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Not to be folded or roughly handled

No. 91. Read the following letter from Colonel C. E. FABER, Chief Engineer; to J. D. BOURDILLON, Esq., Secretary to Government, dated 8th April 1859, No. 9404.

SIR,

Adverting to Extract Minutes Consultation of the 27th May 1858, No. 1000, directing the Collector of Vizagapatam to communicate his plan for the improvement of the Harbour of Vizagapatam to the District Engineer for report, through the Department of Public Works, I have the honor to forward copies of two letters from the latter Officer, accompanied by a Plan, reporting fully on the characteristics of the Harbour, and suggesting certain works for its improvement, at an estimated cost of Rupees 23,500, or of only Rupees 13,000 if the aid of Convicts, as requested by Mr. Rohde, be granted.

1 Copies of letters from the District Engineer of Vizagapatam, Nos. 506 and 1012 of 21st September 1858 and 9th March 1859.
1 Plan.

2. Lieutenant Vertue shows that the Bar which obstructs the entrance of the River or Creek forming the Harbour of Vizagapatam, has deep water close within and to seaward of it, and is composed of loose sand and shells, deposited in their present site in consequence of the slackness of the tidal current ebbing and flowing through so expanded an opening as now exists, and he states his conviction that by artificially contracting that opening, by means of a groyne of rough stone projecting seaward from the Northern side of the River's mouth sufficiently far, in a direction slightly convergent to the rocky headland forming the Southern boundary of the entrance, the loose material of which the Bar consists would be swept away, and be effectually prevented from reforming.

3. Looking at the position of the Harbour and its peculiar formation, the plan proposed for its improvement appears extremely feasible, and as it can be carried out at a moderate expenditure with the assistance of Convicts, who cannot be more usefully employed, I would recommend the project to the most favorable consideration of the Honorable the Governor in Council.

4. Lieutenant Vertue has omitted from his Estimate the cost of piling along one side of the proposed groyne, as he states he thinks would be necessary, but as I do not concur with him that piles are at all required, the omission is of no moment, and as the other works indicated by the District Engineer, as useful improvements to the Harbour itself, and to the Town, may be performed advantageously by Convicts, the amount requiring sanction is Rupees 13,000, if their employment be authorized, or Rupees 23,500 if the construction of the groynes alone be undertaken and entrusted to this Department for completion with ordinary labor.

Letter from Lieutenant J. VERTUE, District Engineer, Vizagapatam; to Colonel C. E. FABER, Chief Engineer, dated Vizagapatam, 21st September 1858, No. 506.

SIR,

I have the honor to forward the long promised Plan of the Back-water, which for a variety of reasons, I have been unable to have sooner completed, although I have done all in my power to hasten it on.

2. The principal improvement the Collector proposed to make, is to build a wall of rough stone between the points A and B, the same in the plan indicated by a red line. The scale of the plan does not quite permit one unacquainted with the locality to appreciate the advantage of this, but by it a considerable piece of ground would be enclosed, and permit of the road-way being much widened, the margin of the river would be straightened, and a slight increase thus given to the scouring power, and lastly, a good site would be obtained on which to build the new Custom House, sanctioned for Vizagapatam. This, and the deepening of the Bar, are the principal objects the Collector has in view. I would, in extension of his plan, propose to throw out the groynes, indicated by the red lines, and this done, and the rock on the Bar removed, I anticipate a very great benefit and extension to the trade of this port.

3. Before going further, I would however, say that the lengths of the groynes, the distance between them and a variety of other points are not necessarily intended to be, as on the plan. The red lines on the latter are only meant to convey my idea, the carrying out of which would necessitate a much more accurate Survey, and the acquisition of a number of data, not now in my possession.

4. It will be observed that were the Bar deepened, and the Harbour dredged a little, there would be an average depth of 20 feet at high water for half a mile, while by throwing up the groynes, and straightening and contracting the course of the stream, this depth would not only be preserved, but even increased. An improvement in this respect might easily be effected by enclosing by a rough stone Dam the space enclosed, by the black dotted line the Dam following its course, although it is probable that this space would in time gradually be filled up. It will be observed that opposite this place the Channel shallows considerably.

5. A result caused by the throwing up of the North groyne would be the accumulation behind it of sand and deposit following probably the course of the dotted line. This increase of beach would be a great boon to the Town where space is so much required and it would moreover, serve as a protection to the groyne. The course of the opposite groyne, might be determined so as to completely unite it with the slope of the Hill, and thus it would be rendered perfectly safe. The great scour caused by the gradual contraction of the stream would doubtless keep the Bar perfectly clear, and even at low tide the largest ships which frequent this Coast might enter and lie in the Harbour, where they would be almost land locked and enjoy the most perfect security. It is needless to point out the immense saving of time and money that would be gained by ships entering the Harbour and there discharging their Cargoes, in place of the tedious and often dangerous process now prevailing of landing them in boats, an operation, which moreover, is often on account of stormy weather interrupted for days at a time.

6. The deep valley opposite the indentation within the dotted line might easily be excavated and made into a dry dock where vessels could be repaired with perfect security.

7. The inexhaustible abundance and proximity of stone would render all works in it extremely cheap, and I would strongly recommend that all the small stone, refuse, and deposit removed from the Bar or Harbour, be removed in boats and deposited in the middle swamp, to raise which sufficiently to allow of its being built on, would to the Town of Vizagapatam be an inestimable advantage. It would be an easy matter to prevent the stuff thus deposited from being washed off by the tide.

8. There is only one other matter to which I shall refer and that is the enormous inconvenience to traffic, caused by the delay at the Ferry. In the event of the Harbour being much used by shipping, it would be inconvenient to put there a floating Bridge (the only possible construction) and besides there are serious objections to such, viz., the difficulty caused by the tide, and the rapidity with which the part of the structure touching the water would become encrushed with barnacles and other shell fish.

9. I am quite at a loss to understand why was abondoned the road known as "Captain Rundall's Road," which passes along the edge of the swamp and goes as far as Agnumpoody, to which place the road by the Ferry and Gazawaka is also directed. A considerable portion of the latter is in very bad order and some miles are yet unmade, and to complete the whole a considerable sum will be required. Before this is done I think it worthy of serious consideration, whether it would not be well to repair and maintain Captain Rundall's Road, and abandon the other, in consequence of the enormous delay and inconvenience caused by the passage of the Ferry.

Letter from Lieutenant J. VERTUE, Acting District Engineer, Vizagapatam; to Colonel C. E. FABER, Chief Engineer, dated Camp Waltair, 9th March 1859, No. 1012.

SIR,

I have the honor to forward, in accordance with the instructions contained in your letter, No. 6400 of 18th October 1858, a Survey of the Harbour or Back-water of Vizagapatam, shewing the Bar and Shoals with soundings. The Survey may be relied on, as it was executed in conjunction with the Master Attendant, Captain Meppen, who took the soundings, by some members of the Trigonometrical Survey Department, who happened to be in Vizagapatam, and kindly volunteered their assistance.

2. From the Plan you will see that immediately outside the Bar, the water deepens suddenly, and that moreover the Bar is composed of soft mud, and exhibits no traces of rock as was commonly reported, and these facts go far to render probable the success of the Project which I long ago recommended.

3. A Bar is generally formed by the opposing action of the Sea and a River, and commences where these forces become equal, or nearly so, suffering greater or less extension according to circumstances. In Deltas, where the slope of the ground is very slight and the quantity of deposit annually carried into the Sea very great, a Bar is very soon formed, and extends from year to year, in spite of all that can be done, to prevent it. Groynes are in such case of comparatively little use, as, even although you can ensure a tolerable depth of water between them, when a narrow passage is formed between them, one evil is only avoided for another, for Shoals, and these shifting under certain circumstances, are formed outside the groynes, and the navigation becomes exceedingly difficult and dangerous.

4. I mention these facts merely to shew how otherwise, and how happily, the Harbour of Vizagapatam is situated. There is in the first place no river discharging itself into it, to fill it up with deposits, and though it certainly receives the drainage of 15-20 square miles of country, it happens that from local circumstances, little or no deposit is carried into the Harbour, and that the freshes which occur but seldom, nor last long, are far from being productive of evil, beneficial,* seeing that they invariably deepen the water in the Bar. Independent of there being circumstances which would incline one to so judge, there is the testimony of the oldest inhabitants of the place that the depth of water in the Harbour has not varied, nor has the depth of water on the Bar, nor its size and position during their recollection. The Bar has evidently been originally formed, by the deposit brought down by the freshes, and not by the opposing action of the tide and Sea currents, seeing that it is formed of soft mud, and not of sand, and, moreover, since the testimony of all is to the effect, that it has for many years been in statugus. I think there is every reason to hope, that we may to a great extent at least get rid of it altogether.

* Sic in original.

5. The first thing to be done is of course to throw out a groyne from the point on the North side of the Harbour denoted by a red cross, the same to be carried out to about the end of the Bar, and in direction to be slightly convergent to the opposite shore; leaving an opening of about 50 yards wide at the entrance, by this narrowing the entrance. I anticipate that the increased scour produced will greatly deepen the water on the Bar, and at high tide at least render the Harbour accessible to Ships of such burden as frequent this Coast. The soundings shown in the Plan are referrible to low water, and it will be seen, that even now there is at the South extremity of the Bar, close to the rock, a depth of 9 feet at high water, the water gradually shoaling towards the other extremity. We may then at least expect as a consequence of the presence of the groyne, that the Bar should be at high water deepened to 13 feet, which would admit of the entrance of loaded vessels of 6—700 tons. It will be seen by a reference to the Plan that there is deep water immediately outside and inside the Bar, after crossing which the deep channel lies close to the rock, until it reached the point "Ferry" where it crosses, and is reflected from the satient angle on the opposite side to near the rock shown in the bight on the South side, whence it suffers another reflection, keeping afterwards nearly the centre of the water way.

6. A part of the scheme is also to fill up the re-entering spaces enclosed by the red dotted lines, within which the water is shallow, and which work might well be performed by Convicts to make a road on the South side from the Dolphin's Nose as far as the Ferry, of which about one-third of a mile must be blasted, the material thus gained being used for filling in the bight, in the center of which is shewn a large rock, a dredge would also probably be very useful to here and there widen the deep channel, while various other improvements would doubtless suggest themselves as the work proceeded.

7. By filling up the spaces just mentioned, not only would the scour be increased, but the deep channel straightened, and the navigation rendered more easy.

8. It is quite needless for me to enumerate the advantages Vizagapatam would possess as a Port, were the Harbour rendered accessible to large Vessels, and, moreover, these I mentioned in detail in my Diary for October 1857. Suffice it to say, I feel convinced that no one can look at the locality without coming to the conclusion that there is not a single port between the Hooghly and Cape Comorin that can compare with it. I will now therefore proceed to give a rough sketch of the cost of the proposed operations.

9. I look upon it as highly necessary that the South side of the groyne should be supported by a row of piles driven closely together with their heads inclined inwards, and to a depth of not less than 7 feet more, when easily practicable. This would, I think, be advisable for several reasons. In the first place, the narrowing of the entrance would in all probability increase the volocity of the current with the ebb tide (now during the heavy freshes 5 miles) to at least 7 miles an hour and such a current would by undermining, and by direct action, induce a constant motion in the stones, thereby necessitating frequent repair. Besides this, Ships entering would be liable to knock and rub against it, while, moreover, should the groyne be used as a quarry unless piling be used to bind and keep the stone from spreading, Ships could not approach within some distance of the groyne which would be inconvenient. In addition to the above, if piling be used, less stone will be required, and the work will be altogether rendered much more substantial. On the West side I do not consider that any contrivance is required to retain the stones, seeing that the water in the North-East Channel is shoal, and that moreover, after the groyne is thrown up, I anticipate the gradual filling up of a large portion of the bight that would then be formed, this is by no means the least important advantage that would accrue from the carrying out of these operations, for in Vizagapatam room for building, or any other purpose is not to be had. No doubt piling would be expensive, seeing that the piles must average 5 feet in length and 8 inches in diameter, and would even if made of good country wood cost 20–25,000 Rupees, while if of teak they would cost about 35–40,000 Rupees. If any doubt is entertained of the success of the result, an experiment might be made without piling.

10. I consider that stone might be quarried and deposited at the groyne for 12 annas per cubic yard (much larger stone being required, if size were no object, the cost would be only half the above) and allowing the groyne to be 440 yards long, to have an average height of 14 feet, a thickness at top of 10 feet, and with South and North side slope, respectively of two in 1 and 1 in 1, the whole quantity of stone required will be roughly 21,000 cubic yards, which at a cost of 12 annas per cubic yard would amount to nearly 16,000 Rupees. For conveying the stone, bandies must be used for the first portion of the groyne, and for them a road would have to be made over about 300 yards of sand at a cost of about 700 Rupees, as the road must be well raised to connect the main road and the groyne. It would then be well to employ boats, flat bottomed, 30 feet long, 10 wide, and 3 deep. Four of such at 700 Rupees a piece, would cost 2,800 Rupees, the whole cost would then be for a groyne of 440 yards in length

	Rs
21,000 cubic yards of stone, at 12 annas per cubic yard.....	15,750
4 Boats 30 × 10 × 3 @ 700 Rupees.....	2,800
Road 300 yards long at.....	700
3 Cranes (single) for raising large stones, at 400 Rupees.....	1,200
Rupees	20,450
Superintendence, &c., at 15 per cent.....	3,050
Total.....	23,500

This makes the cost a little more than 53 Rupees per lineal yard, and this I do not think excessive, when the depth of water and the difficulties likely to be experienced from tide currents, &c., are considered. It is quite possible that the groyne may not be required to be carried out so far as I have allowed for, and if this prove the case, the cost would be materially reduced. Besides, it must be remembered that in the above are included the cost of articles which would sell again almost at prime cost, and thus the cost may truly be considered as nearly 10 Rupees per lineal yard less than above stated.

11. With regard to the labour, a certain amount of it must be done by Coolies and trained men, as Convicts not having the free use of their limbs could do little more than load and unload the stone, or about $\frac{2}{3}$rds the actual labour. This would reduce the total disbursement by 10,500 Rupees and make it 13,000 Rupees. I have said *disbursement*, for I think Convict labour dear at any price, 2 Convicts certainly not doing more than 1 Cooly, but on this work I think Convicts might be profitably employed, as the locality is close to the Jail; the men would be well looked after and made to work more than can be said as regards their present employment, and as I do consider their labour, whatever it may be worth, at present frittered away and misapplied.

12. The remaining parts of the project being of inferior importance, and quite subordinate to this, and in their nature moreover, capable of being principally executed by Convict labour, I have not thought it necessary to estimate their cost, the more so as the groyne, if regarded as an experiment, must of course be the work first commenced, the undertaking of the remaining works being entirely dependent on its success, of which I myself have not a doubt.

No. 92. ORDER THEREON, No. 918; dated 18th April 1859.

Resolved to refer these papers for the opinion of Colonel A. T. Cotton who is well acquainted with the locality, as to the probable efficacy of the proposed works, and the probability of their being executed for the estimated sum.

(Signed) J. D. BOURDILLON,
Secretary to Government.

№ 306. Northern Circle.

From,
Lieutenant J. Vertue
Assistt. Engineer Vizagapatam.

To
The Chief Engineer &c &c
Fort St. George.

Sir,

I have the honor to forward the long promised Plan of the Backwater which for a variety of reasons, I have been unable to have sooner completed, although I have done all in my power to hasten it on.—

Vizagapatam Harbour.

2. The principal improvement the Collector proposed to make, is to build a wall of rough stone between the points A. and B. the same as the plan indicated by a red line. The scale of the Plan does not quite permit one unacquainted with the locality to appreciate the advantages of this, but by it a considerable piece of ground would be enclosed, and permit of the roadway being much widened, the Margin of the river would be straightened, and a slight increase thus given to the Scouring power; and lastly a good site would be obtained on which to build the New Custom House, sanctioned for Vizagapatam. This, and the deepening of the bar, are the principal objects the Collector has in view. I would, as an Extension of his plans, propose to throw out the groynes indicated by the red lines, and this

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3. Before going further, I would however say that the lengths of the groynes, the distances between them and a variety of other points are not necessarily intended to be, as on the plan. The red lines on the latter are only meant to convey my idea, the carrying out of which would necessitate a much more accurate Survey, and the acquisition of a number of data, not now in my profession. —

4. It will be observed that were the bar deepened, and the harbour dredged a little, there would be an averaged depth of 20 feet at high water for half a Mile, while by throwing up the groynes and straightening and contracting the course of the stream, their depth would not only be preserved, but even increased. An improvement in this respect might easily be effected by enclosing by a rough stone dam the space enclosed by the black dotted line the dam following its course although it is probable that this space would in time gradually be filled up. It will be observed that opposite this place the Channel shallows considerably. —

5. A result caused by the throwing up of the North groyne would be the accumulation behind it of sand and deposit following probably the course of the dotted line. This increase of beach would be a great boon to the Town where space is so much required and it would moreover serve as a protection to the groyne. The course of the opposite groyne, might be determined so as to completely unite it with the slope of the hill, and thus it would be rendered perfectly safe. —

The great scour caused by the gradual contraction of the stream would doubtless keep the bar perfectly clear, and even at low tide the largest ships which frequent this Coast might enter and lie in the harbour, where they would be almost land locked and enjoy the most perfect security. It is needless to point out the immense saving of time and money that would be gained by ships entering the harbour and there discharging their Cargoes, in place of the tedious and often dangerous process now prevailing of landing them in boats an operation, which, moreover is often, on account of stormy weather interrupted for days at a time. —

6. The deep valley opposite the indentation within the dotted line might easily be excavated and made into a dry dock where vessels could be repaired with perfect security. —

7. The inexhaustible abundance and proximity of stone would render all works in it extremely cheap, and I would strongly recommend that all the small stone, refuse and deposit removed

from

from the bar or harbour, be removed in boats and deposited in the Middle Swamps to raise it which sufficiently to allow of its being built on; would to the town of Vizagapatam be an inestimable advantage. It would be an easy matter to prevent the stuff thus deposited from being washed off by the tide.—

8 There is only one other matter to which I shall refer and that is the enormous inconvenience to traffic, caused by the delay at the Ferry. In the event of the Harbour being much used by shipping it would be inconvenient to put there a floating or Bridge, the only feasible construction, and besides there are serious objections to such viz. the difficulty caused by the tide, and the rapidity with which the part of the structure touching the water would become encrusted with barnacles and other shell fish.—

9. I am quite at a loss to understand why was abandoned the road known as "Captain Rundall's Road" which passes along the wedge of the Swamps and goes as far as Agraharampoody, to which place the road by the Ferry and Gazawaka is also directed. A considerable portion of the latter is in very bad order and some miles are yet unmade and to complete the whole a Considerable sum will be required.— Before this is done I think it worthy of serious consideration whether it would not be well to repair and Maintain Captain Rundall's Road

Road, and abandon the other in consequence of the enormous delay and inconvenience caused by the passage of the Ferry.

I have &c
(Signed) J. Vertue Lieutenant
Ag Dist Engr Vizagapatam
Northern Circle.

Civil Engr Office
Vizagapatam
21st September 1858.

No 1012

From
Lieutenant J. Vertue
Ag Dist Engineer
Vizagapatam

To
The Chief Engineer
D.P.W.
Fort St George.

Sir,

I have the honor to forward in accordance with the instructions contained in your letter No 6500 of 18 October 58 a Survey of the Harbour or Backwater of Vizagapatam, shewing the Bar and Shoals with Soundings. The Survey may be relied on as it was executed in conjunction with the Master Attendant Captain Hepper who took the soundings, by some Members of the Trigonometrical Survey Department, who happened to be in Vizagapatam, and kindly volunteered their assistance.

2. From the Plan you will see that immediately outside the Bar, the water deepens suddenly, and that moreover the Bar is composed of soft Sand, and exhibits no traces of Rock, as was commonly reported and those facts go far to render probable the success of the Project-

Project which I long ago recommended.

3. A Bar is generally formed by the opposing action of the Sea and a River, and commences where these forces become equal, or nearly so, suffering greater or less extension according to circumstances. In Deltas, where the slope of the ground is very slight and the quantity of deposit annually carried into the Sea very great, a Bar is very soon formed, and extends from year to year, in spite of all that can be done, to prevent it. Groynes are in such case of comparatively little use, as, even although you can ensure a tolerable depth of water between them, when a narrow passage is formed between them, one evil is only avoided for another, for Shoals, and these Shiftings under certain circumstances are formed outside the groynes, and the navigation becomes exceedingly ~~became~~ difficult and dangerous.

4. I mention these facts merely to shew how otherwise, and how happily the Harbour of Vizagapatam is situated. There is in the first place no river discharging itself into it, to fill it up with its deposit, and though it certainly receives the drainage of 15-20 Square Miles of Country, it happens that from local circumstances, little or no deposit is carried into the Harbour, and that the freshes which occur but seldom, nor last long are far from being productive of evil, beneficial, seeing that they invariably deepen the water in the Bar. Independent of there being circumstances which would incline one to so judge, there is the testimony of the oldest inhabitants of the place that the depth of water in the Harbour has not varied, nor has the depth of water on the Bar, nor its size and position during their recollection. The Bar has evidently been originally formed, by the deposit brought down by the freshes, and not by the opposing action of the tide and Sea Currents seeing that it is formed of soft mud, and not of sand, and, moreover, since the testimony of all is to the effect, that it has for many years been in Statu quo. I think there is every reason to hope, that we may to a great extent at least get rid of it altogether.

5. The first thing to be done is of course to throw out a groyne from the point on the N. Side of the Harbour denoted by a Red Cross the same to be carried out to about the end of the Bar, and in direction to be slightly convergent to the opposite shore; leaving an opening of about 50 yards wide at the entrance, by this narrowing Entrance. I anticipate that the increased scour produced will greatly deepen the water on the Bar, and at high tide at least render the harbour accessible to Ships of such burden as frequent this Coast. The Soundings shown in the Plan

are

are reversible to low water, and it will be seen, that even now there is at the South extremity of the Bar, close to the Rock a depth of 9 feet at High water, the water gradually shoaling towards the other extremity. We may then at least expect as a consequence of the presence of the groyne, that the Bar should be at high water deepened to 13 feet; which would admit of the entrance of loaded Vessels of 6—700 tons. It will be seen by a reference to the plan that there is deep water immediately outside and inside the Bar, after crossing which the deep channel lies close to the Rock, until it reached the point "Ferry" where it crosses, and is reflected from the Salient angle on the opposite Side to near the Rock shown in the bight on the South Side, whence it suffers another reflection, keeping afterwards nearly the Centre of the water way.

6. A part of the Scheme is also to fill up the re-entering spaces enclosed by the red dotted lines, within which the water is shallow, and which work might well be performed by Convicts to make a Road on the South Side from the Dolphin's Nose as far as the Ferry of which about one third of a Mile must be blasted. The material thus gained being used for filling in the bight, in the Centre of which is shewn a large Rock. a dredge would also probably be very useful to here and there widen the deep Channel. while various other improvements would doubtless suggest themselves as the work proceeded

7. By filling up the spaces just mentioned, not only would the Scour be increased, but the deep Channel straightened, and the navigation rendered more easy

8. It is quite needless for me to enumerate the advantages Vizagapatam would possess as a Port, were the Harbour rendered accessible to large Vessels, and moreover, these I mentioned in detail in my Diary for October 1857. Suffice it to say I feel convinced that no one can look at the locality without coming to the conclusion that there is not a single Port between the Hooghly and Cape Comorin that can compare with it, I will now therefore proceed to give a rough sketch of the Cost of the proposed operations.

9. I look upon it as highly necessary that the South Side of the Groyne should be supported by a Row of piles driven closely together, with their heads inclined inwards, and to a depth of not less than 7 feet — more, where easily practicable. This would I think be advisable for several Reasons. In the first place the narrowing of the entrance would in all probability increase the velocity of the Current with the ebb tide (now during the heavy freshes 5 Miles) to at least 7 Miles an hour and such a Current would by undermining, and by direct action

action, induce a constant motion in the stones, thereby necessitating frequent repair. Besides this Ships entering would be liable to knock and rub against it, while, moreover should the groyne be used as a quarry unless piling be used to bind and keep the Stones from spreading, Ships could not approach within some distance of the groyne which would be inconvenient. In addition to the above if piling be used, less stone will be required, and the work will be altogether rendered much more substantial. On the West side I do not consider that any contrivance is required to retain the stones, seeing that the water in the North East Channel is shoal and that moreover after the groyne is thrown up, I anticipate the gradual filling up of a large portion of the bight that would then be formed this by no means the least important advantage that would accrue from the carrying out of these operations, for in Vizagapatam room for building or any other purpose is not to be had. No doubt piling would be expensive seeing that the piles must average 5 feet in length and 8 inches in diameter, and would even if made of good country wood cost 20- 25,000 Rupees while if of teak they would cost about 35- 40,000 Rupees. If there any doubt is entertained of the success of the result an experiment might be made without piling.

10 I consider that stone might be quarried and deposited at the groyne for 12 annas

annas per Cubic yard, much larger stone being required, if size were no object, the cost would be only half the above, and allowing the groyne to be 440 yards long to have an average height of 14 feet; a thickness at top of 10 feet and with South and North side slope, respectively of 2 in 1 and 1 in 1 the whole quantity of stone required will be roughly 21000 Cubic yards which at a cost of 12 Annas per Cubic yard would amount to nearly 16000 Rupees. For conveying the stone bandies must be used for the first portion of the groyne, and for them a road would have to be made over about 300 yards of sand at a cost of about 700 Rupees as the road must be well raised to connect the main road and the groyne. It would then be well to employ boats, flat bottomed 30 feet long 10 wide, and 3 deep. Four of such at 700 Rupees, apiece would cost 2800 Rupees. the whole cost would then be for a groyne of 440 yards in length.

21,000 Cubic yards of stone at 12 Annas per Cubic yards ——— 15,750.

4 Boats 30 × 10 × 3 @ 700 Rupees ——— 2,800

Road 300 yards long — at ——— 700.

3 Cranes (single) for raising large stones at 400 Rupees ——— 1,200

Rupees ——— 20,450

Superintendence &c. at 15 per Cent ——— 3,050

Total ——— 23,500

This

This makes the cost a little more than 53 Rupees per lineal yard, and this I do not think excessive when the depths of water and the difficulties likely to be experienced from tide, current &c are considered. It is quite possible that the groyne, may not be required carried out so far as above allowed for and if this prove the case, the cost would be materially reduced. Besides it must be remembered that in the above are included the cost of articles which would sell again almost at prime cost; and thus the cost may fairly be considered as nearly 10 Rupees per lineal yard less than above stated.

11th. With regard to the Labour, a certain amount of it must be done by civilians and trained men, as convicts not having the free use of their limbs could do little more than load and unload the stone. or about 2/3rds the actual labour. This would reduce the total disbursement by 12500 Rupees and make it 13000 Rupees. Have said disbursement. For I think convict labour dear at any price. Convicts certainly not doing more than 1/3 labour when the work I think convicts, might be profitably employed, as the locality is close to the Jail. the men would be well looked after and made to work more than can be said as regards their present employment.

and

19

I do not consider their labour worth even what it may be worth at present scattered away and fitful [illegible]

The remaining parts of the proposed works in question, and one of the most important to be first and in their nature moreover as being of more skilled labour executed [illegible] convict labour. I have not [illegible] to estimate their cost, because as no one groyne is regarded as an experiment, it must be carried out to the end before commencement. The understanding of the remaining works seems entirely defective when considered as a whole I imagine I have made [illegible]

I have the honor to be
Sir
Your most obedient
Humble Servant
Charles Hutton
Lieut. R.E.
Executive Engineer
Port Blair
1st March 1863

I have the honor to be
Sir
Your most obedient
Humble Servant
Charles Hutton
Captain
Executive Engineer
Port Blair

Central Office of Pd.

No. 9404 Fort St. George 8th April 1859.

From

The Chief Engineer

To

The Secretary to Government,

Public Works Department.

Marine.

Sir,

Rec'd

16 Copies of letters from the Dist. Engr. of Vizagapatam. dated Nos. 506 and 1012 of 25th Sept. 58 & 9th March 59. 18 Plan.

Adverting to my Minute No. 1000, dated 27th May 1858, directing the Collector of Vizagapatam to communicate his plan for the improvement of the Harbour of Vizagapatam to the District Engineer for report, I have the honor to forward Copies of two letters from the latter Officer, accompanied by a plan, reporting fully on the characteristics of the Harbour, and suggesting certain Works for its improvement at an estimated Cost of Rupees 23500, or of only Rupees 13000 if the aid of Convicts be requested by Mr. Rohde, the pleader.

2. Lieut. Vertue observes that the bar policed obstructs the entrance of

of the River or Creek forming the Harbour of Vizagapatam, has deep water close within and to seaward of it, and is composed of loose sand and shells, deposited in their present site in consequence of the slackness of the tidal Current ebbing and flowing through so extended an opening as now exists, and he states his conviction that by artificially contracting that opening by means of a groyne of rough stone projecting seaward from the Northern side of the Rivers mouth sufficiently far in a direction slightly convergent to the rocky headland forming the Southern boundary of the entrance, the loose material of which the bar consists would be swept away, and be effectually prevented from reforming.

3. Looking at the localities of the Harbour and its peculiar formation, the plan proposed for its improvement appears perfectly feasible, and as it can be carried out at a moderate expenditure with the assistance of Convicts

Convicts, who cannot be more usefully employed, I would recommend the project to the most favorable consideration of the Honorable the Governor in Council.

4. Lieut. Vertue has omitted from his Estimate the cost of piling along one side of the proposed Groyne, as he states he thinks would be necessary, but as I do not concur with him that piles are at all required, the omission is of no moment, and as the other works indicated by the District Engineer, as useful improvements to the harbour itself, and to the town, may be performed advantageously by Convicts, the Amount requiring sanction is Rupees 13000 if their employment be authorized or Rupees 23500 if the construction of the Groynes alone be undertaken and entrusted to this Department for completion with Ordinary labor.

Fort St George
25 April 1859

I have the honor to be
Sir,
Your most Obed Servant
[illegible]
Chief Engineer

P.W. 1859 Dept
Dated 19th April.
No 891
From
The Chief Engineer
To
The Secretary to Govt
D.P.W.
Dated 8th April 1859
Recd 11th April 1859
No 9404 Encl: 2.
No 918 - 18th April 1859.
With an order
Referring to D.P.W. L.
of the 27th May '58 No 1000,
four and a Copies of two
letters from the Divisional
Officer Superintending
on the Plans for the improve-
ment of the harbours of
Vizagapatam by means
of a rough stone breyne at
a cost of Rs 23500 or of
Rs 13000 only if the aid of
Convict Labor be granted
as proposed by the Master

No 918

Received & rep

papers for the opinion of
Colonel A. T. Cotton who is
well acquainted with
the locality, as to the
probable efficacy of the
proposed works, and the
probability of other heavy
repairs being
required for the estimated
sum.

Fort St. George
14th April 1859

To Copies to the Chief Engr. Dispt 19
2 " Col A. T. Cotton
with Plans