already been separately dealt with.

Procs. of Govt., No. 2931, dated 22nd May 1883.
Do. „ 3364, „ 15th June „

7. The position recommended in para. 9 for the armament on the north-east face will be brought to the notice of the Government of India, with reference to Proceedings of Government, No. 6854, dated 29th October 1880.

From the Government of India, No. 1721-S.D. *(Defences—Fort St. George)*, dated 7th October 1880.

8. Paras. 11 to 15 will be communicated to the Public Works Department for early consideration and action.

No. 267. *To the Secretary to the Government of India, Military Department; dated 23rd July* 1883, *No.* 4036.

(True Extract.)

(Signed) E. L. HANKIN, Colonel,
Secretary to Government.

To the Quartermaster-General.
„ Inspector-General of Ordnance.
„ Public Works Department.
„ Adjutant-General, for information.

Exd. P. L. Pereira.

B № 2154 W a/6th Augt 1883

Commr to the Supg Engr
I Circle, who will see to the
very early preparation of the
necessary estimates and the
carrying out of the suggestions
in paras: 11 to 15 of the Qr
Master General's letter.

(Sgd) R.H.S.

Govt. of {1883} Madras.

MILITARY.

To THE QUARTERMASTER-GENERAL,
&c., &c., &c.

Dated July, 23rd.

Issued

Recd. *Encl.*

G.O., 23rd July 1883, No. 4035.

G.O. № 2154 W of 6 August 1883.

JULY.
Nos. 265—267.

Defences—Forts.

Fort St. George.—Orders passed on the Annual Inspection Report on — for 1883, forwarded to the Government of India with the request that orders may issue on the proposal to dismantle the outworks of Fort St. George and to fill in the adjacent ditches; and the position recommended for the armament on the north-east face, brought to the notice of that Government.

S.E. II Circle
Military Deptt

B № 2154 W a/6th Augt 1883.

GOVERNMENT OF MADRAS.

MILITARY DEPARTMENT.

23rd July 1883, No. 4035.

Defences—Forts.

Read the following paper:—

No. 265. *From Colonel R. C. STEWART, Officiating Quartermaster-General, to Colonel E. L. HANKIN, Secretary to Government, Military Department; dated Ootacamund, 28th June* 1883, *No.* 455.

I am desired, by His Excellency the Commander-in-Chief, to forward, for submission to Government, the report of the Annual Committee assembled in accordance with para. 218, Madras Army Regulations, on Fort St. George, with the correspondence as per margin, and with reference to para. 1 of this office letter, No. 336, dated 31st May 1882, I am to solicit the attention of Government to the proposal therein made to dismantle the outworks of the fort, and to fill in the ditches with the *debris* thereof, no orders regarding which have as yet been passed.

Copy of letter, No. 163, dated 28th February 1883, from the Officer Commanding 5/1st, Royal Artillery.
Copy of Annual Report by Colonel Burton, R.E., dated 6th February 1883.
Memo. by Colonel Burton, R.E., dated 24th February 1882, on the conservancy of Fort St. George.

2. With reference to para. 2 of the above-mentioned letter, I am desired again to express the recommendation of Sir Frederick Roberts that all the obsolete stores and guns be removed from the arsenal and from their present scattered positions about the fort, which, in the O.G., No. 2903, dated 15th June 1882, His Excellency the Governor in Council concurred in, but regarding which no orders have yet been issued. In reference to this important question Sir Frederick Roberts would suggest that the Inspector-General of Ordnance be called on to report on this measure, the expense attending it, and the mode in which he would propose to dispose of the obsolete stores.

3. Adverting to the remark in the O.G. above referred to relative to the cleansing of the main ditch, I am desired to remark that since submitting the annual report on Fort St. George for 1882, the experiment has been tried of cleansing a small section of the main ditch of the fort. This work was executed in the month of February at a cost of Rs. 1,123, and was twenty-eight days in progress.

Procs. of Govt., No. 5041, of 21st Sept. 1882.

4. The Officer Commanding Eastern District reported that the cleansing of the ditch was satisfactory, and that there were no bad results from it to the health of the garrison.

5. It seems therefore from this experiment that there need be no fear of sickness, should it hereafter be decided to continue the process of cleansing the ditch; but in His Excellency's opinion the work would be a costly one, and it seems more desirable to consider it hereafter in connection with the demolition of the outworks.

6. In the report which accompanies this letter Brigadier-General R. C. Stewart again recommends the removal of the arsenal from the fort, and comments on the utilization by the arsenal and some Government offices of the best buildings in the fort, whilst the British soldiers occupy the worst.

7. Sir Frederick Roberts does not agree with General Stewart as to the removal of the arsenal from the fort, but His Excellency is decidedly of opinion that the offices of the Accountant-General and the Controller of Military Accounts should be removed from the fort, and the buildings now occupied by these offices given up for the better accommodation of the troops of the garrison. I am desired to say that His Excellency will shortly address Government again on this very important question.

8. As regards the armament, I am desired to say that His Excellency has decided that it is not necessary to place one of the 80 R.M.L. guns on the seaface, but His Excellency urges strongly that six Nordenfelt guns be included in the armament for the defence of the seaface; these machine guns being admirably adapted for this purpose.

Procs. of Govt., No. 2931, of 22nd May 1883.

Vide Proceedings of Government, No. 3364, of 15th June 1883.

9. Sir Frederick Roberts is likewise of opinion that the best position for the guns forming the north-east group is on the Orillon demi-bastion, instead of on the interior demi-bastion at the north-east corner of the fort.

Procs. of Govt., No. 6854, of 29th Oct. 1880.

10. The report of the Officer Commanding the Royal Artillery seems to call for no remark from His Excellency, neither that officer nor Brigadier-General R. C. Stewart having apparently appreciated the fact that the question of the retention of the arsenal within the fort has already been definitely decided.

11. The recommendations of the Executive Engineer seem to be both practical and desirable, and Sir Frederick Roberts would hope that they may be considered in the Public Works Department at an early date. They are as follows:—

I. The north sea gateway should be permanently closed and blocked up.
II. The choultry gateway should be built up.
III. A bridge pit and drawbridge constructed at the north gate.
IV. All the outworks on the north-west and south fronts should be removed and the drawbridges to the gateways at the *enceinte* bastions put in order.
V. All the escarp walls of the *enceinte* to be pointed with cement and renewed.
VI. That new water-supply pipes should be laid on to the cisterns, and pipes for daily consumption attached to the cisterns.
VII. That certain changes should be made in the conservancy arrangements.

12. As regards the supply of water, I am desired to say that His Excellency Sir Frederick Roberts cannot too strongly condemn the old system under which the cisterns were never emptied, and he begs that Colonel Burton's recommendation may receive special consideration.

13. The conservancy arrangements are, I am desired to say, under the consideration of the Officer Commanding the Eastern District, and need not further be discussed here.

14. Besides the above works there are in connection with the armament—

I. The emplacements for the guns.
II. The shell and cartridge stores.
III. The completion of the laboratory.

15. As regards the retention or otherwise of certain buildings which would interfere with the fire of some of the guns, I am desired to say that while Sir Frederick Roberts is well aware of this undesirable obstruction at some points, it seems unnecessary at present to do more than to direct that buildings which obstruct the fire of the guns be not multiplied in future.

16. In conclusion, I am desired by His Excellency the Commander-in-Chief to say that he earnestly begs for an early decision on the future arrangements in

connection with Fort St. George, which have been for a considerable period under discussion.

From Brigadier-General R. C. STEWART, C.B., Commanding Eastern District, to the Quartermaster-General, Fort St. George; dated Madras, 16th April 1883, No. 125½-G.

I have the honor to state that, in accordance with G.O., 12th October 1882, No. 2659-W., I made my annual inspection of Fort St. George, on the 12th instant, accompanied by the officers named in the margin.

Colonel Gloag, R.A., Commanding Royal Artillery, Eastern District.
Colonel Burton, R.E., Executive Engineer.
Major Atkinson, Deputy Assistant Quartermaster-General, Eastern District.

2. The poor condition of the fort is plainly shown in the accompanying reports of the Artillery and Engineer officers, and with regard to that of the latter, whilst advocating, as in former years, the demolition of the outworks, &c., I have only to express my hope that not a rupee may be spent on any of the works, either in "plastering" or in "pointing" until some reality is recognized in the schemes and propositions, &c., that periodically pass between this Government and the Government of India regarding the fate of this decayed fortress and the comfort of the soldiers who garrison it.

3. As I have, under different Commanders-in-Chief and latterly on my own account, been writing about Fort St. George for the last ten years, and now see matters worse than ever after much waste of money, I think I may conclude that it will be long before any plans are put into execution. Under these circumstances I would earnestly beg that, towards mitigating in some measure the discomfort of those who have to live night and day within these hot crumbling walls, in the meantime while the Government are deliberating, a few rupees may be laid out in making the interior of the place a little tidy and giving the occupants some more breathing room.

4. I allude to what is known in the fort as "ordnance rubbish," *i.e.*, old obsolete guns, old and broken carriages, broken iron wheels and old iron and wood of all descriptions, piles of old shot that have collected the dirt and dust of ages, and all such objectionable matter.

Several places that should be kept clear and clean for the healthful passage of the breeze are filled with heaps of this worthless material, that no one can be induced to accept and carry away. I think there is nothing unreasonable in the request that this "ordnance rubbish" be removed from the fort. It belongs to the arsenal. I would have the D.P.W. yard removed also.

5. In connection with this subject I would bring to notice that the Surgeon-General, Her Majesty's Forces, continually impresses on me that the soldiers in the fort are too crowded, and that to guard against any outbreak of sickness, this defect should be seen to. I can only answer him that, out of the many buildings he sees in the fort, there is only a certain amount of accommodation allotted to the battalion of infantry and half battery of artillery that forms the garrison, and that amount they have and, do what I will, that is all they are likely to get; but here I may urge upon His Excellency the necessity, in my opinion, of moving the question in Government, whether it is wise or desirable that the best buildings in the fort should be occupied by native writers and workmen for eight hours in the day, while many of the British soldiers have to exist in the worst for the twenty-four hours.

6. In the arsenal, which I believe has no *raison d'être* in the fort of to-day, there is the most suitable accommodation for troops that can be found in the presidency, and in this building some of the soldiers ought to be located.

Instead of this we see one grand apartment given up to the storing of obsolete small arms that never again can be used by us. They can be of service to no one but to a rebellious and successful mob, and yet we preserve them in our best house and entertain a body of men to clean and oil them periodically. Adjacent to this there is another splendid room where old arms, obsolete weapons of sorts and things called "curiosities" are kept, together with some equipment stores, while on the basement and other rooms different manufactures are carried on. These have some workshops built on to the escarp of the *enceinte*, and thus mark the flank defence of a large portion of the works, as the gas works do on the opposite side of the fort.

7. In a word, as regards the arsenal, I maintain that there is nothing there which cannot and which ought not to be done in buildings outside the fortress. If the old obsolete arms were got rid of and the ammunition and certain stores, equipments, &c., placed under charge of the soldiers in the place, there is nothing in the arsenal that requires greater guard than that commonly given to property in the different mercantile houses in the town.

8. Two other fine buildings are occupied for a few hours in the day by native writers of the accounts and other civil departments.

9. It can easily be imagined how the fort is fouled by the thousands of workmen and writers and their friends that enter daily; add to this the stench from the poisoned ground on which there have been stables since no one now knows when—such a state of things is, I am aware, not allowed in Fort William, and with good reason.

10. In conclusion, I would make a suggestion that I do not see in former reports, viz., that, should the crumbling outworks be demolished and decently arranged in their ditches, the bastions should come down also and the curtains (now greatly honeycombed with latrines) lowered and shortened and adapted for an artillery and infantry defence, proportionate to the strength of the garrison.

This would give much more room in the place and help in a measure towards making it a place of refuge, if this idea should continue to be entertained.

11. The delay in submitting the report was caused by the absence on duty of the Executive Engineer, Presidency.

I entirely concur in the opinions expressed by Brigadier-General R. C. Stewart, C.B., Commanding Eastern District.

2. I append reports from Major W. Bisset and Lieutenant Winter on the ordnance and the sites the guns are finally to occupy, from the latter of which it will be seen that unless the obstacles, &c., complained of are not removed, the fire of many of the guns will not only be rendered useless as against an enemy, but destructive to ordnance, troops, gas works, &c.

3. If so many pieces of ordnance are to be kept in position on the works, at least three batteries of garrison artillery would require to be located in the fort to look after them, their ammunition and stores, and cover would require to be placed over some of the more delicate guns, "Gatlings" for instance, to preserve them from the destructive effects of exposure to heat, rain, and sea air.

4. The batteries would require to be housed separately in different barracks, owing to the great distances between the several positions in which the ordnance is placed; otherwise the exposure of the men would only lead to sickness, and medical objections would be raised. In fact, the fort would have to be sub-divided into handy districts, as is the case in every modern work.

5. If the fort is only required as a place of refuge in case of local disturbance, all this is needless. The minor works only require to be levelled, the arsenal, a source of danger where it now is, and all its stores, curiosities, &c., should be removed elsewhere, then all the beautifully roomy buildings now occupied by it, and civil departments, after being cleared, could be given over to the military. At present there is no place where panic-stricken non-combatants, in case of a disturbance, could be housed; if the above suggestion were carried out there would be room for all Europeans at any rate who might require a refuge. Then a British regiment, a few artillery men with a few "Gatlings" and light rifled guns would suffice; or the fort might be cleared of the arsenal and all departments, thoroughly cleaned, and left as it is, with a few minor needful alterations it would then answer all purposes as a temporary refuge.

6. I am of opinion that nothing which might be done to the fort would ever render it of any use against modern artillery, nor cause it to become of any good in the defence of our commercial interests. I am confirmed in this opinion, long since formed, by the results of the late bombardment of Alexandria. I indeed believe that its works would not stand the firing of any armour piercing guns which might be placed on them. I therefore strongly deprecate the expenditure of a single rupee on its works with any such object in view. I hold an opinion that, if not levelled with the ground, the works should be allowed gradually to crumble away and subside into the ditches, like many other more celebrated fortresses.

ST. THOMAS' MOUNT,
24*th April* 1883.

(Signed) A. R. GLOAG, Colonel, R.A.,
Commanding Royal Artillery, Eastern District.

I dissent with the following portions of Brigadier-General's report. Para. 2, "that not a rupee may be spent on any of the works, either in plastering or pointing until some reality is recognised."

Rendering the walls of the escarp of the *enceinte*, viz., the portion of this fort which is intended by the Government of India to be retained—is, in my opinion, necessary to maintain the walls in a substantial condition and to keep them in good order. The neglect of this in bye-gone years has, in a great measure, led to the many adverse criticisms on this place. Of course I assume the intention of the Government of India has not been altered.

2. Also in para. 4, "the D.P.W. yard be removed also."

The present yard (viz., a portion of the berm of the main ditch in front of royal bastion and of the interior of this bastion) is necessary to the Executive Engineer having charge of the new works and repairs to military and civil buildings in the fort. He must have some such

establishment or place, or not do the work. In my own opinion the only reasonable objection which can be made to it is the use of it as a store yard for materials received from civil buildings outside the fort. This is inevitable whilst nearly all the works in Madras, civil and military, are under this one officer.

3. Para. 11. "The delay in submitting the report was caused by * * * Executive Engineer."

There must be some misapprehension as to my non-attendance on the Committee before 12th April, as I was ready to attend any day between 6th February and 12th April, but until a few days before 8th April I was not told I should have to attend it, and even then I said to Deputy Assistant Quartermaster-General I would attend "any day."

4. I also dissent with para. 3 of C. R. A.'s. report, so far as I have observed the practice of the Royal Artillery elsewhere. One garrison battery would suffice for the care, &c., of the armament proposed. One battery, I presume, in such a climate as this would perhaps be required to be assisted by about thirty of the fort lascars.

5. I also dissent from para. 4 as to "removal of all its stores," *i.e.*, stores of the arsenal. On the contrary I think as many of the present "authorised warlike stores" of the Government as possible (without prejudice to the barrack accommodation) should be stored in this fort. But it is in my opinion the use of an unusually fine large airy building as a store room for curiosities and obsolete arms and the use of the outworks for the manufacture of ordnance stores in the fort which is so objectionable and which should be stopped. No part of the limited space and buildings of this fort should be used as a museum and manufactory.

6. C. R. A.'s. para. 6 would lead one to suppose he was unaware of the intention Government to keep and maintain the fort only as a place of refuge in case of insurrection of the civil population. The civil population would not, in all probability, be in possession of modern artillery.

7. Further, as to my own report of 6th February 1883, the questions mentioned in paras. 4 and 5 of it have, since it was written, been settled by His Excellency the Commander-in-Chief.

I must modify the concluding sentence in para. 9 for reasons stated, and to the extent already described in my report No. 5820, dated 13th March 1883, to Deputy Assistant Quartermaster-General, Eastern District. The great leakage in the ditch renders it well nigh impossible to empty it.

BANGALORE,
26*th April* 1883.

(Signed) W. H. BURTON, Lieut.-Col., R.E.

From Major W. BISSET, R.A., Commanding 5/1st Brigade, Royal Artillery, Welsh Division, to the Adjutant, Royal Artillery, Eastern District; dated Saint Thomas' Mount, 28th February 1883, No. 163.

With reference to Deputy Assistant Quartermaster-General, Eastern District's letter, No. 237, dated 31st January 1883, and No. 205-R.A.,E.D., dated 6th February 1883, forwarding No. 5680-S.M.G., dated 21st October 1882, I have the honor to submit the following report on the armament of Fort St. George, Madras.

1. The armament consists of the following ordnance mounted on the works, viz.:—

Five 80-pdr. 5-ton R.M.L. guns.
Thirty-six 24-pdr. 37 cwt.
S.M. cast iron guns.
Six 18-pdr. 37 cwt. S.B. cast iron guns.
One 6-pdr. 15 cwt. S.B. do.
Three 10″ cast iron mortars.
Six 9-pdr. 10 cwt. S.B. bronze guns on Saluting Battery for saluting purpose only.

2. There are still two 24-pdr. cast iron guns to be mounted to complete the armament on the Royal Bastion. These two guns cannot be mounted in the place allotted for them, the wash-house of the military prison standing on the site.

3. Expense Magazine, No. 9, is not yet completed, the alterations to the window have not yet been carried out.

4. One 80-pdr. gun has fired 144 rounds since last examination; application has been made through head-quarters to the Inspector-General of Ordnance to have this gun examined. The remaining guns in position and the ammunition and stores for them are in good condition.

5. The carriages of the 80-pdr. guns will not run up properly, and the platforms will not traverse properly, owing to their being sprung, and they are therefore unserviceable.

6. There are now required at the following bastions :—

Wallajah	Racers for one 80-pdr. R.M.L. gun and embrasures for four 24-pdr. S.B. guns.
St. George's	Racers for one 80-pdr. R.M.L. gun.
Royal	Racers and emplacements for one 80-pdr. R.M.L. gun, and embrasures and platforms for two 24-pdr. S.B. guns.
N.E. Demi	Racers and emplacement for one 80-pdr. R.M.L. gun.
Flagstaff Battery	Racers and emplacement for one 80-pdr. R.M.L. gun.
S.E. Demi	Racers and emplacement for one 80-pdr. R.M.L. gun and embrasures for three 24-pdr. S.M. guns.

Forwarded to Deputy Assistant Quartermaster General, Eastern District.

R.A., EASTERN DISTRICT,
2nd March 1883.

(Signed) A. R. GLOAG, Colonel, R.A.,
Commanding R.A., Eastern District.

PART II.

ANNUAL REPORT ON FORT ST. GEORGE,

Madras.

Detailed description of every part of the Defences.—Fort St. George is a bastioned fort built on five fronts and nearly surrounded, *i.e.*, with exception of two outworks, by a wet ditch, the water in which is from 8 to 10 feet in depth according to the season of the year. The ditch is fed with fresh water from the watershed of the fort, and with salt water by percolation through the glacis (formed by the rapidly increasing breadth of land) on the seaface, and rises and falls perceptibly at times with the tide. The culvert built in 1857, for the better replenishment of sea water in the ditch, is now cut off from the sea owing to the accretion of sand on the foreshore due to the construction of the Madras Harbour Works, since the above date.

2. The escarp and counterscarp of all the ditches are rivetted with brickwork.

3. Upon the seaface, eastern front, there are no outworks. The ditch and ramparts are considerably less in section on this than on the other fronts. In these ramparts are 76 brick cisterns for storing water for use in case the fort is attacked. The North Sea Gateway, which has long since been disused, ought to be built up so as to render the protection of the adjacent shell and cartridge stores, proposed to be located on either side, easier; and the drawbridge removed. The drawbridge of the South Sea Gate ought to be put into working order.

4. It will still cost less to mount two $\frac{80}{88}$-pounder guns enbarbettee at the Redan position, *viz.*, one at salient of North Redan, and one on salient of South Redan, than one such gun as proposed by Government of India on the site of the old flagstaff.

5. On the North front, as defined by the salients of the Orillon Demi Bastion and the Royal Bastion, are the following outworks—

(*a*) Caponiere.
(*b*) North Ravelin.
(*c*) East Lunette of North Ravelin.
(*d*) West Lunette of North Ravelin.
N.B.—Each of these two last-mentioned outworks have dry ditches in front.
(*e*) Orillon Demi Bastion.
(*f*) N.E. Blind of Bastion.
(*g*) N.E. Counterguard of Bastion.

The proposal of the Government of India was to mount one $\frac{80}{88}$-pounder and five 24-pounder S.B. guns on the salient, &c., of the N.E. Demi Bastion, which involves the demolition of the Orillon Demi Bastion immediately in front of the N.E. Demi Bastion. In my opinion this arrangement should be modified, as it would be (when the N.E. Demi Orillon is demolished) impossible to find a convenient site in the fort for the laboratory and accommodation for warlike stores now located therein. Moreover, the expense of joining up the left flank and right face of the Orillon Bastion with the North curtain, and the left face of N.E. Demi Bastion must be considerably less than removing the great mass of casemates and ramparts of the Orillon Bastion.

The Orillon Demi Bastion affords also a more commanding and convenient position for the N.E. angle group of guns than does the N.E. Demi Bastion.

This question should be determined before the estimate for the emplacements of this group of guns on the N.E. Demi Bastion is approved. Further, the casemates of the Orillon Demi Bastion afford better means of providing dry shell and cartridge stores than do those of the N.E. Demi Bastion.

The Gas works will impede the fire of the two S.B. guns to be mounted whether on left flank of N.E. Demi Bastion or on the Orillon itself, and also of two on the right flank of Royal Bastion. Therefore the Gas works ought, in any case, be removed.

When a decision as regards the retention or otherwise of the Orillon Bastion has been definitely arrived at, it will be time to make a definite proposal as regards the main ditch on the north front.

The Choultry Gateway, long since disused as a gate, should be built up, and a drawbridge and bridge pit constructed at the North Gate.

6. On the N.W. front as defined by the sulients of the St. George's and Royal Bastions are the following outworks—

The St. George's Caponiere.
,, ,, Ravelin.
North Lunette of do.
South do. do.

These three latter outworks are in a state of disrepair, are almost useless—one affords very indifferent quarters for some few of the Governor's Bandsmen—in time of peace, and would be prejudicial to the defence in time of tumult, insurrection, &c.

The traverses on the covered way of the glacis on this and the other fronts are out of repair—their repair is not required; but the repair and maintenance of the palisades are necessary.

St. George's drawbridge should be put into working order.

7. On the S.W. face defined by the salients of Wallajah and St. George's Bastions are the following outworks—

The Wallajah Caponiere.
,, ,, Ravelin.
,, North Lunette of Ravelin.
,, South ,, ,,

The three latter outworks are best described as similar to those of the last-mentioned front.

The Wallajah drawbridge should be put into working order.

8. On the St. Thomé or southern face the outworks consist of the—

Caponiere,
Ravelin,
Counterguard or Bounette of the Ravelin,
West Lunette of Ravelin,
East Lunette,
S.E. Counterguard,

which are best described as similar to those of the former fronts.

There are two work sheds of the Ordnance Department on this face at foot of escarp of the curtain which ought to be removed, as they impede the flanking fire of 24-pounder S.B. on adjoining bastions.

The drawbridge should be put into working order.

9. It will be observed from the above, that I propose again this year, as last, to level the outworks, and fill in the ditches thereof with the *debris* of these works, involving, certainly, the completion of short pieces of counterscarp walls across the present junction of the outworks ditches with the main ditch. This will provide a large level space of ground under cover of the glacis and under command of the fire of the present *enceinte* in which to shelter refugees in tents, commissariat cattle, &c., whether it is accompanied or not by a cleansing of the main ditch is for consideration. I am still of opinion it should be so; in this month the sewage mud is in places commencing to be uncovered—the insanitary state of the ditch is very bad and requires the usual remedy for being full of sewage.

10. The escarp wall, as before stated, is built of brick work, in some places it is rendered over with line plaster, in others remote from the sea pointed with line mortar; and within the last few years portions near the Wallajah Gate and Redan have been rendered with Madras cement plaster.

I think that the whole of these walls should be either pointed with such cement or rendered according to description of work lately done on the Flagstaff Redan—the sea face walls being the first, generally speaking, required to be so protected from the weather.

11. The water-supply is detailed in the appendix to the plan: in my opinion it is most unfortunate, as regards the purity of the water stored in the cisterns, that the water drawn for daily consumption should not have been from those cisterns direct, instead of from the Seven Wells pipes supplying those cisterns: this of course results in the water in the cisterns being never changed, up till last year, 1882, when they were emptied and cleansed and refilled. No record is to be found when they were previously so emptied, and consequently the water stored was affected by stagnation.

All new water-supply pipes should be laid on to the cisterns, and pipes for daily consumption and those already laid on to the mains should be attached to the cisterns.

12. The proper conservancy of the fort depends of course upon the efficiency of the various establishments maintained for the purpose, and by a proper use of the sewers and cess-pit, and of the carts maintained for carrying away daily the contents of the latrines.

Up till last February, the Barrackmaster, the executive officer working the greater portion of the conservancy establishment, used daily to empty the sweepings of the streets down the cess-pit pipes leading into the sewers. He said he did so by orders received. From that misuse of these cess-pits and sewers and from inefficient supervision, it became the practice to empty the contents of the latrines also, in the same way, whereby these sewers have poured sewage into several parts of the main ditch—the rapid increase to the sewage bank in the main ditch at the St. George's and St. Thomé drawbridges makes me think this latter practice is still more or less taking place.

I enclose some printed instructions in regard to the proper use of the sewers.

The conservancy establishments ought to be amalgamated, paid and placed under the orders of an officer without any deputy, and the officer ought to have regard to this memorandum.

Work in progress on the defences.—Nil.

13. *Work considered necessary*—

(*a*) All the emplacements, ground platforms, embrasures, and parapets near the same, for such guns of the proposed armament as have not yet emplacements and embrasures and ground platforms—*vide* details of armament, &c., Part I, Rs. 9,630. Rs. 9,630.

(*b*) The work indicated in this report as required for the draw-bridges, Rs. 3,000. Rs. 3,000.

(*c*) The expense, shell and cartridge stores and artillery store for each of the six groups of guns in the proposed armament, Rs. 15,500. Rs. 15,500.

(*d*) The proper completion of the present laboratory in the Orillon Demi Bastion, Rs. 900. Rs. 900.

(*e*) The rendering bowl proof and proof against horizontal fire of the Grand Magazine, St. George's Magazine, Caldwell's Magazine—as in Part I on Magazines not yet estimated.

(*f*) The completion of counterscarp walls of main ditch, and demolition of the outworks other than the Orillon Demi Bastion into the outwork ditches not yet estimated.

(*g*) The rendering or the pointing of the escarp walls of the *enceinte* with Madras Portland cement, Rs. 5,000, proposed for 1883-84.

(*h*) The proper observance of the enclosed printed regulations for the conservancy of the fort as regards the sewers debouching into the main ditch.

Nothing extra to sanctioned establishment.

BANGALORE,
6*th February* 1883. (Signed) W. H. BURTON, Lieut.-Col., R.E.

Regulations for the Conservancy of Fort Saint George, so far as it is effected by means of the Sewers.

The sewers in Fort Saint George, the general direction of which is shown by the heavy square cast-iron gratings, are intended only for draining off storm-water and rainfall in the

Fort: they are *not constructed* so as to carry off, or dispose of properly *any sewage*, or of any water or substance which can become sewage more foul and offensive than the waste water from cook-houses and bath-rooms.

On no account should *urine*, or the *emptyings* of *latrines*, be cast on the above-mentioned gratings, or put into the cess-pits under these gratings. These cess-pits are intended *to prevent* road sweepings, silt, &c., *passing into the sewers* under them.

No such sweepings, silt, rubbish, &c., can properly pass into the sewers if the cess-pit grating is lifted off and the silt, &c., taken out by means of an iron hand scoop (constructed for the purpose and obtained from the Executive Engineer) and put into a water-proof sewage barrow or cart, to be by it carried off to the sea beach and there buried in a sand pit, or to some other place appointed from time to time for the reception of such.

It being of great importance to sanitation that these cess-pits are not emptied oftener than necessary, the Barrackmaster will carefully discriminate when and how often to empty them, bearing in mind that *no silt, &c., must ever enter* the sewer.

In order that no *sewer gas* which is so fatal to human life generally, but especially at night, should escape from the sewer, the cess-pits are made water-tight and connected by a pipe with the sewer, the upper end of the pipe is trapped by an iron bell covering it, and so constructed that when water in the cess-pit is as high as the top of the pipe and the grating with bell is in its proper position, the water effectually seals the end of the pipe.

In case, therefore, any foul smell is perceived near one of these gratings and evidently comes from such grating, this smell will be due to one of the three following causes:—

(*a*) *Foul sewage having been improperly put into the cess-pit, or placed on the grating by which it has naturally fallen in.*

(*b*) *The water in the cess-pit having, by long stagnation, become foul.*

(*c*) *The water in the cess-pit, necessary for effectually sealing the upper end of the pipe connecting sewer and cess-pit, having by leakage or evaporation, &c., sunk below the level of the bottom of the iron bell.*

It follows, therefore, if the action of the various parts above described be carefully considered and remembered, and that the evil marked (*c*) has occurred, the remedy will be *to replenish the water*, and if advisable by reason of the otherwise foul state of this water *to entirely change it taking off the old water to the sea beach* or other place appointed in the sewage barrow or cart. No. I Remedy.

And that if either of the evils marked "*a*" or "*b*" has happened, the one and only remedy is *to empty the cess-pit* and *carry off* the contents to the *sea beach* or other place appointed in the sewage barrow or cart. No. II Remedy.

And whenever in either of the above cases the cess-pit is emptied to clean it out dry, freely sprinkle over it a bucket full of unslaked lime, and refill with water obtained from the sea face ditch, or other inodorous water, which of course need not be necessarily filtered water.

At the time when the iron grating is taken off for any of the above purposes, the end of the cess-pit sewer connecting pipe should be *closed by a tompion* provided for the purpose to *prevent* the *escape* of *sewer gas*.

As it would be injurious to health to empty the cess-pits oftener than is necesary for (1) keeping them inodorous, and (2) not too full of silt, the Barrackmaster will be able to judge when to empty them solely by the sense of smell and by measuring the height of silt—care being taken that the cess-pits are never emptied by passing the silt into the sewer, whether by hand or otherwise; for this would soon so choke these sewers that the well-nigh impossible but most costly work of clearing them out would be imposed upon the P. W. Department, that the iron box forming the cess-pit be on no account disturbed or removed except by the P. W. Department; and if it is found out of order, a Requisition for its immediate repair, &c., would be properly submitted to the Executive Engineer direct on Form No. M 7. Also that No. II remedy is never tried as a means of abating a bad smell until No. I remedy has been tried and found to fail.

CHEPAUK,
24*th February* 1882. (Signed) W. H. BURTON, Lieut.-Col., R. E.

No. 266. ORDER THEREON, 23rd July 1883, No. 4035.

Ordered that the foregoing papers be forwarded to the Government of India with the request that orders may issue on the proposal to dismantle the outworks of Fort St. George and to fill in the adjacent ditches, submitted last year.

Procs. of Govt., No. 2903, dated 15th June 1882.

2. The Inspector-General of Ordnance will report on the question raised in para. 2 of the Quartermaster-General's letter affording all the information desired by His Excellency the Commander-in-Chief.

3. In accordance with the recommendation in para. 5 no further action will be taken for the present in cleansing the main ditch.

4. It should now be understood by all concerned that the project of removing the Arsenal from Fort St. George has been abandoned.

5. The Government await the communication promised in para. 7 on the question of appropriating to the use of the troops certain buildings in the Fort, now otherwise occupied.

6. His Excellency's proposals in para. 8 to dispense with an 80-pdr. R.M.L. gun on the Flagstaff redan and to include six Nordenfelt guns in the armament on the seaface have already been separately dealt with.

Procs. of Govt., No. 2931, dated 22nd May 1883.
Do. „ 3364, „ 15th June „

7. The position recommended in para. 9 for the armament on the north-east face will be brought to the notice of the Government of India, with reference to Proceedings of Government, No. 6854, dated 29th October 1880.

From the Government of India, No. 1721-S.D. *(Defences—Fort St. George)*, dated 7th October 1880.

8. Paras. 11 to 15 will be communicated to the Public Works Department for early consideration and action.

No. 267. *To the Secretary to the Government of India, Military Department ; dated 23rd July* 1883, *No.* 4036.

(True Extract.)

(Signed) E. L. HANKIN, Colonel,
Secretary to Government.

To the Quartermaster-General.
„ Inspector-General of Ordnance.
„ Public Works Department.
„ Adjutant-General, for information.

Exd. P. L. Pereira.

~~94 Cav. Dy~~ 12/7/00

Lr. 2154 dy 6th Augt/83.

Communicated to the Superintendent 5th Circle, who will see to the very early preparation of the necessary estimates and the carrying out of the suggestions in para 11 to 15 of the Quarter Master General's letter.

/sd/ S. H. S.

Lt. Fifth Circle
Daily Orderly

No. 94 Mar. dy 13-2-83
304W. dy 20-11-83

Govt. of {1883} Madras.

MILITARY.

To THE QUARTERMASTER-GENERAL,
&c., &c., &c.

Dated July, 23rd.

Issued

Recd.

Encl.

G.O., 23rd July 1883, No. 4035.

Lr. 2154 Wdy 6-8-83

JULY.
Nos. 265—267.

Defences—Forts.

Fort St. George.—Orders passed on the Annual Inspection Report on — for 1883, forwarded to the Government of India with the request that orders may issue on the proposal to dismantle the outworks of Fort St. George and to fill in the adjacent ditches; and the position recommended for the armament on the north-east face, brought to the notice of that Government.