

The
Proposed site of Gas work
near the Medical College
Moths

The blue line shows the Main
that is to supply the Fort &
the Chemical Experiment Laboratory



13th May 1883
J. P. M. M.
J. P. M. M.

Scale 18 inches = 1 Mile
1000
500
1000 feet

H.B.
At A are two methods used as
directing houses = if the directing
houses & the substation
of 8 May 1883 are built at the NW of B
the proposed gas works will be
hidden from the public view
to C & D

Done 16 May 1883

W. H. M. M.
16th May 1883
Vacation Engineer's

GOVERNMENT OF MADRAS.

MILITARY DEPARTMENT.

29th October 1883, No. 5797.

Barrack Department.

Read the following papers:—

No. 402. *From Lieutenant-Colonel R. C. STEWART, Officiating Quartermaster-General, to Colonel E. L. HANKIN, Secretary to Government, Military Department; dated Ootacamund, 2nd April 1883, No. 2750-10.*

His Excellency the Commander-in-Chief has lately had under his consideration the exceedingly defective arrangements for the lighting of Fort St. George.

2. From a perusal of the papers connected with this subject it would appear that from time to time a sum of not less than Rs. 80,000 has been spent on the gas works of Fort St. George with results, I am desired to say, so exceedingly unsatisfactory that, at the present time, there are but eighty-six gas lights in the whole fort.

3. These are in the "King's barracks" occupied by a portion of the Essex Regiment, but the remaining blocks of barracks, the family quarters, the guard rooms, the streets and gateways are still lighted with common oil or kerosine.

4. The Commander-in-Chief cannot but remark that probably no large city in the empire is so badly lighted as is Madras, and His Excellency would desire to urge upon Government the advantages of gradually introducing the electric light, with which it seems possible to commence an experiment in Fort St. George, and which would probably be hereafter generally introduced into the town and suburbs.

5. If, however, Government are unwilling to consider this experiment, then I am desired to recommend that the subject of lighting the entire fort with gas may again receive the consideration of Government.

6. It seems from a perusal of Proceedings of Government, No. 1163, of 5th April 1877, that His Grace the Governor in Council directed that application should be made to the Government of Bombay for the services of an experienced Gas Engineer to examine and to report on the present condition of the gas works, and the best means to be adopted for their working in future, and I am desired to request you to favor me with the results of this application.

7. In connection with this question arises that of the interference of the present gas works with the efficient range of some of the guns of the fort which will be taken up along with the general question of the lighting of the fort if Government will accord their approval of the Commander-in-Chief's proposition; but this interference of the gas works with the range of the fort guns might add weight to the introduction of the proposed experiment with the electric light.

No. 2170.

Transferred to the Public Works Department for consideration and report.

(By Order.)

OOTACAMUND,
13th April 1883.

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

No. 403. Memorandum from Colonel R. H. SANKEY, R.E., Secretary to Government, Public Works Department, to Colonel E. L. HANKIN, Secretary to Government, Military Department; dated Ootacamund, 10th July 1883, No. 217-E.

The Quartermaster-General's letter of the 2nd April 1883 regarding the lighting of Fort St. George (see G.O., Military Department No. 2170, dated 13th April) was transferred to this department for consideration and report.

2. With reference to His Excellency the Commander-in-Chief's remarks, para. 4 of the letter under reply, it will be observed from the reply of the President, Municipal Commission, No. 257, of 1st May 1883, that no scheme for the general lighting of Madras by electricity has as yet been framed, and that, if this power be applied to the lighting of the fort, the scheme whatever it is must be independent of the town.

3. Since the receipt of above letter it may be mentioned that there has been a proposal to utilize the services of Mr. Jones (Municipal Engineer now on sick leave in England) in instituting inquiries on the general subject, and Government have expressed themselves prepared to assist in the matter by the grant of travelling expenses.

4. Whatever the result it is clear that there can be no practical outcome for a long time, and it will therefore be apparently better to consider the question as between gas and oil lighting for the fort.

5. To aid in dealing with the matter a precis of previous correspondence has been drawn up in the annexed office note, dated 24th April 1883.

6. First, as to the inquiry made by His Excellency the Commander-in-Chief in para. 6 of the Quartermaster-General's letter as to the results of the application made to the Government of Bombay for the services of an experienced Gas Engineer, it will be seen that this, as also one of a similar character addressed to the Government of India, led to no result.

7. Subsequently Mr. Faulkner reported on the whole subject, and the file was circulated to His Grace the Duke of Buckingham in 1877, and returned by him in March 1880 with directions to record the papers.

8. It being understood that the Executive Engineer (Colonel Burton) had in hand a scheme for supplying gas to the fort from works which he proposed to erect at the chemical laboratory (a new work now under execution) he was requested to state fully his proposals on the subject, and, after consulting the Chemical Examiner, to state whether he could by this means supply sufficient gas to the fort to supersede all present oil lights, excepting perhaps a few at detached places.

9. From Colonel Burton's reply, No. 1172, of 17th May 1883, it will be observed that his scheme of supply from the chemical laboratory would as a fact only increase the present number of gas lights (stated by him to be 106) to 150, while not less than 800 would be needed if the present oil lighting was to be superseded.

10. This small instalment, which is all apparently that could be guaranteed unless large and new works specially designed were undertaken, would cost only Rs. 3,300.

11. He reports that although there is at present no leakage from the pipes, that, owing to insufficient pressure, the light afforded by the burners is "insufficient for the men to read by, and anything but good;" and again that, in addition to the lighting now supplied, "the soldier provides himself with a lamp at his own expense when he wants a light greater than that necessary to direct him to the stair-case, doors, &c."

12. The feeble quality of the light is clearly proved by the very small expenditure of gas per hour. The fact is the present bells are so thin and the distributing pipes are so much corroded that they cannot bear the pressure required to

force the needful supply of gas to the burners, which should not be less than four cubic feet each per hour.

13. Looking to the whole position of matters and duly taking into account—

- (1) the high cost of skilled direction for works of this character;
- (2) the difficulty, if not the impossibility, of commanding the services of an expert to design and carry out the works;
- (3) the necessarily high price of coal;
- (4) the impossibility in the Madras air and soil, and especially so close to the sea, of preventing rapid corrosion of all the plant and service pipes;

it may be fairly questioned whether a renewed effort to light the fort with gas will not lead to a serious outlay with no adequate result.

14. The cost of oil lighting is no doubt high, but not so high as gas has proved if the whole of the charges, including the superintendent's salary, be taken into account.

15. There is no specific report as to what the present plant would fetch if disposed of.

So far as burners and other fittings as also some of the minor distributary pipes are concerned they would, no doubt, command a sale, as also possibly some of the machinery connected with the new gas works (which have never been used).

But as regards the bells composed of very thin sheet iron and most of the rest of the old plant, very little would probably be realized.

16. It is now, moreover, a question how to clear the line of fire for the gun, which, under the lately sanctioned scheme for the armament of the fort, has to be placed on the north-east salient.

This cannot be done without the removal of both the old and the new gas works.

Orders are now necessary.

Precis on Gas Works of Fort St. George.

With their despatch, No. 18 of 1853, the Board of Directors of the East India Company transmitted to the Government of Madras copy of a communication addressed to them by the Chairman of the Oriental Gas Company (Limited) making proposals for substituting gas for ordinary oil lamps.

After detailed inquiry as to the advantages to be obtained and the cost of the experiment, which was estimated at Rs. 12,000 for apparatus, the matter was deferred pending consideration by the Government of India.

It was subsequently decided, in May 1859, to provide and set up the necessary apparatus for lighting the barracks, &c., in Fort St. George, with oil gas at an estimated cost of Rs. 12,410.

The substitution of coal for oil in the manufacture of gas was considered in G.O., No. 1513, dated 12th November 1861.

From experiments made it appeared that the cost of oil gas as compared with coal gas was as 21 to 15, while the cost of an oil light was found to be double that of an oil gas light.

G.O., No. 11, dated 7th January 1862.

G.O., No. 343, dated 18th March 1862.

Further experiment showed that the cost of each description of light per month would be—

	RS.	A.	P.
One oil lamp	...	...	...
" " gas lamp	...	...	...
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calculating 400 lights to be burnt nightly in the fort, the annual cost would be for—	...	...	...
Oil lamps	...	...	...
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Coal gas lamps	...	...	...

RS. A. P.

3 8 0

2 0 0

1 0 0

RS.

16,800

9,600

4,800

The cost already incurred for machinery and fittings for making oil gas was Rs. 12,000, adding to this Rs. 2,000 for alterations and additions for adapting them to coal gas and Rs. 10,000 for piping, the total cost of the plant for making coal gas was estimated at Rs. 24,000. Orders were issued for introducing the change.

In April 1865 the Superintendent of the Gas Works at Fort St. George submitted a memorandum showing the then state of the works; the experiment thus far was considered by Government as having been fairly successful. The average number of lights burnt in the barracks was 103, the cost per light being Rs. 2-5-0 per mensem. It was estimated that if the experiment were extended to the whole of the fort and 500 lights burnt nightly, the cost of each light would be reduced to Rs. 1-1-9, or a total of Rs. 556 per mensem for 500 lights. Adding to this interest on outlay incurred on the works, charges for superintendence, &c., the total cost of 500 lights would be Rs. 821 per mensem, or Rs. 1-10-3 for each light, as against Rs. 3-8-0 for oil lamps.

In G.O., No. 83, dated 26th January 1866, an estimate of Rs. 80,000 was sanctioned for the works requisite to light the whole of the fort with gas so as to provide for 800 lights.

In July 1866 the Officer Commanding the 60th Rifles at the fort reported to the Quartermaster-General that—

- (1) the gas lamps in the barracks were very high;
- (2) the men could not see to read or write unless they were immediately underneath the lamps;
- (3) the description of burner did not seem to be economical; the jets, as a rule, being thin straight pillars instead of a broad fan-tailed flame;
- (4) the gas was constantly going out in various parts of the barracks, owing sometimes to the wind from which the flame was insufficiently protected;

G.O., No. 2359, dated 26th July 1866.

- (5) that at times the light from the gas was very bad.

In March 1868 a project for improving and extending the gas works was laid before the Secretary of State. The cost of the proposed works was estimated at Rs. 72,800.

This project was criticised at length by Colonel A. Robertson, who submitted a comprehensive memorandum on the details of the scheme, and offered suggestions for its revision.

G.O., No. 2892, dated 11th September 1868.

A revised project based on these remarks was sanctioned in G.O., No. 2728, dated 24th August 1869.

From a comparative statement submitted by the Superintending Engineer in August 1872, it appeared that the actual cost of the works amounted to Rs. 78,224, against the original estimates of Rs. 84,005.

G.O., No. 2113, dated 5th September 1872.

From information laid before Government in 1877 it appeared that the manufacture of gas was being carried on at a heavy loss and with most unsatisfactory results, that the light was

bad, that the machinery was in constant need of repair, and that the fort ditch was in danger of pollution from the refuse of the works. Application was therefore made to the Government of Bombay for the temporary services of an experienced Gas Engineer to report on the condition of the works and the best means to be adopted for the future. The accounts were also ordered to be verified as regards both construction and cost of working.

The application to the Government of Bombay, as well as one to the Government of India, proved unsuccessful, and all the papers were eventually made over to Mr. Executive Engineer

Faulkner, who was then acting as General Superintendent of the Public Works Stores and Workshops. He was directed to report as to the cost per 1,000 cubic feet at which gas had hitherto been manufactured at Fort St. George.

Mr. Faulkner's report was laid before Government in December 1877. From this it appears that in the twelve months ending August 1877, 274,260 cubic feet of gas were made, of which only 263,345 were consumed, leaving 10,915 cubic feet as wastage; the cost being, exclusive of superintendence, &c., Rs. 2,869, or about Rs. 10-13-0 per 1,000 cubic feet consumed.

38,308 lights were burnt during the year, so that each light used per night 6-875 cubic feet of gas.

There were burning on an average for the year 105 lights per night, and the average cost for each light was Rs. 2-4-5 per month, or Re. 0-1-3 per night.

If, however, the gas works were fully utilized, the cost per 1,000 cubic feet could, it is pointed out, be reduced to Rs. 4-8-0 instead of Rs. 10-13-0, the actual cost. Adding the cost of superintendence, the cost would amount to Rs. 5-8-0 per 1,000 cubic feet.

The cost of lighting by oil lamps was found to be Rs. 3-8-11 per month per lamp as against Rs. 2-4-5 by gas, or for 105 lamps the cost would be for oil lamps for one year Rs. 4,482-3-0 as against Rs. 4,068-14-6 for gas.

The papers were circulated to His Grace the Duke of Buckingham and Chandos in 1877, and were returned on the 5th March 1880, with the following remark:—

"These papers should be kept in the Government Offices. This question will no doubt again arise, and they will be useful for reference. So return them."

The papers were duly recorded, and no further action was taken.

His Excellency the Commander-in-Chief now revives the question in letter from the Quartermaster-General, No. 2750-10, dated 2nd April 1883.

No. 3885.

Forwarded to the Commander-in-Chief for any further remarks His Excellency may desire to offer.

(By Order.)

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

12th July 1883.

To the Quartermaster-General.

No. 404. From Brigadier-General R. C. STEWART, Quartermaster-General, to Colonel E. L. HANKIN, Secretary to Government, Military Department; dated Ootacamund, 13th October 1883, No. 1177.

I am desired by the Commander-in-Chief to state that His Excellency has had under his consideration the correspondence which accompanied Order of Government, No. 3885, of 12th July last, Military Department, relative to the question of the lighting of Fort St. George.

2. From a perusal of memorandum, No. 217-E., of 10th July 1883, by the Honorable Colonel R. Sankey, C.B., Secretary to Government, Public Works Department, it would appear that, in consequence of—

- (1) the high cost of skilled direction for works of this nature;
- (2) the difficulty, indeed impossibility, of obtaining the services of an expert to design and carry out these works;
- (3) the high price of coal;
- (4) the destructive influence of the climate of Madras on the plant and service pipes;

that officer is of opinion that it may be fairly questioned whether a renewed effort to light the fort with gas will not lead to a serious outlay with no adequate results.

3. With Colonel Sankey's opinion before him, and likewise taking into consideration the very inferior light now given by the gas in Fort St. George, as well as the great expense that must be incurred before an appreciable improvement could be anticipated, and an adequate supply of gas for the whole of the barracks and other purposes in the fort provided, the Commander-in-Chief is of opinion that it would be better to relinquish all further utilization of the gas works and to light the fort with kerosine oil of the best quality; and I am to solicit the Government to take this question into their very early consideration, so that all further expenditure in connection with the supply of gas may cease as soon as it is possible to introduce a system of lighting by oil, and that the Department Public Works may have opportunity of making arrangements for removing those gas works which interrupt the line of fire of the gun which it is proposed to mount upon the north-east salient outwork of the fort.

4. I am further to remark that seeing how very far behind other towns and cities in India Madras is in the matter of lighting, the Commander-in-Chief feels

sure that the Government will take the matter into their earnest consideration in view of an early introduction of an electric light.

5. His Excellency is glad to observe that this matter has so far engaged the attention of Government that the Vice-President of the Municipality has been requested to obtain full information whilst in England as to the best means of lighting Fort St. George by electricity, and he would be glad if Government would hereafter favor him with the result of those inquiries, His Excellency being strongly of opinion that it is desirable to take early steps towards the improvement of the general lighting of Fort St. George.

No. 405.

ORDER THEREON, 29th October 1883, No. 5797.

The Right Honorable the Governor in Council concurs in the opinion of His Excellency the Commander-in-Chief expressed in para. 3 of the Quartermaster-General's letter, No. 1177, dated 13th October 1883, and directs that early action be taken by the Barrack Department and the Commissary-General for lighting the fort with kerosine oil.

2. All expenditure in connection with the supply of gas will cease at the earliest possible date, and the necessary orders will issue in the Public Works Department for the removal of the old and new gas works and disposal of all plant, stores, &c., connected therewith.

3. This correspondence will be communicated to the Financial Department for consideration, with reference to the remarks of the Commander-in-Chief in para. 4 of the Quartermaster-General's letter No. 1177.

4. His Excellency's request in the concluding paragraph of that letter will be referred to the Public Works Department for compliance in due course.

(True Extract.)

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

To the Quartermaster-General.

- " Commissary-General.
- " Controller of Military Accounts.
- " Surgeon-General, Her Majesty's Forces in Madras.
- " Financial Department.
- " Public Works Department, with 5 enclosures (1 plan).
- " Adjutant-General, for information.

Gobt. of (1883) Madras.
MILITARY.

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

Dated October, 29th.

Issued

Recd.

Encl.

G.O., 29th October 1883, No. 5797.

B No 3320 W 21-11-83

OCTOBER.
Nos. 402-405.

Barrack Department.

Lighting of Fort St. George.—Adoption of measures for lighting Fort St. George with kerosine oil and for the removal of the old and new gas works, &c., directed; and the suggestion as to the introduction of an electric light, referred to the Financial Department.

GOVERNMENT OF MADRAS.

MILITARY DEPARTMENT.

29th October 1883, No. 5797.

Barrack Department.

Read the following papers:—

No. 402. From Lieutenant-Colonel R. C. STEWART, Officiating Quartermaster-General, to Colonel E. L. HANKIN, Secretary to Government, Military Department; dated Ootacamund, 2nd April 1883, No. 2750-10.

His Excellency the Commander-in-Chief has lately had under his consideration the exceedingly defective arrangements for the lighting of Fort St. George.

2. From a perusal of the papers connected with this subject it would appear that from time to time a sum of not less than Rs. 80,000 has been spent on the gas works of Fort St. George with results, I am desired to say, so exceedingly unsatisfactory that, at the present time, there are but eighty-six gas lights in the whole fort.

3. These are in the "King's barracks" occupied by a portion of the Essex Regiment, but the remaining blocks of barracks, the family quarters, the guard rooms, the streets and gateways are still lighted with common oil or kerosine.

4. The Commander-in-Chief cannot but remark that probably no large city in the empire is so badly lighted as is Madras, and His Excellency would desire to urge upon Government the advantages of gradually introducing the electric light, with which it seems possible to commence an experiment in Fort St. George, and which would probably be hereafter generally introduced into the town and suburbs.

5. If, however, Government are unwilling to consider this experiment, then I am desired to recommend that the subject of lighting the entire fort with gas may again receive the consideration of Government.

6. It seems from a perusal of Proceedings of Government, No. 1163, of 5th April 1877, that His Grace the Governor in Council directed that application should be made to the Government of Bombay for the services of an experienced Gas Engineer to examine and to report on the present condition of the gas works, and the best means to be adopted for their working in future, and I am desired to request you to favor me with the results of this application.

7. In connection with this question arises that of the interference of the present gas works with the efficient range of some of the guns of the fort which will be taken up along with the general question of the lighting of the fort if Government will accord their approval of the Commander-in-Chief's proposition; but this interference of the gas works with the range of the fort guns might add weight to the introduction of the proposed experiment with the electric light.

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Transferred to the Public Works Department for consideration and report.

(By Order.)

OOTACAMUND,
13th April 1883.

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

No. 403. Memorandum from Colonel R. H. SANKEY, R.E., Secretary to Government, Public Works Department, to Colonel E. L. HANKIN, Secretary to Government, Military Department; dated Ootacamund, 10th July 1883, No. 217-E.

The Quartermaster-General's letter of the 2nd April 1883 regarding the lighting of Fort St. George (see G.O., Military Department No. 2170, dated 13th April) was transferred to this department for consideration and report.

2. With reference to His Excellency the Commander-in-Chief's remarks, para. 4 of the letter under reply, it will be observed from the reply of the President, Municipal Commission, No. 257, of 1st May 1883, that no scheme for the general lighting of Madras by electricity has as yet been framed, and that, if this power be applied to the lighting of the fort, the scheme whatever it is must be independent of the town.

3. Since the receipt of above letter it may be mentioned that there has been a proposal to utilize the services of Mr. Jones (Municipal Engineer now on sick leave in England) in instituting inquiries on the general subject, and Government have expressed themselves prepared to assist in the matter by the grant of travelling expenses.

4. Whatever the result it is clear that there can be no practical outcome for a long time, and it will therefore be apparently better to consider the question as between gas and oil lighting for the fort.

5. To aid in dealing with the matter a precis of previous correspondence has been drawn up in the annexed office note, dated 24th April 1883.

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7. Subsequently Mr. Faulkner reported on the whole subject, and the file was circulated to His Grace the Duke of Buckingham in 1877, and returned by him in March 1880 with directions to record the papers.

8. It being understood that the Executive Engineer (Colonel Burton) had in hand a scheme for supplying gas to the fort from works which he proposed to erect at the chemical laboratory (a new work now under execution) he was requested to state fully his proposals on the subject, and, after consulting the Chemical Examiner, to state whether he could by this means supply sufficient gas to the fort to supersede all present oil lights, excepting perhaps a few at detached places.

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force the needful supply of gas to the burners, which should not be less than four cubic feet each per hour.

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It was subsequently decided, in May 1859, to provide and set up the necessary apparatus for lighting the barracks, &c., in Fort St. George, with oil gas at an estimated cost of Rs. 12,410.

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From a comparative statement submitted by the Superintending Engineer in August 1872, it appeared that the actual cost of the works amounted to Rs. 78,224, against the original estimates of Rs. 84,005.

G.O., No. 2113, dated 5th September 1872.

From information laid before Government in 1877 it appeared that the manufacture of gas was being carried on at a heavy loss and with most unsatisfactory results, that the light was bad, that the machinery was in constant need of repair, and that the fort ditch was in danger of pollution from the refuse of the works. Application was therefore made to the Government of Bombay for the temporary services of an experienced Gas Engineer to report on the condition of the works and the best means to be adopted for the future. The accounts were also ordered to be verified as regards both construction and cost of working.

G.O., No. 1163, dated 5th April 1877.

The application to the Government of Bombay, as well as one to the Government of India, proved unsuccessful, and all the papers were eventually made over to Mr. Executive Engineer Faulkner, who was then acting as General Superintendent of the Public Works Stores and Workshops. He was directed to report as to the cost per 1,000 cubic feet at which gas had hitherto been manufactured at Fort St. George.

Mr. Faulkner's report was laid before Government in December 1877. From this it appears that in the twelve months ending August 1877, 274,260 cubic feet of gas were made, of which only 263,345 were consumed, leaving 10,915 cubic feet as wastage; the cost being, exclusive of superintendence, &c., Rs. 2,869, or about Rs. 10-13-0 per 1,000 cubic feet consumed.

38,308 lights were burnt during the year, so that each light used per night 6-875 cubic feet of gas.

There were burning on an average for the year 105 lights per night, and the average cost for each light was Rs. 2-4-5 per month, or Re. 0-1-3 per night.

If, however, the gas works were fully utilized, the cost per 1,000 cubic feet could, it is pointed out, be reduced to Rs. 4-8-0 instead of Rs. 10-13-0, the actual cost. Adding the cost of superintendence, the cost would amount to Rs. 5-8-0 per 1,000 cubic feet.

The cost of lighting by oil lamps was found to be Rs. 3-8-11 per month per lamp as against Rs. 2-4-5 by gas, or for 105 lamps the cost would be for oil lamps for one year Rs. 4,482-3-0 as against Rs. 4,068-14-6 for gas.

The papers were circulated to His Grace the Duke of Buckingham and Chandos in 1877, and were returned on the 5th March 1880, with the following remark:—

"These papers should be kept in the Government Offices. This question will no doubt again arise, and they will be useful for reference. So return them."

The papers were duly recorded, and no further action was taken.

His Excellency the Commander-in-Chief now revives the question in letter from the Quartermaster-General, No. 2750-10, dated 2nd April 1883.

No. 3885.

Forwarded to the Commander-in-Chief for any further remarks His Excellency may desire to offer.

(By Order.)

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

12th July 1883.

To the Quartermaster-General.

No. 404. From Brigadier-General R. C. STEWART, Quartermaster-General, to Colonel E. L. HANKIN, Secretary to Government, Military Department; dated Ootacamund, 13th October 1883, No. 1177.

I am desired by the Commander-in-Chief to state that His Excellency has had under his consideration the correspondence which accompanied Order of Government, No. 3885, of 12th July last, Military Department, relative to the question of the lighting of Fort St. George.

2. From a perusal of memorandum, No. 217-E., of 10th July 1883, by the Honorable Colonel R. Sankey, c.b., Secretary to Government, Public Works Department, it would appear that, in consequence of—

- (1) the high cost of skilled direction for works of this nature;
- (2) the difficulty, indeed impossibility, of obtaining the services of an expert to design and carry out these works;
- (3) the high price of coal;
- (4) the destructive influence of the climate of Madras on the plant and service pipes;

that officer is of opinion that it may be fairly questioned whether a renewed effort to light the fort with gas will not lead to a serious outlay with no adequate results.

3. With Colonel Sankey's opinion before him, and likewise taking into consideration the very inferior light now given by the gas in Fort St. George, as well as the great expense that must be incurred before an appreciable improvement could be anticipated, and an adequate supply of gas for the whole of the barracks and other purposes in the fort provided, the Commander-in-Chief is of opinion that it would be better to relinquish all further utilization of the gas works and to light the fort with kerosine oil of the best quality; and I am to solicit the Government to take this question into their very early consideration, so that all further expenditure in connection with the supply of gas may cease as soon as it is possible to introduce a system of lighting by oil, and that the Department Public Works may have opportunity of making arrangements for removing those gas works which interrupt the line of fire of the gun which it is proposed to mount upon the north-east salient outwork of the fort.

4. I am further to remark that seeing how very far behind other towns and cities in India Madras is in the matter of lighting, the Commander-in-Chief feels

sure that the Government will take the matter into their earnest consideration in view of an early introduction of an electric light.

5. His Excellency is glad to observe that this matter has so far engaged the attention of Government that the Vice-President of the Municipality has been requested to obtain full information whilst in England as to the best means of lighting Fort St. George by electricity, and he would be glad if Government would hereafter favor him with the result of those inquiries, His Excellency being strongly of opinion that it is desirable to take early steps towards the improvement of the general lighting of Fort St. George.

No. 405.

ORDER THEREON, 29th October 1883, No. 5797.

The Right Honorable the Governor in Council concurs in the opinion of His Excellency the Commander-in-Chief expressed in para. 3 of the Quartermaster-General's letter, No. 1177, dated 13th October 1883, and directs that early action be taken by the Barrack Department and the Commissary-General for lighting the fort with kerosine oil.

2. All expenditure in connection with the supply of gas will cease at the earliest possible date, and the necessary orders will issue in the Public Works Department for the removal of the old and new gas works and disposal of all plant, stores, &c., connected therewith.

3. This correspondence will be communicated to the Financial Department for consideration, with reference to the remarks of the Commander-in-Chief in para. 4 of the Quartermaster-General's letter No. 1177.

4. His Excellency's request in the concluding paragraph of that letter will be referred to the Public Works Department for compliance in due course.

(True Extract.)

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

To the Quartermaster-General.

- „ Commissary-General.
- „ Controller of Military Accounts.
- „ Surgeon-General, Her Majesty's Forces in Madras.
- „ Financial Department.
- „ Public Works Department, with 5 enclosures (1 plan).
- „ Adjutant-General, for information.

Gobt. of (1883) Madras.

MILITARY.

To

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

Dated October, 29th.

Issued

Recd.

Encl.

G.O., 29th October 1883, No. 5797.

OCTOBER.

Nos. 402-405.

of 21-11-83

Barrack Department.

Lighting of Fort St. George.—Adoption of measures for lighting Fort St. George with kerosine oil and for the removal of the old and new gas works, &c., directed; and the suggestion as to the introduction of an electric light, referred to the Financial Department.

P.W. Department.

N^o 364C

Letter from the Suptg. Engr. V. Circle
N^o 3907 of 11 February/84.

Referred to the Military
department, with reference to the orders
in that Department N^o 5797 of 29th
October 1883, for opinion whether there
is any objection to the proposals of
the Suptg. Engineer for disposal
of the materials of the Fort Saint
George Gas Works, and for demolition
of the buildings mentioned in
Statement B.

Manstmont

Col. Rb.

Chapauk 3
15th February/84

Secretary to Govt. P.W.D.

4th Dec 84

To The Military Dept.
in original.

86/22
2013/86

1892
20/2/84

Former papers.

MILITARY (1884) DEPARTMENT.

No. 757

REQUESTED TO BE
RETURNED WITH REPLY.

From

THE P. W. Dept.

No. 3646

I W. Horn
16th July 84.

Dated

11th Feb: 84

Recd.

16 — " — 84

Registered

ENCLOSURES. 5

P. G., No.

, dated

7954

No 771

Referred to H.E.
the Commander-in-
Chief.

Wm. Herbert St. John
Offy Secy to Govt

Wm. Aug 1

Returned with reply
3 March 1884

No.

Forwarding for
the opinion of Govt.
proposals of the Suptg.
Eng^r 5th Circle, in re
the disposal of the
Fort St. George Gas
works and the demo-
lition of the buildings
attached thereto.

10/10/82
20/2/84

1423

83	Shaw Bee (large)	1	.	.	.	1	downville
84	Brass pump	1	.	.	.	1	San Francisco
85	Pineapple or grass tongue	2	.	.	.	2	do
86	Shawners - (Shawners)	4	.	.	.	4	do
87	File	1	.	.	.	1	do
88	James & Sons	1	.	.	.	1	do
89	Bellows	1	.	.	.	1	do
90	Stone	2	.	.	.	2	do
91	Keys for turning the screw of pistons	2	.	.	.	2	do
92	Brass sheet metal for gas	1	.	.	.	1	do
93	Patents	3	.	.	.	3	do

W H Norton

at 1000

See: Engr. P. 12

4
311

Tried materials and materials that are now in use.

52	Relief	1	1	Unserviceable.
53	Mouth piece	4	4	Unserviceable.
54	Lead Lilo	3	3	do
55	Keys for the lids	2	2	do
56	Construction pipes	3	3	do
57	Bridge pipes	3	3	Unserviceable.
58	Hydraulic chain	1	1	In fair order.
59	Condenser complete	1	1	do
60	Seawater	1	1	Unserviceable.
61	Small line pump	1	1	do
62	Large do	1	1	do
63	Brass stop cock 2" Dr.	2	2	In fair order.

64	Gas Bell	2	2	Unserviceable.
65	Iron chains of above	120 ft.	120 ft.	Unserviceable.
66	Wheel of the Bell	4	4	In fair order.
67	Putty of do	2	2	Unserviceable.
68	Grinding stones of do	2	2	do
69	Levi ropes	about 64 ft.	64 ft.	In fair order.
70	Butlet valves	2	2	Unserviceable.
71	Cyphons	2	2	do
72	Regulator	1	1	do
73	Pressure Gauge	1	1	do
74	Iron rod	7 ft.	7 ft.	do
75	Scrapers	about 11 ft.	11 ft.	do
76	Stake	11	11	do
77	Coke cooler	5	5	do
78	Pokers	2	2	do
79	Johnson Scoops	1	1	do
80	Ladders	1	1	In fair order.
81	Shovel for turning stop cocks	1	1	do
82	Bamboo ladders	3	3	Unserviceable.

29	Palmyra rafters from 1 1/4 in length.	28		28	Semi-circular
30	Lime plaster room and coal store, walls built in lime, roof tiled, 2 rooms.		(32 19)		do
31	Palmyra rafters	44	11'		do
32	Teakwood rafters		1500 ft		do
33	Do ridge pole	1	(32 10" 4 1/2")		do
34	New Gao District House, walls built in lime, roof corrugated iron with iron beams				
35	Iron beams 19 1/2 span	10	(45 32)		do
36	Old Gao District House, walls built in lime, timber very roof corrugated iron plates, iron rails 1 room			10	do
37	Iron rails old	8	16		do
38	New Gao chimney			60'	do
39	Copper roof terminal joints	5 ft	3/4		do
40	Throught iron bands	5			do
41	Gao Governor's house, walls				

42	built in lime roof tiled	19	10)		do
43	Teak butter door	1	(3 1/2 6')		do
44	Do window	1	(3 1/2 4 1/2)		do
45	Palmyra rafters from 1 1/4 in length	24			do
46	Teak rafters	1600 ft			do
47	Do J. Barnack's Gao lantern				do

known well as they cannot be used for any other purpose

Attached to Buildings
and found in sheets in Fort
St George

48	Old C. J. Single Bracket	73		73	Old and new, but some of them may be used for the old lantern proposed to be used in the Fort
----	--------------------------	----	--	----	---

49	Do Single lantern post	36		36	do
50	Do Double do	1		1	do
51	Old Gao mule	5		5	do

Lot of Stone and Building Belonging to the old Gas Works in the Fort which are recommended to be sold, denotified re.

Show
No Description of article

Dimensions
No. 1 2 3 4

Low
height

Serviceable or
unserviceable

Remarks

Building materials and fittings

1	N. 1. Geometric old.	1	40' 18'	1	completely out of repair and unserviceable in its present state.	
2	do	2	15' 10'	2	do	
3	East river column old	6	16'	6	do	
4	N. 1. Lathie slings old	6	21'	6	do	
5	chain - do. made out of 5/8" round wire	6	do	120 lbs	do	
6	Old Gas valves	2	do	2	do	
7	Cauldrons weights, etc old	6	do	6	do	
8	East river wheels for lifting chains N. 1. Schani made out of 1/2" round	6	1' 5"	6	do	
9	do					
10	do					
11	do					
12	do					
13	Old C. 1. wheels for lifting chains -	4	1' 5"	4	do	
14	do	4	do	4	do	

15-

15 Cauldrons weights old etc
16 11" wheels, 1/2" and 1/4" old
in fine work that not 1/2" bricks floor
3 items.

Would last for a number of
years longer as they are:
but when the building is
demolished it is not
known what they could
be used for.

17	do	3	4	7	3	do	
18	do	4	3 1/4	4 1/2	4	do	
19	do	2	3 1/4	4 1/2	2	do	
20	do	10	do	do	10	do	
21	do	1600 lbs	do	do	1600 lbs	do	
22	do	28	7' 2"	4"	28	do	
23	do	1	46' 6"	4"	1	do	
24	do	1	40	6"	3 1/4"	1	do
25	do						
26	do						
27	do						
28	do						

6/5650
2-2-84

2/6557
31-3-84

23
14/2
134/84
2012
3176

Statement B.

Stores belonging
to old gas works
recommended to
be sold, demolished
etc.

Ind 757 1/84
Dym 182
26/2/84

(1) Government Gas Works.
Mr. J. H. George. Chairman.
 Notes belonging to the old Gas Works in the first in charge of the
 Deptt. for Gas Works - recommended to be sold by auction or
 otherwise.

Description of articles	No.	Dimensions		Serviceable or Unserviceable.	Remarks.
		L.	B. S.		

3	15	5	6	5	12	
1	Large and spare materials.					
2	Common round shades	10				
3	Flashed	1				Serviceable
1	Flashed	38				do.
1	Chamber shades, small.	2				do
5	Flashed chamber shades	2				do
6	Gas chimneys, large & small	29				Unserviceable
4	Painted or shade tops	6				do
8	Gas lanterns for oil lights	10				do
9	Spending - light - melie	1				do
10	Large old melie	1				do
11	13 gas screens for the above	5				Serviceable
12	Gas materials	28				do
13	1/2 inch gas pipes for leaden pipes	3				Unserviceable
14	Wall brackets with pieces	6				do
15	Bottoming rollers	9				Serviceable
16	Top lights of theatre room	9				Unserviceable

77	3/4" brass stph coets	2				do
78	do	4				do
79	knives	3				do
80	Brass wheel	1				do
81	3/4" to 1/2" stph coet	1				do
82	Bottoming rollers	1				do
83	Heavy full of brass	1				do
84	Bottoming rollers	1				do
85	Brass frame and door	1				do
86	Old pendants	35				do
87	Outlet valves	2				do
88	Putty	2				do
89	Portable stoves	1				do
90	Water gas Retort	1				do
91	Turnace for melting lead	1				do
92	Hydraulic main of oil gas	1				do
93	Oil gas measures or Retorts	2				do

19	1 1/2 x 1/4" - do -	for iron	19	2	do
20	1/2 x 1/4" - do -	for lead	31	1	do
21	13 nos Blows	lakes -	27 1/3	2	do
22	Almond burners for	blows -	16	6	Almond order -
23	do -	for shales -	22	10	do

61	Burton's Piles (C.S.) 2 1/2"	2	2	do
65	C.S. Pile 3 1/2"	3 Pkts.	8 Pkts.	do.
66	Teakwood Office table	1	1	do
67	Chair	1	1	do
68	Old and rotten materials	10	10	do
69	Roofed round shales -	3	3	do
70	13 nos shingles	3	3	do
71	1" do cork plugs	5	5	do
72	Boiling plates of cork -	23	23	do
73	Plugs of the old cork	25	25	do
74	ofendants & side lights	18	18	do
75	High cork of oldendants	28	28	do
76	Blows	8	8	do
77	Side lights	5	5	do

3/5457
2.2.24

3/6557
3.3.84

44
3.3.84
3.3.84

Statement C.

Stores belonging
to old Gas works
in charge of Supt
Gas works.

28/12/82
28/12/82
28/12/82

25

35	Large round shades	2	.	.	.	2	Leicester	✓
36	Small do.	2	.	.	.	2	do.	✓
37	Large shade covers	2	.	.	.	2	do.	✓
38	Small do.	2	.	.	.	2	do.	✓
39	Large shade holders	2	.	.	.	2	do.	✓
40	1 1/2" brass stop cock	1	.	.	.	1	do.	✓
41	Stop cock for iron head	1	.	.	.	1	do.	✓
42	do - for leaden pipes	1	.	.	.	1	do.	✓
43	Stop cock show, everything complete	1	.	.	.	1	do.	✓
44	Large brass ceiling plate	1	.	.	.	1	do.	✓
45	Small brass unions	2	.	.	.	2	do.	✓
46	Pack containing 5 punch tools	1	.	.	.	1	Leicester	✓
47	One packed barrel		.	.	.			
48	Box containing down iron pipes	1	.	.	.	1	Stl.	✓
49	Measure large	1	.	.	.	1	Leicester	✓
50	Brass pump	2	.	.	.	2	do.	
51	Syphon, position	2	.	.	.	2	do.	
Iron materials.								
51	Iron hooks for hanging lanterns	6	.	.	.	6	do.	
52	Top row pendant	1	.	.	.	1	do.	
53	1" iron coupling	100	.	.	.	100	do.	
54	Top row	2	.	.	.	2	do.	
55	Elbows	7	.	.	.	7	do.	
56	1" iron Joes	23	.	.	.	23	do.	
57	10" J. pipe 1" dia about 60 ft.	60 ft.	.	.	.	60 ft.	do.	
58	Syphon boxes	5	.	.	.	5	do.	
59	Bottom of C.S. pipe 4" dia	1	.	.	.	1	do.	
60	Stump hole of the reading room, ward	2	.	.	.	2	Leicester	
61	do. 10" J. pipe	2	.	.	.	2	do.	
62	Long pendant, 7 feet each	4	.	.	.	4	Leicester	
63	4" pipes of 8 ft. with a branch each in it	3	.	.	.	3	do.	

2-2-86

6/557
+ 8/3-8

#6
SW 1319/10
20/3
31/28

Statement D.

Stores belonging to
old gas works in
charge of Presiding
Executive Engineer.

Wm 757
Dym 182
2/2/82

17	Brown stn seats $\frac{3}{8}$ " with	Elbows	14	14	Leicester
24	Brown galvanized pipe	bolts	110	110	do
25	Eight light-blue with sets	attached	1	1	do
26	Handsome bracket, Brown		1	1	do
27	Leaving plates, small		8	8	do
28	do —, large		4	4	do
29	Brown pipes (all about $1\frac{1}{2}$ ft.)		3	3	unnecessary
30	draw pipe with a funnel		1	1	do
31	Eight sided light		1	1	do
32	Eight in the form of letter A		1	1	do
33	do — do. V		1	1	do
34	The Dealwood box con- taining the following articles		1	1	do

143	Ornat. bicolor	1 1/2 1 1/4	928	0	0	923	Ornat. bicolor
144	do - 1 1/4 1/4		230	0	0	230	do
145	do. 3/4 6 1/4		929	0	0	929	do
146	do. 1 1/2 or		493	0	0	193	do
147	do. 1 1/2 or		4168	0	0	3668	do
148	do. 1 1/2 or		1762	0	0	1662	do
149	do. 3/4 or		12076	0	0	11576	do
150	Boxer large		2	0	0		do

He: Large. 2nd at 1st

10	10 long	1 1/2	8	0	0	1 1/2	do
11	10 long	1 1/2	8	0	0	1 1/2	do
12	10 long	1 1/2	8	0	0	1 1/2	do
13	10 long	1 1/2	8	0	0	1 1/2	do
14	10 long	1 1/2	8	0	0	1 1/2	do
15	10 long	1 1/2	8	0	0	1 1/2	do
16	10 long	1 1/2	8	0	0	1 1/2	do
17	10 long	1 1/2	8	0	0	1 1/2	do
18	10 long	1 1/2	8	0	0	1 1/2	do
19	10 long	1 1/2	8	0	0	1 1/2	do
20	10 long	1 1/2	8	0	0	1 1/2	do
21	10 long	1 1/2	8	0	0	1 1/2	do

Having the following articles -

107	Chas Cookins for Lant	63	0	0	0	0	63	vertical
108	Stan Lant for do	123	0	0	0	0	123	do
109	John ^{3 other} for Bruckman	29	0	0	0	0	29	do
110	Buckman for Lant	141	0	0	0	0	141	do
111	Reado	51	0	0	0	0	51	do
112	Munko	148	0	0	0	0	148	do
113	WJ Abbott 1/2	98	0	0	0	0	98	do
114	Stein 1' T 3/4 1'	45	0	0	0	0	32	do
115	do 1 1/4 T 1/2 - 1 1/4	130	0	0	0	0	129	do
116	do 1' T 1/2 1'	66	0	0	0	0	53	do
117	do 1 1/4 1 1/4	39	0	0	0	0	36	do
118	do 1 1/4 3/4 1 1/4	21	0	0	0	0	20	do
119	do 1 1/4 3/4 1'	9	0	0	0	0	8	do
120	do 1 1/4 1/2 1'	13	0	0	0	0	12	do
121	do 2 1/2 1'	3	0	0	0	0	2	do
122	do 2 1' 1'	5	0	0	0	0	4	do
123	John T 2' 2'	16	0	0	0	0	4	do
124	do T 1' 3/4	27	0	0	0	0	15	do

Leaving the following articles -

75	Shells with long 1 1/2 or 1 3/4 long	30	0	0	0	0	0	30	Centinella
76	do do 1 or 1 1/2 long	5	0	0	0	0	0	5	do
77	Shells with bend 1 1/2 or	67	0	0	0	0	0	48	do
78	Shells with 2 bands both 1 1/3 long 3 or	504	0	0	0	0	0	504	do
79	Shells 6 1/2 long 3 1/4	485	0	0	0	0	0	461	do
80	Shells 6 1/2 long 3 1/4	2	0	0	0	0	0	2	do
81	Shells with long 1 1/2 or 1 3/4 long	1	0	0	0	0	0	1	do
82	Shells with long 1 1/2 or 1 3/4 long	4	0	0	0	0	0	4	do
83	Shells with long 1 1/2 or 1 3/4 long	28	0	0	0	0	0	28	do
84	Shells with long 1 1/2 or 1 3/4 long	6	0	0	0	0	0	6	do
85	Shells with long 1 1/2 or 1 3/4 long	1	0	0	0	0	0	1	do
86	Shells with long 1 1/2 or 1 3/4 long	3	0	0	0	0	0	3	do
87	Shells with long 1 1/2 or 1 3/4 long	1	0	0	0	0	0	1	do
88	Shells with long 1 1/2 or 1 3/4 long	1	0	0	0	0	0	1	do
89	Shells with long 1 1/2 or 1 3/4 long	86	0	0	0	0	0	86	do
90	Shells with long 1 1/2 or 1 3/4 long	47	0	0	0	0	0	41	do
91	Shells with long 1 1/2 or 1 3/4 long	14	0	0	0	0	0	2	do
92	Shells with long 1 1/2 or 1 3/4 long	5	0	0	0	0	0	5	do

93	Shells with long 1 1/2 or 1 3/4 long	5	0	0	0	0	0	5	do
94	Shells with long 1 1/2 or 1 3/4 long	1	0	0	0	0	0	1	do
95	Shells with long 1 1/2 or 1 3/4 long	11	0	0	0	0	0	11	do
96	Shells with long 1 1/2 or 1 3/4 long	12	0	0	0	0	0	12	do
97	Shells with long 1 1/2 or 1 3/4 long	47	0	0	0	0	0	44	do
98	Shells with long 1 1/2 or 1 3/4 long	72	0	0	0	0	0	69	do
99	Shells with long 1 1/2 or 1 3/4 long	39	0	0	0	0	0	29	do
100	Shells with long 1 1/2 or 1 3/4 long	140	0	0	0	0	0	140	do
101	Shells with long 1 1/2 or 1 3/4 long	96	0	0	0	0	0	96	do
102	Shells with long 1 1/2 or 1 3/4 long	38	0	0	0	0	0	38	do
103	Shells with long 1 1/2 or 1 3/4 long	15	0	0	0	0	0	15	do
104	Shells with long 1 1/2 or 1 3/4 long	30	0	0	0	0	0	30	do
105	Shells with long 1 1/2 or 1 3/4 long	61	0	0	0	0	0	61	do
106	Shells with long 1 1/2 or 1 3/4 long	106	0	0	0	0	0	106	do

34 The Sealwood box con-
taining the following articles -

40	Gallies drop screws	3/8"	328	"	"	"	328	inverted	do
41	do	1/2"	110	"	"	"	110	"	do
42	Elliptical screws	1"	2	"	"	"	2	"	do
43	do	1/2"	83	"	"	"	71	"	do
44	Boots for screws		21	"	"	"	9	"	do
45	Lower Lanthorn Cords		145	"	"	"	121	"	do
46	1 1/2" Brass cork plug		7	"	"	"	3	"	do
47	1" black lead cement		1	"	"	"	1	"	do
48	Wet mastic 80 degrees		1	"	"	"	1	"	do
49	do	10"	1	"	"	"	1	"	do
50	Boards for 5' x 8' fundatio		2	"	"	"	2	"	do
51	boards for 16' long	do	2	"	"	"	2	"	do
52	Boards for 4' deck		4	"	"	"	4	"	do
53	do	3"	2	"	"	"	2	"	do
54	Boards for 5' x 8' fundatio		3	"	"	"	8	"	do
55	Boards for fundatio 6' x 8'		4	"	"	"	4	"	do
56	Boards for 2'		2	"	"	"	2	"	do
57	16' long & 8' wide	2"	3	"	"	"	3	"	do

58	24' long & 6' wide	2"	1	"	"	"	1	"	inverted
59	16' x 16'	3"	2	"	"	"	2	"	do
60	7' x 7'	4"	1	"	"	"	1	"	do
61	13' x 6'		1	"	"	"	1	"	do
62	Rau head masts 1/2" x 1/4"		3094	"	"	"	3094	"	do
63	enrichment masts		3252	"	"	"	3252	"	do
64	elite glass		102	"	"	"	102	"	do
65	top glass		2036	"	"	"	2036	"	do
66	13' x 13' glass		303	"	"	"	303	"	do
67	clear glass 8'		1859	"	"	"	1847	"	do
68	cut glass 8' x 8'		449	"	"	"	434	"	do
69	Alumina glass 8' x 8'		135	"	"	"	135	"	do
70	Painted with white								
71	Orange bottom	800	"	"	"	"	764	"	do
72	W. H. Paint 1/2" x 1/2"	70	"	"	"	"	70	"	do
73	Stucco with 1/2" x 1/2"	36	"	"	"	"	36	"	do
74	do	8	"	"	"	"	8	"	do
75	do	103	"	"	"	"	103	"	do

Government Gas works.
 Store St. George. Chester.
 Notes belonging to Aldgas works in the Store in charge of Geo. Lingiers Presy. Dr.
 10 W. 100 fms. recommended to be sold by auction or otherwise.

Stem	Description of article	Measurements			Remarks
		Cts.	D	10 fms	
1	15- An One Eng. Presy. Dr. Notes.		5	5	12
2	1 x 1 1/2	1	"	"	1
3	do. 1 1/2 x 2.	1	"	"	1
4	do. 1/4 x 5/8 for 3000	1	"	"	1
5	Diagrams 2, 1 1/2, 1, 1/4	1	"	"	1
6	Plate Large	1	"	"	1
7	Plate 200 fms	6	"	"	4
8	Plate 200 fms	4	"	"	4
9	Plate 200 fms	4	"	"	4
10	Plate 200 fms	4	"	"	4
11	Plate 200 fms	4	"	"	4
12	Plate 200 fms	4	"	"	4
13	Plate 200 fms	4	"	"	4
14	Plate 200 fms	4	"	"	4
15	Plate 200 fms	4	"	"	4
16	Plate 200 fms	4	"	"	4
17	Plate 200 fms	4	"	"	4
18	Plate 200 fms	4	"	"	4
19	Plate 200 fms	4	"	"	4
20	Plate 200 fms	4	"	"	4
21	Plate 200 fms	4	"	"	4
22	Plate 200 fms	4	"	"	4
23	Plate 200 fms	4	"	"	4
24	Plate 200 fms	4	"	"	4
25	Plate 200 fms	4	"	"	4
26	Plate 200 fms	4	"	"	4
27	Plate 200 fms	4	"	"	4
28	Plate 200 fms	4	"	"	4
29	Plate 200 fms	4	"	"	4
30	Plate 200 fms	4	"	"	4
31	Plate 200 fms	4	"	"	4
32	Plate 200 fms	4	"	"	4
33	Plate 200 fms	4	"	"	4
34	Plate 200 fms	4	"	"	4
35	Plate 200 fms	4	"	"	4
36	Plate 200 fms	4	"	"	4
37	Plate 200 fms	4	"	"	4
38	Plate 200 fms	4	"	"	4
39	Plate 200 fms	4	"	"	4
40	Plate 200 fms	4	"	"	4

Stem	Description of article	Measurements			Remarks
		Cts.	D	10 fms	
1	15- An One Eng. Presy. Dr. Notes.		5	5	12
2	1 x 1 1/2	1	"	"	1
3	do. 1 1/2 x 2.	1	"	"	1
4	do. 1/4 x 5/8 for 3000	1	"	"	1
5	Diagrams 2, 1 1/2, 1, 1/4	1	"	"	1
6	Plate Large	1	"	"	1
7	Plate 200 fms	6	"	"	4
8	Plate 200 fms	4	"	"	4
9	Plate 200 fms	4	"	"	4
10	Plate 200 fms	4	"	"	4
11	Plate 200 fms	4	"	"	4
12	Plate 200 fms	4	"	"	4
13	Plate 200 fms	4	"	"	4
14	Plate 200 fms	4	"	"	4
15	Plate 200 fms	4	"	"	4
16	Plate 200 fms	4	"	"	4
17	Plate 200 fms	4	"	"	4
18	Plate 200 fms	4	"	"	4
19	Plate 200 fms	4	"	"	4
20	Plate 200 fms	4	"	"	4
21	Plate 200 fms	4	"	"	4
22	Plate 200 fms	4	"	"	4
23	Plate 200 fms	4	"	"	4
24	Plate 200 fms	4	"	"	4
25	Plate 200 fms	4	"	"	4
26	Plate 200 fms	4	"	"	4
27	Plate 200 fms	4	"	"	4
28	Plate 200 fms	4	"	"	4
29	Plate 200 fms	4	"	"	4
30	Plate 200 fms	4	"	"	4
31	Plate 200 fms	4	"	"	4
32	Plate 200 fms	4	"	"	4
33	Plate 200 fms	4	"	"	4
34	Plate 200 fms	4	"	"	4
35	Plate 200 fms	4	"	"	4
36	Plate 200 fms	4	"	"	4
37	Plate 200 fms	4	"	"	4
38	Plate 200 fms	4	"	"	4
39	Plate 200 fms	4	"	"	4
40	Plate 200 fms	4	"	"	4

GOVERNMENT OF MADRAS.

MILITARY DEPARTMENT.

29th October 1883, No. 5797.

Barrack Department.

Read the following papers :—

No. 402. *From Lieutenant-Colonel R. C. STEWART, Officiating Quartermaster-General, to Colonel E. L. HANKIN, Secretary to Government, Military Department; dated Ootacamund, 2nd April 1883, No. 2750-10.*

His Excellency the Commander-in-Chief has lately had under his consideration the exceedingly defective arrangements for the lighting of Fort St. George.

2. From a perusal of the papers connected with this subject it would appear that from time to time a sum of not less than Rs. 80,000 has been spent on the gas works of Fort St. George with results, I am desired to say, so exceedingly unsatisfactory that, at the present time, there are but eighty-six gas lights in the whole fort.

3. These are in the "King's barracks" occupied by a portion of the Essex Regiment, but the remaining blocks of barracks, the family quarters, the guard rooms, the streets and gateways are still lighted with common oil or kerosine.

4. The Commander-in-Chief cannot but remark that probably no large city in the empire is so badly lighted as is Madras, and His Excellency would desire to urge upon Government the advantages of gradually introducing the electric light, with which it seems possible to commence an experiment in Fort St. George, and which would probably be hereafter generally introduced into the town and suburbs.

5. If, however, Government are unwilling to consider this experiment, then I am desired to recommend that the subject of lighting the entire fort with gas may again receive the consideration of Government.

6. It seems from a perusal of Proceedings of Government, No. 1163, of 5th April 1877, that His Grace the Governor in Council directed that application should be made to the Government of Bombay for the services of an experienced Gas Engineer to examine and to report on the present condition of the gas works, and the best means to be adopted for their working in future, and I am desired to request you to favor me with the results of this application.

7. In connection with this question arises that of the interference of the present gas works with the efficient range of some of the guns of the fort which will be taken up along with the general question of the lighting of the fort if Government will accord their approval of the Commander-in-Chief's proposition; but this interference of the gas works with the range of the fort guns might add weight to the introduction of the proposed experiment with the electric light.

No. 2170.

Transferred to the Public Works Department for consideration and report.

(By Order.)

OOTACAMUND,
13th April 1883.

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

No. 403. Memorandum from Colonel R. H. SANKEY, R.E., Secretary to Government, Public Works Department, to Colonel E. L. HANKIN, Secretary to Government, Military Department; dated Ootacamund, 10th July 1883, No. 217-E.

The Quartermaster-General's letter of the 2nd April 1883 regarding the lighting of Fort St. George (see G.O., Military Department No. 2170, dated 13th April) was transferred to this department for consideration and report.

2. With reference to His Excellency the Commander-in-Chief's remarks, para. 4 of the letter under reply, it will be observed from the reply of the President, Municipal Commission, No. 257, of 1st May 1883, that no scheme for the general lighting of Madras by electricity has as yet been framed, and that, if this power be applied to the lighting of the fort, the scheme whatever it is must be independent of the town.

3. Since the receipt of above letter it may be mentioned that there has been a proposal to utilize the services of Mr. Jones (Municipal Engineer now on sick leave in England) in instituting inquiries on the general subject, and Government have expressed themselves prepared to assist in the matter by the grant of travelling expenses.

4. Whatever the result it is clear that there can be no practical outcome for a long time, and it will therefore be apparently better to consider the question as between gas and oil lighting for the fort.

5. To aid in dealing with the matter a precis of previous correspondence has been drawn up in the annexed office note, dated 24th April 1883.

6. First, as to the inquiry made by His Excellency the Commander-in-Chief in para. 6 of the Quartermaster-General's letter as to the results of the application made to the Government of Bombay for the services of an experienced Gas Engineer, it will be seen that this, as also one of a similar character addressed to the Government of India, led to no result.

7. Subsequently Mr. Faulkner reported on the whole subject, and the file was circulated to His Grace the Duke of Buckingham in 1877, and returned by him in March 1880 with directions to record the papers.

8. It being understood that the Executive Engineer (Colonel Burton) had in hand a scheme for supplying gas to the fort from works which he proposed to erect at the chemical laboratory (a new work now under execution) he was requested to state fully his proposals on the subject, and, after consulting the Chemical Examiner, to state whether he could by this means supply sufficient gas to the fort to supersede all present oil lights, excepting perhaps a few at detached places.

9. From Colonel Burton's reply, No. 1172, of 17th May 1883, it will be observed that his scheme of supply from the chemical laboratory would as a fact only increase the present number of gas lights (stated by him to be 106) to 150, while not less than 800 would be needed if the present oil lighting was to be superseded.

10. This small instalment, which is all apparently that could be guaranteed unless large and new works specially designed were undertaken, would cost only Rs. 3,300.

11. He reports that although there is at present no leakage from the pipes, that, owing to insufficient pressure, the light afforded by the burners is "insufficient for the men to read by, and anything but good;" and again that, in addition to the lighting now supplied, "the soldier provides himself with a lamp at his own expense when he wants a light greater than that necessary to direct him to the stair-case, doors, &c."

12. The feeble quality of the light is clearly proved by the very small expenditure of gas per hour. The fact is the present bells are so thin and the distributing pipes are so much corroded that they cannot bear the pressure required to

force the needful supply of gas to the burners, which should not be less than four cubic feet each per hour.

13. Looking to the whole position of matters and duly taking into account—

- (1) the high cost of skilled direction for works of this character;
- (2) the difficulty, if not the impossibility, of commanding the services of an expert to design and carry out the works;
- (3) the necessarily high price of coal;
- (4) the impossibility in the Madras air and soil, and especially so close to the sea, of preventing rapid corrosion of all the plant and service pipes;

it may be fairly questioned whether a renewed effort to light the fort with gas will not lead to a serious outlay with no adequate result.

14. The cost of oil lighting is no doubt high, but not so high as gas has proved if the whole of the charges, including the superintendent's salary, be taken into account.

15. There is no specific report as to what the present plant would fetch if disposed of.

So far as burners and other fittings as also some of the minor distributary pipes are concerned they would, no doubt, command a sale, as also possibly some of the machinery connected with the new gas works (which have never been used).

But as regards the bells composed of very thin sheet iron and most of the rest of the old plant, very little would probably be realized.

16. It is now, moreover, a question how to clear the line of fire for the gun, which, under the lately sanctioned scheme for the armament of the fort, has to be placed on the north-east salient.

This cannot be done without the removal of both the old and the new gas works.

Orders are now necessary.

Precis on Gas Works of Fort St. George.

With their despatch, No. 18 of 1853, the Board of Directors of the East India Company transmitted to the Government of Madras copy of a communication addressed to them by the Chairman of the Oriental Gas Company (Limited) making proposals for substituting gas for ordinary oil lamps.

After detailed inquiry as to the advantages to be obtained and the cost of the experiment, which was estimated at Rs. 12,000 for apparatus, the matter was deferred pending consideration by the Government of India.

It was subsequently decided, in May 1859, to provide and set up the necessary apparatus for lighting the barracks, &c., in Fort St. George, with oil gas at an estimated cost of Rs. 12,410.

The substitution of coal for oil in the manufacture of gas was considered in G.O., No. 1513, dated 12th November 1861.

From experiments made it appeared that the cost of oil gas as compared with coal gas was as 21 to 15, while the cost of an oil light was found to be double that of an oil gas light.

G.O., No. 11, dated 7th January 1862.

G.O., No. 343, dated 18th March 1862.

Further experiment showed that the cost of each description of light per month would be—

	RS.	A.	P.
One oil lamp	...	...	...
" " gas lamp	...	...	...
" coal gas lamp	...	...	...
calculating 400 lights to be burnt nightly in the fort, the annual cost would be for—	RS.		
Oil lamps	...	...	...
" gas lamps	...	...	...
Coal gas lamps	...	...	...

RS. A. P.

3 8 0

2 0 0

1 0 0

16,800

9,600

4,800

The cost already incurred for machinery and fittings for making oil gas was Rs. 12,000, adding to this Rs. 2,000 for alterations and additions for adapting them to coal gas and Rs. 10,000 for piping, the total cost of the plant for making coal gas was estimated at Rs. 24,000. Orders were issued for introducing the change.

In April 1865 the Superintendent of the Gas Works at Fort St. George submitted a memorandum showing the then state of the works; the experiment thus far was considered

by Government as having been fairly successful. The average number of lights burnt in the barracks was 103, the cost per light being Rs. 2-5-0 per mensem. It was estimated that if the experiment were extended to the whole of the fort and 500 lights burnt nightly, the cost of each light would be reduced to Rs. 1-1-9, or a total of Rs. 556 per mensem for 500 lights. Adding to this interest on outlay incurred on the works, charges for superintendence, &c., the total cost of 500 lights would be Rs. 821 per mensem, or Rs. 1-10-3 for each light, as against Rs. 3-8-0 for oil lamps.

In G.O., No. 83, dated 26th January 1866, an estimate of Rs. 80,000 was sanctioned for the works requisite to light the whole of the fort with gas so as to provide for 800 lights.

In July 1866 the Officer Commanding the 60th Rifles at the fort reported to the Quartermaster-General that—

- (1) the gas lamps in the barracks were very high;
- (2) the men could not see to read or write unless they were immediately underneath the lamps;
- (3) the description of burner did not seem to be economical; the jets, as a rule, being thin straight pillars instead of a broad fan-tailed flame;
- (4) the gas was constantly going out in various parts of the barracks, owing sometimes to the wind from which the flame was insufficiently protected;
- (5) that at times the light from the gas was very bad.

G.O., No. 2359, dated 26th July 1866.

In March 1868 a project for improving and extending the gas works was laid before the Secretary of State. The cost of the proposed works was estimated at Rs. 72,800.

G.O., No. 832, dated 13th March 1868.

This project was criticised at length by Colonel A. Robertson, who submitted a comprehensive memorandum on the details of the scheme, and offered suggestions for its revision.

G.O., No. 2392, dated 11th September 1868.

A revised project based on the remarks was sanctioned in G.O., No. 2728, dated 24th August 1869.

From a comparative statement submitted by the Superintending Engineer in August 1872, it appeared that the actual cost of the works amounted to Rs. 78,224, against the original estimates of Rs. 84,005.

G.O., No. 2113, dated 5th September 1872.

From information laid before Government in 1877 it appeared that the manufacture of gas was being carried on at a heavy loss and with most unsatisfactory results, that the light was bad, that the machinery was in constant need of repair, and that the fort ditch was in danger of pollution from the refuse of the works. Application was therefore made to the Government of Bombay for the temporary services of an experienced Gas Engineer to report on the condition of the works and the best means to be adopted for the future. The accounts were also ordered to be verified as regards both construction and cost of working.

G.O., No. 1163, dated 5th April 1877.

The application to the Government of Bombay, as well as one to the Government of India, proved unsuccessful, and all the papers were eventually made over to Mr. Executive Engineer Faulkner, who was then acting as General Superintendent of the Public Works Stores and Workshops. He was directed to report as to the cost per 1,000 cubic feet at which gas had hitherto been manufactured at Fort St. George.

Mr. Faulkner's report was laid before Government in December 1877. From this it appears that in the twelve months ending August 1877, 274,260 cubic feet of gas were made, of which only 263,345 were consumed, leaving 10,915 cubic feet as wastage; the cost being, exclusive of superintendence, &c., Rs. 2,869, or about Rs. 10-13-0 per 1,000 cubic feet consumed.

33,308 lights were burnt during the year, so that each light used per night 6-875 cubic feet of gas.

There were burning on an average for the year 105 lights per night, and the average cost for each light was Rs. 2-4-5 per month, or Re. 0-1-3 per night.

If, however, the gas works were fully utilized, the cost per 1,000 cubic feet could, it is pointed out, be reduced to Rs. 4-8-0 instead of Rs. 10-13-0, the actual cost. Adding the cost of superintendence, the cost would amount to Rs. 5-8-0 per 1,000 cubic feet.

The cost of lighting by oil lamps was found to be Rs. 3-8-11 per month per lamp as against Rs. 2-4-5 by gas, or for 105 lamps the cost would be for oil lamps for one year Rs. 4,482-3-0 as against Rs. 4,068-14-6 for gas.

The papers were circulated to His Grace the Duke of Buckingham and Chandos in 1877, and were returned on the 5th March 1880, with the following remark:—

“These papers should be kept in the Government Offices. This question will no doubt again arise, and they will be useful for reference. So return them.”

The papers were duly recorded, and no further action was taken.

His Excellency the Commander-in-Chief now revives the question in letter from the Quartermaster-General, No. 2750-10, dated 2nd April 1883.

No. 3885.

Forwarded to the Commander-in-Chief for any further remarks His Excellency may desire to offer.

(By Order.)

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

12th July 1883.

To the Quartermaster-General.

No. 404. From Brigadier-General R. C. STEWART, Quartermaster-General, to Colonel E. L. HANKIN, Secretary to Government, Military Department; dated Ootacamund, 13th October 1883, No. 1177.

I am desired by the Commander-in-Chief to state that His Excellency has had under his consideration the correspondence which accompanied Order of Government, No. 3885, of 12th July last, Military Department, relative to the question of the lighting of Fort St. George.

2. From a perusal of memorandum, No. 217-E., of 10th July 1883, by the Honorable Colonel R. Sankey, c.b., Secretary to Government, Public Works Department, it would appear that, in consequence of—

- (1) the high cost of skilled direction for works of this nature;
- (2) the difficulty, indeed impossibility, of obtaining the services of an expert to design and carry out these works;
- (3) the high price of coal;
- (4) the destructive influence of the climate of Madras on the plant and service pipes;

that officer is of opinion that it may be fairly questioned whether a renewed effort to light the fort with gas will not lead to a serious outlay with no adequate results.

3. With Colonel Sankey's opinion before him, and likewise taking into consideration the very inferior light now given by the gas in Fort St. George, as well as the great expense that must be incurred before an appreciable improvement could be anticipated, and an adequate supply of gas for the whole of the barracks and other purposes in the fort provided, the Commander-in-Chief is of opinion that it would be better to relinquish all further utilization of the gas works and to light the fort with kerosine oil of the best quality; and I am to solicit the Government to take this question into their very early consideration, so that all further expenditure in connection with the supply of gas may cease as soon as it is possible to introduce a system of lighting by oil, and that the Department Public Works may have opportunity of making arrangements for removing those gas works which interrupt the line of fire of the gun which it is proposed to mount upon the north-east salient outwork of the fort.

4. I am further to remark that seeing how very far behind other towns and cities in India Madras is in the matter of lighting, the Commander-in-Chief feels

sure that the Government will take the matter into their earnest consideration in view of an early introduction of an electric light.

5. His Excellency is glad to observe that this matter has so far engaged the attention of Government that the Vice-President of the Municipality has been requested to obtain full information whilst in England as to the best means of lighting Fort St. George by electricity, and he would be glad if Government would hereafter favor him with the result of those inquiries, His Excellency being strongly of opinion that it is desirable to take early steps towards the improvement of the general lighting of Fort St. George.

No. 405.

ORDER THEREON, 29th October 1883, No. 5797.

The Right Honorable the Governor in Council concurs in the opinion of His Excellency the Commander-in-Chief expressed in para. 3 of the Quartermaster-General's letter, No. 1177, dated 13th October 1883, and directs that early action be taken by the Barrack Department and the Commissary-General for lighting the fort with kerosine oil.

2. All expenditure in connection with the supply of gas will cease at the earliest possible date, and the necessary orders will issue in the Public Works Department for the removal of the old and new gas works and disposal of all plant, stores, &c., connected therewith.

3. This correspondence will be communicated to the Financial Department for consideration, with reference to the remarks of the Commander-in-Chief in para. 4 of the Quartermaster-General's letter No. 1177.

4. His Excellency's request in the concluding paragraph of that letter will be referred to the Public Works Department for compliance in due course.

(True Extract.)

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

To the Quartermaster-General.

- " Commissary-General.
- " Controller of Military Accounts.
- " Surgeon-General, Her Majesty's Forces in Madras.
- " Financial Department.
- " Public Works Department, with 5 enclosures (1 plan).
- " Adjutant-General, for information.

Exd. E. C. Shunker.

Gobt. of (1883) Madras.

MILITARY.

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

Dated October, 29th.

Issued

Recd.

Encl.

G.O., 29th October 1883, No. 5797.

Bh 33254 42/11-83

OCTOBER.
Nos. 402-405.

Barrack Department.

Lighting of Fort St. George.—Adoption of measures for lighting Fort St. George with kerosine oil and for the removal of the old and new gas works, &c., directed; and the suggestion as to the introduction of an electric light, referred to the Financial Department.

G. No. 257

Municipal Office,

Madras, 1st May 1883.

From

A. J. Arundel Esq.
President, Municipal Commission.

To

Colonel The Honble L. A. Danks Esq. &c.

Secretary to Government
Public Works Department.

SIR,

In reply to your letter of 24th April 1883 I have the honor to inform you that the Municipal Commissioners owing to lack of funds have not been able to frame a scheme for any general lighting of the Town with electricity. The utmost we at present contemplate is to utilize the surplus steam power of the Drainage Pumping Steam-Engines at Longapuram and in the Napier Dock for electric lighting in the immediate neighbourhood. In neither of these cases would there be power available for lighting Fort St. George. A portion of the City so isolated and compact as the Fort would probably be best served by its own engines and installation complete.

I have received from England
and have discussed with the Vice President
Mr Jones, — though merely superficially —
a number of prospectuses and like papers
from Electric Light Companies in Eng-
land, but we were unable to arrive at
any immediate conclusion as to the
method best suited for the limited pur-
poses above referred to.

Mr Jones is now on his way
to England on furlough and will be
in communication with me on this sub-
ject. I would suggest, if it be not
out of place, that Government also might
take advantage of Mr Jones's stay in
England to obtain from him full and
complete information as to the best means
of lighting the Fork with electricity.
His experience in the Lablacheff system
belonging to the Municipality and his know-
ledge of the Fork itself will be of prac-
tical use.

I

I have the honor to be
Sir,
Yours most obed^t Serv^t
H. Drundell
President, Mineral Form^y

lethm

No.	Sub-head.	Quantity.	Rate.	Per	Amount.	T
			RS.	A.	P.	RS.
	Two new posts & fixing					250
	Store house, workshop and coal shed for 20 tons 33' x 15'					950
	Boundary hedge					50
	Laying on water.					200
						Rs 642
	Deduct cost of Scheme as sanctioned for Medical College.					312
						Rs 329

СЕРПАНК,

158

Lieut.-Colonel, R.E.,
Executive Engineer, Presidency.

Colonel, R.E.,
Superintending Engineer, 5th Circle.

2/100/

No.

OF 188 - 8

BUILDINGS AND ROADS.

5TH CIRCLE

DIVISION

STATION

LOCALITY

Presidency

Madras.

Banks of Cooum
near Medical College
& St. Ann's.

Abstract of Estimate framed by
Burton Oak.
for Changing Gas works
from Fort Medical
College.

Amounting to Rs. 3,300.

Return To the A.C.

On 5th 8th 1883

15 May 1883.

No. 1241.

To, The Executive Engineer,
Presidency.

Sir, With reference to your letter
no. 5922 of 19 March 1883, I have the
honor to state that your proposition
regarding the removal of the Gas
works into the Medical College
grounds, cannot be entertained
as it is strongly objected to by
the Medical and Educational
Dept. as persons most concerned.

The correspondence has been
forwarded to the B. Mr. General
for perusal and orders of
H.E. the Commander-in-Chief.

Yours,

Col. E. Skinner
Major
Dy. Asst. B. Mr. General
E.D.

(Encopy)

W. H. Burton

L. J. O. R.

21-583
 1. 1/2 2
 4875/83
 9571

M 54083/83

Bangalore.
 17th May 1883.

N^o 1172.
 From,

The Executive Engineer,
 Presidency.

To,
 The Superintending Engineer
 v Circle.

Sir,

With reference to your N^o 383 of
 26 April 1883, I have the honor to report
 that in the improvements to the
 Medical College Laboratory, Estimate
 sanctioned by Govt. in G. O. No: 89 W of
 10 January 1883, are included several
 items amounting to Rs 3126 for
 laying pipes (now in Gas Store, Fort
 St. George) from the Fort old Gas
 works, erecting 2 new gas bells in
 brick pits at the College under a
 tiled shed, and providing and
 fixing 30 burners at the College.

No arrangements for commencing
 this work have, as yet, been made
 pending a reference I made to
 the Military authorities on 19th
 March

Enc 3.
 1 Plan
 1 Est.
 1 Copy of letter
3

March 1883 as to a final decision
on the subject of removing Gas
works from the Fort, to which
reference no reply has as yet been
received, ~~and~~ I made the following
proposal for H.E. the Commander-in-
Chief's early consideration, viz: -

In lieu of taking Gas from the
Fort to Medical College, to make
gas in new works ^{near} ~~at~~ the Medical
College and take it to the Fort
on the distinct presumption that
the N^o of lights, now 106, should
be not very materially increased,
i.e. should never exceed 150.

The Medical College burners being 30. ²180.

This scheme will cause, if
adopted, ^{an excess} increase of Rs. 3,300 on the Medical
College Est^d.

I must point out that this is an
essentially different scheme to
that of superseding ^{all} the "present
"oil lights except a few in de-
"tached places", for the N^o there ~~would~~
be not 150 but more likely

800, or perhaps more - many of
these will be outside lights -
^{Necessitating a greater consumption of Gas.}

This latter scheme would involve
a much larger pipe ^{than 2 1/2"} from the
Medical College and larger works -
the 3^d in fact built at Madras -
and probably a large renewal of
the branch pipes now in the Fort,
all the burners, fittings ^{long disused} would
have to be renewed ^{owing to rust &c.} and old branches
running under, in and out of
the buildings examined - Unless
there is an early probability
of any such large work being
favourably entertained, I propose
to postpone attempting to prepare
the Estimate by means of the
present staff of the Division.
Moreover also whilst a reliable
Estimate can be prepared for
the 1st mentioned scheme, no
such one can for the 2nd,
on account of there being no
practical gas fitter in Madras.

In this connection I think all attempts at a general gas lighting system in Fort St. George will be more or less unsatisfactory - for, if not a general and comprehensive system it is not likely to be a satisfactory one ^{as to cost} & a small set of lights involving the same establishment, or nearly so, as a large set.

At present I have ascertained that 10 lights burn 11 hours, the shape of each light is not fan like, but that of a candle; the colour is good, the burning steady and free from smell at night, and perhaps there is no leakage because free from smell by day.

The light afforded is insufficient for the men to read or write with, and anything but good owing ~~probably~~ to want of

pressure. More pressure cannot ^{thinness?} be given ^{owing to the thickness and age} ~~from~~ of the ~~old~~ bells.

I have not had very much to do with Gas supply in Barracks, but from what I have and from the above description of these, I should say that good oil lamps lighted at sun-set and put out at 10 P.M. with some few, such as "Magazine wall" lamps, ^{a ship's lamps} allowed to burn all night at the heads of stairs &c. would be preferable and would answer every reasonable purpose. One fact alone seems to condemn the present system, viz: that the "gas burns 11 hours" from which I also infer the lighting is weak, for no one could sleep in the glare of bright gas lights.

The following estimate does not provide for any such continuous burning, (as such is extravagant and unnecessary and unusual with troops) but only for 4 hours for each burner. Gas required would thus be $180 \times 4 \times 4 \text{ cft.} = 2880 \text{ cft.}$ requiring 2 bells of 3,000 cft. capacity each.

The

The total cost of this will be Rs. 6,424, from which if Rs. 3,126 be deducted as the cost of work already sanctioned and provided with funds at the Medical College will be Rs. 3,300 to be otherwise provided.

The cost of present establishment is per
 museum ————— Rs. 196.
 Add for coal ————— 101.
 contingencies ————— 25.
 For 106 lights Rs. 322.
 or per light per museum 3.03.

This does not include deterioration of plant, which requires renewal in the course of a certain no. of years.

This amount of coal gives a weak light and does not supply 4 cft. per hour =
 In addition to ~~above~~ the soldier provides himself with a lamp at his own cost, when he wants a light greater than that ^{necessary} to direct him to the stair-case, doors &c. &c.

The cost of establishment necessary for 180 lights, giving a good strong light for 4 hours and burning 4 cft. per hour - would be

Est.

Rs.
 Establishment — 196.
 Coal, 180 lights — 268.
 contingencies — 40.
 504.
 or per light — 2.80.

Chargeable to Medical College. 84 }
 — do — Milz Dept. — 420. } per museum.

With reference to the enclosed letter 1241 d. 15 May 1883 from Dy. Asst. Q. Mr. General, I would observe that the Medical and Educational authorities appear to be acting ultra vires in strongly objecting to the Gas works being placed at the Medical College, as the new works would be outside the limits of the Medical College compound as defined by an old plan in my possession: it is true the boundary wall has been removed, but the line of it is as shown on the drawing and the new works would be on Milz Dept. ground.

I have the honor to be
Sir,

Your most obedient servant.

W H Burton. Lt. Col. R.E.

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Enclosures. 3.

N. 926

Submitted to the Chief Engineer P. W. Dept., with reference to his Memorandum N. 482 dated 24 April 1883.

Under Secretary P. W. Dept.

Superintendent Engineer Bangalore 35 Circle 7 June 1883

From

P. W. C. N. 4815
THE EXECUTIVE ENGINEER,

PRESIDENCY.

No. 1172.

Dated

17 May 1883

1883.

Received

ENCLOSURE.

Subject.

New Gas works in compound of medical college.

Submit report with Estimate on the subject of the.

GOVERNMENT OF MADRAS.

MILITARY DEPARTMENT.

29th October 1883, No. 5797.

Barrack Department.

Read the following papers:—

No. 402. From Lieutenant-Colonel R. C. STEWART, Officiating Quartermaster-General, to Colonel E. L. HANKIN, Secretary to Government, Military Department; dated Ootacamund, 2nd April 1883, No. 2750-10.

His Excellency the Commander-in-Chief has lately had under his consideration the exceedingly defective arrangements for the lighting of Fort St. George.

2. From a perusal of the papers connected with this subject it would appear that from time to time a sum of not less than Rs. 80,000 has been spent on the gas works of Fort St. George with results, I am desired to say, so exceedingly unsatisfactory that, at the present time, there are but eighty-six gas lights in the whole fort.

3. These are in the "King's barracks" occupied by a portion of the Essex Regiment, but the remaining blocks of barracks, the family quarters, the guard rooms, the streets and gateways are still lighted with common oil or kerosine.

4. The Commander-in-Chief cannot but remark that probably no large city in the empire is so badly lighted as is Madras, and His Excellency would desire to urge upon Government the advantages of gradually introducing the electric light, with which it seems possible to commence an experiment in Fort St. George, and which would probably be hereafter generally introduced into the town and suburbs.

5. If, however, Government are unwilling to consider this experiment, then I am desired to recommend that the subject of lighting the entire fort with gas may again receive the consideration of Government.

6. It seems from a perusal of Proceedings of Government, No. 1163, of 5th April 1877, that His Grace the Governor in Council directed that application should be made to the Government of Bombay for the services of an experienced Gas Engineer to examine and to report on the present condition of the gas works, and the best means to be adopted for their working in future, and I am desired to request you to favor me with the results of this application.

7. In connection with this question arises that of the interference of the present gas works with the efficient range of some of the guns of the fort which will be taken up along with the general question of the lighting of the fort if Government will accord their approval of the Commander-in-Chief's proposition; but this interference of the gas works with the range of the fort guns might add weight to the introduction of the proposed experiment with the electric light.

No. 2170.

Transferred to the Public Works Department for consideration and report.

(By Order.)

OOTACAMUND,
13th April 1883.

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

No. 403 Memorandum from Colonel R. H. SANKEY, R.E., Secretary to Government, Public Works Department, to Colonel E. L. HANKIN, Secretary to Government, Military Department; dated Ootacamund, 10th July 1883, No. 217-E.

The Quartermaster-General's letter of the 2nd April 1883 regarding the lighting of Fort St. George (see G.O., Military Department No. 2170, dated 13th April) was transferred to this department for consideration and report.

2. With reference to His Excellency the Commander-in-Chief's remarks, para. 4 of the letter under reply, it will be observed from the reply of the President, Municipal Commission, No. 257, of 1st May 1883, that no scheme for the general lighting of Madras by electricity has as yet been framed, and that, if this power be applied to the lighting of the fort, the scheme whatever it is must be independent of the town.

3. Since the receipt of above letter it may be mentioned that there has been a proposal to utilize the services of Mr. Jones (Municipal Engineer now on sick leave in England) in instituting inquiries on the general subject, and Government have expressed themselves prepared to assist in the matter by the grant of travelling expenses.

4. Whatever the result it is clear that there can be no practical outcome for a long time, and it will therefore be apparently better to consider the question as between gas and oil lighting for the fort.

5. To aid in dealing with the matter a precis of previous correspondence has been drawn up in the annexed office note, dated 24th April 1883.

6. First, as to the inquiry made by His Excellency the Commander-in-Chief in para. 6 of the Quartermaster-General's letter as to the results of the application made to the Government of Bombay for the services of an experienced Gas Engineer, it will be seen that this, as also one of a similar character addressed to the Government of India, led to no result.

7. Subsequently Mr. Faulkner reported on the whole subject, and the file was circulated to His Grace the Duke of Buckingham in 1877, and returned by him in March 1880 with directions to record the papers.

8. It being understood that the Executive Engineer (Colonel Burton) had in hand a scheme for supplying gas to the fort from works which he proposed to erect at the chemical laboratory (a new work now under execution) he was requested to state fully his proposals on the subject, and, after consulting the Chemical Examiner, to state whether he could by this means supply sufficient gas to the fort to supersede all present oil lights, excepting perhaps a few at detached places.

9. From Colonel Burton's reply, No. 1172, of 17th May 1883, it will be observed that his scheme of supply from the chemical laboratory would as a fact only increase the present number of gas lights (stated by him to be 106) to 150, while not less than 800 would be needed if the present oil lighting was to be superseded.

10. This small instalment, which is all apparently that could be guaranteed unless large and new works specially designed were undertaken, would cost only Rs. 3,300.

11. He reports that although there is at present no leakage from the pipes, that, owing to insufficient pressure, the light afforded by the burners is "insufficient for the men to read by, and anything but good;" and again that, in addition to the lighting now supplied, "the soldier provides himself with a lamp at his own expense when he wants a light greater than that necessary to direct him to the stair-case, doors, &c."

12. The feeble quality of the light is clearly proved by the very small expenditure of gas per hour. The fact is the present bells are so thin and the distributing pipes are so much corroded that they cannot bear the pressure required to

force the needful supply of gas to the burners, which should not be less than four cubic feet each per hour.

13. Looking to the whole position of matters and duly taking into account—

- (1) the high cost of skilled direction for works of this character;
- (2) the difficulty, if not the impossibility, of commanding the services of an expert to design and carry out the works;
- (3) the necessarily high price of coal;
- (4) the impossibility in the Madras air and soil, and especially so close to the sea, of preventing rapid corrosion of all the plant and service pipes;

it may be fairly questioned whether a renewed effort to light the fort with gas will not lead to a serious outlay with no adequate result.

14. The cost of oil lighting is no doubt high, but not so high as gas has proved if the whole of the charges, including the superintendent's salary, be taken into account.

15. There is no specific report as to what the present plant would fetch if disposed of.

So far as burners and other fittings as also some of the minor distributary pipes are concerned they would, no doubt, command a sale, as also possibly some of the machinery connected with the new gas works (which have never been used).

But as regards the bells composed of very thin sheet iron and most of the rest of the old plant, very little would probably be realized.

16. It is now, moreover, a question how to clear the line of fire for the gun, which, under the lately sanctioned scheme for the armament of the fort, has to be placed on the north-east salient.

This cannot be done without the removal of both the old and the new gas works.

Orders are now necessary.

Precis on Gas Works of Fort St. George.

With their despatch, No. 18 of 1853, the Board of Directors of the East India Company transmitted to the Government of Madras copy of a communication addressed to them by the Chairman of the Oriental Gas Company (Limited) making proposals for substituting gas for ordinary oil lamps.

After detailed inquiry as to the advantages to be obtained and the cost of the experiment, which was estimated at Rs. 12,000 for apparatus, the matter was deferred pending consideration by the Government of India.

G.O., No. 808, dated 30th June 1858.

It was subsequently decided, in May 1859, to provide and set up the necessary apparatus for lighting the barracks, &c., in Fort St. George, with oil gas at an estimated cost of Rs. 12,410.

The substitution of coal for oil in the manufacture of gas was considered in G.O., No. 1513, dated 12th November 1861.

From experiments made it appeared that the cost of oil gas as compared with coal gas was as 21 to 15, while the cost of an oil light was found to be double that of an oil gas light.

G.O., No. 11, dated 7th January 1862.

G.O., No. 348, dated 18th March 1862.

Further experiment showed that the cost of each description of light per month would be—

	RS.	A.	P.
One oil lamp	...	...	...
" " gas lamp	...	...	...
" " coal gas lamp	...	...	...
calculating 400 lights to be burnt nightly in the fort, the annual cost would be for—	...	...	...
Oil lamps	...	...	...
" " gas lamps	...	...	...
Coal gas lamps	...	...	...

RS. A. P.

3 8 0

2 0 0

1 0 0

RS.

16,800

9,600

4,800

The cost already incurred for machinery and fittings for making oil gas was Rs. 12,000, adding to this Rs. 2,000 for alterations and additions for adapting them to coal gas and Rs. 10,000 for piping, the total cost of the plant for making coal gas was estimated at Rs. 24,000. Orders were issued for introducing the change.

In April 1865 the Superintendent of the Gas Works at Fort St. George submitted a memorandum showing the then state of the works; the experiment thus far was considered by Government as having been fairly successful. The average number of lights burnt in the barracks was 103, the cost per light being Rs. 2-5-0 per mensem. It was estimated that if the experiment were extended to the whole of the fort and 500 lights burnt nightly, the cost of each light would be reduced to Rs. 1-1-9, or a total of Rs. 556 per mensem for 500 lights. Adding to this interest on outlay incurred on the works, charges for superintendence, &c., the total cost of 500 lights would be Rs. 821 per mensem, or Rs. 1-10-3 for each light, as against Rs. 3-8-0 for oil lamps.

In G.O., No. 83, dated 26th January 1866, an estimate of Rs. 80,000 was sanctioned for the works requisite to light the whole of the fort with gas so as to provide for 800 lights.

In July 1866 the Officer Commanding the 60th Rifles at the fort reported to the Quartermaster-General that—

- (1) the gas lamps in the barracks were very high;
- (2) the men could not see to read or write unless they were immediately underneath the lamps;
- (3) the description of burner did not seem to be economical; the jets, as a rule, being thin straight pillars instead of a broad fan-tailed flame;
- (4) the gas was constantly going out in various parts of the barracks, owing sometimes to the wind from which the flame was insufficiently protected;

G.O., No. 2359, dated 26th July 1866. (5) that at times the light from the gas was very bad.

In March 1868 a project for improving and extending the gas works was laid before the Secretary of State. The cost of the proposed works was estimated at Rs. 72,800.

G.O., No. 832, dated 18th March 1868. This project was criticised at length by Colonel A. Robertson, who submitted a comprehensive memorandum on the details of the scheme, and offered suggestions for its revision.

G.O., No. 2892, dated 11th September 1868. A revised project based on these remarks was sanctioned in G.O., No. 2728, dated 24th August 1869.

From a comparative statement submitted by the Superintending Engineer in August 1872, it appeared that the actual cost of the works amounted to Rs. 78,224, against the original estimates of Rs. 84,005.

G.O., No. 2113, dated 5th September 1872.

From information laid before Government in 1877 it appeared that the manufacture of gas was being carried on at a heavy loss and with most unsatisfactory results, that the light was bad, that the machinery was in constant need of repair, and that the fort ditch was in danger of pollution from the refuse of the works. Application was therefore made to the Government of Bombay for the temporary services of an experienced Gas Engineer to report on the condition of the works and the best means to be adopted for the future. The accounts were also ordered to be verified as regards both construction and cost of working.

The application to the Government of Bombay, as well as one to the Government of India, proved unsuccessful, and all the papers were eventually made over to Mr. Executive Engineer

Faulkner, who was then acting as General Superintendent of the Public Works Stores and Workshops. He was directed to report as to the cost per 1,000 cubic feet at which gas had hitherto been manufactured at Fort St. George.

Mr. Faulkner's report was laid before Government in December 1877. From this it appears that in the twelve months ending August 1877, 274,260 cubic feet of gas were made, of which only 263,345 were consumed, leaving 10,915 cubic feet as wastage; the cost being, exclusive of superintendence, &c., Rs. 2,869, or about Rs. 10-13-0 per 1,000 cubic feet consumed.

38,308 lights were burnt during the year, so that each light used per night 6-875 cubic feet of gas.

There were burning on an average for the year 105 lights per night, and the average cost for each light was Rs. 2-4-5 per month, or Re. 0-1-3 per night.

If, however, the gas works were fully utilized, the cost per 1,000 cubic feet could, it is pointed out, be reduced to Rs. 4-8-0 instead of Rs. 10-13-0, the actual cost. Adding the cost of superintendence, the cost would amount to Rs. 5-8-0 per 1,000 cubic feet.

The cost of lighting by oil lamps was found to be Rs. 3-8-11 per month per lamp as against Rs. 2-4-5 by gas, or for 105 lamps the cost would be for oil lamps for one year Rs. 4,482-3-0 as against Rs. 4,068-14-6 for gas.

The papers were circulated to His Grace the Duke of Buckingham and Chandos in 1877, and were returned on the 5th March 1880, with the following remark:—

"These papers should be kept in the Government Offices. This question will no doubt again arise, and they will be useful for reference. So return them."

The papers were duly recorded, and no further action was taken.

His Excellency the Commander-in-Chief now revives the question in letter from the Quartermaster-General, No. 2750-10, dated 2nd April 1883.

No. 3885.

Forwarded to the Commander-in-Chief for any further remarks His Excellency may desire to offer.

(By Order.)

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

12th July 1883.

To the Quartermaster-General.

No. 404. From Brigadier-General R. C. STEWART, Quartermaster-General, to Colonel E. L. HANKIN, Secretary to Government, Military Department; dated Ootacamund, 13th October 1883, No. 1177.

I am desired by the Commander-in-Chief to state that His Excellency has had under his consideration the correspondence which accompanied Order of Government, No. 3885, of 12th July last, Military Department, relative to the question of the lighting of Fort St. George.

2. From a perusal of memorandum, No. 217-E., of 10th July 1883, by the Honorable Colonel R. Sankey, C.B., Secretary to Government, Public Works Department, it would appear that, in consequence of—

- (1) the high cost of skilled direction for works of this nature;
- (2) the difficulty, indeed impossibility, of obtaining the services of an expert to design and carry out these works;
- (3) the high price of coal;
- (4) the destructive influence of the climate of Madras on the plant and service pipes;

that officer is of opinion that it may be fairly questioned whether a renewed effort to light the fort with gas will not lead to a serious outlay with no adequate results.

3. With Colonel Sankey's opinion before him, and likewise taking into consideration the very inferior light now given by the gas in Fort St. George, as well as the great expense that must be incurred before an appreciable improvement could be anticipated, and an adequate supply of gas for the whole of the barracks and other purposes in the fort provided, the Commander-in-Chief is of opinion that it would be better to relinquish all further utilization of the gas works and to light the fort with kerosine oil of the best quality; and I am to solicit the Government to take this question into their very early consideration, so that all further expenditure in connection with the supply of gas may cease as soon as it is possible to introduce a system of lighting by oil, and that the Department Public Works may have opportunity of making arrangements for removing those gas works which interrupt the line of fire of the gun which it is proposed to mount upon the north-east salient outwork of the fort.

4. I am further to remark that seeing how very far behind other towns and cities in India Madras is in the matter of lighting, the Commander-in-Chief feels

*Inclusive
of Super
intendence*

sure that the Government will take the matter into their earnest consideration in view of an early introduction of an electric light.

5. His Excellency is glad to observe that this matter has so far engaged the attention of Government that the Vice-President of the Municipality has been requested to obtain full information whilst in England as to the best means of lighting Fort St. George by electricity, and he would be glad if Government would hereafter favor him with the result of those inquiries, His Excellency being strongly of opinion that it is desirable to take early steps towards the improvement of the general lighting of Fort St. George.

No. 405.

ORDER THEREON, 29 October 1883, No. 5797.

The Right Honorable the Governor in Council concurs in the opinion of His Excellency the Commander-in-Chief expressed in para. 3 of the Quartermaster-General's letter, No. 1177, dated 13th October 1883, and directs that early action be taken by the Barrack Department and the Commissary-General for lighting the fort with kerosine oil.

2. All expenditure in connection with the supply of gas will cease at the earliest possible date, and the necessary orders will issue in the Public Works Department for the removal of the old and new gas works and disposal of all plant, stores, &c., connected therewith.

3. This correspondence will be communicated to the Financial Department for consideration, with reference to the remarks of the Commander-in-Chief in para. 4 of the Quartermaster-General's letter No. 1177.

4. His Excellency's request in the concluding paragraph of that letter will be referred to the Public Works Department for compliance in due course.

(True Extract.)

Chambers

Colonel,

Secretary to Government.

To the Quartermaster-General.

- „ Commissary-General.
- „ Controller of Military Accounts.
- „ Surgeon-General, Her Majesty's Forces in Madras.
- „ Financial Department.
- „ Public Works Department, with 5 enclosures (1 plan).
- „ Adjutant-General, for information.

Exd. E. C. Shunker.

Mr. No. 9571 ✓

Govt. of (1883) Madras.

MILITARY.

No. 3320 Wd/Novr 21st 1883

Comd^r to the Sup^r
Engineer Fifth Circle
who will submit
proposals for carry
ing out the instructions
contained in para
2 of the foregoing order
in the Military Dept^t

and
of the
to take
charge.

To

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

N.D.C.

Oct
nd to

Dated October,

Issued

Recd.

11/11/83

Encl.

6 (1/11/83)

G.O., 29th October 1883, No. 5797.

2. The result of the
enquiries now being
made in England
by the Vice President
of the Municipalities
to electric lighting
will be communicated
in due course by the
President thro' the
Finl Dept^t

7.C.
364C
15-2-84.
X.
11-11-83. 2/11

ces in Madras.
enclosures (1 plan)

OCTOBER.

Nos. 402-405.

No. 3320 Wd/Novr 21st 1883

Barrack Department.

Lighting of Fort St. George.—Adoption of
measures for lighting Fort St. George with
kerosine oil and for the removal of the old and
new gas works, &c., directed; and the suggestion
as to the introduction of an electric light, refer-
red to the Financial Department.

With order

Genl Dept^t Dept^t

The Sup^r Fifth Circle
" Finl Dept^t
" Finl Dept^t