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MADRAS RECORD OFFICE.

Government of Madras.

Public Works DEPARTMENT.

G.O. No.	826	Press Mis.
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Dated	18-3	1864.

Not to be folded or roughly handled

CB

*Proceedings of the Madras Government, Public Works Department,
18th March 1864.*

Read the following papers :—

No. 438. From Captain J. BEAN, R. E., Officiating Superintending Engineer, 6th Division, to Colonel C. A. ORR, R. E., Secretary to Government, Public Works Department, dated Tanjore, 25th February 1864, No. 1,976.

SIR,

1. I have the honor to report, for the information of Government, on the subject referred to in paragraph 3 of their Order, No. 279, of the 26th January 1864, communicating Despatch* from the Right Honorable the Secretary of State of India for my opinion, and calling for observations on the works, the early construction of which is urged by the Directors of the Great Southern of India Railway, for the improvement of the Negapatam Harbour.

2. I have twice visited the works at this Harbour within the last six weeks, and on the last occasion the Collector of the District was good enough to accompany me and to point out the scheme of improvements and protective works suggested by the Committee appointed in 1860, of which he formed a Member. I find that the state of the Jetty is very much the same as in 1848, when I reported to Colonel Lawford on the state of the Harbour, and on the effect of the works undertaken for its improvement, and projected by him.

3. The Jetty is still in an incomplete condition, and its extremity, in the present state of the coast line at this season, is about twenty yards distant from the sea high tide level. I observe that there are two lines of sand deposit, one projecting southwards from the mouth beyond the end of the Jetty, and the other projecting northwards from the south bank, the low portion of the sand spit dividing the sea and river having been extended by the westerly winds. These winds are now beginning to prevail, and their tendency will be to shift both the mouth and the bar more to the northwards. Altogether, the state of the Harbour is not satisfactory, and the bar at low-tide only contains about 2½ feet in depth of water. An improvement, however, has been effected along the narrow spit of sand forming the western side of the Harbour, and the measures taken by Mr. Fraser, Executive Engineer, and others, in the way of erecting fences and planting marine shrubs, have had a favorable tendency to arrest the sand drift, and to form banks averaging two yards in height above the level of the sea.

4. As regards the measures proposed to improve and secure the present Harbour, they may be enumerated briefly as follows :—

- (1.) To strengthen and extend the present Jetty beyond high tide level.
- (2.) To strengthen the spit of land between the sea and back-water.
- (3.) To throw out groynes on the sea and river faces of the sand spit.
- (4.) To erect a southern training wall at the entrance of the Harbour, and
- (5.) To enlarge the basin for tidal-water.

The Engineers consulted by the Railway Directors urge the prosecution of the first of these works, at a cost of £4,000, and the necessity of adopting precautionary measures to prevent the recurrence of a breach at the southern extremity of the sand bank, opposite the bend of the river's course, is also brought to notice.

5. On a careful consideration of the works proposed, I am strongly inclined to support the proposal of the Directors and Engineers of the Railway, that is, to provide at once for the extension of the northern wall or Jetty to a length of forty yards. It appears to me that this is the work of all others to which we must first look for the improvement of the Harbour, and I believe material benefit will be derived from its execution. The importance of the Harbour, which had an Import and Export trade in 1860 valuing 26 to 28 lacs of Rupees respectively, seems to justify the outlay on such improvements. By lengthening this wall on the line of sunken foundations of the former extended Jetty, I believe that not only will the effects of the north-east monsoon, in washing up sand with a tendency to close the bar, be lessened, but that a strong river scour in the freshes will be carried along the face into deep water, and the ebb and flow of tide will assist in maintaining a considerable depth at the bar.

6. I must not, however, fail to support the recommendation of the Railway authorities, that the spit on the right bank of the river forming the Harbour should be carefully watched, and means taken, as opportunity offers, to strengthen it. Though I understand it has been much strengthened of late years, the bank still requires protective works. I do not advocate throwing up an earthen embankment, but I would, as suggested by Colonel Lawford, erect a strong line of piling for three or four hundred yards in length, the piles to be driven by a common Pile Engine and backed with loose stone. Fences also with thin brushwood and twigs intertwined should be erected and marine plants grown. If money is available, groynes on the sea side, at intervals of 100 yards, may be thrown out, and they might be built at a comparatively small cost, if the design of those I erected at Cochin be followed, though they should be of a somewhat stronger material. The three groynes also, on the river face, already erected, might be advantageously renewed and strengthened, as the unsuitable material, coral stone, of which they are made has not rendered them durable, and the noses of all have sunk and been carried away.

7. It is on account of the frail barrier which only interposes between the sea and the river, that I do not advocate the erection of the southern training wall recommended by the Committee, and which is to leave an opening of only 80 yards wide for the river to disembogue at its highest state of fresh. I am confident that, if the northern and southern walls were constructed as proposed, another breach would occur at the same spot as before, and I agree with Colonel Lawford in his view expressed in his report embodied in Government Order No. 1,019 of the 16th May 1860, and in his Memorandum dated 15th February 1861, because I think the freshes should be allowed to expand at the mouth to avoid a breach opposite the direct course of the river where it turns northward, but not to avoid as he considers "too strong a current" nor "because the constant tendency of the sand bank to extend northward keeps the mouth confined quite as effectually as any artificial work could do," in which two opinions I do not concur. On the contrary, I think with Government, as expressed in their Order of the 26th September 1861, No. 1,785, that a groyne, or better still a training wall, would counteract the injurious effect of the southerly winds in silting up the mouth northwards, and I also consider that the strong current thus produced by the river freshes would have a very valuable effect in maintaining deep water.

8. The above opinion, however, only refers to the present state of things, and when the spit of sand is rendered perfectly safe, and groynes constructed, I would advocate the erection of the southern training wall, simultaneously with the deepening and widening of the Kaduvayar, and the extension of the Vellyaur river water to Negapatam, which should not be deferred, for I believe the increase to the amount of the flood-waters thus proposed is much required, and will have a most beneficial effect on the Port.

9. With reference to the cost and style of work, it is not shown how the cost of Pier, Rupees 40,000, which it is proposed to run out in continuation of the old Jetty, is arrived at. In the Estimates* sent up to Government and which were prepared after the Report of the Committee, of which Mr. Carr, whose name appears in the Order quoted at the head of this letter was one of the Members, had appeared (but whether with their concurrence or not I cannot say), the cost of re-building and extending, or more properly strengthening, the Jetty was set down as Rupees 14,000. This allowed a breadth of 11 yards at foundation, and 3½ yards average at top, with heights respectively of 6 and 2 yards. Adopting this data, though the upper breadth is insufficient, and calculating for a length of 40 yards, I find that 2,920 cubic yards of
Rupees 26,240. 5,840 tons of stone at the rate of 4½ Rupees per ton, given
Rupees 13,500. by Captain Oakes, and 150 piles driven 2 feet apart at the toe
of the work at 90 Rupees each, the rate given by the same

Officer, would make up the sum of 40,000 Rupees.

10. I do not consider that the mode of erecting the Jetty and hitherto followed, which was proposed by the Committee, and which I believe was forced upon them owing to the difficulty of procuring requisite material, is at all a good one. The plan consists of throwing in loose stones

until it finds its own level up to low-water mark, and then of raising the superstructure with solid brick in chunam. With this section, the foundation of loose stones yields unevenly, and the solid resisting mass above is sunk unequally and breaks off in huge masses, which it is found extremely difficult to unite and join with the remaining work. These masses are carried down further and further by their own weight, until they finally disappear. With rubble stone we have much more command over our material, we can regulate the settlement and fill up interstices to avoid percolation, and have even work throughout, whilst eventually solid masonry can be constructed. I used to obtain considerable quantities of ships' ballast, free of cost, excepting boat hire, on the western coast, and it was found very useful for Harbour works. As 30 vessels are expected at the Negapatam Port this season, this material might perhaps become available. I am surprised that piling has never been tried on the Tanjore coast, as in Malabar. With a simple Pile Engine and a half ton ram worked by a single crab, these piles can be sunk easily to a depth of 20 or 25 feet, at a cost of 10 or 15 Rupees per pile. They can also be purchased in length, of 40 or 50 feet, brought round from the western coast, and driven at a cost which ought to be below Captain Oakes' Estimate, which allowed for the use of a Steam Pile Engine. These piles would be a great protection at the foot of the Jetty, and especially at the angle of the river's course on the sand pit, in counteracting disturbing influences in the sandy bed, but if the former is built with loose stone, I cannot say that they are absolutely needed.

11. Since the date of the Committee's Report, circumstances have materially altered, whereby the facilities for bringing materials to the work have greatly increased. The great Southern India Railway has been opened from Negapatam to Trichinopoly, and stone from the Trichinopoly and Tanjore Ports, instead of from Ceylon as originally intended, can be brought in waggons at a goods' rate, I believe, not exceeding one Rupee per yard. There is much laterite in the latter Port, but it is too small to be of great use, as cubes of this material of less content than one cubic yard, or 18 cubic feet, are not desirable for Harbour works. If the stone fails, however, quarries have been discovered, I understand, 11 miles east of Tanjore, where granite can be blasted in any quantity and brought down to Negapatam at a cost not exceeding that quoted by Captain Oakes, 4½ Rupees per ton.

12. On one of my late visits to Negapatam I inspected the large dredge. It appears to me in perfect working order, and I think it a pity that during the period arrangements are making to transport it to Paumben, which may not be matured, and during the remainder of the working season, advantage is not taken of deepening the river, at the shoals, by its means, and so avoiding a probability of a breach, if the Railway authorities consent to give the use of one of their Engineers for working the dredge, which the Collector believes they are willing to do. There is already a European Dredge Maistry in charge of the machinery who has had some little experience under Mr. Mechanical Engineer Wait.

13. Without wishing to extend this report to an unnecessary length, I would notice that the present Jetty is in an unsafe and dangerous state, many of the cubes having been displaced and portions sunk in places from the want of liberal repairs. The average yearly expenditure from 1857-58 to 1862-63 has only been Rupees 800, and in four of these years only Rupees 300. If the extension of this work is determined upon, I would recommend a small portion of the funds being diverted for the necessary repairs, and the advisability of strengthening the western side of the sand spit should not be lost sight of at the same time. The water also which in the monsoon extends nearly northwards to Nagore from the Jetty, should be made to discharge into the sea north of the work, and not allowed to flow through the sluice constructed in the body of the Jetty near the landing place, to the danger of the whole work. This sluice will suffice for the drainage water of the town, which should be disconnected from the flood-water on the coast swamp, and allowed to disembogue through a masonry channel with floor and side walls, as proposed by Mr. Fraser, if funds can be provided for it, to allow of merchants finding wharfage room on land otherwise flooded. The rear of the Jetty should be clay puddled to prevent the water standing on the beach, from percolating through and causing breaches as heretofore, and the beach should

*4 Proceedings of the Madras Government, Public Works Department,
18th March 1864.*

be raised and every means taken, by the planting of marine shrubs and adoption of other measures, to protect the back of the work from the monsoon floods, which partly stand on the low, sandy ground bordering the shore during the rainy season.

No. 439. Despatch from the Right Honorable Sir C. WOOD, Bart., Secretary of State for India (Public Works), to His Excellency the Honorable the Governor in Council, Fort Saint George, dated India Office, London, 9th February 1864, No. 3:—

SIR,

1. In continuation of my Despatch No. 19 of 9th December last, relative to the improvement of the Harbour of Negapatam, I now forward copy of a further letter on the subject from the Directors of the Great Southern of India Railway Company.

2. On re-consideration, I am disposed to think that the professional opinions which have been given in favor of the works alluded to in my former Despatch, as likely to cost not more than £4,000, will justify the immediate outlay of that comparatively moderate sum.

3. The difficulty and expense of procuring suitable materials, which have hitherto been objections to the adoption of any project for the improvement of the Harbour, will now, I understand be greatly diminished by the facilities afforded by the Railway for the transport of stone from Tanjore and Trichinopoly.

4. It will be understood that the principal work referred to above is the re-construction and extension of the old Pier or Jetty running out into the sea on the north side of the river mouth. Any additional operations may for the present be limited to piling on its inner face of that short portion of the spit of land which is exposed to the action of the river current.

From H. W. NOTMAN, Esq., Secretary to the Great Southern of India Railway Company, to the Under Secretary of State for India, &c. &c. &c., India Office, dated 2, Leadenhall Street, London, E. C., 18th December 1863, No. 49.

SIR,

1. The Directors of this Company have received from their Agent in India a copy of the Proceedings of the Madras Government (Public Works Department) of 21st October 1863, with an Order thereon, No. 3,055, to the effect that the Government see no reason for altering the decision already given with respect to the proposed improvements of the Harbour of Negapatam. That decision, as conveyed in Order No. 1,600, dated 19th June 1863, was that the Government were not prepared to accede to the recommendation of the Consulting Engineer for Railways to improve the Harbour, until the opinion of a competent Harbour Engineer could be obtained. No steps, however, appear to have been taken to obtain such an opinion, and the work therefore remains in abeyance.

2. In June 1860 a Commission was appointed by the Madras Government to consider and report on the best means of improving the Port of Negapatam, and their Report was submitted in December 1860.

3. The Order of Government, No. 1,785, 23th September 1861, states in detail the works which they consider advisable "at present," and in a subsequent Order it is observed that the Deputy Chief Engineer will "obtain from the District Engineer, Tanjore, a revised Estimate of the expense required to carry out the works now ordered, and means will be provided from the Reserve fund 1862-63, should the sum entered in the Budget of that year for the work in question not be available."

4. None of the works then thought advisable and ordered, have been carried out, and the Directors trust that the importance to the Company of the improvements being no longer delayed, will be accepted as their apology for so soon again addressing the Secretary of State on the subject.

5. In calling the attention of the Madras Government to this matter, in July last, the Agent of the Company observes that the extension of the Line from Trichinopoly to Erode will, when

*Proceedings of the Madras Government, Public Works Department, 5
18th March 1864.*

ready for use, have the effect of drawing to the Port of Negapatam, a large traffic from Ceylon for conveyance to the Western Coast, especially during the continuance of the south-west monsoons, and urges the importance of timely measures being taken to improve the Port.

6. It is understood that a sum of money has been voted for the improvement of the Harbour of Beypoor, the Terminus of the Madras Railway on the Western Coast; and the Directors of this Company will be prepared, as in that case, to instruct their Engineers to undertake the execution of the works, under the direction of the Madras Government, should Sir C. Wood be of opinion that such a course will expedite matters.

7. The Directors feeling extremely anxious on this subject, respectfully hope that it may meet with Sir Charles Wood's early and favorable consideration.

No. 440.

ORDER THEREON, 18th March 1864, No. 826.

* G. O. No. 279.

1. On the 26th of January* last, the Government forwarded to the Superintending Engineer, 6th Division, for his opinion, a copy of a Despatch, with enclosures, from the Right Honorable the Secretary of State for India, in which the early construction of certain works, for the improvement of the Negapatam Harbour, was urged by the authorities of the Great Southern of Indian Railway.

These works consisted of,

(1.) The extension of the old Jetty, on the north side of the entrance to the Harbour, to a length of 40 yards.

(2.) The protecting and strengthening of the long, narrow spit of sand, on the right bank of the river, separating it from the sea.

2. In the foregoing letter Captain Bean reports at length upon the present condition of the Harbour, and upon the measures proposed for its improvement; supporting, in general, the views advocated by the Railway authorities.

3. A subsequent Despatch, recorded above, from the Right Honorable the Secretary of State, gives cover to a further letter from the Directors of the Great Southern of India Railway Company, in which the construction of the works of improvement to the Harbour, already advocated by them, is again most strongly urged.

4. Before sanctioning an expenditure of Rupees 40,000, upon a scheme of this nature, the Government desire to be furnished with a correct Plan of the Harbour and back-water, showing the coast for two miles north and south of the present entrance. Soundings should be shown upon the Plan, taken at right angles to the beach, and extending from the beach to five fathoms water. One line of soundings should be taken at the mouth of the river, and two others on either side, north and south of the mouth, at distances of a quarter of a mile from each other. The Superintending Engineer will also furnish the Government with information regarding the rise of tide, the currents, the prevalent winds, &c. They believe that the general current at Negapatam, as elsewhere along this coast, is from the south; but they desire to know how long it runs in that direction, and how long from the north.

5. At the same time the Superintending Engineer will submit Estimates for the following works:—

(1.) Extension of the Jetty to a length of 40 yards.

(2.) Necessary repairs to the present Jetty.

(3.) Any work of an emergent nature, required for the security of the right bank of the river, between it and the sea.

6 Proceedings of the Madras Government, Public Works Department,
18th March 1861.

6. With regard to the Dredge, Captain Bean is requested to report the terms upon which the Railway authorities will consent to give the services of their Engineer, and how he proposes to defray the cost of working it.

(True Extract.)

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

To the Superintending Engineer, 6th Division.
" Consulting Engineer for Railways.
" Financial Railway Department.

Exd. S. T. Augustin.

N. 1976

Supg: Engrs Office 6th Division
Panjora 25th February 1864

From,

Captain J. Bean R E

Offs. Supg: Engineer 6th Div.

To,

Colonel C. A. Orr R E

Secretary to Government

P. W. D.

Sir,

I have the honor to report, for the information of Government, on the subject referred to in para: 3 of their Order N. 279 of the 26th January 1864 communicating despatch from the Right Honorable the Secretary of State of India for my opinion, and calling for observations on the works, the early construction of which is urged by the Directors of the Great Southern of India Railway, for the improvement of the Nagapattam Harbour.

2 I have twice visited the works at this Harbour within the last six weeks, and on the last occasion the Collector of the District was good enough to accompany me and to point out the scheme of improvements and protective works suggested by the Committee

appointed

N. 1976 dated 9th
Panjora 25th Feb 1864

appointed in 1860, of which he formed a Member. I find that the state of the Jetty is very much the same as in 1848, when I reported to Colonel Lawford on the state of the Harbour, and on the effect of the works undertaken for its improvement and projected by him.

3 The Jetty is still in an incomplete condition, and its extremity, in the present state of the Coast line at this season, is about 20 yards distant from the Sea high tide level. I observe that there are two lines of sand deposit one projecting Southwards from the mouth beyond the end of the Jetty, and the other projecting Northwards from the South bank, the low portion of the sand spit dividing the Sea and river having been extended by the westerly winds. These winds are now beginning to prevail, and their tendency will be to shift both the mouth and the bar more to the Northwards. Altogether, the state of the Harbour is not satisfactory, and the bar at low tide only contains about $2\frac{1}{2}$ feet in depth of water. An improvement, however, has been effected along

along the narrow spit of sand forming the western side of the Harbour, and the measures taken by Mr. Fraser Executive Engineer, and others, in the way of erecting fences and planting Marine shrubs, have had a favorable tendency to arrest the sand drift, and to form banks averaging 2 yards in height above the level of the Sea.

4 As regards the measures proposed to improve and secure the present Harbour, they may be enumerated briefly as follows.

- 1 To strengthen and extend the present Jetty beyond high tide level.
 - 2 To strengthen the spit of land between the sea and back water.
 - 3 To throw out groynes on the sea and river faces of the sand spit.
 - 4 To erect a Southern Training wall at the entrance of the Harbour and,
 - 5 To enlarge the basin for tidal water.
- The Engineers consulted by the Railway Directors were the prosecution of the first of these works, at a cost of £4000, and the necessity of adopting precautionary measures to prevent the recurrence of a breach at the Southern extremity

extremity of the sand bank, opposite the bend of the River's course, is also brought to notice.

5 On a careful consideration of the works proposed, I am strongly inclined to support the proposal of the Directors and Engineers of the Railway, that is, to provide at once for the extension of the Northern wall or Jetty to a length of 40 yards. It appears to me that this is the work of all others to which we must first look for the improvement of the Harbour, and, I believe, material benefit will be derived from its execution. The importance of the Harbour, which had an Import and Export Trade in 1860 valuing 26 to 28 lacs of Rupees respectively, seems to justify the outlay on such improvements. By lengthening this Wall on the line of Sunken foundations of the former extended Jetty, I believe, that not only will the effects of the North East Monsoon, in washing up sand with a tendency to close the bar, be lessened, but that a strong river scour in the freshes will be carried along the face into deep water, and the ebb and flow of

if tide will assist in maintaining a considerable depth at the bar.

6 I must not, however, fail to support the recommendation of the Railway authorities, that the spit on the right bank of the River forming the Harbour should be carefully watched, and means taken, as opportunity offers, to strengthen it. Though I understand it has been much strengthened of late years, the Bank still requires protective works. I do not advocate throwing up an earthen embankment, but I would, as suggested by Colonel Lawford, erect a strong line of Piling for three or four hundred yards in length, the Piles to be driven by a Common Pile Engine and backed with loose stone. Fences, also, with thin brushwood and twigs intertwined should be erected and marine plants grown. If money is available, Groynes on the sea side, at intervals of 100 yards, may be thrown out, and they might be built at a comparatively small cost, if the design of those I erected at Cochin be followed, though they should be of a somewhat stronger material. The three Groynes

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also, on the River face, already erected, might be advantageously renewed and strengthened, as the unsuitable material, Coral stone, of which they are made has not rendered them durable, and the noses of all have sunk and been carried away.

7 It is on account of the frail barrier, which only interposes between the Sea and the River, that I do not advocate the erection of the Southern training wall recommended by the Committee, and which is to leave an opening of only 80 yards wide for the River to disembogue at its highest state of fresh. I am confident that, if the Northern and Southern walls were constructed as proposed, another breach would occur at the same spot as before, and I agree with Colonel Lawford in his view expressed in his Report, embodied in Government Order No. 1019 of the 16th May 1860, and in his Memorandum dated 15th February 1861, because I think the freshes should be allowed to expand at the mouth to avoid a breach opposite the direct course of the River where it turns
Northward

Northward, but not to avoid as he considers "too strong a current" nor "because the constant tendency of the sand bank to extend Northward keeps the mouth confined quite as effectually" as any artificial work could do, in which two opinions I do not concur. On the contrary, I think with Government, as expressed in their Order of the 26th September 1861 No. 1785, that a groynes, or better still a training wall, would counteract the injurious effect of the Southerly winds in silting up the mouth Northwards, and I also consider that the strong current thus produced by the River freshes would have a very valuable effect in maintaining deep water.

8 The above opinion, however, only refers to the present state of things, and when the spit of sand is rendered perfectly safe, and Groynes constructed, I would advocate the erection of the Southern training wall, simultaneously with the deepening and widening of the Radnagor, and the extension of the Vellyam River water to Kappadam, which should not be deferred, for I believe the increase to the amount of the

the flood waters thus proposed is much required, and will have a most beneficial effect on the Port.

9 With reference to the cost and style of work, it is not shown how the cost of Pier, Rupees 40,000, which it is proposed to run out in continuation of the old Jetty, is arrived at. In the Estimates sent up to Government and which were prepared after the Report of the Committee, of which Mr. Carr whose name appears in the Order quoted at the head of this letter was one of the Members, had appeared, but whether with their concurrence or not I cannot say, the cost of rebuilding and extending, or more properly strengthening, the Jetty was set down as Rupees 40,000. This allowed a breadth of 11 yards at foundation, and $3\frac{1}{2}$ yards average at top, with heights respectively of 6 and 2 yards. Adopting this data, though the upper breadth is insufficient, and calculating for a length of 40 yards, I find that 2920 Cubic yards or 5840 Tons of stone at the rate of 11.5 Rupees per Ton, given by Captain Baker, and 150 Piles driven 2 feet apart at the top.

Govt order No. 578 and 2169 dated 26th March 1862 and 11th September 1862

Rupees 26,280

Rupees 13,500

of the work at 90 Rupees each, the rate given by the same Officer, would make up the sum of 40,000 Rupees. 205

10 I do not consider that the mode of erecting the Jetty and hitherto followed, which was proposed by the Committee, and which I believe was forced upon them owing to the difficulty of procuring requisite material, is at all a good one. The plan consists of throwing in loose stone until it finds its own level up to low water mark, and then of raising the Superstructure with solid brick in Chunar. With this section, the foundation of loose stone yields unevenly, and the solid resisting mass above is sunk unequally and breaks off in huge masses, which it is found extremely difficult to unite and join with the remaining work. These masses are carried down further and further by their own weight, until they finally disappear. With rubble stone we have much more command over our material, we can regulate the settlement and fill up interstices to avoid percolation, and have even work throughout, whilst eventually solid masonry can be

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11 Since the date of the Committee's Report, circumstances have materially altered, whereby the facilities for bringing material to the work have greatly increased. The Great Southern of India Railway has been opened from Negapatam to Trichinopoly, and stone from the Trichinopoly and Tanjore Forts, instead of from Ceylon as originally intended, can be brought in waggons at a good rate, I believe, not exceeding one rupee per yard. There is much laterite in the latter Fort, but it is too small to be of great use, as cubes of this material of less content than one cubic yard, or 18 cubic feet, are not desirable for Harbour works. If the stone fails, however, quarries have been discovered, I understand, 11 miles east of Tanjore, where granite can be blasted in any quantity and brought down to Negapatam at a cost not exceeding that quoted by Captain Oakes, $4\frac{1}{2}$ Rupees per ton.

12 On one of my late visits to Negapatam, I inspected the large Dredge. It appears to me in perfect working order, and I think it a pity that

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yard.

that during the period arrangements are making to transport it to Saunber, which may not be matured, and during the remainder of the working season, advantage is not taken of deepening the river, at the Shoals, by its means, and so avoiding a probability of a breach, if the Railway authorities consent to give the use of one of their Engineers for working the Dredge, which the Collector believes they are willing to do. There is already a European Dredge Mistry in charge of the machinery who has had some little experience under Mr. Mechanical Engineer Wait.

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The average yearly expenditure from 1857/58 to 1862/63 has only been Rupees 800, and in four of these years only Rupees 300. If the extension of this work is determined upon, I would recommend

recommend a small portion of the funds being diverted for the necessary repairs, and the advisability of strengthening the western side of the sand spit should not be lost sight of at the same time. The water, also, which in the monsoon extends nearly northwards to a lagoon from the Jetty, should be made to discharge into the Sea North of the work, and not allowed to flow through the sluice constructed in the body of the Jetty near the landing place, to the danger of the whole work. This sluice will suffice for the draining water of the town, which should be disconnected from the flood water on the Coast Swamp, and allowed to discharge through a masonry channel with floor and side walls, as proposed by Mr. Fraser, if funds can be provided for it, to allow of merchants finding wharfage room on land otherwise flooded. The rear of the Jetty should be clay puddled to prevent the water, standing on the beach, from percolating through and causing breaches as heretofore, and the beach should be raised and every means taken,

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adoption of other measures, to protect
the back of the work from the monsoon
floods, which partly stand on the low
sandy ground bordering the shore
during the rainy season.

I have the honor to be

Sir,

Your most obedient servant

Wm. G. R. E.

Off. Supr. Engineer B. D. A.

W. G. R. E.

from the sea.

condition of the vessel,
and upon the measures

Proceedings

the following

From the Supergr. 6th Div

Referring on the state of the
Vijaypatnam Harbour

From the Secy of State.

Forwarding with their opinion,
copy of a further letter from the
Directors of the Great Southern
of India Railway L^d on the sub-
ject of the improvement of the
Vijaypatnam Harbour, Residency
No 6

Refer.

N. 25th January 1867

N. 9th Decr/64. No 6

G. O. 279

On the 26th January last,
the Government forwarded
to the Superintending Engineer,
6th Division, for his opinion,
a copy of a despatch, with
enclosures, from the Right
Hon^{ble} the Secretary of State
for India, in which the
early construction of certain
works, for the improvement
of the Vijaypatnam Harbour,
was urged by the Authorities
of the Great Southern of
India Railway.

In the foregoing letter
Captain Bear reports at
length upon the present
condition of the harbour,
and upon the measures

These works consisted of,
(1) The extension of the old
jetty, on the north side of
the ~~river~~ entrance to the
harbour, to a length of 40
yards.
(2) The protecting and
strengthening of the long
narrow spit of sand, on
the right bank of the
river, and separating it
from the sea.

12.16 Aug/60 ch 84-85.
" 5.9 " " " 60-61.
" 26.11/61 " " 261 @ 265
" 26 March/62 " " 259-490
" 11.6/64 " " 193 194.
" 26 June/64 " " 562 563.

17.1.1867
To the Secy of State
From the Supergr. 6th Div
The Supergr. Engineer
6. Div

To
The Secretary of State
P. 100

Received 25th Jan 1867
Recd to Secy of State

26.1.1867

Referring on the

state of the above

Vijaypatnam Harbour

21.8.82-1884 March/61-

Office of the Secretary of State
29.1.1867

2.4.1867

reporting
views addressed
Railway Authorities.

A subsequent despatch
recorded above, from the
Right Hon^{ble} the Secretary
of State, gives scope to a
further letter on the subject
from the Directors of the
Great Southern of India
Railway Company, in
which the construction
of the works of improvement
to the harbour, already
advocated in them, is
again most strongly
urged.

Before sanctioning
an expenditure of Rs.
40,000, upon a scheme
of this nature, the Govt.
desire to be furnished
with a correct plan of
the harbour & backwaters,
showing the Coast for
two miles north & south
of the present entrance.
Foundings should be
shown upon the plan &
taken at right angles
to the beach, & extending

at the
two rivers, and two others
on either side, north and
south of the mouth, at
distances of a quarter of a
mile from each other.
~~in the form of lines of~~
for moorings. The
Superintending Engineer
will also furnish the
Govt. with information
regarding the rise of tide,
the currents, the prevalent
winds, &c. They believe
that the general current
is the Cape Tamir, as elsewhere
along this coast, is from
the south; but they
desire to know how long
it runs in that direction
and how long from the
north.

At the same time
the Supt. Engineer will
submit estimates for
the following works:-
(1) Extension of the
jetty to a length of
50 yards.
Necessary repairs to

of the right bank of the
river, between it and
the sea.

With regard to the
bridge, Captain Bean
is requested to report
the terms upon which
the Railway Authorities
will consent to give
the services of their
Engines, & how he
proposes to defray the
cost of working it.

W.B.

Captain Bean's England
27th April 1864

W.B. & Co. Ltd.

To
The Superintending Engineer
Consulting Engineer for Railways
Financial Railway Department
Cape of Good Hope

1st 1864 Depart
Proc. of Govt for a bridge

No 826.

Proc. of the Cape
of 18th March 64