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TAMIL NADU ARCHIVES

GOVERNMENT OF TAMIL NADU

Public Works DEPARTMENT

G.O. No. B.P. No.	749 W	Press. Mis.
Dated 22.3.1880 ~~197~~		

Not to be folded or roughly handled

749/1

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

22nd March 1880, No. 749 W.

Buildings and Roads.
Civil Works.

Read the following paper:—

No. 103. From Lieutenant-Colonel W. CHRYSTIE, R.E., Superintending Engineer, First Circle, to the Chief Engineer, Public Works Department, dated Madras, 7th March 1880.

In your memorandum No. 9 of the 2nd May, addressed to me at Bombay, you sent me urgent orders to submit a full report and opinion on the action now desirable to take in the matter of Bishop Tissot's reclamation within the Vizagapatam backwater, but, although I joined the circle in the latter end of that month, I was prevented by other pressing duties from visiting Vizagapatam until the middle of September, and it is only within the last few days that I have received the information which I considered it desirable to obtain before submitting my report.

2. The Acting Collector convened a meeting of the Vizagapatam Municipal Board on the morning of the 19th September, to discuss with me the question of the connection existing between the reclamations by Bishop Tissot in the backwater and the damages suffered by the town through inundation during the cyclone of 1876 and 1878. The members were much divided in opinion, one party considering that the reclamation had no influence on the flood, whilst the majority of the native members held strongly that the disastrous effects had been at least greatly increased by the bunds, urging that Mr. Goodrich had himself cut them to let off the water.

3. The flood marks of the water in the town show that the reclamation embankments can have had no direct effect on the depth of the inundation, as they must have been entirely submerged long before it reached its maximum. Mr. Goodrich himself states, paragraph 5 of his No. 40, dated 12th January 1879, that they were breached early, and he does not assert that they have caused any damage in the past, but only anticipates that they will cause it in the future, when the banks have been strengthened.

4. From levels taken by the Executive Engineer himself to flood marks still visible, it appears that the water stood in Kottapettah, near the woodyard road and not far from the Magazine hill, which is just east of the reclamation, 6·81 feet above high tide level during the cyclone of December 1878 and 5 inches higher in October 1876, but at the Tidal Observatory in the outlet leading from the backwater to the sea it was only 2·56 above H.T.L. in 1878. This gives a very great surface fall to the flood, but there can be no doubt that the latter reading is correct, and the former has been approximately corroborated by levels to five flood marks in different parts of the town taken by Supervisor Venkataramiah and which I now forward.

5. Major Beatty in paragraph 6 of his report, dated 8th November 1871, gives the drainage basin of the river entering the Vizagapatam backwater as 220 square miles, but from a map of the district on a scale of 1 inch to the square mile, I find it to be 134 square miles, and this agrees pretty nearly with the basin shown on the old Trigonometrical atlas sheet. I forward a drawing completing the survey of the back water below H.T.L., showing its total area to be $5\frac{1}{4}$ square miles, of which nearly $2\frac{1}{2}$ are included in the reclamation; but without a record of the duration of the flood, the rate at which it rose and fell and the discharge into the sea hour by hour as the level of the bar altered under the scour, all which details are wanting, it is impossible to

even form an opinion how much the reclamation might have raised the flood level had the bunds stood, but breaching early as they did their effect on the highest flood level must have been *nil*.

6. The reclamation banks had been in a great measure repaired when I saw them, on the east and part of the south, when they had been nearly all swept away, on new inner lines. They were not being laid out with the level, but the Rev. Mr. Richard informed me that it was intended to make them about 3 feet above H.T.L., inner slope 2 to 1, sea slope 4 to 1, revetted with stone on the east face and 3 yards wide at top. From levels forwarded by the Executive Engineer it appears that the bund is actually being made from 3·42 to 4·52 above high water spring, but the lowest of these readings of course represents the actual strength of the bund to keep out floods, but even the highest would have been overtopped in the cyclone floods. There exists nine sluices, each 3 feet by 4 feet, placed at from 1 foot above to L.T.L. for the purpose of draining the land, also an old weir 26 yards long with its crest — ·95 below H.W. springs in the west face; another 20 yards long in the south face had been destroyed in the cyclone and had not been reconstructed. A new weir 31 yards long with its crest + ·52 above H.W.S. has been recently constructed near the Magazine hill, and a fourth 20 yards long with its crest H.W.S. + 1·96 in the south face. The position of these works is shown in the key plan, and the two latter are those alluded to in the 5th paragraph of Mr. Goodrich's letter No. 40.

7. In paragraph 3 of that letter Mr. Goodrich states that, had the reclamation been carried out with a greater expenditure of labor, broad canals would have been cut in the mud flats and parts thereof been raised by the process above flood level. From seventy-eight readings taken on the flat in 1873 and 1874, I find that its average surface was 2·3 above L.W. spring tides, so that by the process indicated only 700 o of the 1,615 acres of the reclamation could have been raised 1 foot above H.W. spring by the excavation of 4 millions of cubic yards of soil, whilst the land thus reclaimed would have still been subject to inundation by every freshes, and therefore of value only as grazing ground. To state the figures is sufficient to show that such a method of reclamation could never have been intended.

8. What Bishop Tissot has done is to put a bund only sufficiently strong to keep out tidal water and moderate river freshes round two sides of 272 square mil of salt swamp, the third side being closed by an embanked road previously existing, and between which and the town a not inconsiderable drainage finds its way through the fish ponds into the backwater, whilst the fourth side is left open to pass on to the reclamation the drainage of the land above, which I calculate from the map to measure about 8 square miles including the steep southern slope of the Kylasa hill. By constantly passing the fresh water on to the land and draining it off by means of the nine low level sluices, he will sweeten the soil and render it fit for grazing; in time, but necessarily in a very long time, silt will be deposited to an extent making the land worth cultivating. The Rev. Mr. Richard informs me that 20 acres of the former swamp now pay revenue as cultivated land, and that 300 acres are ploughed up for pasture. I enclose two cross sections of the reclamation showing in different colors the surface level in 1873 and in February 1879. On the upper or northern of the two sections no gain in level has been made, whilst on the other, going west for the Magazine hill, a substantial gain of 5 inches rise in the surface level is shown. A line run immediately within what was formerly the H.T.L. where the drainage now enters, the reclamation would probably show a still greater gain as all heavy particles of silt would be deposited there, but we have no former levels on that line to compare with.

9. I am clearly of opinion that the existence of these works can in no way have directly, either by preventing the spread of the drainage water over the land enclosed, or by ponding up the drainage received within the embankment (as would be inferred by Mr. Goodrich's action in cutting the bund to let off the water), have contributed to raise the level of the floods which in 1876 and 1878 damaged houses and property in the town of Vizagapatam. I walked round the bund and over the ground included in the reclamation and found it everywhere sweet and free from bad odours, which from the correspondence would not appear to have been the case before the works were

commenced, and is certainly in most marked contrast with the condition of the arm of the backwater already mentioned, between the reclamation and the town, where the stench was terrible. I cannot therefore, in the interest of the town of Vizagapatam, recommend the Government to interfere with Bishop Tissot's work until it has been shown that their effect is to appreciably raise the level of such exceptional floods as cause damage to the town. The information at present available by no means, in my opinion, support that conclusion. The volume of drainage entering the backwater from its catchment of 134 square miles is, in cyclones, so large that the height to which the water rises in the town must depend far more on the rapidity with which it is passed over the bar into the sea, than on the moderating effect resulting from its spreading over the area reclaimed. The Master Attendant informed me that in 1878 the bar gave way suddenly at last, and that then only the level of the flood water began immediately to subside.

10. In order to ascertain whether the silting of the backwater, as reported by Major Beatty and Mr. Nordman, form a comparison of the actions of 1868 and 1873 still continued, I caused certain levels to be taken, and forward a sheet of seven cross sections and one longitudinal section at places marked on the key plan showing in red lines the depths obtained in 1879, and in black lines Mr. Nordman's depths of 1873. At cross section C D from the rocky island the depth has decreased from 22 feet to 19·34, but, with this exception, a very marked general increase in the depth of water in the backwater is shown. At B.M. No. 7 it has increased from 10 feet to 26·56, at B.M. No. 11 from 11 feet to 20·02, at the Ferry it is now 33 feet where it was 25 feet in 1873 and 28 feet in 1868. I believe that the depth of the backwater is maintained by the scour of excessive land floods, such as those of the cyclones in 1876 and 1878, and not by the action of the tides. In October 1879, when these cross sections were taken, there was from 5·14 to 6·6 of water on the bar at H.W. and 3·3 to 3·5 at L.W.

11. So far, I think, I have been on pretty safe ground, but I approach the subject of the bar with the very greatest diffidence, as it is acknowledged to be a special and most difficult branch of the profession, in which I have had no experience, and in this particular case the data on which to form an opinion are very deficient.

I forward a copy of the very imperfect Register of the depth of water on the bar intermittently kept out by the Master Attendant at Vizagapatam. It commences in December 1874, but there are very few soundings in 1874, 1875 and 1876, and these all taken during the north-east monsoon show depths varying from 10·5 to 14·6; the Register for the first ten months of 1877 is nearly complete, and up to the end of May the depth at H.T. remained steady at from 12 to 14 feet with only a slight tendency to shoal, but in June it began to decrease and continued to do so rapidly through July and August until a minimum of 8 feet at H.W. was registered on the 15th October, improving again to 7·11 on the 5th December, when the soundings again began to decrease, and the state of the bar remained very bad until scoured by the cyclone of December 1878. From January 1879 to the end of September the readings were generally from 11 to 14 feet, declining in October and November to 6 and 7 feet, and again deepening to 8·10 in December and 10·9 in January 1880. From Mr. E. G. Thomas' work on Vizagapatam and its Port, I find that ordinary local rain has but little effect on the bar, a rainfall of 13·1 inches between the 16th and 20th May 1877 having no effect whatever, whilst 5·1 inches on the 2nd September of the same year only increased the depth of water from 3·11 to 5·11. This is probably due to the flood being moderated by spreading over the swamps.

12. Captain Winckler, the Master Attendant, informed me that sand was deposited along the coast north of the harbour during the prevalence of the current from the north, and removed again when the current ran from the south, and he drew my attention to the soundings on the bar during 1877, when the deterioration was slight whilst the current was from the north, but rapid whilst it was from the south; he suggested that this was caused by the current from the north being set seaward by the Dolphin's nose, and thus helping the stream issuing from the harbour, whilst the current from the south sweeping round the Dolphin's nose checks the issuing stream and disperses it northwards. I am inclined to attach importance to this

theory, although it is not borne out by the Registers of 1878 and 1879. I believe the bar to be entirely caused by the action of the littoral currents, and a record of their direction and force, with that of the wind, would probably explain minor variations of the depths on the bar which otherwise appear incomprehensible.

13. The bar is nearly 300 yards seawards of the narrowest part of the harbour mouth, which is about 225 feet wide. From the old plan, without date, forwarded to me from your office, I find that when it was made there was 5·6 water on the bar with 18 feet in the harbour mouth; Major Beatty's plans show 7 feet on the bar with 16 in the harbour mouth, whilst the Registers of 1877-78 and 1879 uniformly show a much greater depth opposite the tide gauge, although not in the narrowest part of the mouth, than on the bar. I therefore conclude that the stream issuing from the backwater is able to prevent the deposit of sand, so long as it is confined within a channel of 225 feet wide or thereabouts, and consider that if the harbour mouth were prolonged into deep water (17 feet) by parallel groynes, in the position I have sketched in pencil on Major Beatty's plan, a bar would not form in front of it. It would be necessary to dredge to keep the backwater at the requisite depth, but dredging on the present bar would be useless as the sand composing it is constantly in motion.

14. As the stream would have to deepen between the suggested groynes by its own scour, the groynes could not be built with concrete blocks in the manner now usual for sea works, and I do not venture to suggest what section would be required for rough stone groynes. Any quantity is procurable of any size deemed best at the base of either groyne, plant is available at Dowlaishweram, and I think that one rupee a cubic yard should cover all charges for the above.

From F. BRICKWELL, Esq., Executive Engineer, Vizagapatam Division, to the Super[illegible]tending Engineer, First Circle, dated Waltair, 4th December 1879, No. 3,003.

WITH reference to your No. 193-C, dated 19th September 1879, I have the honor to forward plans as per margin which embody nearly the whole of the information you ask for.

One Contour Survey of the western portions of the backwater.
,, Key plan.
,, Sections taken across the backwater.

2. They were prepared by Mr. Surveyo[illegible] Lawrence, but owing to no allotment of funds having been made on the sanctioned estima[illegible] No. 305 of 1879-80, no pay has been passed to him for the time during which he was on this duty.

3. I therefore have the honor to request you will allot funds at an early date as asked for in my No. 2,478, dated 15th October 1879.

4. With regard to paragraph 2 of your letter under reply, I regret that my absence from head-quarters nearly the whole of the month has precluded my attending to it up to date; but as soon as some urgent work now on hand is complete, I will check the levels and send you the results.

From the same Officer, dated Waltair, 16th December 1879, No. 3,176.

IN conclusion of this Office No. 3,003, dated 4th December 1879, and with reference to your No. 193-C, dated Vizagapatam, 19th September 1879, I have the honor to inform you that on the 12th and 13th I made inquiries in the neighbourhood of the Magazine hill and Kottapettah and took levels with the following results:—Flood mark of 1878 on the wall of a house in the woodyard road, not far from the market, clearly seen on the whitewash = M.S.L. + 8·87. I was only able to find one flood mark of 1876 on which any reliance would be placed. It was in a room of a large house near the Magazine hill on the bank of the fish pond, and I was not able to take levels to it, but it was exactly 5 inches higher than that of 1878, which was also shown in the same room, more particularly on a wooden door which had been varnished or oiled previously to 1876, and the water had left two most distinct stains on the varnish, which were also to be seen in a lesser degree on the plaster of various passages and courtyards.

2. The flood mark of 1878 is also marked on the door posts of the Tidal Observatory close to the commercial shed near the harbour mouth, and this is = M.S.L. + 4·62, and I believe is reliable.

3. I have been very careful not to take any so-called flood marks at the instance of well-informed persons, unless collateral evidence of a convincing kind would be adduced in addition, and I believe you may rely upon the above figures.

No. 104. ORDER THEREON, 22nd March 1880, No. 749 W.

IT is observed from the foregoing report by the Superintending Engineer, that the cyclone flood of October 1876 attained a maximum height of about 7 feet above high tide level at a point in Kottapettah near the woodyard road in Vizagapatam, from which it is clear that the banks now being made from 3·42 to 4·52 feet above high tide level round the reclaimed ground can have no effect in curtailing the ultimate waterspread during such periods of extraordinary flood or of raising the water level.

2. His Grace the Governor in Council is therefore clearly of opinion that so long as the banks raised around the ground in question are not carried to a greater height than that of the highest known flood they should neither be cut nor in any way interfered with.

3. As the piling up of the water in the backwater is in very great measure due to the existence of the bar of sand which runs from about the Dutch battery to the Fort flagstaff (which thus in the early stages of flood prevents free escape), the Government is disposed to accept the solution of the difficulty proposed by Colonel Chrystie for confining the channel between groynes and thus bringing such a scour to bear on the bar as will tend at all times to keep it clear and with a depth it is hoped of at least 15 feet at low water. An estimate for the groynes in question will therefore now be prepared and submitted by the Superintending Engineer when the question will be finally considered.

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintending Engineer, First Circle.
,, Revenue Department.

Exd. S. T. Austin.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of 1880 Madras

PUBLIC WORKS.

To

The SUPERINTENDING ENGINEE
FIRST CIRC
&c., &c.

Dated March, 22nd.

Issued

Recd. Encl.

G. O., 22nd March 1880, No. 748 W.

MARCH.
Nos. 103-104.

DR. TISSOT'S RECLAMATION WITHIN VIZAGAPATAM BACKWATER.

From

Lt Col Chrystie RE. 748/4

Superintending Engineer 1st Circle

To

The Chief Engineer

Fort St George

Sir

In your Memorandum No 9 of the 2d May, addressed to me at Bombay you sent me urgent orders to submit a full report and opinion on the action now desirable to take in the matter of Bishop Tissot's reclamation within the Vizagapatam Backwater, but, although I joined the Circle in the latter end of that month, I was prevented by other pressing duties from visiting Vizagapatam until the middle of September and it is only within the last few days that I have received the information which I considered it desirable to obtain before submitting my report.

2. The Acting Collector convened a meeting of the Vizagapatam Munic

Board on the morning of the 19th Septr to discuss with me the question of the connection existing between the reclamations by Bishop Tissot in the Backwater and the damages suffered by the Town through inundation during the Cyclone of 1876 and 1878. The members were much divided in opinion, one party considering that the reclamation had no influence on the flood whilst the majority of the native members held strongly that the disastrous effects had been at least greatly increased by the bunds, urging that Mr Goodrich had himself cut them to let off the water.

3. The flood marks of the water in the Town shew that the reclamation embankments can have had no direct effect on the depth of the inundation, as they must have been entirely submerged long before it reached its maximum. Mr Goodrich himself states, para 5 of his No 40 dated 12th Jany that they were breached early, and he does not assert that they have caused any damage in the past but only anticipates that they [illegible] will cause it in the future, when the banks have been strengthened.

4. From levels taken by the Executive Engineer himself to flood marks still visible it appears that the water stood in Kottapettah, near the Woodyard road and not far from the Magazine hill which is just east of the Reclamation 6.81 feet above High Tide Level during the Cyclone of December 1878 and 5 inches higher in October 1876, but at the Tidal Observatory in the outlet leading from the Backwater to the Sea it was only 2.56 above HTL in 1878. This gives a very great surface fall to the flood, but there can be no doubt that the latter reading is correct and the former has been approximately corroborated by levels to five flood marks in different parts of the Town taken by Supervisor Venkataramiah and which I now forward.

5. Major Beatty in para 6 of his Report dated 8 Nov 1871 gives the drainage basin of the river entering the Vizagapatam Backwater as 220 square miles but from a map of the District on a scale of 1 inch to the square mile, I find it to be 134 square miles and this agrees pretty nearly with the basin shown on the old Trigonometrical Atlas Sheet. I forward a drawing completing the survey of the Backwater below H.W.L. shewing its total area to be 5 1/3 square miles, of which nearly 2 1/2 are included in the reclamation but without a record of the duration of the flood, the rate at which it rose and fell and the discharge into the sea hour by hour as the level of the bar altered under the scour, all which details are wanting, it is impossible to even form an opinion how much the reclamation might have raised the flood level had the bunds stood, but breaching early as they did, their effect on the highest flood level must have [illegible]

6.

6. The reclamation banks had been in a great measure repaired when I saw them, on the East and part of the South, where they had been nearly all swept away, on new inner lines. They were not being laid out with the level, but the Revd Mr Richard informed me that it was intended to make them about 3 ft above H.W.L. inner slope 2 to 1, sea slope 4 to 1 revetted with stone on the East face and 3 yards wide at top. From levels forwarded by the Executive Engineer, it appears that the bund is actually being made from 3·42 to 4·52 above High Water Spring, but the lowest of these readings of course represents the actual strength of the bund to keep out floods, but even the highest would have been overtopped in the cyclone floods. There exists 9 sluices, each 3'x4', placed at from 1 foot above to L.W.L. for the purpose of draining the land. also an old weir 26 yards long with its crest -·95 below H.W. Spring in the west face. another 20 yards long

in the south face had been destroyed in the Cyclone and had not been re-constructed. A new weir 31 yards long with its crest +·52 above HWS has been recently constructed near the Magazine Hill and a 4th 20 yards long with its crest HWS +1·96 in the south face. The position of these works is shewn in the Key Plan and the two latter are those alluded to in the 3rd para of Mr Goodrich's letter No 40.

7. In para 3 of that letter Mr Goodrich states that, had the reclamation been carried out with a greater expenditure of labor, broad canals would have been cut in the mud flats and parts thereof been raised by the process above flood level. From 78 Readings taken on the flat in 73/74, I find that its average surface was 2·3 above HW Spring Tides so that by the process indicated only 700 out of the 1615 acres of the reclamation could have been raised 1 foot above HW Springs by the excavation of 4 millions of Cyards of soil, whilst the land thus reclaimed would have still been subject to inundation by every freshe and therefore of value only as grazing ground. To state the figures is sufficien to shew that such a method of reclamation could never have been intended.

8. What Bishop Tissot has done is to put a bund only sufficiently strong to keep out tidal water and moderate river freshes, round 2 sides of 3½ square miles of salt swamp, the 3rd side being closed by an embanked road previously existing, and between which and the town a not inconsiderable drainage finds its way through the fish ponds into the Backwater, whilst the 4th side is left open to pass on to the reclamation the drainage of the land above, which I calculate from the map to measure about 8 square miles including the steep southern slope of the Kylasa Hill. By constantly passing the fresh water on to the land and draining it off by means of the 9 low level sluices, he will sweeten the soil and render it fit for grazing in time, but necessarily in a very long ti

silt will be deposited to an extent making the land worth cultivating. The Revd. Mr Richard informs me that 20 acres of the former swamp now pay revenue as cultivated land, and that 300 acres are ploughed up for pasture. I enclose 2 cross sections of the Reclamation shewing in different colors the surface level in 73 and in February 1879. On the upper or Northern of the 2 sections no gain in level has been made, whilst on the other, going west for the Magazine Hill, a substantial gain of 8 inches rise in the surface level is shewn. A line run immediately within what was formerly the H T L where the drainage now enters the reclamation would probably shew a still greater gain as all heavy particles of silt would be deposited there, but we have no former levels in that line to compare with.

9. I am clearly of opinion that the existence of these works can in no way have directly either by preventing the [illegible] of the drainage water over the land enclosed or by ponding up the drainage received within the embankment (as would be inferred by Mr Goodrich's action in cutting the bund to let off the water) have contributed to raise the level of the floods which in 1876 and 1878 damaged houses and property in the town of Vizagapatam. I walked round the bund and over the ground included in the Reclamation and found it everywhere sweet and free from bad odors, which from the correspondence would not appear to have been the case before the works were commenced and is certainly in most marked contrast with the condition of the arm of the Backwater already mentioned between the reclamation and the Town where the stench was terrible. I cannot therefore in the interest of the Town of Vizagapatam, recommend the Government to interfere with Bishop Tissot's work until it has been shewn that their effect is to appreciably raise the level of such exceptional floods as cause damage

to the Town. The information at present available by no means, in my opinion, support that conclusion. The volume of drainage entering the Backwater from its catchment of 134 square miles is, in Cyclones, so large, that the height to which the water rises in the Town must depend far more on the rapidity with which it is passed over the Bar into the sea than on the moderating effect resulting from its spreading over the area reclaimed. The Master Attendant informed me that in 1878 the Bar gave way suddenly at last and that then only the level of the flood water began immediately to subside.

10. In order to ascertain whether the silting of the Backwater as reported by Major Beatty and Mr Hordman from a comparison of the sections of 1868 and 1873 still continued, I caused certain levels to be taken and forward a sheet of 7 cross sections and 1 longitudinal section at places marked on the Key Plan shewing in red lines the depths obtained in 1879 and in black lines Mr Hordman's depths of 1873. At cross section CD from the Rocky Island the depth has decreased from 22 ft to 19·34 but, with this exception, a very marked general increase in the depth of water in the Backwater is shewn. At B.M. No 7 it has increased from 10 ft to 24·56, at B.M No 11 from 11 ft to 20·02, at the Ferry it is now 33 ft where it was 25 ft in 1873 and 28 ft in 1868. I believe that the depth of the Backwater is maintained by the scour of successive land floods such as those of the Cyclones in 1876 and 1878 and not by the action of the Tides. In October 1879, when these cross sections were taken, there was from 6·16 to 6·6 of water on the Bar at HW and 3·3 to 3·5 at LW

11. So far I think I have been on pretty safe ground, but I approach the subject of the Bar with the very greatest diffidence as it is acknowledged to be a special and most difficult branch of the profession in which I have had no experience

and

and in this particular case the data on which to form an opinion are very deficient.

I forward a copy of the very imperfect Register of the depth of water on the Bar intermittently kept out by the Master Attendant at Vizagapatam. It commences in Decr 1874, but there are very few soundings in 74, 75 and 76, and these all taken during the N. E. Monsoon shew depths varying from 10·5 to 4·6; the register for the first 10 months of 1877 is nearly complete and up to the end of May the depth at HW remained steady at from 12 to 14 ft with only a slight tendency to shoal, but in June it began to decrease and continued to do so rapidly through July and August until a minimum of 3 ft at HW was registered on the 18th October improving again to 7'11 on the 5th Decr when the soundings again began to decrease and the state of the bar remained very bad until scoured by the Cyclone of Decr 1878. From Jany 1879 to the end of Septr the [illegible] was generally from 11 to 14 ft declining in October and November to 6 and 7'10 ft and again deepening to 8'10 in Decr and 10'9 in January 1880. From Mr J. G. Thomas' work on Vizagapatam and its Ports, I find that ordinary local rain has but little effect on the Bar, a rainfall of 13·1 inches between the 16th and 20th May 1877 having no effect whatever whilst 5·1 inches on the 2nd Septr of the same year only increased the depth of water from 3'11 to 5'11. This is probably due to the flood being moderated by spreading over the swamps.

12. Captain Winckler, the Master Attendant, informed me that sand was deposited along the coast north of the Harbour during the prevalence of the current from the north and removed again when the current ran from the South; and he drew my attention to the soundings on the Bar during 1877 when the deterioration was slight whilst the current was from the north, but rapid whilst it was from the south; he suggested that this was caused by the

current from the north being set seaward by the Dolphins' nose and thus helping the stream issuing from the Harbour, whilst the current from the south sweeping round the Dolphins' nose checks the issuing stream and disperses it southwards. I am inclined to attach importance to this theory although it is not borne out by the Registers of 1878 and 1879. I believe the bar to be entirely caused by the action of the littoral currents, and a record of their direction and force, with that of the winds, would probably explain minor fluctuations of the depths on the bar which otherwise appear incomprehensible.

13. The bar is nearly 300 yards seawards of the narrowest part of the Harbour mouth, which is about 225 ft wide. From the old plan without date forwarded to me from your Office, I find that when it was made there was 8'6 water on the bar with 18' in the harbour mouth; Major Beatty's plans shew 7' on the Bar with 16 in the harbour mouth whilst the Registers of 77. 78 and 79 uniformly shew a much greater depth opposite the Tide gauge, although not in the narrowest part of the mouth, than on the bar. I therefore conclude that the stream issuing from the Backwater is able to prevent the deposit of sand, so long as it is confined within a channel of 225 ft wide or thereabouts, and consider that if the harbour mouth were prolonged into deep water (17') by parallel groynes in the position I have sketched in pencil on Major Beatty's Plan, a bar would not form in front of it. It would be necessary to dredge to keep the Backwater at the requisite depth, but dredging on the present Bar would be useless as the sand composing it is constantly in motion.

14. As the stream would have to deepen between the suggested groynes by its own scour, the groynes could not be built with concrete blocks in the manner now usual for sea works, and I do not venture to suggest what section would be required for rough stone groynes

Any quantity is procurable of any size deemed best at the base of either pagne; plant is available at Dowlaishweram, and I think, that one rupee a cubic yard should cover all charges for the above -

I have &c &c

Sd/ W. Chrystie Lt Col ME

Supg Engr 1st Circle.

Madras

7th Mar/80.

True Copy

Col RE

Ch Engr

P.W.D.
22 MAR 80
No 2003

No 3003

Vizagapatam Dn Office

Waltair 4th December 1879

From

The Executive Engineer 7th/12

Vizagapatam Division

To

The Superintending Engineer

First Circle, Dowlaishweram

Sir,

our Survey of
Western portions
back water
Plan.
tions taken
s the back
en

With reference to your No 192/C dated 19th September 1879 I have the honor to forward Plans as per margin which embody nearly the whole of the information you ask for.

2. They were prepared by Mr Survey Lawrence but owing to no allotment of funds having been made on the sanctioned estimate No 305 of 79-80 no pay has been passed to him for the time during which he was on this duty.

3. I therefore have the honor to requ you will allot funds at an early date as asked for in my No 2478 dated 15th October 79

4. With regard to para 2 of your letter under reply I regret that my absence from Head Quarters nearly the whole of the month has precluded my attending to

do

it up to date, but as soon as some urgent work now on hand is complete, I will check the levels and send you the results.

I have the honor to be
Sir
Your most Obdt Servt
F. Bucknell
Executive Engineer
Vizagapatam Division

General 6948

From

The Executive Engineer
Vizagapatam Divⁿ

P.W.D.
22 MAR 80
No. 2005

To

The Superintending Engineer
First Circle
Dowlaishvaram

No. 3003

Dated 4th } December 1879
Recd }

No. of Code 3.

Both the Plans now submitted and that already in the Office but the Draughtsman calculate and the total area of the Backwater below H.T.L. including Bishop [illegible] reclamation. Along with on section the height of Bishop [illegible] bund where not already stated

W 10.12

[illegible]

The total area of the back water including Bishop [illegible] reclamation is [illegible] Heights of Bishop [illegible] bund have been entered in all the sections taken through [illegible]

[illegible]

Backwater of Vizagapatam —

Submits plans which embody nearly the whole of the information asked for regarding the —

[illegible] for orders
with reference [illegible]

No. 3176

Vizagapatam Division Office
Waltair 16 December 1879

1810

769/14

From

The Executive Engineer
Vizagapatam Division

To

The Superintending Engineer
First Circle
Dowlaishvaram

Sir,

In conclusion of this Office No. 3003 dated 4th December 1879 and with reference to your No. $\frac{193}{C}$ dated Vizagapatam 19th September 1879 I have the honor to inform you that on the 12th and 13th I made enquiries in the neighbourhood of the Magazine Hill and Kothapetta and took levels with the following results:— Flood mark of 1878 on the wall of a house in the Wood yard Road not far from the Market clearly seen on the whitewash = **M. S. L. + 8.87.** I was only able to find one flood mark of 1876 on which any reliance would be placed. It was in a room of a large house near the magazine Hill on the bank of the

Fish pond and I was not able to take levels to it - but it was exactly 5 inches higher than that of 1878 which was also shown in the same room more particularly on a wooden door which had been varnished or oiled previously to 1876 and the water had left two most distinct stains on the varnish which were also to be seen in a lesser degree on the plaster of various passages and Courtyards.

2 The flood mark of 1878 is also marked on the door posts of the tidal observatory close to the Commercial Shed near the Harbour mouth and this is = M.S.L. + 4.62 and I believe is reliable.

3 I have been very careful not to take any so called flood marks at the instance of well informed persons unless collateral evidence of a convincing kind could be adduced in addition and I believe you may rely upon the above figures.

I have the honor to be
Sir
Your most obdt. Servt.
J. [illegible]
[illegible]

General

From

The Executive Engineer
Vizagapatam Division

P.W.D.
22 MAR 80
No. 2005

To

The Supg. Engineer
First Circle
Dowlaishwaram

No

Dated December 1879

No of Enclosures None

Magazine Hill & Kottapetta

Informs that he made enquiries in the neighbourhood of the — and took levels with certain results.

Draft order

Here enter G.O. No 749 of 22 Mar /80

It is observed from the foregoing report by the Superintending Engineer that the cyclone flood of October 1876 attained a maximum height of about 7 ft. above high tide level at a point in Kottapettah near the Woodyard road in Vizagapatam from which it is clear that the banks now being made from 3.42 to 4.52 ft. above high tide level round the reclaimed ground can have no effect in curtailing the ultimate water spread during such periods of extraordinary flood or of raising the water level.

His Grace the Governor in Council is therefore clearly of opinion that so long as the banks raised around the ground in question are not carried to a greater height than ~~that~~ of the highest known flood they should neither be cut nor in any way interfered with

As the piling up of the water in the backwater is in a great measure due to the existence of the bar of sand which runs from about the Dutch battery to the Fort Flag Staff (which thus in the early stages of flood prevents free Escape) the Government is disposed to accept the solution of the difficulty proposed by Colonel Chrystie for confining the Channel between groynes and

scour to bear on the bar as will tend at all times to keep it clear and with a depth it is hoped of at least 15 feet at low water - An Estimate for the groynes in question will therefore now be prepared and submitted by the Supd. Engineer

When the groynes [illegible]
[illegible]
[illegible] 15/3/80

15 ft. [illegible]
[illegible] depth [illegible]

Hon W. Huddleston
[illegible]

7459 / 18

For orders

I beg to submit
herewith the report
just received from Colˡ
Chrystie in reference
to the Vizagapatam
backwater, the reclam-
-ations in which are
reported by the Presᵗ
of the Municipal Commⁿ
in his No 40 of 12 Jan:
79 to "cause or inten-
-sify the danger to the
town."

It was impossible
to get this question
fairly examined
before the arrival of
Colonel Chrystie in
May last and the
occupations were [illegible]
that he could not
visit Viz

Ro. G. 2-5-79.
dated Regr
[illegible]

X: Issue and print
also my note –
The question is one which
with the Presidency jail
I suppose should now
~~to~~ engage the very early
attention of Colonel Prender-
-gast on assuming charge of
No 1 Circle
22/3/80

Let the [illegible]
[illegible]

Your draft can now
[illegible] correspondence with

which, time has been required to collect the information necessary for arriving at a safe opinion

This has now I think been done by Colonel Chrystie whose report of the 7th instant should be read as it will not bear abridgement.

It is clear that the popular opinion as to the reclamation banks having raised the maximum flood level and often caused or intensified the danger to the town has been based in a total misconception, and it is a pity that Dr. Tissot should have been despatched to announce an account of a perfectly ignorant opinion

I have drafted the attached order 7149 general of approval which will I hope sufficiently dispose of this part of the question but like Colonel Chrystie I feel some hesitation in recommending the measures for deepening the bar on which so much depends

If we can suppose the groynes actually in position the first step will no doubt have been made but till the ~~flood~~ stream has bored its course under ordinary conditions to clear the channel we cannot of course be quite sure that the requisite relief will be afforded at a sufficiently early period during the occurrence of maximum floods

All analogy however points to the probability of the stream thus effectively confined keeping the passage clear, and as it is the most obvious process I think Government might hope to accept the [illegible]

It is not at all improbable
that in carrying out the oper-
-ation of constructing the rough
stone groynes we shall put
this point to test — Colonel
[illegible] rejects (wrongly I
think) the idea of using steam
dredging for clearing the bar
as the sand being all in
motion this would be a labour
of Sisyphus and for much
the same reason it may be not altogether
found (inapplicable towards
clearing away the sand to a
sufficient depth for the base
of the groynes — It may thus
be necessary in carrying out
the work chiefly to trust in
the stone and ~~trust~~ to scour
scour for its taking up a
sufficiently deep position aided
of course by dredging, jetting
or other processes

The work may take a
long time to execute if as
I fear we shall have ~~to trust~~
in great measure to the scour
produced by floods for getting
the material of the groynes
to a sufficient depth, but
in thus carrying out the work
we shall at least be able
to test the accuracy or otherwise
of the principle on which the
work

4-272
7-7-06
5-8-46

Orgl 1939 W returned
13-8-80 & sent to
[illegible] on
10/12/98 -

Called for [illegible]
telegram

Cu 2005

Govt. of (1880) Madras.

PUBLIC WORKS.

To

23/0/80

Dated

Issued

Recd. Encl.

G. O. 22 Mar 1880. No. 749 W.

Nos. 103-104-

Dr Lees's reclamation within the Vizagapatam Backwater.

5/3