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MADRAS RECORD OFFICE.

Government of Madras.

Financial DEPARTMENT.

G.O. No. 519 Press Mis.

76-27. 76-77

Dated 6—3— 1825.

20/21

Not to be folded or roughly handled

Proceedings of the Madras Government, Financial Department, 6th March 1875.

Municipal Drainage.

No. 76. Read the following Proceedings of Government in the Public Works Department, dated 25th February 1875, No. 208 :—

Read the following letter from W. CLARK, Esq., C.E., Drainage Engineer, Madras, to Colonel G. W. WALKER, R.E., Secretary to Government, Public Works Department, Fort St. George, dated Mount Road, 12th February 1875.

In continuation of my Memorandum, dated 14th January 1875, I have now the honor to forward a further report of progress made with the scheme for draining Madras, and I take this opportunity of forwarding a Memorandum on the River Cooum for such consideration as you may deem desirable.

DRAINAGE OF MADRAS.

Memorandum.

The levels of those portions of the town area which are likely to be comprised within the drainage scheme are now nearly completed, and two only of the Surveyors are retained to take such further levels as may from time to time be found necessary.

2. With the plans of Major Tulloch's scheme alluded to in my former Memorandum,* I have been able definitively to fix on the position to be given to the main sewers in the various districts of the town, and these very nearly coincide with those adopted by him.

* Dated 14th January 1875.

3. The absence of any reliable plan at a smaller scale† has necessitated my laying out the scheme on the Revenue maps at the large scale of 100 feet to the inch, and in fact the sections then became working drawings by which, when completed, any part of the work can at once be commenced. This is a great advantage, but it involves a considerable extra amount of labor above what the delineation of a scheme absolutely requires, as every sewer will be shown at its inclination and depth to $\frac{1}{0}\frac{1}{0}$th of a foot ; this, I trust, will be satisfactory to the Government, but the time occupied in doing this is very considerable.

† The six-inch plan is too small.

4. The laying out of the sewers for Black Town is now completed on plan, but have not all as yet been transferred to the sections ; this and the inking in of the plans, &c., is a large and very tedious business. I have been compelled to increase considerably the number of Draughtsmen employed, and I hope in the course of the next two weeks to get the entire drainage plans and sections of Black Town and the Fort completed, and good progress made with the plans of the other divisions.

5. The sections of the remaining and more important sewers will also, I hope, soon follow ; but it is quite evident to me that I shall be unable to complete the whole work in this detailed form within the period of my engagement, with every possible assistance and spending long hours at the work daily. I mention this now not as a difficulty but to prevent disappointment.

6. I may here mention that the site I have fixed on for the pumping station is on the open area of land to the east of the Elephant Gate Bridge, but should any difficulty arise as to the arrangements for obtaining this property, a small spot on the opposite side of the canal in the People's Park will be suitable ; but I would prefer the former.

7. The object in selecting this position is to save about 4 feet of lift for the pumps and the construction of about one mile of the deepest, and, therefore, most expensive portion of the work, as laid down in Major Tulloch's scheme.

8. The out-fall culvert I propose to carry along the ridge of high ground occupied by a portion of Mint Street, from the end of Ramanen Street and along the Trivatoor High Road to the sandy

road shown on the map as Balakistnama Naick Street leading to the sea. That portion of the outfall within the town will have a fall of 5 feet per mile, and can be constructed either of iron or brickwork; estimates will be given for both. The brickwork culvert can be made absolutely impervious by brick-in-cement lining; but should the present price of cast iron in England prevail when the works are executed, it is probable that only a very small increase of expense would be incurred by adopting that material, should it be deemed desirable; but I am quite confident that the brickwork culvert can be satisfactorily completed and be equally efficient at a smaller cost.

12*th February* 1875. (Signed) W. CLARK, C.E.,
Drainage Engineer.

THE RIVER COOUM.

The condition of the River Cooum, as the chief receptacle for the surface waters of Madras, is of the greatest importance.

2. The area of the city is far too large to permit of any measures for effecting its surface drainage, excepting by the ordinary means of gravitation to a lower level, and as the level of the sea is the lowest that can possibly be obtained, it is evident that, if the River Cooum can be kept down to this, it will be in the best condition for effecting the surface drainage of the city.

3. It is moreover desirable, for many reasons, that fresh supplies of sea water should enter with the daily tidal current; the presence of a stagnant lagoon of sea water closely adjacent to the most populous part of a large city is most undesirable, but when it is made to receive the sewage of the population for weeks and months together, as at present, it becomes a source of nuisance and danger to health. The greatest benefit to the Cooum, undoubtedly, will be the diverting of the sewage into other channels, and to prevent entirely the contamination of its waters; and should the very necessary works of drainage be executed, still in the present condition of the bed of the River Cooum (which has for many years received the greater part of the sewage) the necessity for an improvement in its condition will only be lessened in degree, and therefore I venture to offer, for the consideration of Government, a few remarks on the subject.

4. From a daily observation of the bar since my arrival in December last, and from information with which I have been favored by Colonel Goddard, Colonel Moberly, and others, it is apparent that no regular discharge of upland fresh water throughout the year can be expected, and it is from the tidal influence alone that any power can be obtained towards the keeping of the "bar" open throughout the year; and the case at once resolves itself into the question of quantity and velocity of the current entering and issuing four times in the twenty-four hours.

5. In this view of the matter, the area of the Cooum affected by the tidal influence and regarded as a *reservoir* for the flood-water at high tide, to be discharged as the tide falls, is an important feature. The river when in flood, as during October last, scoured out the entire channel through the bridge, and a clean channel was left; this was the result of an enormous body of water moving at a high velocity.

6. As the quantity diminishes at the cessation of the rains, the water of the flood tide gradually finds its way in, and it becomes a contest between the loose sand thrown up by the surf at the mouth of the river and the entering and issuing tidal water; as this process goes on during the north-eastern monsoon current, the river is forced towards the southern end of the bridge, where there is a short groyne, and the drift sand occupies four-fifths of the water-way of the bridge leaving a narrow channel only, this channel is kept open for several months by the scouring action of the tidal water in passing to and from the *reservoir* of the Cooum.

7. As the river succeeds in forcing for itself a channel through the enormous quantity of loose shifting sand for several months, it may, I think, be expected that, if some comparatively small means of assistance were afforded, it would remain permanently open.

8. Those who have known the river before the rough groyne of granite boulders above alluded to was placed on the sea side of the bridge at its southern end, will be able to say how far, or for what period, the closing of the "bar" has been protracted.

Proceedings of the Madras Government, Financial Department, 6th March 1875.

9. My observations during the past two months have shown that the outlet of the channel into the sea shifts towards the north. A quantity of sand accumulates on the "bar" side at the head of the groyne and gradually increases in extent, causing the opposite or north side of the channel to scour away the sand by the action of the waves which break on its face during flood tide and carrying the sand nearer to the bridge, where a very considerable eddy is formed, and a quantity of sand is piled up at the back of the shoal first formed as above; as this action proceeds, the northern side of the channel becomes more and more exposed to the action of the waves, and the silting up of the channel is more and more rapid, until the time when the projecting shoal on the south side will overlap the northern side of the channel completely, (it now extends to a point opposite the seventh arch from the southern end of the bridge) and will soon completely overlap the channel; in this condition of things the waves (which break nearly parallel to the shore) will commence to cut the point of the shoal itself and drive it bodily in towards the bridge, and the "bar" will then at once be closed.

10. I am of opinion that, if a channel of suitable width be formed by the construction of groynes on both sides, and the entering and issuing water be confined to this channel during the dry season, that a quantity of water moving at sufficient velocity will be obtained to keep the channel open throughout the year by the scouring action of the tidal water alone. I have roughly estimated the quantity of water which the River Cooum will contain between the South Beach and Harris' Bridges.

11. The ordinary rise of the tide I learn is about 3 feet; for purposes of calculation I have taken 2 feet 6 inches as spread over the area of the Cooum between the above points, and I find the quantity to be about 16½ millions of cubic feet which must enter through the channel at the "bar in six hours; this quantity in a channel, having a sectional area of 300 square feet, would give an average velocity of 2½ feet per second—of course this velocity is not uniform, it is greatest about half tide of both flood and ebb; and at extreme high or low water the velocity for a brief period is *nil*, but for a very considerable portion of the six hours the velocity will be much higher—from 4 to 5 feet per second—and I consider quite sufficient to keep the channel, with a capacity such as I have mentioned, open if the loose sand at the mouth be so far confined and controlled as to admit of the scouring action of the water being concentrated on its sectional area only, and in a direction at right angles to the general shore line.

12. I have repeatedly observed the water entering with a velocity at the surface of 4 feet per second (and the channel I take to be about the size I have indicated) under the present condition of things, but the mass of sand it has to contend with on both sides along its whole length is too great to be overcome by the small stream opposed to it.

13. I am unable to say whether the water-way of the bridge is sufficiently ample to admit of 50 feet out of its 500 feet to be appropriated to the construction of a groyne on the north side of the channel; but judging from the other bridges higher up where the water-way is very considerably less, I should think 50 feet might be spared—in that case I should appropriate the 3rd arch (from the south end of the bridge) to the construction of the groyne, which, with the existing one on the south side, should be extended about 200 feet further seaward and to a depth which experience has proved to be the lowest point of scour under the bridge.

14. Should it be inadmissible to construct a groyne in that position then an independent opening further to the north would be necessary at a considerable increase of expense.

15. The river in its shoal portion should be deepened so as to be from 1 to 2 feet of depth at low water.

16. It would also be necessary, on the approach of the monsoon season, to keep the sand at the bar down to a level which would easily admit of the flood water topping and scouring it away, so as to avoid any undue strain on the permanent channel.

17. The upper reaches of the river may be immensely improved by training walls at intervals to confine the stream during the dry season to a defined channel—the general bed being levelled—

and it is, I believe, sufficiently high for grass to grow upon. Not only would the general appearance of the river then be improved, but its discharging power would, I consider, be improved also.

12th February 1875. (Signed) W. CLARK, C.E.,
Drainage Engineer.

Transferred to the Financial Department.

2. His Excellency the Governor in Council thanks Mr. Clark for his suggestion on the subject of the Cooum River. The project may more conveniently be discussed when Mr. Clark's Drainage proposals shall have been decided on.

(True Extract.)
(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government, P.W.D.

No. 77. ORDER THEREON, 6th March 1875, No. 519.

Communicated to the Municipal Commissioners for the Town of Madras and to the Sanitary Commissioner, in continuation of G.O., dated 27th January 1875 No. 151.

(True Extract.)
Chief Secretary.

To the President of the Madras Municipal Commission.
" Sanitary Commissioner.
" Public Works Department.

Exd. T. O'Connor.

5

Drainage Engineer's Office,
123 Mount Road,
12th February 1875.

From,
W. Clark Esqr. C.E.
Drainage Engineer,
Madras.

To,
Colonel G. W. Walker R.E.
Secretary to Government P.W. Departt.
Fort St. George.

Sir,

Enclosures 2.

In continuation of my memorandum dated 11th January 1875, I have now the honor to forward a further Report of progress made with the scheme for draining Madras, and I take this opportunity of forwarding a Memorandum on the River Coovum for such consideration as you may deem desirable.—

I have the honor to be,
Sir,
Your most obedient Servants,

W. Clark C.E.
Drainage Engineer.

Govt. of Madras.

FINANCIAL.

To

THE PRESIDENT OF THE MADRAS MUNICIPAL COMMISSION.
&c., &c., &c.

Dated March 6th.

Recd. 8th.

G.O., 6th March 1875, No. 519.

MARCH.
Nos. 76-77.

Drainage of Madras.—Proceedings of Government, Public Works Department, transferring Report and Memorandum from the Drainage Engineer on the scheme for draining Madras, and on the River Cooum, communicated to the Municipal Commissioners for the Town of Madras and to the Sanitary Commissioner, in continuation of G.O., dated 27th January 1875, No. 151.

2 9

Memorandum

The levels of those portions of the Town area which are likely to be comprised within the Drainage Scheme are now nearly completed, and two only of the Surveyors are retained to take such further levels as may from time to time be found necessary.—

With the plans of Major Tulloch's scheme alluded to in my former Memorandum[x] I have been able definitively to fix on the position to be given to the Main Sewers in the various districts of the Town and these very nearly coincide with those adopted by him.—

The absence of any reliable plan at a smaller[x] scale has necessitated

[x] Dated 16th January 1875.

[x] The six inch Plan is too small.

P. W. 1875 Depr.
No: 1074

From
The Drainage
Engineer
To 12 Febr. 1875
Rd 17th " "
E. 2.

Forwarding a further report of progress made with the scheme for draining Madras, and also a Memo: on the River Cooum —

Read in Tel. No 479 of 1875.

necessitated my laying out the scheme on the Revenue Maps at the large scale of 100 feet to the inch, and in fact the Sections then became working drawings by which when completed any part of the work can at once be commenced - This is a great advantage but it involves a considerable extra amount of labor above what at the delineation of a scheme absolutely requires, as every Sewer will be shewn at its inclination and depths to 1/10th of a foot - this I trust will be satisfactory to the Government, but the time occupied in doing this is very considerable. -

The laying out of the Sewers for Black Town is now completed on Plans, but have

have not all as yet been transferred to the Sections, this and the inking in of the Plans for is a large and very tedious business. I have been compelled to increase considerably the number of Draughtsmen employed, and I hope in the course of the next two weeks to get the entire drainage Plans and Sections of Black Town and the Fort completed, and good progress made with the Plans of the other Divisions. -

The Sections of the remaining, and more important Sewers will also I hope soon follow - but it is quite evident to me, that I shall be unable to complete the whole works in this detailed form within the period of my engagement, with every possible assistance

and

and spending long hours at the work daily- I mention this now not as a difficulty but to prevent disappointment.-

I may here mention that the site I have fixed on for the Pumping Station is on the open area of land to the East of the Elephant Gate Bridge, but should any difficulty arise as to the arrangements for obtaining this property, a small spot on the opposite side of the Canal in the Peoples Park will be suitable, but I would prefer the former.-

The object in selecting this position is to save about 14 feet of lift for the Pumps and the construction of about one mile of the deepest and therefore most expensive portion of the work as laid down in Major Tulloch's scheme.-

The outfall Culvert I propose to carry along the ridge of high ground occupied by a portion of Mint Street, from the end of Ramanen Street and along the Trivatoore High Road to the sandy Road shewn on the Map as Balakistnama Naick Street leading to the Sea- That portion of the outfall within the Town will have a fall of 5 feet per mile, and can be constructed either of Iron or Brickwork,- estimates will be given for both- The Brickwork Culvert can be made in absolutely imperious by Brick in Cement lining; but should the present price of cast Iron in England prevail when the works are executed, it is probable that only a very small

increase

increase of expense would be incurred by adopting that material should it be deemed desirable, but I am quite confident that the Brickwork Culvert can be satisfactorily completed and be equally efficient at a smaller cost.—

Drainage Engrs Office
123 Mount Road
12th February 1875.

W Blair
C E
Drainage Engineer.

Madras 27th March 1795

Surface Drainage.

Encl in Fort St. George Gl 10th Sept 1795

The River Cooum

The Condition of the River Cooum and the Shore at Black for the Surface waters of Madras is of the greatest importance.

The area of the city is far too large to permit of any measures for effecting its Surface drainage, except-ing by the ordinary means of gravitation to a lower level, and as the level of the Sea is the lowest that can possibly be obtained, it is evident, that if the River Cooum can be kept down to this, it will be in the best condition for effecting the Surface drainage of the city.

It is moreover desirable for many reasons that fresh Supplies

of

of Sea water should enter with the daily tidal current: — the foreshore of a stagnant lagoon, of Sea water closely adjacent to the most populous part of a large city is most undesirable; but when it is made to receive the Sewage of the population for weeks and months together, as at present, it becomes a Source of nuisance and danger to health. The greatest benefit to the Town undoubtedly will be the diverting of the Sewage into other Channels, and to prevent entirely the contamination of its waters; and should the very necessary works of drainage be executed, still in the present condition of the bed of the River Town (which has for many years received the

the greater part of the Sewage) the necessity for an improvement in its condition will only be lessened in degree, and therefore I venture to offer for the consideration of Government a few remarks on the Subject.

From a daily observation of the Bar since my arrival in December last and from information with which I have been favored by Colonel Goddard, Colonel Moberly and others, it is apparent that no regular discharge of upland fresh water throughout the year can be expected, and it is from the tidal influence alone that any power can be obtained towards the keeping of the "Bar" open through-out

throughout the year; and the case
at once resolves itself into the question
of quantity and velocity of the current
entering and issuing four times in the
24 hours.

In this view of the matter,
the area of the Cowm affected by
the tidal influence and regarded
as a reservoir for the flood water
at high tide, to be discharged as
the tide falls is an important fea-
ture. The river when in flood,
as during October last, scoured
out the entire channel through the
Bridge, and a clear channel
was left, this was the result of
an enormous body of water moving
at a high velocity.

As the quantity dimi-

2/6

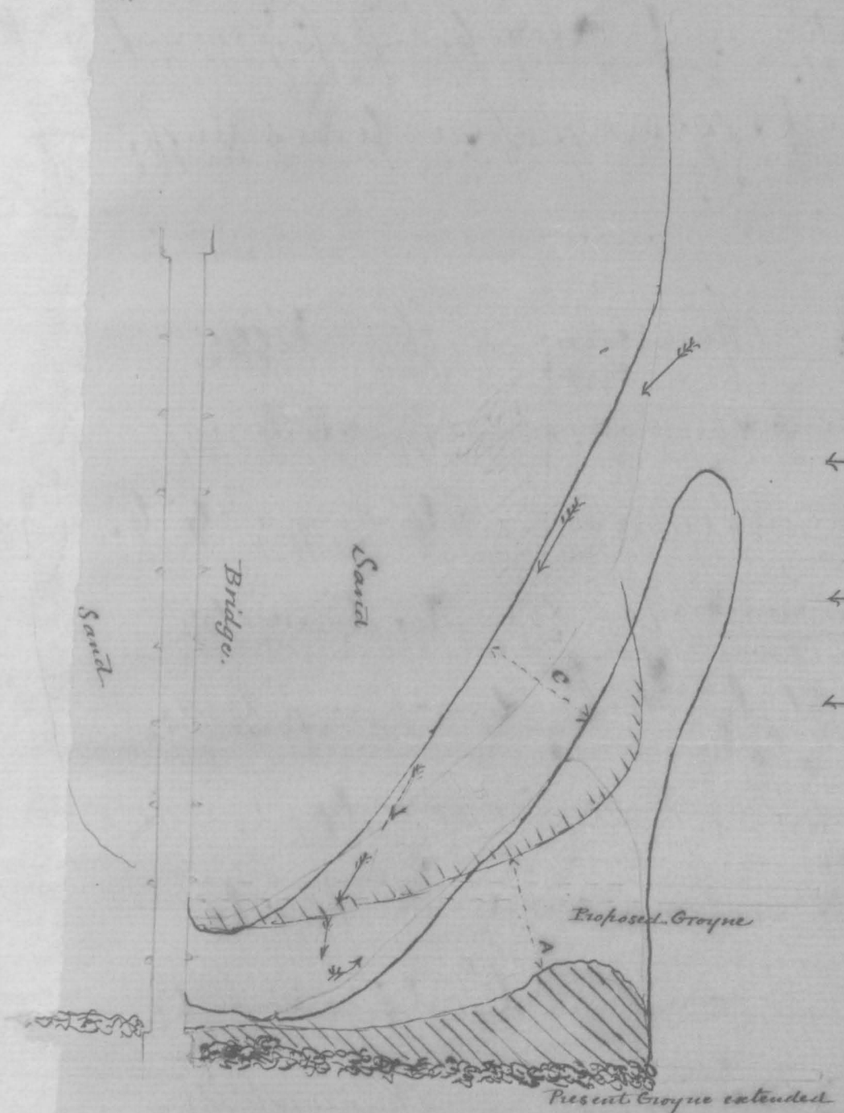


Diagram illustrating the shifting of the Channel towards the North and the process by which the Bar is closed.

diminishes at the cessation of the rains, the water of the flood tide gradually finds its way in, and it becomes a contest between the loose sand thrown up by the Surf at the mouth of the river, and the entering and issuing tidal water; as this process goes on during the north eastern monsoon current, the river is forced towards the Southern end of the Bridge where there is a short groyne; and the drift Sand occupies four fifths of the water way of the Bridge leaving a narrow Channel only, this Channel is kept open for Several months by the Scouring action of the tidal water in passing to and from the reservoir of the Coum.

As the river Succeeds in forcing for itself a Channel through the

enormous

enormous quantity of loose shifting sand for Several months, it may I think, be expected that of Some comparatively small means of assistance were afforded, it would remain permanently open.

Those who have known the River before the rough groyne of granite boulders above alluded to was placed on the Sea Side of the Bridge at its Southern end, will be able to say how far, or for what period the closing of the "Bar" has been protracted.

My observations during the last two months have shewn that the outlet of the Channel into the Sea shifts towards the north — a quantity of Sand accumulates on the "Bar" side at the head of the groyne, and gradually

gradually increases in extent, causing the opposite or north side of the Channel to Scour away the Sand by the action of the waves which break on its face during flood tide and carrying the Sand nearer to the Bridge, where a very considerable eddy is formed, and a quantity of Sand is piled up at the back of the Shoal first formed, as above; as this action proceeds, the northern Side of the Channel becomes more and more exposed to the action of the waves, and the silting up of the Channel is more and more rapid until the time when the projecting Shoal on the South Side will overlap the northern Side of the Channel completely (it now extends to a point opposite the Seventh arch from

from the Southern end of the Bridges and will soon completely overlap the Channel – in this condition of things the waves (which break nearly parallel to the Shore) will commence to cut the point of the Shoal itself and drive it bodily in towards the Bridges, and the "bar" will then, at once be closed.

I am of opinion that if a Channel of suitable width be formed by the construction of groynes on both sides, and the entering and issuing water be confined to this Channel during the dry Season, that a quantity of water moving at sufficient velocity will be obtained to keep the Channel open throughout the year, by the Scouring action of the tidal water alone.

I have roughly estimated the quantity of water which the River Coorong will contain between the South Beach and Harris Bridges.

The ordinary rise of the Tide I learn is about three feet, – for purposes of calculation I have taken 2 feet 6 inches, as spread over the area of the Coorong between the above points, and I find the quantity to be about 16½ millions of cubic feet which must enter through the Channel at the "Bar" in 6 hours; this quantity in a Channel having a Sectional area of 300 Square feet would give an average velocity of 2½ feet per Second – of course this velocity is not uniform, it is greatest

greatest about half tide of both flood and ebb; and at extreme high or low water the velocity for a brief period is nil - but for a very considerable portion of the 6 hours the velocity will be much higher - from 4 to 5 feet per second - and I consider quite sufficient to keep the channel with a capacity, such as I have mentioned, open if the loose sand at the mouth be so far confined and controlled as to admit of the scouring action of the water being concentrated on its sectional area only, and in a direction at right angles to the general shore line.

I have repeatedly observed the water entering with a velocity at the surface

surface of 4 feet per second and the channel I take to be about the size I have indicated, under the present condition of things - but the mass of sand it has to contend with on both sides along its whole length is too great to be overcome by the small stream opposed to it.

I am unable to say whether the water way of the Bridge is sufficiently ample to admit of 50 feet out of its 500 feet, to be appropriated to the construction of a groyne on the north side of the channel - but judging from the other Bridges higher up where the water way is very considerably less, I should think 50 feet might

might be spared – in that case I should appropriate the 3rd Arch (from the South end of the Bridge) to the construction of the groyne, which with the existing one on the South Side should be extended about 200 feet further Seaward and to a depth which experience has proved to be the lowest point of Scour under the Bridge.

Should it be inadmissible to construct a groyne in that position then an independent opening further to the north would be necessary at a considerable increase of expense.

The River in its Shoal portion Should be deepened So as to be from one to two feet of depth at

Low water.

It would also be necessary on the approach of the monsoon Season to keep the Sand at the Bar down to a level which would easily admit of the flood water topping and Scouring it away, so as to avoid any undue Strain on the permanent Channel.

The upper reaches of the River may be immensely improved by training walls at intervals to confine the Stream during the dry Season to a defined Channel – the general bed being levelled and it is I believe Sufficiently high for grasses to grow upon; not only would the

general

general appearance of the River
then be improved but its discharg-
-ing power would I consider be
improved also.

Drainage
Engrs Office
123 Mount Road
12th February 1875

W Clark
C.E.
Drainage Engineer

Coorum River

Read in Pub. Dept. 4th 1875

Public Works Dep.t

Proceedings of the Madras Govt.

Read the following:

From
Mr. Clark
Drainage Engineer, Madras
(No. E. dated 12th Feby: 1875.

Order thereon 25th February 1875 No. 208

Transferred to
the Financial Department.
His Excellency the
Governor in Council thanks Mr.
Clark for his suggestions on the
subject of the Coorum River. The
project may more conveniently
be discussed when Mr. Clark's drain-
age proposals shall have been
decided on.

True Extract

J. Smalley Coll.r &c.
Secretary to Government

To the Financial Department &c.
with papers.

Municipal - Drainage

6th March 1875. No 519.

113

Communication to the Municipal Commissioners for the Town of Bradford to the Sanitary Commissioner in continuation of S.O. of 27th January 1875. No. 157.

The President of the Bradford Local Govt. Board.
" Sanitary Commissioner.
" Public Works Department.

Accepted 17/3

27th January 1875. No. 201-211

Municipal (1875) Expenditure.

Municipal Commissioners. Drainage

Correspondence regarding

Public Health Department

Bradford

Rep. 45 of 1875

No. 200. Bradford

No. 479.

Transmitting Report and plans from the Drainage Engineer on the scheme for draining the low-lying portion of the Town Council

Written up

obt. of {1875 Madras.

Final

G., 6th Mch., 1875, No. 519

No. 76-77.

Drainage of Madras - Pros. Govt. P.W.D. transfg. Report and Memo. from the Drainage Engr. on the Scheme for draining Madras, and on the River Cooum, comd. to the Mun. Comrs for the Town of Madras and to the Cantt. Comrs for consideration of G.O. 27th Jany. 1875, No. 151.