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MADRAS RECORD OFFICE.

Government of Madras.

Revenue **DEPARTMENT.**

G.O. No. 705 Press
38-39 Mis.

Dated 2-5- 1860.

Not to be folded or roughly handled

Proceedings of the Madras Government, Revenue Department, for the month of May 1860.

No. 38. Read the following Proceedings of the Madras Government in the Marine Department, dated 28th April 1860, No. 172:—

Furnishing copy of a letter and of its enclosures on Lieutenant Taylor's works on the Western Coast and directing the transmission of certain Plans to the Conservator of Forests. (Vide Marine Proceedings from 21st to 30th April 1860 Nos. 7-8.)

No. 39. ORDER THEREON, 2nd May 1860, No. 705.

Ordered to be communicated to the Conservator of Forests together with Plans Nos. 52 and 53 with reference to paragraph 2 of the Order, also to the Board of Revenue for information.

(Signed) C. G. MASTER,
Deputy Secretary to Government.

PROCEEDINGS OF THE MADRAS GOVERNMENT.

Read the following letter from Lieutenant A. D. TAYLOR, I. N., to THOMAS PYCROFT, Esq., Chief Secretary to Government, Fort Saint George, dated Madras, 9th March 1860, No. 4.

I have the honor to forward a Memorandum on the several subjects alluded to in my letter, No. 50, dated August 9th, 1859, to your address; and along with it are sent the levelling book, and plans of the Kalee Nuddee, and of numerous other places on the Canara coast as follows; the plans are all numbered,

No. 42,	Alipee
„ 21,	Kalee Nuddee entrance.
„ 51,	Sedashigur Bay, (unfinished.)
„ 30, 31, & 32,	Kalee Nuddee levels.
„ 33, 34, & 35,	Do. do. (duplicate set.)
„ 32,	Rough original of do.
„ 28 & 29,	Mangalore River mouth, (2)
„ 26,	Honore River mouth.
„ 25,	Beitkool to Benige, Canal's direction (shewn in red.)
„ 52,	Map of Goond forest and its vicinity.
„ 53,	Do. by Assistant Conservator of the Forests.
„ 50,	Sedashigur Bay, carefully drawn, in hopes the Government will forward it to England to be engraved for publication; No. 51, is a half finished copy of the same, which when completed may be retained in India in case the other be lost.

The explanation of this odd numbering is, that the missing numbers have been already given in to the Hydrographical Department at Bombay; some have been delivered in to the Madras Government. I would bring to your notice that copies of the entire tidal length of the Kalee Nuddee, of the Tuddry harbour, and of Honore were being made at Bombay (when I left) for the Madras Government; the originals which I had given in having been required for transmission to England. I would respectfully suggest that application be made for them soon.

No. 3 of 1860.

MADRAS, 7*th March* 1860.

Memorandum on several subjects alluded to in paragraph 2 of letter No. 50, bearing date August 9th, 1859, from Lieutenant Taylor, to the Chief Secretary to Government, Fort Saint George.

1. On the levels of the Kalee Nuddee, or Sedashigur river.

These commenced near Hundigudda, a little hamlet on the left bank at the furthest limit of tide water, and twenty miles from the river's mouth. The Datum level was 3 feet above the mean sea surface; the lowest monthly average of mean tide being assumed as this mean sea level.

2. The levelling extended over a distance of about 18 miles, to the village of Bohberigudda on the right bank, 38 miles from the sea; and here the surface water of a long level reach was found to be 132 feet above mean level of the sea.

3. At this point we were compelled to cease our exact levelling operations, being called away to other duty, I however subsequently took several other rough measurements with the Aneroid Barometer, but the record book of these was burnt; (as reported in my letter of May 2nd, 1859, No. 25) I however jotted down at the time some of the ascertained heights, and will here mention some of the leading features of the Kalee Nuddee and its banks.

4. About 8 miles above Bohberigudda, the Nooji, or Kanooree Nullah, one of the tributaries of this river, falls into it; the point of junction is elevated about 160 feet above the sea, and at a distance of 3 more miles (which is a nearly level reach) the steep gradients of the river commence. Estimating that the bed of the river a few hundred yards above this spot is about

200 feet above the sea, we know that 5 or 6 miles further eastward is the foot of the Lalgoly falls which I made to be more than 500 feet above the sea; these falls are in three distinct lengths with intervening level water spaces, the drop is more than 300 feet in a distance of half a mile, and the top of the falls is between 800 and 900 feet higher than the sea level, or about 1,200 feet lower than the town of Hoobly (distant 40 miles) the great Cotton mart.

5. Eastward of these falls about 2½ miles the Tuttihal Nullah falls into the Kalee Nuddee and the direction of the main river totally changes; standing at the point of junction of the streams we must look to the north-west direction, to the mountains at the back of the Goa territory for the source of the Kalee Nuddee and the Oojlee Nuddee, the principal upper waters of the Sedashigur river.

6. The Tuttihal, (which on a hurried inspection of the map might be thought to be the main river as it comes from an easterly direction) appears to have but little flow in the month of April before the rains begin, its water standing here and there in pools. Where the Yellapore, Dharwar road crosses it, about a mile above the point of its junction with the Kalee Nuddee, the sandy bed of the Nullah is about 1,200 feet above the sea.

7. The Nooji Nullah, or Kanooree, (alluded to in paragraph 4) which has its source in the ghauts east of Cape Ramas, takes firstly an easterly course for some 15 miles, then flows round the north side of the Goond plateau; its lowest reach, until it falls into the Kalee Nuddee, has a south east direction along the east side of Goond for a length of 6 miles. It flows through a naturally scarped gorge at the extreme north end of Goond, and in this we found the bed of the Nullah to be about 800 feet above the sea; and the plateau of Goond is about a like elevation above the bed of the Nullah, or say, 1,600 feet above the sea.

8. The gorge is not 100 feet broad, and of great height, its length is more than 100 yards. No more perfect spot could be found for a bund, or stone bulk head, to dam back the water of the Nooji Nullah at an elevation of more than 1000 feet above the sea.

9. Having described the above levels, I will pass on to a short account of the forest, known by the general appellation of Goond from a village near its centre which is about 1,560 feet above the sea, and in an excellent climate; the north extreme of the plateau overlooking the steep gorge, above described, is a little higher than Goond village and 3½ miles distant from it by a jungle path, and over about 2 miles of this distance a little water-course drains in the rainy season the surface of the plateau and passing through Goond flows down eastward into the Kanooree Nullah at a distance of 3 miles from its junction with the Kalee Nuddee. Nature thus gives a line of road of most gentle gradient, along which to drag the timber, felled on the plateau, and it may be drawn along a nearly level line for about a mile to the south-east of Goond towards a more convenient Nullah, the Baligar, (marked B.) down which it may slide into the Kanooree at a point below which there is nothing to hinder its being floated to the sea in the usual way; it will be seen from the map that the Goond Nullah reaches the Kanooree at the bend (marked T.) where are some obstructing rocks, to avoid which I propose the above detour.

10. With regard to the valuable teak timber in such great abundance on both banks of the Nooji Nullah to the west of the Goond plateau, I see no difficulty, (should Government be disposed to work those forests effectually and get out all the fine well grown trees, by either entertaining a large temporary establishment under an European head, or by giving a contract to any body on most liberal terms, as considerable capital would be necessary for the carrying out of the work on a grand scale so as to ensure success,) I see no difficulty in the way of getting the timber down to the bed of the Nullah, and then of floating it down by short stages by damming across the Nullah in the same manner as that now adopted by the Native Contractors, only on a far grander scale; in some places a little blasting might be necessary.

11. However this is a question the settlement of which had far better be left to the judgment of the District Engineer and Conservator of Forests, who can best co-operate in such a matter and settle upon the best method after looking at the country; I may mention that the plan of the Assistant Conservator of constructing roads in numerous directions for the purpose of dragging the timber up the sides of some Nullahs and down others, such proposed roads amounting in the aggregate to 23 miles, will require immense modification; for the sketch which he has furnished of Goond plateau and the Kanooree Nullah fails entirely to shew the nature of that locality, as it differs widely from the delineation on the Great Indian Atlas, of which I herewith send an enlarged sketch along with Mr. Müller's map for comparison.

12. Had I not suffered the loss of my book of notes taken on the occasion of my trip up that Nullah, I should have been in a position to verify the correctness of the Indian Atlas in its delineation of those parts; I am convinced that it perfectly represents the *general* features of Goond and the Nullah bounding its two sides; whereas the Assistant Conservator's rough survey is very erroneous, in short altogether wrong in the bearings of the Nullah reaches; the truth of this assertion may be tested at any time by an Engineer; it is but justice to Mr. Müller, that I should point out he never intended his rough map should have been taken off in lithograph and circulated, thereby giving it a fictitious value which he never claimed for it.

13. Above the gorge mentioned in paragraph 5, the ascent of the river bed is very gradual, and on both banks the teak is in great abundance, over many square miles of country. The most effectual, and I believe cheapest, way of getting down the timber would be to dam up that gorge and so obtaining water-carriage to that spot for many miles from above, and forming a reservoir, whence the timber could be dragged down inclined planes till it reached the Kanooree Nullah below the very steep and rocky portions (between P. and T. on the map) below which it could be floated down in the usual manner.

14. These remarks of mine may fall far short of what was expected from me when ordered to look at the Goond Forest and to see how its timber might be brought down; and I can merely hope that by them the subject may be again revived, and the vast importance of that timber may not be suffered to escape notice; we reckoned to have seen there and on the banks of the Kalee Nuddee 100,000 trees of an average measurement of 5 candies; this at 20 Rupees the candy will give them a value of one million sterling, and it is worth while to spend even half that sum in bringing them down to the seaport of Sedashigur.

15. During the last year, I read a very interesting paper upon woods for ship building, copied into the Engineer's Journal of Calcutta; it was from Honduras, I think, and the subject of increased supplies of ship-building timber was prefaced by these remarks, "every British "subject in the United Kingdom has a material interest in the cheapening of timber, and I "think that the remark very forcibly applies even to ship-building timber alone. I will endea-"vour to show you how this cheapening may be effected by opening np new sources of supply, "as well as by taking a greater advantage of those sources already open to us." "It is not sufficient that we discover forests of timber, even of the finest quality; for before they be turned "to profitable account, we require a population to fell and trim the timber, a good shipping "port, and the cheapest possible means of bringing the timber from its native forests down to "the port of shipment. But we require even more than this in the majority of cases, *viz.*, a "climate such as the European Superintendents can, not only live in, but be able to expose "themselves in, with some degree of impunity. As a summary then we may consider to be "essential:

(1) A tolerable climate.
(2) A bundance of good timber.
(3) Sufficient amount of cheap labour.
(4) Numerous intersecting creeks and rivers to float down the timbers.
(5) And lastly, a safe and eligible port for their shipment."

16. All these advantages, these essentials co-exist on the banks of the Kalee Nuddee, and as the Forest Conservator has pronounced the Goond timber to be well grown and ripe, and has urged the early working of this valuable forest, as it is much threatened with fire, much dead wood lying in the forest, I think the time has arrived for prompt action, and I need offer no apology for reminding Government of this.

17. I now leave the subject of Forests and proceed to that of the best line for the South coast canal below Beitkool, on which subject a very few words will suffice, as plan numbered 25 delineates the country and the line which I have examined. It will be seen that there are only

two impediments, and those not of a really formidable nature; one is the cutting or tunneling through the narrow neck of a cape, at a part where it is 90 feet high in the centre, and 150 yards broad at the base; the other is the formation of a rough stone breakwater, 1,000 yards in length, round a cape, or rather round a rocky cliff, so as to form a canal; this work is in quite shallow water. I do not presume to offer an opinion as to the construction of the work, but merely make these remarks in explanation of the chart sent.

18. On the general subject of lights and light-houses for the west coast I have little time now to enter, nor have I been yet able to talk the subject over with the Superintendent of Marine, whose time is now too fully occupied with his departmental duties; it would be better that I should defer any remarks upon this subject until, by actual inspection of the system in Europe, some new ideas may be infused into my mind, when if opportunity offers I may recur to the subject.

19. The improvement to any great extent of Mangalore river mouth must become of so little consequence when the perfect canal system of the west coast shall have been developed, with a first class harbour at its extreme north and south points, or at least at its north limit, that any further suggestions of mine may well be dispensed with, especially as the District Engineer of Canara has taken such marked exception to what I wrote in 1857, regarding those operations at Mangalore which were so unsuccessful. I think it better therefore to merely hand in to Government the Charts of Mangalore and Honore; the Engineers who have to carry out any works there may decide what is likely to be the best plan; the proposition to consider that question was indeed mainly self-imposed, and contingent upon my getting time for the work if permitted to come to Madras on duty; I may venture then, without fear of disappointing Government, to pass by the question now when I am going on furlough to England.

20. With reference to the west coast harbours generally, I feel that little need now be said until we gain some knowledge as to the course which will eventually be pursued with regard to canals. The subject of one great harbour at Beitkool has now been pretty fully discussed at a conference which Colonel Bell was good enough to bring about on the 30th January last. I beg to forward copy of a letter, detailing my views, which was written at the Chief Engineer's request subsequently to the discussion, and which has, I hope, exhausted the subject for the present in its nautical bearings.

21. The conclusion arrived at now is that the road approach from Hoobly (the great Cotton mart) to Beitkool should be perfected; and though the report of the Dharwar Commission, differs with the Canara District Engineer as to the shortest and easiest line which can be selected, the difference need not delay operations, as either line is good, and it is but fair that, where both are on the proper side of the river, and their difference is immaterial, the Engineer of the District should be permitted to adopt his own favorite line, which is sure of being better attended to. I do not doubt that before long we shall see both lines constructed, the one for up traffic, and the other for down traffic.

22. I may be pardoned for pointing out some additional advantages derivable from the perfection of the road from Hoobly to Beitkool, terminating in a pier, alongside which large ships may lie; the Government may profit by it in sending to that port for embarkation any British Regiments returning homewards from such places as are nearer to that coast than to this; again Native Regiments may also be embarked there, and the great item of boat hire be thereby saved; the Company who are constructing the Railway from Bombay to Madras may take advantage of Beitkool to land their plant required for the portion of line through the Moodgal and Bellary country, and Sholapoor district between the Beema and Kistna rivers; a glance at the Indian Atlas must convince people that with a traction engine from Beitkool to those districts the plant may be carried far cheaper than by their own line from Bombay to Sholapoor with the unfinished Bhore ghat incline and the alternative frightfully steep cart road, and Bombay Harbour without any pier accommodation and consequent enormously expensive system of employing boats to land everything, except heavy machinery and for that vessels sometimes go into Dock and under the sheers. Also may the Bellary Irrigation Company adopt the new line, if they have any plant to arrive from Europe, Beitkool will be found the most convenient port at which to land and despatch it up country. If Messrs. Brice and Co. are willing to try their traction Engines scheme now, this new line of road is the one upon which to operate, being a gradual rise from the sea to the Deccan table land, and avoiding a steeple chase over large rivers and high water-sheds which is the peculiar feature and characteristic of the old Arbyle Ghaut line which they wished to take in hand.

From Lieutenant A. D. TAYLOR, I. N., to Colonel BELL, Chief Engineer of Public Works, dated Madras, 6th February 1860, No. 1.

I am thankful for the opportunity given me of further detailing my views regarding Beitkool harbour; in the first place let me explain that, as now standing it is a safe refuge from any of the gales which occur on the coast. In my first report I led people to *infer* that, if we were able to go in a small canœ, during the most boisterous weather to nearly the extreme point of the head, there could not be much question about a vessel's being moored there snugly; Colonel Cotton has said in his Memorandum of March 3rd, 1858, that, "it, in fact, affords even in its present state, a most accessible and perfectly safe shelter for vessels." The Dharwar Commission ascertained the opinion of the Pattamar tindals that Beitkool Bay was "safe anchorage in all seasons and in all weathers."

2. The extensive harbour works recommended by the Officers of your Department were projected manifestly without a thorough comprehension of the above facts; but as our consultation of last Monday seemed to clear up the subject, I need only refer to paragraphs 9, 17, 18, 19 & 33 of my first report, dated September 13th, 1855, to shew that the object of any stone works proposed by me was, to so nullify the little swell that rolls in as to enable vessels to lie alongside wooden piers; paragraphs 36 & 38 of my second paper of July 27th, 1857, also point the attention to piers or wharves as the essential thing; and the same is alluded to by Colonel Cotton in his Memorandum on Beitkool.

3. I am sure then it will be conceded that, instead of taking in hand most expensive works of doubtful success, and of which intelligent Engineers hold diverse opinions, we should attempt to turn the great natural advantages of Carwar head and the deep water in its vicinity to practical use.

4. It is too much the fashion amongst Engineers to refrain from consulting the nautical public as to what works they require, and so the trade of our ports is likely to become saddled with, "*dues*" which are felt as indeed a grievance, because the works whose expenses they are to cover were neither wanted nor asked for. I will instance Kurrachee and Bombay, for which places extensive wet docks were proposed, but, fortunately for the Indian public whose money was to be sunk in their construction, they cannot be proceeded with in the present financial difficulty. Beypore is another instance where Engineers planned a boat harbour without asking the mariner whether his ship could lie in the roads during gales; and I might also mention the Madras Screw-pile pier which is only adapted for securing a little extra comfort to about 1,000 passengers monthly while it must be utterly incompetent to land or embark one-tenth of the trade of Madras, and will become an absolute impediment to the Masoola boats; nor can any other description of boat be adopted, for whatever we have (except a few life-boats which may be hoisted at the pier) must be capable of being beached in a gale.

5. Premising that the political and mercantile interests have seen the necessity of such a port as Beitkool there are still *two points* of view from which a scheme of this nature must be looked at; the Engineering and the nautical; and in describing the fluvial, marine, and atmospheric forces which contribute to oppose or to assist the work of man; and in arguing the conditions essential to success, the Engineer and the Seaman may differ in opinion and the one may encroach on the other's province, yet neither may say "your remarks are not needed." It would be strange indeed if the Engineer who has to construct the harbour, and who has only viewed it from the landward side, knows better than the Seamen who has to use it, what the latter wants; Again as Engineers differ among themselves, so may Seaman among themselves, and yet one may glean a useful hint from others. Having said the above, I feel it will profit little to make

any further allusion to Captain Walker's characterisation of some of my remarks as worse than useless, but I do not expect my individual opinions to be taken for more than their worth; I may say however that I have seen more of the west coast in its different aspects than most people.

6. In endeavouring to bring about the adaption of a new harbour not far distant from another such as Bombay affording good shelter, we must offer to merchants and shipmasters some substantive advantages which that other port does not possess; failing this, it is difficult to attract vessels to such new ports.

7. Sedashigur is one hundred leagues nearer England than is Bombay; it is the natural outlet for the cotton and other productions of the Southern Mahratta, Dharwar, and Northern Mysore country. By shipping bales of cotton here, we save the cost and trouble of carrying it 300 miles further away from England, which adds 600 miles to its journey thither and subjects it to great deterioration in small native craft. Besides this we must relieve the Merchants of their expenses in its embarkation at Comta and landing at Bombay, as well as the ultimate boat hire in shipping the pressed bales at the latter place where they have as yet no wharf accommodation, although there seems a prospect at last that an extensive pier scheme will be undertaken by a joint-stock Company.

8. Thus in my harbour scheme, I promise the shipmaster piers or wharves, by the side of which his vessel may lie snugly, and the attainment of such an advantage, I consider next in importance to the perfecting of the land communications from the cotton districts.

9. In considering how we can best construct piers, we should accept what nature has already afforded us in the way of shelter and not throw away her gifts which have stood the test of time, and if earnestly studied will enable us to deduce reason for the existing arrangement of deep and shallow water.

10. Though they have been partly explained in former reports I would recapitulate in a summary way the winds and weather experienced at Sedashigur; for it is evident that the Engineer projectors of the scheme which was handed up to the Government, have not succeeded in grasping this essential portion of the subject.

11. The 4 months from November to February inclusive are a season of strong land winds, and glassy smooth sea in the bay; in March, April and part of May we have Northwest fresh sea breezes in the afternoon at fortnightly intervals; and not *gales* of wind sometimes very heavy, as Colonel Cotton misunderstood me to say; for even our monsoon winds may scarcely be characterised as such.

12. Late in May or early in June the south-west monsoon commences with the wind from the southward of southwest, at which times the south part of the bay is very smooth; during the 3 months of that season, there is not the least break of the sea along the north side of Carwar head, but simply a long undulation; although the open sea away from the head breaks considerably at times.

13. After the middle of August the sea is never rough and the monsoon wind has expended itself although plenty more rain has to fall. In each of the months of September and October one week of fresh westerly breezes with a not very heavy sea may be expected; these are accompanied by squalls of rain.

14. The southwest monsoon is not one continuous downpour of rain; but periods of beautifully fine weather, lasting for a week or a fortnight on end, alternate with squally periods of about equal duration.

15. During March and April the months intervening between the cold season and the monsoon there are two or three occasions of fresh north-west sea breezes lasting for 3 or 5 consecutive afternoons and lulling towards midnight.

16. Thus it may be said that throughout the entire year there are only ten periods each lasting from 3 to 11 days or averaging a week (in all 70 days) during which any break-water would be needed to prevent vessels from bumping against a pier.

17. Carwar head affords such full protection from the south-west monsoon, and the winds from any other quarter being harmless as they bring no swell into the cove, we need not look to Plymouth, or to Portland, for a precedent for the slope which the sea-face of any stone breakwater would stand at, such a breakwater coming to the sea surface is all we want to break that oscillation of the sea which makes vessels uneasy alongside a pile pier.

18. I wish you to accept the foregoing remarks which should have been published before, as merely a preface to what I would point out as (in my opinion) constituting the primary requirements of the harbour. All seem agreed now that the inland communications should first be improved by a road directly down to the cove and terminating in a jetty or pier, partly of stone and partly of wood; the proposed site is shewn on accompanying plans.

19. The next thing is the levelling of the north face of the head by blasting and quarrying, in the course of which operation the largest stones might be used for the commencement of one pier at the point C. G. and another towards the isolated rock to the west and north of which the water is so very deep; north-westward from this rock is the direction of the grand pier which should be built at the rate of about 200 feet a year until extended to 1,500 feet as the crowning work of our harbour affording ample wharf accommodation for many years, and if more be eventually required any number of similar piers may be thrown out from that rock.

20. Many years hence we may need an enormous refuge harbour along that coast and no place offers such great facilities for the construction of one. The great yearly strides which science makes will of course afford more abundant data for the manner of constructing any large harbour, and it is best to leave the plan of it to those in whose days it may be carried out; I would however point your attention to my plan of an eventual grand refuge harbour as shewn in green on the lithographed chart.

21. Now with regard to the habour we now require, I think its construction should be so managed as that each year's completed portion should be available for immediate use. The road and the jetty may be finished simultaneously and ships may then take in cargo at the pier head if we lay down one of the screw moorings carried by me to Tuddry, in the position marked in lake; with this assistance a vessel could be breasted to the pier every day and hauled off (if needs be) at night, and thus at once we should afford the promised advantages which Bombay the greatest commercial port in India cannot yet boast of.

22. Nature gives us smooth water during the most stormy season along the north face of the head; it would be of greatest advantage to have an entrance in such smooth water; therefore I contend that the opening should be along the cliffs; a temporary staging must then be erected over 400 feet of water and from that point should commence the actual breakwater to run in a N. N. E. direction for 1,000 yards; the space in which at Bombay the Merchant vessels(frequently more than 100 in number) now lie is little more than 1,000 yards wide by 2,500 long and this is the same area which I would shelter from the above breakwater to the little cove itself: and far more perfectly sheltered will they be than they can be in Bombay.

23. I am fully convinced that for the exit of vessels the cliff opening in smooth water is what we want; by leaving this the breakwater may ultimately be extended to northward, but if commenced from the head, a ship in going out will have to encounter a heavy swell off its extreme point and the fact that as it is thrown out further north, the shoaler does the water become, seems to me conclusive that not to leave an opening by the cliffs will be an irremediable error in judgment.

24. Enormous masses of stone, weighing 10 tons can be quarried in the west side of the cove, floated out, and dropped upon the site of the breakwater, which if carried on at the rate of 500 feet a year will in the second year afford abundant shelter to a wharf at the rocks marked V, (same as in original plan of September 1855) whereat a ship of the largest size may then take in or discharge cargo in safety at all times.

25. It will be a great point gained if during the construction of works we can leave the present coasting trade undisturbed and free to take advantage of the natural shelter of Beitkool cove; therefore I leave the cove alone and propose that a commencement of two Jetties should

be made at D, and G, and the ultimate roadway towards the ship harbour should be formed over them by piling across 100 feet of entrance in the middle.

26. I cannot conceive what possible advantage will be derived from the attempt to extend the harbour towards the two islands off the river mouth ; if that immense area be made a smooth water basin, I am convinced that measures must be taken to keep the river from entering it, otherwise we lose one of the leading advantages pointed out by Colonel Cotton and by the Dharwar Road Commission, *viz.*, that "no river falls into it, an advantage that scarcely any other harbour has."

27. I have already in paragraph 4th of my second report mentioned the possibility of harbours being of too great dimensions, but to enable you to form a better conception of the relative sizes of Bombay and Beitkool, I forward a survey of the former drawn to the same scale as the lithographed Chart of Sedashigur Bay, executed in your Office four years ago. On both I have thrown a faint blue tint over the extent of anchorage ground occupied, in the one actually in the other possibly by merchant ships.

28. Is it likely that Beitkool will in our day need shipping accommodation equal to that now enjoyed by the greatest commercial port of India.

29. I would refer you to the accompanying copy of a letter addressed by me to the late Acting District Engineer of Canara, which you will concede should have been in some degree considered as embracing nautical points in reference to this harbour, paragraph 5 speaks decidedly as to the shelter now afforded in the cove to vessels of less burthen than 500 tons, the only want being road communication from Dharwar and a wharf at which such vessels may be laden. I think we are all now agreed as to those being the first essentials.

30. The lighting of the harbour is another most important point, and as I have stated to Government the selection of sites for light-houses before the plan of the proposed harbour is settled, will be premature.

31. My first inspection of the magnificent bay of Sedashigur convinced me that works on a very great scale could be undertaken there ; but I was not bold enough to give in an extensive scheme, knowing that many a fine project falls to the ground from the very boldness of it. Thus I confined myself to a very small harbour in the cove, and to a single light-house on the head which should be seen from a greater distance than one on the Oysters, which rocks afford no landing place in rough weather though a boat harbour may be there easily constructed, which shall be available to facilitate landing whenever a boat can come out into the open sea with safety.

32. In drawing up instructions for entering the bay which I postponed till the place of the lights was decided upon, I would have given the bearings on which the light should be approached so as to avoid the Oyster rocks, the other dangers of the bay and the island off the head and this I thought would be sufficient.

33. But if a more capacious harbour is in contemplation, requiring a breakwater to the north of the head, we want something more, we must have a small light (coloured if you like) on the north extreme of that breakwater or the Oysters must be used as a breakwater and a light put upon them.

34. This last is the plan I advocate and for this reason that the breakwater however carefully built may not assume its settled form till after some years of battering by the sea of the south west monsoon, and it would thus be unadvisable to build prematurely a light-house on its end but on the Oysters a column may be built at once and their straggling rocks connected so as to form a breakwater one statute mile in length, nine-tenths of which is already provided by nature. Vessels arriving during the night would thus anchor under their lee, and in the morning could be taken in to the harbour without fear of fouling any other vessel, a contingency possible at night.

35. In the last paragraph we have further argument against having a continuous line of stone breakwater standing out northward from the cliffs, for if the entrance to the harbour be round that, we must have a small green or red light to mark the pier head. Now a column for that cannot be constructed until the extreme contemplated length of the work is attained, and then the hammering of the sea will demand perhaps several seasons before the final settlement of the pier head stone until which be arrived at no permanent columnar structure can be erected.

36. It has been stated by myself and others that Beitkool cove, had not diminished in depth within the recollection of its oldest fishermen, but that does not carry us back many years perhaps only to the time when the river mouth was where the new mouth has burst out to the south, which is the place in fact whereat my Chart represents it to have been 50 years ago. Does it not seem strange reasoning on the part of Engineers that going upon such a statement, they should conclude that no silting may take place even if a long breakwater of 1,500 yards be thrown out from the head to the north.

37. If the mouth was down south 50 years ago and since then until 1857, had been traveling up north, the lash of the sea from southwest causing it to do so (as shewn on the plan) and preventing the deposit from moving down south into Beitkool cove, is it not reasonable to suppose that the alluvium of the river water (for its muddiness in the rainy season proves it to hold some matter in suspension) has during the last half century been mostly carried out to sea by the ebb, and down the coast by the southerly current which then prevails. I happen to have surveyed the bay with the late Captain Montrion in 1845, and 10 years afterwards found the mouth had moved up nearly a mile to the north, and that the water near the islands north of the entrance had shoaled considerably during that period, proving an unmistakeable deposit.

38. I would partly accede to the reasoning of the Engineers if the condition of the river mouth was now as in 1855, but the fact is that in the monsoon of 1857, with the coming down of the freshets, a new mouth burst open, a mile and a half to the south, and this has since increased in depth until now it is at highwater the most convenient entrance into the river. I say then that if the harbour works which have just been planned and estimated for, be carried out, the whole force of the ocean swell will be removed from that southern mouth and whilst the sea still remains hammering at the north mouth, this latter must become closed and so the river will empty itself directly into the harbour : the river water will surely go out of that mouth whereat it meets with the least opposition. Who then is bold enough to say that under these altered circumstances no silting up of the harbour may take place.

39. From what I have witnessed in Bombay harbour and elsewhere, I am firmly convinced that running water (bearing in it alluvium) keeps that in suspension entirely when stirred up by the ocean swell depositing scarcely a particle whilst that agitation of the water continues; but let Islands or a breakwater of any sort intervene to create smooth water, a portion of the matter will be deposited and if the current ceases the entire quantity held in suspension will subside to the sea bottom.

40. Any project for a harbour here must include works to prevent the river from emptying itself into that harbour, otherwise in course of time the latter would be so silted up as to be spoilt notwithstanding the working of a dozen dredges. The effect of permitting the river to discharge itself into the harbour would doubtless be a good deep entrance into the river, but the quantity of silt that would come down would spoil the harbour and form a bar for the river at the harbour's entrance.

41. I regret that my reports were not sufficiently explicit on the subject of the silting up of this bay, I did not enter upon every possible argument for I hoped that some discussion might be permitted before the final settlement of any plan. Indeed in the Order of Government at the end of the printed pamphlet on the Harbour of Beitkool, it is clearly stated that, "the Government are anxious that the matter should be well deliberated upon." This Order will be seen in Consultation Minutes of Madras Government No. 1012, dated 28th May 1858.

42. I do not pretend that my arguments are all correct, and I am sure that others also can err in judgment, especially if they have not been eye witnesses of the effect of the monsoon on the west coast of India. My first report was written before I had heard any other opinion and was consequently imperfect; my next was written at Madras and principally from memory, but it

contained additions to and explanations of the former plan; now I have further considered the subject and have heard the opinions of others and deem it right to protest against any ill digested plan for a harbour at a place so highly favored with natural gifts as Beitkool.

Extract of a letter to the Acting District Engineer of Canara; No. 63, dated Mangalore, 10th November 1858.

Paragraph 5. "The similarity of these two places (Portland and Sedashigur) will be apparent, though Portland is considerably larger; but we have a beautiful little natural harbour for small craft in Beitkool cove, where all vessels of a less burthen than 500 tons can now lie secure from all winds, and wharfs only are wanted to enable vessels to load there at once, provided that the roads from Dharwar be finished."

(True Extract.)

(Signed) A. D. TAYLOR,
Lieutenant Indian Navy.

ORDER THEREON, 28th April 1860, No. 172.

Copies of the above letter and of its enclosures will be furnished to the Superintendent of Marine, to the Chief Engineer, through the Public Works Department, and to the Conservator of Forests through the Revenue Department.

Note.—No. 42, Alipee Roads, has already been lithographed.

2. Of the plans received with the above letter, Nos. 28, 29, and 26 will be forwarded to the Superintendent of Marine, who will be asked whether he would recommend any copies being taken of them, and if so, how many. Plans Nos. 52 and 53 will be forwarded to the Conservator of Forests, through the Revenue Department.

Nos. 21, 30 @ 35, 32 *(rough original)*, 25, 50 *and* 51.

3. The rest of the plans, with the note book, will be forwarded to the Chief Engineer, through the Public Works Department. No. 50 will be returned for transmission home, after the Chief Engineer has completed No. 51, which, Lieutenant Taylor states, is a half-finished copy of it.

4. Application in the Public Works Department will be made to the Government of Bombay for the copies alluded to at the end of Lieutenant Taylor's letter.

5. In thus disposing of this last communication from Lieutenant Taylor, the Government thank him for the valuable services which he has rendered and resolve to pass to him in acknowledgment of them a present of (Rupees 2,000) two thousand Rupees, his conduct will also be brought to the notice of the Bombay Government.

(True Extract.)

Chief Secretary.

To the Superintendent of Marine, with 3 plans.
" Revenue Department, with 2 plans.
" Public Works Department, with 11 plans and a note book.
" Civil Auditor.
" Accountant General.

Exd. F. Cartledge.

to spare copies

Revenue 1860 Depart.

Pro: of Govt. 10th May -

No. 910

Proceedings of the Madras Govt. in the Marine Dept.

Dated 28th } April 1860
Recd. 30th }
No. 172

2 Plans.

Furnishing copy of a letter and of its enclosures on Lieut. Taylor's works on the Western Coast and directing the transmission of certain Plans to the Conservator of Forests -

No. 705.

Ordered to be communicated to the Conservator of Forests together with plans Nos. 52 and 53 with reference to para 2 of the order, also to the Board of Revenue for information.

Fort St. Geo.
2nd May 1860

1 Copy to the Conservator of Forests with [illegible] No. 172 & 2 plans
2 " " Board of Revenue with do. do. [illegible]

No. 38 & 39.

No. 705. 2d. May

Without Order