

(1) Number of pages _____

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(3) Initials of the Referencer _____

MADRAS RECORD OFFICE.

Government of Madras.

Public Works

DEPARTMENT.

G.O. No. 2975	Press Mis.
366-367	
Dated 19-12	1866.

Not to be folded or roughly handled

No. 366. Read the following letter from the Superintending Engineer, 4th Division, to the Secretary to Government, Public Works Department, dated Madras, 27th November 1866, No. 3,372 :

With reference to paragraph 2 of G. O. No. 1,920, dated

1 Report.
13 Plans.
1 Estimate.

have the honor to forward
by Doctor W. J. Perin,
of Gas Works, and Captain Goddard,

Executive Engineer North Range, Presidency District, on the existing Gas Works, and on the proposed additions, accompanied by plans and explanatory drawings, showing the Gas Manufactory in all its details.

From the Executive Engineer, Fort Range, and the Superintendent of Government Gas Works, to the Secretary to Government, Public Works Department, dated Madras, 15th November 1866, No. 57.

We have the honor to submit the project called for in Government Order No. 1,920, dated 2nd June 1866.

1. The plans and explanatory drawings accompanying comprize, first, a general plan marked A, showing the site of the present Gas works, the existing works in plan, and the proposed additions; second, diagrams B and C, showing detail of manufacture of gas at present in use, viz., mixed coal and oil gas; third, the remaining plans have reference to the proposed extensions, and consist of D, a general site plan showing the proposed additions at the gas works, and E, F, G, and H, details of the above additions. Plans I, J, K, L, M, exhibit the mains and service pipes, &c., for proposed extension of gas lighting to the Recreation and Reading-rooms, Mess House, Family Barracks, Government Office, and Saint Mary's Church.

Detailed and abstract estimates, with specifications for the whole of the proposed estimates, are also herewith forwarded.

2. Diagrams B and C are sufficiently explanatory of all the details of the existing works, the gas at present manufactured being mixed coal and oil gas in the proportions sanctioned by Government in its Order No. 977, dated 20th September 1865. The process of manufacture differs in no important way from that pursued in other works.

3. The now proposed additions being much more extensive than those originally intended, have necessitated several additions at the Gas Works which were not originally estimated for, these additions are necessary to the daily supply of gas in sufficient quantity to ensure the illuminating power the Government are desirous should be furnished. Such are the extra bench of retorts, and new hydraulic main additions to the condenser and purifying apparatus, as also a larger gas bell and tank.

4. In the comparison between the burners used in Fort William and Fort Saint George, made by Colonel Dickens in his letter No. 547, dated 31st May 1866, paragraphs 5—12, it appears not to be understood that the gas used in Fort Saint George is a mixture of coal and oil gas, not as in Fort William of coal gas only. The gas itself is quite sufficiently illuminating, and the burners in use now are those procured from Calcutta, and are the ordinary bat's wing burners, with which it would not be possible to produce a thin straight pillar of flames. The result of an inspection of the lights and buildings by an Engineer Officer, an Officer of the 60th Rifles, and the Superintendent of Gas Works, lead to the conclusion that the present defective lighting was due to three causes, viz., insufficiency in number of lights, the bad position of the lights, and want of proper protection from the wind; it appeared to be the unanimous opinion that the light from a single burner was in itself sufficiently illuminating. In the accompanying project the first of these defects is removed by the addition to the number of burners in each room, occasioning a daily consumption of 15,000 cubic feet instead of 10,000, as originally calculated; the second defect will also be remedied as far as the position of the punkahs will admit; the third defect is already being removed by enclosing

Proceedings of the Madras Government, Public Works Department.
19th December 1866.

each light in a glass lantern, these lanterns are made up at the works at a cost of Rupee 1-5-0 each. We believe that these arrangements will, when carried out, afford the illuminating power required.

The estimates were furnished recently through Messrs. Short & Co. Gas manufacturing firm. The abstract estimate shows the cost of the proposed extensions, but the actual cost will be less, although the revised additions are extensive, thus showing a reduction in rates.

6. In paragraph 10 of Colonel Dickens' letter, attention is drawn to the differences in rates at which gas is procurable at Madras and in Calcutta and Dinapoor, the explanation of this is simple, it is due to the differences in price of coal, in Madras it is 25 Rupees a ton, in Calcutta, I believe, 15; the addition of oil also increases the price per 1,000 cubic feet, but the mixed gas is more illuminating and does not require so large a consumption to each burner, the difference in fact is very small; and as regards Dinapoor, in favor of Madras, the following calculations (in round numbers) will prove this:—

Actual expenditure up to date rather less than	Rs. 20,000
Cost of proposed extensions	65,000

Total... 85,000

Interest on this sum at 8 per cent. per annum being 5 per cent. interest on capital, and 3 per cent. for wear and tear, is Rupees 6,800 or 566-10-8 per mensem.

Interest on Capital...	Rs. 566	A. 10	P. 8
50 Tons of coal, at 25 Rupees per ton	1,250	0	0
96 Maunds of oil, at 3½ Rupees a Maund	336	0	0
Salary of Superintendent...	100	0	0
Do. Establishment ..	100	0	0

Total... 2,352 10 8

* The quantity required to produce 450,000 cubic feet of gas, the probable monthly requirement. The cost thereof per 1,000 cubic feet will be Rupees 5-3-0, say Rupees 5-4-0; at Calcutta it is 5 Rupees; whilst at Dinapoor the estimated cost is Rupees 7.

No. 367.

ORDER THEREON, 19th December 1866, No. 3,995.

MILITARY WORKS, No. 23.

Ordered to lie over with reference to the Orders of Government under date the 1st instant, No. 3,832.

(True Extract.)

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

To the Superintending Engineer, 4th Division.
.. Public Department.
.. Military Department.
.. Superintendent Government Gas Works.

Exd. S. T. Augustin.

A-57.

From
The Executive Engineer Fort Range.
and
The Superintendent of Govt Gas Works.
To
The Secretary to Government
Public Works Department
Fort St. George.

Sir,
We have the honor to submit the project called for in Government Order No. 1920 dated 2^d June 1866.—

1. The plans and explanatory drawings accompanying comprise: 1st A general plan marked **A**, shewing the site of the present Gas works - the existing works in plan, and the proposed additions. 2^d Diagram **B** and **C** shewing detail of manufacture of Gas at present in use. - viz. mixed Coal and Oil gas. 3^d The remaining plans have reference to the proposed extensions and consist of **D** a general site plan shewing the proposed additions at the Gas Works, and **E.F.G** and **H** details of the above additions. Plans **I.J.K.L.M** exhibit the mains and service pipes &c for proposed extension of gas lighting to the Recreation and

and Reading rooms, Mess House, Family Barracks, Government's Office, and St Mary's Church...

Detailed and Abstract estimates with Specifications for the whole of the proposed estimates are also herewith forwarded.

2. Diagrams B and C are sufficiently explanatory of all the details of the existing works. the gas at present manufactured being mixed Coal and Oil gas in the proportions sanctioned by Government in its Order No: 977 dated 20th October 1865. The process of manufacture differs in no important way from that pursued in other works.

3. The now proposed additions being much more extensive than those originally intended, have necessitated several additions at the gas works which were not originally estimated for, these additions are necessary to the daily supply of gas ~~insufficient~~ quantity to ensure the illuminating power the Government are desirous should be furnished. Such are the extra bench of Retorts, and new Hydraulic main, additions to the Condenser and purifying apparatus, as also a larger gas bell and tank.

In

4. In the comparisons between the burners used in Fort William and Fort St George made by Colonel Dickens in his letter No: 527 dated 31st May 1866 Paras 5-12. it appears not to be understood that the gas used in Fort St George is a mixture of Coal and Oil gas not as in Fort William of Coal gas only. The gas itself is quite sufficiently illuminating, and the burners in use ^{now} are those procured from Calcutta and are the ordinary batwing burners with which it would not be possible to produce a thin straight pillar of flames. The result of an inspection of the lights and buildings by an Engineer Officer, an Officer of the 60th Rifles, and the Superintendent of Gas Works lead to the conclusion that the present defective lighting was due to three causes. Viz: Insufficiency in number of lights, the bad position of the lights, and want of proper protection from the wind, it appeared to be the unanimous opinion that the light from a single burner was in itself sufficiently illuminating. In the accompanying Project the first of these defects is removed by the addition to the number

of

of burners in each room, occasioning a daily Consumption of 15,000 Cubic feet instead of 10,000 as originally calculated. the 2^d defect will also be remedied as far as the position of the Burners will admit. the 3^d defect is already being removed by enclosing each light in a glass lantern. these lanterns are made up at the works at a Cost of Rupee 1-5-0 each. We believe that these arrangements will, when carried out, afford the illuminating power required.

5. The prices entered in the estimates are furnished recently through Messrs. Short & Co. from a Birmingham Manufacturing Firm. The abstract estimate shows the Cost of the proposed extension will be Rupees 65,000 but is little in excess of that originally furnished although the revised additions are much more extensive; this is owing to the reduction in rates.

6. In para 10 of Colonel Dickens's letter attention is drawn to the differences in rates at which gas is procurable at Madras and in Calcutta and Dinapore, the explanation of this is simple - it is due to the differences in price of Coal, in Madras it is 25 Rupees a Ton, in Calcutta it

believe

believe 15. the addition of Oil also increases the price per 1000 Cubic feet, but the mixed gas is more illuminating and does not require so large a Consumption to each burner, the difference in fact is very small and as regards Dinapore in favor of Madras the following calculations (in round number) will prove this.

	Rupees.
Actual expenditure up to date rather less than	20,000
Cost of proposed extensions	65,000
<u>Total</u>	<u>85,000</u>

Interest on this sum at 8 Per Cent per Annum being 5 per Cent interest on Capital and 3 per Cent for wear and tear is Rupees 6,800 or 566-10-8 per Annum.

Interest on Capital	566-10-8
50 Tons of Coal at 25 Rupees per Ton	1,250-0-0
96 Maunds of Oil at 3 1/2 Rs a Maund	336-0-0
Salary of Superintendent	100-0-0
Establishment	100-0-0
<u>Total</u>	<u>2,352-10-8</u>

Note.

* The quantity required to produce 4,50,000 Cubic feet of Gas the probable monthly requirements.

The

of burners in each room, occasioning a daily
Consumption of 15,000 Cubic feet instead
of 10,000 as originally calculated. the 2^d
defect will also be remedied as far as the
position of the Burners will admit.
the 3^d defect is already being removed
by enclosing each light in a glass in
luminous lanterns and mounting
at the mouth of each of these
burners.

I believe
more illuminating
fact is very small;
round numbers) will prove

Actual expenditure up to date
Cost of proposed extension.

Interest on this sum at 8 per cent. per
cent. for wear and tear, is Rupees 6,800 or

Interest on Capital...
50 Tons of coal, at 25 Rupees
96 Maunds of oil, at 3 1/2 Rupees
Salary of Superintendent...
Do. Establishment...

* The quantity required to produce 450,000 cubic
feet per 1,000 cubic feet will be Rupees 5-3-0, say Rupees
estimated cost is Rupees 7

No. 367.

ORDER THEREON,

MILITARY WORKS, No. 23.

(True
(Signed)

To the Superintending Engineer, 4th Divi
.. Public Department.
.. Military Department.
.. Superintendent Government Gas

Ed. S. T. Augustin.

... that these arrangements will, when carried out, afford
the illuminating power required.
5. The prices entered in the
estimate are furnished recently from
the fact that the prices of coal and oil
are fluctuating. The estimate shows the cost of the
extension with the original estimate
little in excess of that originally
although the actual addition of
more extension, this is owing to the
reduction in rates.

6. The price of 10 of 1200 ft.
little attention is drawn to the difference
in rates at which gas is purchased in
Madras and in Calcutta. The
this explanation of this is simple. It is
the difference in price of Coal, in fact
it is 25 Rupees a ton in Calcutta

believe 15. the addition of Oil also increases
the price per 1000 Cubic feet, but the mixed
gas is more illuminating and does not as
require so large a Consumption to each
burner, the difference in fact is very small
and as regards Dinapoor in favor of Madras
the following calculations (in round number)
will prove this.

	Rupees.
Actual expenditure up to date rather less than	20,000
Cost of proposed extensions	65,000
<u>Total</u>	<u>85,000</u>

Interest on this sum at 8 Per Cent per Annum
being 5 per Cent interest on Capital and
3 per Cent for wear and tear is Rupees 6,800
or 566-10-8 per Annum.

Interest on Capital	566-10-8
50 Tons of Coal at 25 Rupees per Ton	1,250-0-0
96 Maunds of Oil at 3 1/2 Rs a Maund	336-0-0
Salary of Superintendent	100-0-0
Do Establishment	100-0-0

Total - 2,352-10-8

Note.

* The quantity required to produce 4,50,000 Cubic
feet of Gas the probable monthly requirements.

The

5
the Cost therefore per 1000 Cubic feet will be
Rs. 5-3 say Rupees 5-4. at Calcutta it is
5 Rupees whilst at Dinapore the estimated
Cost is Rupees 7.-

We have the honor to be
Sir

Your most obedient servants

Madras

15th November 1866

J. Goodwood Esq. M.A.
Executive Engineer North Bengal.

James Wyndham and
Capt. Geo. Gas only.

235 of 1866-67.
No. 7 as per Plan

6

Specification of work to be performed in laying down Wrought
Iron branch pipes &c. for supplying Gas to the
Mess House in Fort Saint George.

212 Running feet Wrought Iron screwed
socket branch pipes 1" &c. with unions, socket
elbows, socket T pipes, Thimbles and brass
cocks with wooden box 15" sq. each. are to be
supplied and connected with cast iron main
and branch pipes, 460 Running feet copper
main pipes $\frac{5}{8}$ " &c. & 150 Running feet branch
pipes $\frac{3}{8}$ " &c. with unions elbows copper junctions
and T pipes to be supplied and fitted in the
wall and in the roofs of the building with
Clamps.

The Gas lights to be supplied to the Lower
Story.
1 Single light patent pendant with bats wing
burner and stop cock complete with
1 burner.

2 Double light brackets with organ burner &c.
with 2 burners each.

2 Four light patent pendants with &c. &c.
with 2 burners each.

1 Single light bracket with bats wing burner and
stop cock with 1 &c.

Upper Story.

- 3 Single light brackets with bating burner and stop cocks complete with 1 burner each.
- 2 Double light brackets with organ burner do with 2 burners each.
- 1 Double light patent pendants with do do with 2 burners each.
- 2 Triple light patent do with do with 3 burners each.
- 1 Four light patent do with do with 4 burners.
- 1 Six light patent do with organ burner do with 6 burners.
- 1 Seventy two four light patent do with do with 72 burners

The above mentioned articles are to be supplied and fitted in the Lower & Upper Story building to supply the Gas light as per Plan.

The earth to be excavated, the wrought iron branch pipes to be laid & refilled the earth, also the road to be laid with old & new materials of 3" thick well tamped and watered.

Detailed dimensions and quantities are clearly shown in the accompanying Estimate and Drawing.

J. J. J. J.
Executive Engineer

By Order of the Committee
Fort St. George
15 November 1866.

N. 235 of 1866-67.
S^d as per Plan. E

Specification of work to be performed in laying down Wrought Iron branch pipes &c for supplying Gas to the new Family Barracks in Fort St. George.

Wrought Iron screwed socket branch pipes 1" &c with unions, socket elbows, socket & T Pipes Thimbles and Brass Cocks with wooden box 15" square to be supplied and connected with Cast Iron main & branch pipes. Copper main pipes 5" &c & Copper branch pipes 3" &c with unions, elbows, Copper Junctions & T pipes to be supplied & fitted in the wall and in the Ceilings of the building with clamps.

56. Single patent pendants with bating burner & stop cock complete with 1 burner each to the 1st Block Lower Story.

- 56 Single patent do do to the 1st Block upper story
- 1 Double do do do do do
- 24 Single do do do do to the 2nd Block Lower story
- 24 do do do do do do do 2nd story
- 24 do do do do do do do 3rd story
- 72 do do do do do do do to the 3rd Block 1st 2nd 3rd stories
- 30 do do do do do do do to the 4th Block 1st 2nd 3rd stories

The above mentioned articles are to be supplied & fitted in the 1st, 2nd & 3rd stories of the buildings to supply the Gas light as per Plan. The earth to be excavated, the wrought iron branch pipes to be laid and refilled the earth, also the road to be laid with old & new materials of 3" thick well tamped & watered.

Detailed dimensions and quantities are clearly shown in the accompanying Estimate and Drawing.

Fort St. George
15 November 1866

J. J. J. J. Captain R.E.
Cp. Engineer B. 10-10-10

N. 6. as per Plan F. E.

Specification of work to be performed in laying down
Wrought Iron branch pipes 18" for supplying Gas
to the Government Office in Fort Saint George.

660. Running feet Wrought Iron screwed socket
branch pipes 1" D^o with unions, socket elbows, socket
pipes, Thimbles and Brass Cocks with wooden box 15" square
are to be supplied and connected with Cast iron Main &
branch Pipes. 1250. Rgt. Copper Main pipes 5/8" D^o and 1150. Rgt.
branch pipes 3/8" D^o with unions, elbows, Copper Junctions
& T. Pipes are to be supplied & fitted in the wall
& in the Joists of the building with Clamps; 156. Single
light pendants 7 ft long each with bats wing burners,
Stop Cocks and 1 burner complete to be supplied & fitted,
so as to supply the Gas light as per Plan.

The earth to be excavated, the wrought iron
branch pipes to be laid, & refilled the earth, also the
road to be laid with old & new materials 3" thick well
tamped and watered.

Detailed dimensions & quantities are
clearly shown in the accompanying Estimate & Drawing.

Dr. Exp. Engr. Office
Northern Range
Fort St. George
15th November 1866

J. J. J. J.

Captain R. C.
Executive Engineer, P. W. S. 1. 0.
Northern Range

P. N. 4020/67

Specification of work to be performed in
laying down Wrought Iron branch pipes for
supplying Gas to Saint Marys Church in
Saint George

550 Running feet Wrought Iron screwed
socket & branch pipes 1" dia with unions, socket
elbows, socket T Pipes, Chimbles and Brass cocks
with wooden box 15" dia each are to be supplied and
connected with Cast Iron main & branch pipes -

470 Running feet Copper main pipes 5/8" dia &
350 Running feet branch pipes 3/8" dia with unions
elbows Copper Junctions & T pipes to be supplied
& fitted in the wall and in the Joists of the building
with clamps.

- 9 Six light chandeliers with 6 burners each complete
- 1 Eight light do with 8 burners complete
- 4 Double light pendants with 2 burners each complete
- 2. Extra Globes with burners.

The above mentioned articles are to be
supplied and fitted in the Lower building to
supply the Gas light as per Plan. There is to be
excavated, the wrought iron branch pipes to be
laid, and refilled the earth also the road to be laid
with old & new materials of 3" thick well
tamped and watered.

Detailed dimensions & quantities are
clearly shown in the accompanying Estimate
& Drawing.

For Saint George }
15. November 1866 }

J. Edward Capt. R.E.
Civil Engineer D. & R.

234820/15

N^o 12 as Plan A

Specification of work to be performed in laying down cast Iron main pipes & wrought Iron branch gas pipes in various buildings and in the streets of Fort Saint George.

7000 Running feet cast Iron socket pipes 4" D^r to be supplied with unions, elbows, ^{Thimbles} Pipes and Brass cocks &c. for connecting the main and branch pipes which are to be laid under ground in the General Streets. 4700 Running feet cast Iron socket screw pipes 2" D^r to be supplied with unions, elbows, Pipes & brass cocks &c. for connecting the branch pipes - 5120 Runft. wrought Iron branch socket screw pipes 1" D^r with unions, elbows, Pipes & brass cocks to be supplied for connecting the copper main pipes or composition tubes. 3700 Runft. Copper pipes 7/8" D^r & 500 Runft. copper pipes 3/8" D^r with unions, elbows, copper junctions & Pipes, also 70 large size globes with burners and holders and 24 single light patent Pendant &c. to be supplied & fitted in the wall to supply the Gas light.

The earth to be excavated & filled for laying down the main and branch pipes, also the road to be laid with old & new materials of 3" thick well tamped with water.

Detailed dimensions and quantities are clearly shown in the accompanying Estimated Drawing.

For R. A. Group
15. November 1866.

Spoorn Capt. R.
Executive Engineer Fort Saint George

3914029/11

1224020/11

12341020/11

26 Estimate of making a Chin gun holder 30"x7" with specifications (1)
for working according to estimate

No	Particulars	Weight in lbs	Rate	Per	Amount	Remarks
1256	Supl 1/2 of Iron plate No 17 true gauge for top including lapping	2730	12		199 10	The plates to lapp over 1" on each side and rivetted, the rivets to be 1" from centre to centre.
2479	do do No 10 do for side do	4611			236 3	do do
250	Pls of T Iron 3" for 2 rings 1/2 sides	2205			160 12	These two rings are to be rivetted to the sides at 5" from each other and the rivets to be at 2" from centre to centre.
110	Pls of Angle Iron 3" for one ring to secure the top to side	1103			80 6	one side to be rivetted to the top and the other to the sides, the rivets to be 2" apart.
116	Pls of Iron bar 3"x1/2" for 2 rings to top	582			42 7	These rings to be held at the top by clips, the diameter of the rings 1 1/2" and 2 1/2".
118	Pls of do do for 10 strengthening pieces between the top rings each 6 1/2" long	566			41 4	These are to be fitted between across the rings at the
126	do wrought Iron pipes 1 1/4" for 6 stays of 21" each	421			30 11	These pipes to be made of Iron 1/2" thick the ends to be rivetted at the bottom to the inner ring in the side and to the outer
27	do do for 6 upright bars 1 1/2" each	91			6 10	These are also to be rivetted to the bottom of the
372	do of 1 1/2" round bars for the bars between columns at their top	2100			153 2	These bars to be rivetted to the top of the columns
1317	do of 1/2" round Iron for sheet rivets	241			35 7	These are to be rivetted to the sheet

246
 Estimate of material for making a Chin Gun boiler 20" x 4' with superheater
 for working according to estimate

No	Particulars	Weight in #s	Rate - Per	Amount	Remarks
1256	Supl. 1/2 of chain plate No. 17 trix gauge for top including lapping	2735	12	199 10	The plate to be new 1" on each end and meeting the end of the 1" from center to center.
2479	do do No. 18 do for side of	4611	.	836 3	do
2500	Plt. of T chain 3' for 2 rings to ends	2205	.	160 12	These two rings are to be riveted to the ends of at 5' 1/2" apart from each other and the rings to be at 30" from center to center.
110	Plt. of single chain 3' for one ring to secure the top to side	1103	.	80 6	one side to be riveted to the top and the other to the side. the rivets to be at 30" apart.
116	Plt. of iron bar 3"x1/2" for 2 rings to top	582	.	42 7	These rings to be riveted at the top by clips, the diameter of the rings to be 1 1/2" and 20 1/2".
118	Plt. of do do for 10 strong thin pieces between the top rings each 6 1/2" long	566	.	41 4	These are to be riveted together with across the rings at the top.
126	do do wrought iron pipes 1 1/4" for 6 stays of 21" each	421	.	30 11	These pipes to be made of steel 1/2" thick the ends to be finished and bolted at the bottom to the iron T iron ring in the side and at the to the crown.
131	do do wrought iron pipes for 6 cross braces 14 1/2" each between stays	281	.	20 7	These are also to be made of steel and bolted to the stays across.
27	do do for 6 upright braces 14 1/2" each	91	.	6 10	These are also to be made of steel 1/2" thick and bolted at the bottom to the iron ring and at the bottom to the stays.
372	do do of 1 1/2" round bar for the bars between columns at their tops	2100	.	153 2	These bars 10 1/2" long 6 of 20 1/2" and 6 of 20 1/2" to be bolted to the top of columns.
1317 1/2	do do of 1 1/2" round bar for 2 sets of do do for rivets to T and angle iron rings of chain.	486	.	35 7	2100 rivets of 1/2" long 16 for riveting stays.
427	do do for rivets to T and angle iron rings of chain.	280	.	26 6	4100 rivets of 1/2" long 16 for riveting 50 angles with rings and clips.
70	Bolts 3/4" and 2" long with heads and nuts for connecting stays to rings	311	.	22 10	for connecting stays to rings.
160	Bolts 1" thick and 3" long for connecting the rods to Plt. of bar iron flat 3"x1/2" for clips	710	.	51 12	for connecting the rods, for every column.
20	Plt. of bar iron flat 3"x1/2" for clips	107	.	7 12	23 clips for holding the top rings on 8 sides of each stay of the clip to be riveted to the top.
9	Plt. of iron bar round 1 1/2" for 6 brackets fastening chain	52	.	3 12	These to be flattened in the ends in one eye in the end of the chain bar fastened to 2 sides in the chain bar for the brackets to be riveted to sides of the iron pillars near top.
102	Plt. of 1 1/2" chain for lifting rollers and diagonals	155	.	11 1	
	End and diagonals	3250	.	236 15	
	Sundry bolts, pins, iron hole in	800	.	58 5	
	Total Weight	20,849	.	1520	
	Weight from back		.	6	

(2)

17

Estimate of the Gas Holder (Continued)

No.	Particulars	Weight in #s	Pct Per	Amount	Remarks
6	Brought Forward Cast Iron Columns 15' long and of 9" diam.	6840	- 1 -	1520 6	The columns to be 9" internal diam and the side metal to be 1" thick and the fastenings to be riveted with 5/8" bolts for 1/2" bolted to the top of the tank.
6	Guide rods 2 1/2" round and 16' long	1495	- - -	101 3	These rods to be fitted at the bottom to the back of the tank and fastened to the side of the tank in their length between every two columns.
6	Rollers 6" diameter and 4" thick for guide rods	200	- - -	13 8	The rollers to be made with flanges to work against the guide rods & not to slip from their position.
6	Guide pulleys 2" diameter for guiding chains	680	- - -	46 8	The flanges to be made with depth and breadth than the first ones and breadth of the chain.
6	Cast Iron Sheet 3' x 1' x 1/8" for the bottom of column	686	- - -	46 7	These plates are to hold the guide rods and serve as bottom plates for columns & be bolted to the top of walls.

27. 11. 1900

2713 Date 27/3.

108.

8. Apr. 25 97

17. Feb. 5

410. 115 32

10

100

800 28 27 26

215. *Quercus* 645

215 - Aug 24 3
109 days 32

11/13/13

111313

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11

	Line and	
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4209	2	✓
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2024 69

99			

25-
5-0

30	10
108	153

2600	.	.
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1000	1000	1000	1000
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15-8009	2	✓
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:		
9		

390	13	5
200	1	1

200	1	2
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with California

John Jay to H. Rouse

Ampt. 21 Nov 1885

1

10

600	Smith
600	Hammer new
400	Liber & Tarners
400	Parkers

Stal Labor

Total Estimate *Pinkham*

		12	Sack	650	.	.
		4	"	168	12	.
		10	"	357	.	.
		6	"	150	.	.
				1018	12	.
				209	2	/
				Price		
				Time		

No. 235 of 1866-67.

Estimate for enlarging the Gas works at Fort Saint George, and supplying gas to such buildings as are not yet thus provided for, prepared agreeably to Government Order No. 3187 of 6th October 1880.

And Superintending Engineer A. S. Lee Jr. N^o 2557 of 11th October 1886.

Measurements

Measurements

Measurements

Answer Plan 100.

Remains of parent Rotors and breaking 3 sets of double bench. Rotors with one end hydraulic main.

18--11-68. 3574 1 Side wall.

16--17-18--19--20--21--22--23--24--25--26--27--28--29--30--31--32--33--34--35--36--37--38--39--40--41--42--43--44--45--46--47--48--49--50--51--52--53--54--55--56--57--58--59--60--61--62--63--64--65--66--67--68--69--70--71--72--73--74--75--76--77--78--79--80--81--82--83--84--85--86--87--88--89--90--91--92--93--94--95--96--97--98--99--100--101--102--103--104--105--106--107--108--109--110--111--112--113--114--115--116--117--118--119--120--121--122--123--124--125--126--127--128--129--130--131--132--133--134--135--136--137--138--139--140--141--142--143--144--145--146--147--148--149--150--151--152--153--154--155--156--157--158--159--160--161--162--163--164--165--166--167--168--169--170--171--172--173--174--175--176--177--178--179--180--181--182--183--184--185--186--187--188--189--190--191--192--193--194--195--196--197--198--199--200--201--202--203--204--205--206--207--208--209--210--211--212--213--214--215--216--217--218--219--220--221--222--223--224--225--226--227--228--229--230--231--232--233--234--235--236--237--238--239--240--241--242--243--244--245--246--247--248--249--250--251--252--253--254--255--256--257--258--259--260--261--262--263--264--265--266--267--268--269--270--271--272--273--274--275--276--277--278--279--280--281--282--283--284--285--286--287--288--289--290--291--292--293--294--295--296--297--298--299--300--301--302--303--304--305--306--307--308--309--310--311--312--313--314--315--316--317--318--319--320--321--322--323--324--325--326--327--328--329--330--331--332--333--334--335--336--337--338--339--340--341--342--343--344--345--346--347--348--349--350--351--352--353--354--355--356--357--358--359--360--361--362--363--364--365--366--367--368--369--370--371--372--373--374--375--376--377--378--379--380--381--382--383--384--385--386--387--388--389--390--391--392--393--394--395--396--397--398--399--400--401--402--403--404--405--406--407--408--409--410--411--412--413--414--415--416--417--418--419--420--421--422--423--424--425--426--427--428--429--430--431--432--433--434--435--436--437--438--439--440--441--442--443--444--445--446--447--448--449--450--451--452--453--454--455--456--457--458--459--460--461--462--463--464--465--466--467--468--469--470--471--472--473--474--475--476--477--478--479--480--481--482--483--484--485--486--487--488--489--490--491--492--493--494--495--496--497--498--499--500--501--502--503--504--505--506--507--508--509--510--511--512--513--514--515--516--517--518--519--520--521--522--523--524--525--526--527--528--529--530--531--532--533--534--535--536--537--538--539--540--541--542--543--544--545--546--547--548--549--550--551--552--553--554--555--556--557--558--559--560--561--562--563--564--565--566--567--568--569--570--571--572--573--574--575--576--577--578--579--580--581--582--583--584--585--586--587--588--589--590--591--592--593--594--595--596--597--598--599--600--601--602--603--604--605--606--607--608--609--610--611--612--613--614--615--616--617--618--619--620--621--622--623--624--625--626--627--628--629--630--631--632--633--634--635--636--637--638--639--640--641--642--643--644--645--646--647--648--649--650--651--652--653--654--655--656--657--658--659--660--661--662--663--664--665--666--667--668--669--670--671--672--673--674--675--676--677--678--679--680--681--682--683--684--685--686--687--688--689--690--691--692--693--694--695--696--697--698--699--700--701--702--703--704--705--706--707--708--709--710--711--712--713--714--715--716--717--718--719--720--721--722--723--724--725--726--727--728--729--730--731--732--733--734--735--736--737--738--739--740--741--742--743--744--745--746--747--748--749--750--751--752--753--754--755--756--757--758--759--760--761--762--763--764--765--766--767--768--769--770--771--772--773--774--775--776--777--778--779--780--781--782--783--784--785--786--787--788--789--790--791--792--793--794--795--796--797--798--799--800--801--802--803--804--805--806--807--808--809--810--811--812--813--814--815--816--817--818--819--820--821--822--823--824--825--826--827--828--829--830--831--832--833--834--835--836--837--838--839--840--841--842--843--844--845--846--847--848--849--850--851--852--853--854--855--856--857--858--859--860--861--862--863--864--865--866--867--868--869--870--871--872--873--874--875--876--877--878--879--880--881--882--883--884--885--886--887--888--889--890--891--892--893--894--895--896--897--898--899--900--901--902--903--904--905--906--907--908--909--910--911--912--913--914--915--916--917--918--919--920--921--922--923--924--925--926--927--928--929--930--931--932--933--934--935--936--937--938--939--940--941--942--943--944--945--946--947--948--949--950--951--952--953--954--955--956--957--958--959--960--961--962--963--964--965--966--967--968--969--970--971--972--973--974--975--976--977--978--979--980--981--982--983--984--985--986--987--988--989--990--991--992--993--994--995--996--997--998--999--1000--1001--1002--1003--1004--1005--1006--1007--1008--1009--1010--1011--1012--1013--1014--1015--1016--1017--1018--1019--1020--1021--1022--1023--1024--1025--1026--1027--1028--1029--1030--1031--1032--1033--1034--1035--1036--1037--1038--1039--1040--1041--1042--1043--1044--1045--1046--1047--10

65
11/12

14-03 8-23 . 25 1/2 Petting'wall of North Pavehin

Total			
<u>1659¹²/₄</u>	Cordage here for Cleaveland	if the one only work	 6 Sept. 30 7 ¹⁰

Do. for removing to Petards &c.

So for cutting the Rampwall of the North

Plaster and Gypsum 3 Double Ports and Gunpowder 2 . . 84.
with fire bricks in clay as per Plan.

12 --- 4-10 4 --- . 232 Foundation to rear wall.

15-2-10-163. 69978 Wall about to L.

12-92-9d. - " 140¹/₄ Foundation of 1 Side wall.

14	2	14-3	399	Ends wall above
----	---	------	-----	-----------------

Foundation of Paris between the Journal

23-31-64-9. 2367/8 7 Dierl

22-6332	14 6 1/2	Order of New Furnace
22-6332	14 6 1/2	Order of New Furnace

3-62-32-14 9/4 Bloeting wall between the furnace under the front wall 3

32-335. 11/14 Front wall under the Hydraulic main.

20 . . 636 . 23 Front wall to the Furnace

16-231- 36 Flue walls round the Chimney

2811%

185% Deduct for 5 Peterboroughs Fine Royal Front Wall Varnish 872.3

28 1/2 bushels 81

Carried Over— 5021511

11/20/20

43

Brought Over 502.15 11

23 1-1/2-9 29 Arch work for glue
29 6-5-9-4 185 1/8 Do for 5 Stunners.

Set 6 185 1/8 - Circular arch work in Chumam 4 2 1/2 cts 45 10 6

17 6-9-2-1/2 29 5/8 Gate wall to the 5 Stunners
40 6-9-4 1/2 11 1/4 Do to Do

12 6-4-9-2 8 1/8 Arch over the 5 Stunners

30 6-2-2-4 1/2 19 3/4 - Crossing the side wall of the 5 Stunners

20 5-5-9 7 5/8 Arch under the 5 Stunners

20 1-2-3-6 11 3/4 - Crossing wall to the 5 Stunners

15 1-1-2 15 1/8 Do Do Retort

Set 6 182 1/8 Fire brick work in clay 2 23 cts 118 5 4

25 2 1/2-9 37 1/4 - Arch work over the Stunners' windows the Retort

29 6-5-9-4 1/2 29 5/8 Do Retort

Set 6 185 1/8 - Cement work with the 5 Stunners in Retort 7 2 1/2 cts 118 7 1/2

1850 - Crossing with 2 sets Chumam to the pond wall 2 43 cts 29 3

Costy fine for masonry the outside of the Retort 12 5

40 8 320 - Crossing with the 5 Stunners in Chumam 8 4 1/2 cts 25 9 7

1 3 1-3-6 4 Granite above arch under the pond 14 64 5

16 18 288 - Concrete above the roof with the 5 Stunners with
chase and mit 8 2 10 4 1/2 cts 118 3 2

Chase Bridge like taken from the water gate for bag 6 5 1/2 cts

2 1/2 5 1/2-12 1/8 4 - Deck work around pond wall on the bottom 10 1/2 cts 10 1/2 30 8 4 80

1 6 3-3-4 9-6 13 arches

4 3 5-5-9 18-10-3 13 Stunners

40 4 1/2-4 1/2 5-10-9 13 arches

10 10-6 1-4-5-4 13 arches over the pond

Set 6 182 1/8 - Deck work around pond 2 15 4 1/2 cts 64 5 3

300 West Oil 3 cts 1 9 1/2 cts 3 23

Carrail Over 1113 13

P. 1 as of 22 Jan. 18.

Specification for Improvements to the Gas Works East Smith's Green, Madras.
 Of Robert of Estimate Office 65, 1877

Approved by Estimate to Purchase 65,477

The building to be 44.3' long by 15.6' wide from outside to outside to contain five bays with plausible bench seats and all necessary. This places floor 8' 6" as per Plan & Sections accompanying.

The rear wall to be 15.3' long 4.3' thick at bottom & 1.6' at top. its inner face to be within latter of 2 inches to the foot to be built on a foundation 4' deep 4.6' broad at top and 5.2' at bottom - the outside being plumb.

The curb wall to be 12'-3" long, 2' broad & 13'-3" high in front with a gradual slope to meet the rear wall. Foundations & deep 2'-6" thick at top & 8' at bottom with an offset of 3' on each side.

The side walls or piers of the furnaces will be 4-9 long 1'-6" thick & 4-4 high to S. springings. Line of arch built on a foundation 4' deep 2' thick at top & 2'-6" at bottom with an offset of 3 on each side.

The arch over each gunnase will be a truck with a radius of $2-10\frac{1}{2}$ feet. Each arch will be built in two concentric rings of $4\frac{1}{2}$ each the inner ring to be of fire bricks set in clay—

The porch pit between each two piers will be 1' inside 1'-9" long 8' 1" - 3" high to top of pier base. The side walls of the arch pit & pier place will be 9" thick and 2'-1 1/2" high. From the tops will spring a semicircular arch 9" thick and 6' long. The space (9") between piers & side walls, and in rear (2'-9") of the pier place will be built up solid to a height of 1'-9" the whole to rest on a foundation 2' deep.

Will send the money Glad to do so. The money is

The front of the furnaces will be closed with a wall of fire bricks 6" thick & in which the door to will be fixed. Over the front of the furnaces & connecting them with each other will be a wall 2' - 3" thick carried up to a height of 10' above the level of the floor & through the wall the main flue will pass to the shaft and on the top of it the Hydraulic Main will rest.

[illegible]

The Roof will be of Corrugated iron supported on Sparlins $4\frac{1}{2} \times 4\frac{1}{2}$ at the sphere end, and at the front and cross member $9\frac{1}{2} \times 5$ Support on four wooden posts to the end walls. The posts will be Circular 10 Or at bottom and 9 at top they will be $12 \times 4\frac{1}{2}$ high & each post will bear own 2 rimmed slab $1-3$ 12" and 6" deep set in the retaining wall of the flooring.

slab 1: 3" deep and 6" high. Set in the Retaining wall of the flooring.
 On front of the Surfaces and between the end walls, a flooring will be laid. Carved Cornices
 of a Course of bricks on edge 12" thick supported by a Retaining wall 12" 6" wide and 3' deep.

Lord Sumner George
15th November 1866.

Specimen Engineer No. 1 on N. D.

Edward
Bryant

Captain R. B.

750 200

for setting up in the wall
Composition tube 3/4" dia with clamps for setting up
in the pits

17 - Copier functions with screws
56 Change fasten standard 7/8" with lat wings
lenses and stops each complete with
lenses each

10 Wrought iron 1" dia for joining the copier main
10 Do unions 1" dia for joining the copier main
25 Copier elbow and union 3/8" dia
2 - do 1" and union 3/8" -
20 - do 1" and union 3/8" -
5 - do elbow and union 3/8" -
5 Brass sets 1" dia with wooden box 16" dia complete
Securing the earth and laying down the wrought
iron plates and filling the earth

200 Runways

10/11/1867
Wm. H. ...
10/11/1867

Costy, one for sitting up the prices &c.	25 ..
Monday Charges & scaffolding &c.	35 40. 1200 .
W. 40 20 per Week &c.	

I am down amongst brown barren fields and
 nothing has left to the new family
 parcels in West End Square.

Wm. H. Allen & Son, 120 N. 2nd St., New York, N. Y.

25 Do measure of 1' long by 4" etc 1 side and
other side of 1" etc for connecting the faces } 1 . . . etc 5 . .
10 Do Do the bottom 9" long by 1" etc for joining
the main faces } . 10 8 at 6 10 8

20 Wrought iron Electrodes 1" dia for joining the
branches together 8. 00 10 ..
25 Pl. Shingles for inner and outer thread 2. 00 5 10.
Compositional tube of " dia with clamps to the 5 branches.

For selling up in the wall _____ 1. 1844. 85.
Composition three 3/8" or with compass for selling up
in the wall _____ 2. do 93 12.

17 - Copper Junctions with Silver _____ . 2. . 8. . 22. .
36 Change Fast with Standard of _____ with Lab. ring _____
Summers and stops each Complete with } 6. . or 336. .
Summers each _____ }

10	Mrought iron 17" dia for joining the cast-iron main	3	• 8 •	do	5 • •
10	do unions 1" dia for joining the cast-iron main	3	• 6 •	do	3 1/2 •
25	Cast-iron elbow and unions 3/8" dia	—	5 8 •	do	11 7 1/4
2	do 17" and unions 3/8" —	—	2 8 •	do	• 6 8 •
20	do 17" and unions 3/8" —	—	7 8 •	do	19 8 • •
5	do elbow and unions 3/8" —	—	7 • •	do	2 1/2 8 •

5. Paul says: "The wooden box is" 42 cm 10 22 50
 "Decorating the earth and saying: Round the round
new riches and regaling the earth _____

Carroll Ave
 426 4 4 4530

	Brought Over	1113 13
Excavating foundation filling & leveling the earth		20
Sundry Charges &c		563
<u>No. 2 Asper Chan. & and. &c.</u>		1190
Hydraulic main, Iron Retorts & Furnaces &c.		10
Taking down and resetting present Hydraulic main		
1 Old present iron pipe to be used for Gas Retort		
1 new Hydraulic main 1 1/2 ft long as per separate estimate		180
<u>estimate</u>		
10 New Cast iron elliptical retorts each 7 ft long and 14 in on the major axis to be supplied from the	150	Est 1500
Print at 112 150 each		
6 Cast iron flange pipes each 16 ft long with 200 lb. in. in. of bend 2 in. inner diameter to be supplied from	15	Est 90
Print & Smoky at Pipes 15 each		
5 Furnaces with iron flaking frames & shutters &c or Complete	50	Est 250
8 Piping feet wrought iron pipes 1 in. dia. for connecting Hydraulic main with Gas retorts	32	134 194
1 Do Cast iron bend pipes with flanges 2" dia	8	Est 2
15 Do Cast iron pipes 2 in. dia. connecting 2 Hydraulic main	8	Est 78
Sundry Charges and scaffolding &c		90 148 2140
No. 3 as per portion of General Plan &c.		
Supplying additional lights to the European Baracks and lighting the verandas of the same building		
915 Pummery feet Wrought iron Branch pipes 1" dia	5	Est 216 14
8 Do Socket elbows 9" long 1" dia	8	Est 14
18 Do Socket T pipes 1" dia for joining the branch pipes	6	Est 6 12
91 Timber for inner and outer thread	2	Est 11 6
Composition tube 3/8	2	Est 178 8
5 Draft Cocks 1" dia with wooden box 15" square Complete	10	Est 50
102 Copper T and unions 5/8 in dia	5	Est 42 8
102 Elbow Copper unions 3/8 in dia	3	Est 29 12
102 Single pendants 7 feet long with single bat wing burner and stop cock complete	5	Est 570
Composition tube 5/8 in dia in store		
Carried Over	1119 12	3330

Dec 15. { November 1886. \$235.
 The gas tanks and fittings
 Di. George and company
 gas & tank fittings as
 are not yet from friends
 for. Amounting to \$65.100.

284220/11

112	Running feet.	Wrought iron branch pipes 1" dia with standard socket . 32 Pft. 22	28
10	Do unions 1" dia	6. 82.	3 12.
10	Do 1" dia	8. 2.	3 . . .
12	Turnbuckle for inner and outer thread	2. 2.	18.
340	Running feet.	Composition tube 5/8" dia with clamps to the 5 branches . 4. Pft. 85	85 . . .
700	Do	Copper branch pipes or composition tube 3/4" dia with clamps . 2. 2.	6 93 12.
17	Copper junctions with screws	2. 2.	8 22.
20	Copper T and unions 5/8" dia	7 8. 2.	12 8.
5	Copper elbows and unions 5/8" dia	7. . .	2 48
25	Do Do 3/8" dia	5 8. 2.	11 74
2	Do T and unions 3/4" dia	2 8. 2.	60
5	Brass cocks 1" dia with wooden box 15 1/2" complete	10 . . .	20 . . .
56	Single patent pendant 7/8" with bat wing burners and stop cocks complete with 1 burner each	6 . . .	82 336 . . .
1	Double Do	30 . . .	20 . . .
	Cooby hire for laying down the pipes and fitting with screw and nut . . .		20 . . .
	2nd Block Lower Story		
280	Do	Wrought iron branch pipes 1" dia with standard socket . 32 Pft. 55	68
		Carried Over	14784 4 4530 . . .

Cooby hire for laying down the pipes and fitting
 up with screw and nut 82. 20 . . .

1st Block Upper Story.

Brought Over 149844 4530

100 18mm feet
260 280

4 Brought over 1' long by 1/2" etc 1 side and other
doct 1" etc for connecting the pipes } 100 24 400
4 do doct elbow 9" long by 1" etc for joining
the main pipes } 108 20 2108
8 do doct 1" pipes 1" etc for joining the
branch pipes } 80 20 1600
28 Shingles for outer and inner thread } 20 20 380
Composition tube 3/8" with Clamps } 10 25 250
Copper branch pipes or composition tube 3/8" etc
with Clamps } 20 20 400
5 doct 1" Clamps with 8 screws } 20 20 400

8 Brought over 1" etc for joining the copper
main pipes } 80 20 1600
8 do 1" etc for joining the copper
main pipes } 60 20 1200
16 doct 1" and unions 3/8" etc } 78 20 1560
5 do elbow and unions 3/8" etc } 70 20 1400
20 do doct and 2 3/8" etc } 58 20 1160
2 do 1" and 2 3/8" } 28 20 560
4 1/2 doct 1" etc with wooden bops 15" etc } 10 20 200
24 Single patent stand out feet with bats
rungs bars and etc doct complete } 60 20 1200
with one burner each }

Carried Over 17769 4530

Brought Over 2447944530

Probable cost for putting up 72 Gas lights
to the above buildings with necessary
iron branch pipes & composition tube
8^{1/2} as well as the detail shown in
the items of the 22 Photo 1023-243-244
1st Photo 1023-243-244
Probable cost for putting up 30 Gas lights to the
above buildings with necessary iron
branch pipes and composition tube
\$¹⁰⁰ 1440 82 142780

Sanctury Charges & scaffolding \$¹⁰⁰ 20848 1410

Laying down wrought iron branch pipes 1st 2nd
for supplying Gas lights the Sanctury

330 Running feet

Wrought iron branch pipes 1st 2nd with steam & water
5 Wrought iron union 1st long 1st side 1st 2nd the other
each 1st 2nd for connecting the main and
branch pipes 100 82 500

11 Do Joets & blowing long 1st 2nd for joining
the branch pipes 108 20 7574
1 Do 1st pipes 1st 2nd for joining the branch
55 Shanks for main and water thread 82 20 200
Composition tube 5^{1/2} 2nd without clamps for
fitting up in the wall 14 14 1780

23 Do 1st 2nd without clamps and
fitting up in the joints & water 20 16 43120
23 Coping Junction with screws 20 8 240
26 Coping screw and union 5^{1/2} 2nd 78 20 1610
5 Do 1st Union 5^{1/2} 2nd 70 20 248
20 Coping screw and union 5^{1/2} 2nd 28 20 428
5 Do 1st and union 5^{1/2} 2nd 58 20 248

Brought Over 319180 8040

Brought Over. 1776 9. 4530
 Cooley-hire for getting up the main and
 branch copper pipes in the wall }
 Cooley-hire for excavating earth & laying
 down the wrought iron pipes and
 refilling the earth } 20

2^d Block 2^d & 3^d Story.

170 Paving-gant Wrought iron branch pipes 1 in. dia. with
 Screwed Socket. 32 1884 3.3 114
 16 Wrought iron unions 1" dia. 6. 84 6
 16 Do 1" dia. 8. 84 8
 17 Turnbuckles for inner & outer thread 2. 84 2
 Composition tubes of 8" dia. with clamps 1. 1884 30

200 Do Double branch pipes or composition tubes
 1/8" dia. with clamps 2. 84 90

10 Copper junctions with screws 2. 84 14
 32 Copper T and unions of 8" dia. 78. 84 20
 10 — Do elbow and unions of 8" dia. 7. 84 5 134
 10 — Do and do 3/8" dia. 58. 84 18 5 1/4
 4 Do T and do 3/8" dia. 28. 84 134

8 Draft cocks 1" dia. with wooden box
 15" long complete 10. 84 80
 48 Single patent pendulous with 1/4 inch wing
 turns & stop cocks complete & turn over 6. 84 288

Cooley-hire for getting up the main and branch
 copper pipes in the wall 40

3^d Block 1st 2^d & 3^d story.

copying of 200
in East Saint George
Lower Olay

140. Running feet.

Thought now branch pipes 1" 3/4 with branch - 3.2 Cpl. 27 11 4

- Loose 1st long 1 side 1 3/4 x 1 1/2
 3. 3/4 unions of 1 1/2 long 1 side 1 3/4 x 1 1/2
 socket 1 3/4 for connecting the pipes - 1 " 6. 3
 4. 3/4 socket elbow 1 1/2 long by 1 3/4 for joining the
 branch pipes - 108 " 6 " 28
 5. 3/4 socket 1 1/2 pipes 1 3/4 for 3/4 x 1 1/2 unions 8 " 2 " 22
 17. 3/4 branches for union & also branch - 4154 1270

lowest over

(Brought to Quas - 244794 4530

Probable cost for putting up 22 Gas lights
 to the above buildings with necessary
 iron branch pipes & composition tube
 8/2 as well as the extra union in
 the line of the 22 sockets 10 2 1/2 x 3 1/2
 1-4 Sockets 10 2 1/2 x 3 1/2 x 3 1/2
 Probable cost for putting up 30 Gas lights to the
 above buildings with necessary iron
 branch pipes and composition tube
 11 4. 82 4278

Sanctory Chicago Street 8/2 - 20848 1110
 No 5 no for Pipe 8/2 1/2
 Laying Union underneath branch pipes 1 3/4
 for supplying Gas lights to the Sanctory

Union in East Saint George

- 350 Running feet
 470 80
 350 80
 11 80 Socket strong 1 long by 1 3/4 for joining
 the branch pipes 108 2757
 4. 80 1 1/2 pipes 1 3/4 for joining the branch
 pipes 88 2
 55 3/4 unions for minor and outer thread 2 6 14
 Composition tube of 3/4 without clamps for
 getting up in the run 1 1/2 1178
 80 3/4 without clamps and
 getting up in the pipe & patches 2 16 4312
 23 Copier Junction with screw 2 8 24
 26 Copier elbow and union of 3/4 78 164
 5 80 1 1/2 Unions of 3/4 7 2 45
 20 Copier elbow and union of 3/4 28 428
 5 80 1 1/2 and union of 3/4 58 248

Carried Over 31918 8640

5.	Brass cocks 1" 2 $\frac{1}{2}$ " with wooden box 15" 15" Complete	27 10 8640
9	Exp. light Chandeliers with 6 burners each Complete	85 76 50
1	Cyrt _____ with 8 burners	140 140 76 50
4	Double light pendant with 2 burners each Complete	30 120 140 76 50
2	Exp. Globes with burners	14 8 140 76 50
Excavating, the earth laying and fixing the wrought iron pipes in the wall and ground and refilling the earth		
body, hire for filling up the copper main and branch pipes 8 $\frac{1}{2}$ "		
Cundry Charges & scaffolding 8 $\frac{1}{2}$ "		
		77 3

N.B. as to Plain L

Laying down wrought iron branch pipes 8 $\frac{1}{2}$ " for supplying gas light to the Government Office in Fort Saint George

660.	Running feet	Wrought iron branch pipes 1" 2 $\frac{1}{2}$ " with screwed socket	32	130 10
10.	2 $\frac{1}{2}$ "	unions 1 ft long 1 side 4" 2 $\frac{1}{2}$ " and other		
10.	2 $\frac{1}{2}$ "	socket 1" 2 $\frac{1}{2}$ " for connecting the pipes	1	10
10.	2 $\frac{1}{2}$ "	socket elbow 9" long by 1" 2 $\frac{1}{2}$ " for joining the main pipes	10 8	6 10 8
10.	2 $\frac{1}{2}$ "	socket T. pipes 1" 2 $\frac{1}{2}$ " for joining the branch pipes	8	5
66.	Thimbles for inner & outer thread		2 8	8 4
1250.	Running feet.	Composition tube 5" 2 $\frac{1}{2}$ " with clamps to the branches for fitting upon the walls	4 3 12 8	
1150.	2 $\frac{1}{8}$ "	3" 2 $\frac{1}{8}$ " for fitting up in the joints	2	14 3 12
63.	Copper junctions with screws		2 8	7 14
20.	Wrought iron socket T. pipes 1" 2 $\frac{1}{2}$ " for joining the brgs and main pipes		8	10

Carried Over

634 10 8 10200 in

Thought over

634 108/0200

20. Thought over socket — pipes unions 1" 3/4 for joining the branch pipes — 6 8 7 8

156. Single light. Patent pendulum to 1/2 ft. long with 10 lb. weight. Unions 1/2 stop cocks complete with 1

lenses each — 6 — 936

100. Shuts 1 5/8 3/4 for joining the shaft main pipes 7 8 3/4 62 8

100. — 3/4 unions 5/8 3/4 for 3/4 branch pipes — 2 8 — 20 13 4

30. — 3/4 elbow & unions 5/8 3/4 — 5 8 — 13 12

30. — 3/4 1/2 unions 5/8 3/4 — 7 — 14 8

30. 3/4 elbow & 3/4 3/8 3/4 — 2 8 — 6 4

30. 3/4 1/2 3/4 — 3/8 3/4 — 5 8 — 13 12

10. Shuts cocks 1 3/4 with wooden key 15 1/2 3/4 complete — 10 — 8 100

Operating the valve and laying down weight. 11

Thought over for laying down the shaft pipes & setting 100 — 30 — 25 4 — 190

Thought over for laying down the shaft pipes & setting 100 — 30 — 25 4 — 190

Thought over for laying down the shaft pipes & setting 100 — 30 — 25 4 — 190

Laying down weight in branch pipes 1/2 for supporting gas light to the shaft house in front of unit house.

Lower shaft

Thought over branch pipes 1 3/4 with lenses

socket — 3 2 3/4 24 11 4

3. 3/4 unions of 1 1/2 long 1 side & 3/4 9 other socket 1 3/4 for connecting the pipes — 1 — 6 3

9. 3/4 socket elbow 9 long by 1 3/4 for joining the branch pipes — 10 8 — 6 —

5. 3/4 socket 1 1/2 pipes 1 3/4 for 3/4 9 unions 1/2 8 — 2 8

17. Shuts for inner & outer shaft — 2 — 2 2

Carried over — 41 5 4 12 170

Thompson

2112 / 241050

4. Coal manufacturing process each 22 ft. long by 3'-

Dr with Langard now do let 8 small 8's } 240 - - 260 160 -

1 I would give you 10 $\frac{1}{4}$ lbs long 1 8 $\frac{1}{2}$ with the deerskins
and the middle 8 $\frac{1}{2}$ ————— } 6 —

2 Ball iron banding 24 in each 64th long by 2¹/₂
— Dr with flange & screw hole 18 in by 18 in for 10 " " " 20 "
Connecting the Chambers —————

1 Toad skin hanging & dried 5 ft long by 1 1/2 in
with flanges described & made for
connecting the strainers

1 Knot pin — 20 — 9 ft long by $2\frac{1}{2}$ " diameter
with 20 — 8 — for connecting the pins }
Sinker & Line Sinker — } 20 . . .

[illegible]

6000 lbs. each 3 ft. long by $\frac{3}{4}$ in. 14. 78.
For connecting the two ends.

Wolfeboro' Dec 18 th Long by 6' 6" with above and further paper 8 ^{rs} _____	300
Do by line for putting up the new articles and making charges 8 ^{rs} about 10 th Cent _____	254 6 10.

To the of Plain ~~to~~ ~~the~~ ~~the~~
 Constructing in Masonry Carts for your work

Barrie Quon " " 1898 " "

Running feet. Composition tube $\frac{5}{8}$ D^o with clamps for filling.
up in the wall.

Brought Over

41 5 4 12 170

80. D^o $\frac{3}{8}$ D^o with clamps for filling
up in the joints 2 10
3. Brought iron socket T^o pipes 1" D^o for joining the
branch and main pipes 8 18
15. D^o unions 1" D^o for joining the copper branch
pipes 6 5 10
2. Brass cock 1" D^o with wooden box 15 D^o complete 10 20
1. Single light patent pendant 6 ft. long with bat
wing burners and stop cocks 4 complete with 1
burner 6 6
2. Double light bracket with argand burner and
stop cocks complete with 2 burners each 5 10
2. Two do patent pendant 4 ft. long with
argand burner and stop cocks complete
with 2 burners each 25 50
1. Single light brackets with bats wing burners
and stop cocks do 2 2
7. Copper elbows $\frac{5}{8}$ D^o for joining the branches
pipes 5 8 3 3 4
5. D^o T^o $\frac{5}{8}$ D^o for joining the main pipes 7 2 14 8
5. D^o unions $\frac{3}{8}$ D^o for joining the branch do 2 8 1 8
Operating the earth and laying wrought iron
pipes and refilling the earth 3
loopy wire for laying down the copper pipes
and filling up with screw & nuts 35
Upper Story.

72. Running ft. Brought iron branch pipes 1" D^o with screwed
socket 32 14 4
8. Shimble for inner & outer thread 2 8 1
5. Brought iron socket unions of 1" D^o for connect-
ing the pipes 6 1 14

Bought from

258 14 8 12 170

290 Running ft

710 292

Compositions like 5/8 3/4 with clamps for fitting up
in the walls 4 69 8
both for launch as 2 3/8 2 3/4 3/4 for do in the 2 8 12

ports

- 1. do 7 5/8 3/4 for joining the copper main pipes 7 8 2 3/4 4 6
- 18. do elbows 5/8 3/4 for do the main pipes 5 8 8 4
- 5. do unions 3/8 3/4 for do the launch pipes 2 8 1 8
- 4. do elbows 3/8 3/4 for do 2 8 13 4
- 14. do junction with screws 2 8 1 12
- 3. Single light brackets with lat wing runners 6
- 2. 4 stop cocks complete with 1 runner each 2 10 6
- 2. Double do with organic runner complete 5 2 3/4 10
- 1. do patent pendant with organic runner 25
- 4. do complete with 2 runners each 25
- 2. 2 small 3/4 stop cocks with 1 runner each 15 8 90
- 1. do do do complete with 1 do 75
- 1. Dip do do with organic runner & stop cock complete with stop runners 85
- 1. Seven by two run light patent pendant with organic runner and stop cock complete with 72
- runners 250
- body line for laying down the copper pipes & fitting up with screws & nuts 8 6
- 3. 4 stop cocks 1 with wooden key 15 9 30
- 4. 4 stop cocks & draft tubing 8 47 94 1030

178 8 as 5 Plan. 01

Laying down East river pipes from the south side of the European Runways to the Point of the Gate end of the pier for the Gas works.

Carried over 13200

Brought on 13200

1854. Pumping feet Cast iron socket pipes 4" 8" with screws nuts and

	washers 8" - - - - -	1	8" 1854
5.	Cast iron elbows 1" 8" - - - - -	3	8" 17 8"
6.	do T. pipes with sockets - - - - -	7	8" 4.5"
1.	8" Diagonal T. with caps - - - - -		8"
7.	8" Blind caps 4" 8" - - - - -	5	8" 35"
5.	8" Bend 4" 8" - - - - -	10	8" 50"
4.	8" Pipe cock 4" 8" with sockets - - - - -	80	8" 320"

140. 8" Ramming the granite stones in the futings & resanding
for laying down the pipes & reflooring the same
in chimneys - - - - - 8" 8" 70"

114. 8" Laying down the pipes under the wooden platform of
the draw bridges with teakwood trunks & screw nuts
4 iron clamps 8" - - - - - 1 114"

1600. 2. 2. 2. Excavating the earth & laying down the pipes & reflooring
the same - - - - - 6" 50"

1600. 2. 2. 2. Laying road with old & new laterite stones jelly & gravel
of 3" thick well tamped with water & sea sand
strewn over - - - - - 1 8" 8" 48"

body hire for laying down the pipes & fitting up 8" - - - - - 50"

Landry charges 8" - - - - - 138 8" 2800"

22. 9. as per Plan & The A.

Laying down gas pipes from the house to the
Regiment recreation & reading room 8"

837.	Cast iron socket pipes 1" 8" - - - - -	1	8" 837"
200.	Wrought iron pipes 1" 8" with screwed sockets - - - - -	32	8" 39 9 4"
	Thimbles for inner & outer thread - - - - -	2	8" 2-8"
	Cast iron T. pipes with sockets 4" 8" - - - - -	7	8" 67 8"
	8" unions and sockets 4" 8" & the other 1" 8" for connecting the pipes - - - - -	1	8" 2"
	8" 8" elbows caps 4" - - - - -	5	8" 35"
	Wrought iron elbows 1" 8" - - - - -	10.8	8" 8"
	Brass socket 4" 8" with socket - - - - -	80	8" 240"

3.	8" 1" 8" with wooden box 15" 8" complete - - - - -	10	8" 30"
	Wrought iron pipe 1" 8" - - - - -	32	8" 69 4 4"
35.	Thimbles for inner & outer thread - - - - -	2	8" 4 6"
200.	Composition tube 5/8" - - - - -	4	8" 50"
150.	8" - - - - -	2	8" 18-12"

22. 9. as per Plan & The A.

Carried Over 1403 15 8 16000

837

Oct 14

1700

10. Copper junction with screws 2. 8. 1 4
- Expanding the joint and laying down the carting - 6 Oct 26-26
- Laying road with old and new latite stone
- Petty & gravel of 3 in thick well
- laid out
25. Set of 20 Pairs & chains for 1 pipes with caps 1 28. 8. 29 2-8
25. Chains of 1 and unions 5/8 6. 9 6
25. Pipes 1 and unions 5/8 5-8. 4 11 7 4
25. Body line for laying down the pipes and 4 8. 15 10
5. Fitting up 30
- Double patent handcart 10 ft with aground
- runners & stop coaks complete with
- runners each 45. 8. 225
3. Double do with aground runners
- and stop coaks complete including
- with 2 runners each 30. 90
10. Single patent do do with 1 runner each 8. 80
30. Common handcart 1 12. 52 8
3. Brags coaks 1 ft with wooden key 15 13
- complete 10. 30

Carting charges 88 98-15-10 2190

125. Running ft

50 2

1. Back iron pipes 4 1/2 1 8. 125
4. 2 2 1/2 3 8. 14
- Throught iron pipes 1 2 3 2. 9 14 4
25. 1 Union & T. Pieces among 14 iron 14. 21 14
25. 5/8 2 2 2 7 8. 4 18 10
25. 3/8 2 2 5 8. 11 7 4
3. Set of keys for 15/8 and 3/8 fitting always
- while lead for amongst iron fitting
- for brags and runners and
- other spars 100
5. Shingles for inner & outer head 22 8 10
36. Screws to set for setting patent
- brackets 10

Laying down & fitting the gas pipes 191-84. 500

Carried Over 18690

Wrought Iron 18690

As per portion of General Plan A.
For lighting the Canteen.

198. Running feet -	Wrought iron pipes 1" Dia.	32.894	393.
2	Do. T pipes with socket 1" Diameter	8.	1.
2.	Do. unions with socket 1" Dia.	6.	12.
10	Thimbles for union & outer thread	2.	14.
	Composition tube 3/8"	2.	28.
1	Union with screws		2.
2	Copper T & unions 3/8" Dia.	58.	148.
4	Do. elbows & unions 3/8" Dia.	28.	134.
1	Draft cocks 1" Dia. wooden bay. 15" long complete		10.
	Excavating earth laying & facing wrought iron pipes in the wall & grout & refilling the earth		15.
	Cooling line for fitting up the copper branch pipes		20.
	2 Upright wooden stands	3	6.
	Sundry charges		27.

No 12 as per portion General Plan A.
Laying down cast & wrought iron main & branch
gas pipes in the street of the Port for supplying
gas to the lights in the buildings & streets of
Port Saint George

7,000 Running feet -	Cast iron socket pipes 4" Dia.	1.	204.700.
26	Do. socket unions 4" Dia. & another socket	1.	26.
4	Do. socket unions 4" Dia. & another socket 2" Dia. for connecting the pipes	18.	6.
118.	Cast iron T pipes with socket 4" Dia. for connecting the main pipes	78.	885.
14	Do. elbows with socket 4" Dia. for connecting the main pipes	38.	49.
20	Draft cocks 4" Dia. with socket	80.	1600.
6655. Right -	Excavating the earth & laying down the pipes and refilling the same		60. 204.156.

Carried Over

Druggist's Book

9773 15 & 18790 ..

20000 . Laying road with old & new latoids alone & } 18 . \$4.300 ..

Good line for laying down the pipes & getting up } .. . 75 ..

with stone & rubble &c.

4760 - Plt - Road from docket pipes 2' Dr. 56 Cyls 1636 4 .

18 - Dr - T-pipes with docket 2' Dr. for } 4 . . . 62 . .

connecting the pipes

22 - Dr - Lanes with docket 2' Dr. for connecting } 1 . . . 22 . .

the pipes

5 - Dr - mounds with Dr for Dr 1120 " 8 12 .

20 Dockets each 2' Dr. with docket 25 . . . 570 . .

4530 - Dr - Breaching the earth & laying down the pipes and } .. . 6 Cyls 141 9 .

refilling the same.

Good line for laying down & getting the pipes 60 . .

13600 . Laying road with old & new latoids alone & } 18 . \$492 204 . .

572 Dockets for minor & anti-throat .. . 20 64 . .

40 Dockets minor pipes with docket .. . 20 . .

95 Dr - elbow with Dr .. . 108 . . 62 . .

81 Dr - minor mounds with docket .. . 6 . . 22 14 .

20 Dockets each 1' Dr. with woodruff 15 of 20 Cyls 10 . . . 200 . .

4870 - Dr - Breaching the earth & laying down the pipes & refilling } .. . 6 Cyls 1523 .

the same

Good line for laying & getting the pipes with iron } .. . 57 . .

clamps &c.

14600 . Laying road with old & new latoids alone & } 18 . \$4219 .

gravel & rubble well beaten with water

3700 - Dr - Conjunction tube 5' Dr. with clamps .. . 4 . Cyls 925 .

570 - Dr - Dr 3' Dr .. . 2 . . 62 8 .

185 Copiers Junction with stone .. . 2 . \$2 23 2 .

88 Copiers mounds 5' Dr. for joining the main pipes 2 . . . 14 10 8

Barnes One 15122 3 6 18790 . .

Brought over

1562236 18790

187 Copper elbows $\frac{5}{8}$ " Dr. for Dr. 58. 28. 85 11457 Dr. 7" - $\frac{5}{8}$ " - Dr. for Dr. 7 20. 31 8.70 Large size Glaciers with burners & holders 8 $\frac{1}{2}$ " }
Complete } 7 49024 Single light Patent Pendant 4 ft. long with bats
wing burners & stop cocks complete to the }
Guard Room } 5 12060 Wrought iron Syphons 1 Dr. with screws & nuts
for connecting with the main pipes to discharge }
the waste water of the Gas } 7 420Constructing 120 Cess-pools with masonry 2 ft. high
by 3 ft. deep each & covering over a leadwood } 10 1200Close planks with frames & iron rings 8 $\frac{1}{2}$ " complete
to only two for laying down the copper main & branch }Pipes & fitting up with screw & nuts 8 $\frac{1}{2}$ " 262Sundry Charges & scaffolding 8 $\frac{1}{2}$ " 918. 92

19150

A. 13. as a portion of Plan A.

The following materials required to replace
the barges & for supplying additional lights
the necessity of which has not been foreseen

450. O. P. 1. Dr. 32 O. P. 89 1.

6 Dr. Socket 7" 1 Dr. 8. 3

2 Dr. unions 3' - Dr. 1 2

4 Dr. 7" 1 Dr. 8. 2

3 Dr. Syphons 1' - Dr. 21

8 Dr. Socket elbows 1' - Dr. 108 5 5 4

45 Thimbles for minor & anchor thread 2. 5 10

381 - O. P. 1. Dr. 4. O. P. 95 4.

20 - O. 1. Dr. 32 Dr. 3 15 4

4 Copper unions $\frac{5}{8}$ " - Dr. 28. 13 420 Dr. elbows $\frac{5}{8}$ " - Dr. 58. 9 28.

Carried over 2373537940

1880

	Adm. portion of	Brought Over	
13 The following) Printed papers to replace booklets and for supplying additional to get the necessity of which has not been provided		1150	
14 Removing the old and new copies from the books to Europe and make the and buying the new & copies		1960	
15 To the same		2930	
16 To the same		2720	
17 To the same		3400	
18 To the same		50100	
19 To the same		15000	

Copy sent to George Washington D.C.
Fort Smith George
15th. November 1886 }

J. H. P. 65100
 J. H. P. 65100
 J. H. P. 65100

22/06/04 M.L.

Duplicate. His tract estimate No 235 of 1866/67.
District Presidency No 1 or 7 m. Co.

Short Estimate for enlarging the Gas works at Fort Saint George.

Estimate Item No.	Description of work	Amount	Total
----------------------	---------------------	--------	-------

1	At 7 Plan to C Removing present Retorts and erecting 5 sets of double bench Retorts with one end High and other low	1190	
2	At 7 Plan to C Hydraulic main Iron Retorts and Furnaces &c	2140	
3	At 7 Portion of General Plan. A Supplying additional lights to the European Barracks & lighting the Mirandah of the same building	1200	
4	At 7 Plan to C Laying down wrought iron branches, pipes and supplying gas light to the new Family Barracks	4110	
5	At 7 Plan to C Laying down wrought iron branches, pipes and supplying gas light to the light to the Court House Church	1560	
6	At 7 Plan to C Laying down wrought iron branch pipes for supplying gas light to the Government Office	1970	
7	At 7 Plan to C Laying down wrought iron branch pipes &c for supplying gas light to the High House	1030	
8	At 7 Plan to C Laying down least iron pipe from the South side of the European Barracks to the Court House & end of the Gas works	2800	
9	At 7 Plan to C Laying down gas pipes from the Court House to the Regimental recreation and reading rooms &c	2190	
10	At 7 Plan to C Copies (as Portion of General Plan. A)	500	
11	At 7 Portion of General Plan. A For lighting the Court House	100	
12	At 7 Portion of General Plan. A Laying down cast and wrought iron main and branch pipes in the Street of the Fort for supplying gas to the light in buildings and Streets	19150	
	Carried Over	37940	

13

... of ... 1840 ... 1150 ...

13

The following materials required to replace breakage and for duty ... 1960

14

Removing the old 3 inch brass pipes from the ... 1960

15

... 2900

16

... 2720

17

... 3400 ... 50100

... 15000

... 1866

... 1866

... 1866

15

... 1866

... 1866

... 1866

Dec 19 - Dec 8 / 11 ... 1866

2 4828 / 18

Albany, N.Y. 1886
Portable Estimate of Constructing a Hydraulic Ram with Specifications for working

No.	Particulars	Height ft.	Rate	Amount	
27 3/8	Supl. of Sheet Iron 3/8" for top cover to main including tapping	4 10 7/8			The sheet is laid over 1/2" on each side across the length and rivetted the rivets to be at 22" from center to center.
49	Supl. of Sheet Iron 3/8" for supplementary deck with its sides including tapping	7 35			
38	Pl. of Angle Iron 2" x 3/8" thick for securing the top and the sides	20 3			There are two pieces of Angle iron each 11'6" long and rivetted to secure the top of the sides of the lower deck by being rivetted a rivet of size at 22" apart from the inner end.
2 1/2	Supl. of Sheet iron 3/8" for both end of the main including tapping	37 1/2			
62 1/2	Pl. of 7/8" round iron for rivets	64			The end sheet is to be rivetted to the sides.
25	Smalls				
25	Hammerhead				600 rivets each to be 1 1/2" long.
30	Files				
21	Riveters				
	Sundry charges				
	Total		180		

Don't forget to send 13th November 1886.

Wm. H. Munn & Co.
Engineers & Iron Works

Copy in a letter to England
8/5. March. 1867

has works

For St. George

P. M. 4020/65

14th December 1865

Proc. 19th Dec. 1865 du 4366

Original
Duplicate

Estimate and specific
ation for a new hydram
lic train

P. 180

Cuc

Printed by the
relieve the

3905

3995

7k

Ordered to lie over
with reference to the
Orders of Govt under
= date the 1st Instant,
No. 3832.

WHL

AP

AB

6554 Dec ✓
" Pub Dept ✓
" Ind Dept ✓
" Suppt Govt Genl Mks ✓
Dec 20: December

Start St George
19th Dec 1866