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MADRAS RECORD OFFICE

GOVERNMENT OF MADRAS

Revenue DEPARTMENT

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Proceedings of the Madras Government, Revenue Department,
21st August 1876.

No. 215. Read the following Proceedings of the Board of Revenue, dated 31st July 1876, No. 1,942:—

Read the following letter from W. LOGAN, Esq., Collector of Malabar, to C. A. GALTON, Esq., Acting Secretary to the Board of Revenue, dated Calicut, 7th June 1876, No. 147.

I HAVE the honor to enclose copy of a report received from the late Officiating District Engineer, which accompanied his plans and estimates for improving the West Coast Canal between Cochin and Tirroor Railway Station, and I now address the Board to lay before them the importance of this work in developing the resources of this district, and my views regarding the effect the canal works will have on the land revenue at a certain point in its course.

2. The Board are probably aware that, during the heavy monsoon months, large boats can, even at present, pass from Cochin and the country to the south of that place as far as Badagara on the north, a distance of between 200 and 250 miles. At other times of the year, moderately-sized boats only, and those with difficulty, can pass only as far as Tirroor Railway Station. It is in contemplation to complete a good navigable canal throughout the whole length of the above immense tract of country, and to push it on

3. It will be a work of immense importance to this district as it will open up and connect all the fine natural water-communications already existing, and which, even in their present isolated condition, are of very great importance to the country. There are as many as nine fine navigable rivers in this district running inland, many of them as far as the base of the mountain chain of the ghauts.

4. The report, of which I submit a copy, relates only to the first section of the work, viz., that from Tirroor Railway Station towards the south. This section is divided into, I., the Tirroor and Veliangode; II., the Veliangode and Chetwye; and, III., the Chetwye and Cochin sub-sections. In the second of these sub-sections, the question of the effect the work will have on the cultivation about Chowghaut has to be considered. The Board are probably aware that at present it is usual to throw earthen dams across the present water channel, one to the north and the other to the south of Chowghaut, so as to dam in the fresh and exclude the salt-water, which otherwise would fill the extensive jheels and overflow the paddy fields. I have carefully gone into the question of how it is proposed to provide for these two objects in the scheme prepared by Mr. Harris, and stated generally his plan is simply to substitute a lock at either end of this portion of the canal for the two very imperfect dams at present used. A waste weir is also provided the floor of which will be 6 inches above high water-mark. As shutters will be provided for this weir the fresh waterspread will be much larger than can be obtained at present, and it will bring additional lands under cultivation. The locks above referred to will have double shutters so as to close both against fresh water and salt. For the greater portion of the year (say from June to January) the locks will shut against the fresh water, and even when the fresh water falls below high tide level, the quantity of salt water that will find its way in through the locks will

be so small as scarcely to affect the large waterspread within. At present the water within the earthen bunds is decidedly brackish even in January, as I can from personal experience testify, and Mr. Harris says he has seen illicit salt being made from the water. The canal works on this sub-section will, therefore, be of great improvement, even in a revenue point of view. On neither of the other two sub-sections does any question of land revenue arise, except, of course, as regards the land which will have to be taken up for the works.

5. Commending the work to the approval of the Board.

PUBLIC WORKS DEPARTMENT.

MALABAR DISTRICT.

REPORT to accompany the plans and estimates for improvement to the 1st Section of the West Coast Canal between Ponany and Veliangode rivers, on the line between Cochin and Tirroor Railway Station, a distance of eighty miles.

The principal physical features of this section of the canal are the two rivers, Ponany or "Baratha" river and the Veliangode; the former has its rise from the Walliar, Annamllay, and Meengary Mountains; it drains an area of about 1,500 square miles; its total length is about 100 miles, and it debouches into the sea at Ponany, discharging in flood from fifteen to twenty millions cubic yards of flood water per hour. The highest floods usually occur about the end of June or in July and bring down a great quantity of sand. The bed is sandy and subject to

be much raised. During the dry season the sand ridge occur later on, because the outlet is scoured out to three times the dimension by the action of the flood, and it often occurs that two or more outlets occur along the sand ridge taken together half a mile in width. The canal is silted in to a considerable extent; in fact, it is almost obliterated in places during the first flood. The Veliangode river drains an area of about forty-five square miles; the water of this portion is mostly impounded by a dam at Veatil, 300 feet long; the water passes over this dam from 3 to 4 feet head, and the discharge is from one to two and a half millions cubic yards per hour. The opening into the sea is just three and a half miles below or south of the Ponany river, and this opening closes up completely during the dry season, the waves of high tides only racing over into the lagoon within, so that, on the occurrence of a first flood down, an immense body of water is thrown into the canal at this end south of the Ponany entrance 2 miles 3,660 feet, and here again the canal is completely filled in with silt; nor is this all, so great is the rush of water that the people are afraid that the whole river might find its way out by Ponany and destroy the town. For this reason they always cut the sand away, and a sort of lock was constructed at the entrance of canal to regulate the ingress of water during floods.

2. This estimate, amounting to Rupees 1,40,700, provides only for perfecting the water communication through the tongue of land between the Veliangode and Ponany rivers, a distance of 2 miles 3,660 feet, and would therefore represent a cost per mile of Rupees 52,243-0-7; but in fact it opens the line and completes it from the Ponany river through the Veliangode river to Tirroor Railway Station, a distance of eighteen miles, which represents a cost per mile of Rs. 7,816-10-8. Owing to the flooding of the Ponany and Veliangode rivers, and the nature of the openings into the sea and tidal action in connection with these river floods, this short cut through this tongue of land between Veliangode and Ponany rivers is the most difficult portion of the canal to deal with, and therefore the most costly. To convert the present cut into a canal and establish a constant and safe communication between the rivers locks are necessary on both north and south entrances, water-tight embankments, inlets and bridges as detailed in plans, estimates, and surveys. This is purely an artificial cut, just under the sand ridge of the coast, which rises from 7 to 12 feet

above mean sea; it is not a natural drainage, nor is it desirable to let the water from the east or Veliangode river into it; in fact, the drainage is all the other way and should be so, but inlets have been provided and are ample along each break; where a few thousand square yards of land is enclosed by bunds and where there are dwellings on raised mounds, the drainage can be passed south or both sides. The banks of canal and land available is a forest of cocoanut trees. Dikes are cut right through the land a mile and upward to the Veliangode river, and on the mounds the trees are planted. The canal runs parallel with the coast and is no where more than 800 yards from the sea all through pure sand. The old coast road from Ponany to Veliangode runs parallel with the canal on top of the sand ridge between canal and sea.

3. The section of the canal has been made out on the ground by Colonel Mullins, R.E., and has been also examined by Major A. deC. Scott, R.E., Deputy Chief Engineer, on the ground. The site and dimensions of locks and swing bridge on the Ponany Bazaar road has also been fixed by Colonel Mullins, R.E., after an examination of the canal line and Veliangode river, and are of sufficient capacity to meet all requirements: the level of the lock sills 5—M.S.L. has been fixed by Colonel Mullins, R.E., a depth of 3 inches—the proposed line of canal.

4. By the locks and embankments this portion of the canal will be constantly safe to navigation; the floods will be excluded and every provision has been made for drainage; the works proposed are of the most substantial and permanent nature as will be seen from plans and specifications.

5. Section of Canal from Veliangode River to Chetwye.—The principal physical features of this section, a distance of 17 miles 226 feet from the Veliangode river to the entrance into the Chetwye river, is the Caroovanoor river debouching into the sea at Chetwye one and a quarter mile S.W. of canal entrance, the great tidal backwater and the Veliangode river. The Caroovanoor

Yennamakil lakes, and discharges from twelve to fifteen millions cubic yards during floods into the sea. The river does not bring so much silt towards the canal in floods; it does not affect the canal at all much. The great tidal backwaters here run on both sides of the canal to a distance of five miles on the west and three miles on the east back in the direction of the canal, but is beyond the ridges in both cases. The Veliangode river has been already described and affects the canal entrance from Veliangode towards Chetwye just as it does the Ponany section, in fact more so. The first three miles from the river entrance is completely filled in with silt on the occasion of the first floods down the river, so that if the canal entrance is opened to full section to improve it some controlling agency is required, and I propose a lock; in fact, an attempt was made formerly by building something like a lock to regulate the water, but there is little of it left now. The line of canal passes through a valley between the sand ridge of the coast and a ridge running parallel with it on the east. No where is the summit of these ridges a greater distance between them 2,440 yards; in one section 30 yards and the average 932 yards, the total area nine square miles. Nearly a complete plan of it accompanies with areas. The canal runs through centre all through sand and alluvial deposit. The cultivation is paddy, the ridges and high ground and mounds as well as canal banks where they exist are planted with cocoanut trees; from the 14th mile post the water spreads out into a vast lagoon from ridge to ridge down to Chowghaut. The area available to cultivation does not exceed 2,000 acres, and of this about 500 acres is planted near the canal and lagoon with two and three crops annually; all this land is below high tide level; for this purpose the ryots place an earthen dam across the canal at 3,400 feet south of 7th mile post and at Ticadavoo, 2,066 feet south of the 19th mile post, to exclude salt water, and here a staff of watchers are maintained to pass boats over a slip; both bunds are now farmed out by Collector. This, of course, makes the navigation very imperfect; after the monsoons are over when the bunds are made they cannot of course be kept up during the monsoon. The ridge on the west, or sea side, rise from 7 to 14 to 19 feet, where it terminates 3,625 feet south of the 18th mile post and where the weir for discharging surplus water is proposed as per plans. The coast road runs on top of this ridge to Chowghaut where it crosses the canal. There is no wheel traffic in the

vicinity of ~~the~~, and the coast road is little used now. The ridge on the east rises from 7 to 15 feet above mean sea and terminates at the Chetwye river, the coast road running along it.

6. The estimate for this section amounts to Rupees 4,36,270, a distance of 17 miles 226 feet, and would represent a cost per mile of Rupees 25,663; but it also opens the line clear to Edatoority, a distance of thirty-one miles, and would therefore represent a cost per mile of Rupees 14,973; to regulate the flood and tidal water locks with double gates are necessary on both rivers as per plans, and an embankment from the weir around the margin of the waterspread at Ticadavoo; this bund may appear tortuous, but it connects all the bunds and is the line of roadway to all the houses and outlying hamlets, and is the easiest plan to follow. An examination of the plans will show this more closely. The crest of the surplus weir will be 6' + high water, and it is provided with clean grooved cast-iron posts and common shutters, but perhaps self-acting shutters would be preferable; it will discharge with safety up 4 feet, but no such head will ever come upon it. I have allowed in the circulation the highest value—these papers accompany plans, estimates, and specifications—it discharges over a low piece of firm ground, and the north abutment rests in solid ground 18 feet above mean sea. The locks will work both ways, using fresh water both for navigation and irrigation as long as it will last. It is difficult to arrive at an accurate calculation of the lockage and how far it will go to keep up a constant supply from December to June; in a dry season like the present it will not do so, but there is no need to apprehend any miscarriage on that account, for the water may be so regulated as to give a constant supply and navigable depth through canal during all seasons without injury to cultivation. At present the salt water is not solely excluded and never can be by the rude means adopted. I have seen salt making up to Chowghaut along the canal line in January and February, the very months only when water is used for third crop cultivation, and this area is limited but never exceeds 300 acres. I have taken out all the plans and examined all carefully.

Edatoority and Madalagum. This portion of the canal requires no masonry and simply requires sectioning as proposed. I was unable to complete the survey of this portion, but it can easily be done in the dry season; it runs solely through the territory of His Highness the Rajah of Cochin, and I had numerous applications to include this in my estimate from all the people. The Trichoor takes off from Edatoority and his Highness' Government will willingly bear half the cost of all improvements; this brings the canal into the large tidal backwater of Kodungalore and opens the line to Cochin, a further distance of 24 miles, or 80 miles in all, making the total cost of internal water-communication between the Railway Station at Tirroor and Cochin 6,25,000 Rupees, or per mile Rupees 7,812-8-0, which cannot be considered excessive.

8. *Description of the present Canal.*—The large backwater from the Railway Station at Tirroor has a depth of 5 feet water at low water throughout except in a very limited extent in one or two places and a least width of 100 feet; it is very crooked, but nothing could be done to improve the alignment without great expense and it is not necessary. The only improvement required is a proper landing place at the Railway Station at Tirroor. The distance from Tirroor to Ponany canal entrance is fifteen miles.

9. The boats plying on this canal are flat-bottom dhonies and the common canoes and dugouts; the latter carry from one to two tons each and the larger sized boats carry from five to ten tons. A mast of bamboo with a sail of coir matting set up in the prow of the boat sails it along, and the sail is so arranged that suits itself to any but a dead head wind, when the two men in the boat pole or row till the wind is again favorable; towing is never attempted, and never will be on the backwaters of the West Coast.

10. The artificial cut between Ponany and Veliangode rivers is a mere ditch as crooked as a ram's horn, and only canoes and the smallest sized boats can pass it, a distance of 2 miles 3,660 feet. After getting through this portion of the line, the Veliangode river is entered; it is broad and deep enough, and passing up it eastward for a distance of 3,800 feet, the canal entrance between this river and Chetwye is entered; the first seven miles is entirely artificial

through the higher ground of a valley between two ridges, the rest passes through a lagoon and wheels; the water is deep enough in the lagoon but the first four miles from the Veliangode river is silted in every year to such an extent as to seriously impede the waterway, and navigation is sometimes stopped till the bed is cleared of the silt; nor is this all, at near the 7th mile on the north and near the 19th mile on the south bunds are erected immediately after the monsoon to maintain a fresh water lagoon within the length of the twelve miles enclosed by these bunds through the lowest part of this valley; as the depth diminishes during the dry season the borders of the tank are planted with a second crop of paddy. Nothing but the smallest sized boats can pass this portion speedily or safely; it is, as regards navigation and communication, a constant source of complaint, and even small boats are detained within this section for three days at a time, whereas they ought to pass in twelve hours easily.

11. After passing out of this section into the Caroovanoor river at Chetwye, there is a splendid, broad and expansive river and backwaters with a constant depth of not less than 6 feet throughout, and a width of upwards of 100 feet any where down to Edatoority, a distance of fourteen miles, where there is a cut from the Moniem river into the Madalagum backwater. This cut is mostly deep enough but wants widening and straightening down to Madalagum, a distance of ten miles. Boats can pass at present, but, as it is at this place also the Trichoor canal takes off, there are always a great number of boats in the vicinity, and it is troublesome and even dangerous passing through it at night. Passing Madalagum the canal enters the large backwater from Palliport, and from this to Cochin, a distance of twenty-four miles, nothing is required but probably to buoy out the line of navigation in places through the expansive backwater and to urge on the Government of His Highness the Rajah the necessity for the removal of large stakes, driven across the backwater, coming into Cochin; they are very dangerous and many boats have been upset by them, and lives have been lost in my own time at these stakes.

statement of traffic on the line of canal between Tirroor and Cochin, but I learn from statements from the Deputy Collector and Tahsildar that about 15,000 tons per annum pass; the value thereof is set down at ten lakhs of rupees. Paddy, rice, cocoanuts, copra, cotton, and tobacco chiefly, and the cost per ton per mile may be set down at 1½ Annas. During the monsoon the traffic is greater; in fact, for traffic the canal as at present is only available for half the year, and, if the improvements are carried out, it is not too much to expect that the traffic will increase to twice what it is at present, say 30,000 tons per annum, and the cost of carriage will be reduced to one anna per ton per mile; if only one-half of the saving be charged as toll it would represent a return of Rupees 37,280 or 6 per cent; this is a low estimate now that the Warkully barrier is nearly completed which opens a line of internal water-communications from Trevandrum in latitude 8°-29' to Tirroor in latitude 10°-55'.

13. Moreover, there is one point which I would beg to bring prominently to notice and that is the manufacture of salt. In these parts there are vast expanses of land available at Chetwye and Yennamakul where salt is at present manufactured at an enormous waste of labor. No proper system; of course it is illicit manufacture, but I have seen as many as 2,000 people employed at it along the line, the wretched condensing and evaporating pans being in some cases filled with chatties; however I estimate that some two or three lacs of maunds are made annually, and, of course, sold; it cannot be prevented I believe at present; but if this line of communication was opened up, and if the manufacture of salt was farmed out, I believe ten lacs of maunds might be made annually, but taking it at five lacs only, which represents a revenue of Rupees 11,56,775, taking the whole at 18,000 tons and at a toll of ½ Anna per mile for 50 miles in any direction to market, we get a further sum of Rupees 15,000, which brings the revenue derivable from the canal up to Rupees 52,280, or 8½ per cent, besides the indirect returns that may be expected from this work. I think it is worthy of careful consideration.

14. A copy of this report will be forwarded to the Collector of Malabar, from whom I have received every assistance applied for, and who will, I am encouraged to hope, strenuously

*Proceedings of the Madras Government, Revenue Department,
21st August 1876.*

advocate the execution of a work calculated to promote so much the prosperity of the district and raise the depressed condition of the people in these parts so badly off for free communication.

CALICUT,
24th May 1876.

(Signed) T. D. HARRIS,
Special Executive Engr.,
Cochin Range.

(True Copy.)

(Signed) W. LOGAN,
Collector.

SUBMITTED for the information of Government.

2. As a means of improving the important line of communication by water along the West Coast, the scheme referred to deserves cordial support, especially with reference to the proposed extension of the canal to the north of Buddigherry through Mahé, Tellicherry, and Cannanore to Mangalore, but it does not appear that the irrigational advantages are likely to be very considerable. From the District Engineer's report it appears that the fresh water kept back by the temporary dams is used for two months in the year to irrigate a third crop, but only to a limited extent not exceeding 300 acres, and the Board do not suppose that the substitution of locks for dams will lead to any considerable extension of irrigation, though the tidal lock will doubtless offer a better protection against the influx of salt water, whilst the convenience afforded to navigation by the removal of the dams will be a vast improvement.

(Signed) C. A. GALTON,
Acting Secretary.

No. 216.

ORDER THEREON, 21st August 1876, No. 1,139.

Miscellaneous.

COMMUNICATED to the Public Works
Department where the scheme will
receive consideration.

(True Extract.)

(Signed) D. F. CARMICHAEL,
Secretary to Government.

To the Public Works Department.
,, the Board of Revenue.

Exd. W. J. Lewis.

PROCEEDINGS OF THE BOARD OF REVENUE, dated 31st July 1876.

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2. The Board are probably aware that, during the heavy monsoon months, large boats can, even at present, pass from Cochin and the country to the south of that place as far as Badagara on the north, a distance of between 200 and 250 miles. At other times of the year, moderately-sized boats only, and those with difficulty, can pass only as far as Tirroor Railway Station. It is in contemplation to complete a good navigable canal throughout the whole length of the above immense tract of country, and to push it on further north to Mahé, Tellicherry, and eventually to Cannanore and Mangalore.

3. It will be a work of immense importance to this district as it will open up and connect all the fine natural water-communications already existing, and which, even in their present isolated condition, are of very great importance to the country. There are as many as nine fine navigable rivers in this district running inland, many of them as far as the base of the mountain chain of the ghauts.

4. The report, of which I submit a copy, relates only to the first section of the work, *viz.*, that from Tirroor Railway Station towards the south. This section is divided into, I., the Tirroor and Veliangode; II., the Veliangode and Chetwye; and, III., the Chetwye and Cochin sub-sections. In the second of these sub-sections, the question of the effect the work will have on the cultivation about Chowghaut has to be considered. The Board are probably aware that at present it is usual to throw earthen dams across the present water channel, one to the north and the other to the south of Chowghaut, so as to dam in the fresh and exclude the salt-water, which otherwise would fill the extensive jheels and overflow the paddy fields. I have carefully gone into the question of how it is proposed to provide for these two objects in the scheme prepared by Mr. Harris, and stated generally his plan is simply to substitute a lock at either end of this portion of the canal for the two very imperfect dams at present used. A waste weir is also provided the floor of which will be 6 inches above high water-mark. As shutters will be provided for this weir the fresh waterspread will be much larger than can be obtained at present, and it will bring additional lands under cultivation. The locks above referred to will have double shutters so as to close both against fresh water and salt. For the greater portion of the year (say from June to January) the locks will shut against the fresh water, and even when the fresh water falls below high tide level, the quantity of salt water that will find its way in through the locks will be so small as scarcely to affect the large waterspread within. At present the water within the earthen bunds is decidedly brackish even in January, as I can from personal experience testify, and Mr. Harris says he has seen illicit salt being made from the

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3. The section of the canal has been made out of the ground by Colonel Mullins, R.E., and has been also examined by Major A. deC. Scott, R.E., Deputy Chief Engineer, on the ground. The site and dimensions of locks and swing bridge on the Ponany Bazaar road has also been fixed by Colonel Mullins, R.E., after an examination of the canal line and Veliangode river, and are of sufficient capacity to meet all requirements: the level of the lock sills 5—M.S.L. has been fixed by Colonel Mullins, R.E., a depth of 3 inches—the proposed line of canal.

4. By the locks and embankments this portion of the canal will be constantly safe to navigation; the floods will be excluded and every provision has been made for drainage; the works proposed are of the most substantial and permanent nature as will be seen from plans and specifications.

5. *Section of Canal from Veliangode River to Chetwye.*—The principal physical features of this section, a distance of 17 miles 226 feet from the Veliangode river to the entrance into the Chetwye river, is the Caroovanoor river debouching into the sea at Chetwye one and a quarter mile S.W. of canal entrance, the great tidal backwater and the Veliangode river. The Caroovanoor river has its rise in the Patikad Mountains and drains an area of 800 square miles including the Yennamakil lakes, and discharges from twelve to fifteen millions cubic yards of water per hour during floods into the sea. The river does not bring so much silt towards the canal in floods; it does not affect the canal at all much. The great tidal backwaters here run on both sides of the canal to a distance of five miles on the west and three miles on the east back in the direction of the canal, but is beyond the ridges in both cases. The Veliangode river has been already described and affects the canal entrance from Veliangode towards Chetwye just as it does the Ponany section, in fact more so. The first three miles from the river entrance is completely filled in with silt on the occasion of the first floods down the river, so that if the canal entrance is opened to full section to improve it some controlling agency is required, and I propose a lock; in fact, an attempt was made formerly by building something like a lock to regulate the water, but there is little of it left now. The line of canal passes through a valley between the sand ridge of the coast and a ridge running parallel with it on the east. No where is the summit of these ridges a greater distance between them 2,440 yards; in one section 30 yards and the average 932 yards, the total area nine square miles. Nearly a complete plan of it accompanies with areas. The canal runs through centre all through sand and alluvial deposit. The cultivation is paddy, the ridges and high ground and mounds as well as canal banks where they exist are planted with cocoanut trees; from the 14th mile post the water spreads out into a vast lagoon from ridge to ridge down to Chowghaut. The area available to cultivation does not exceed 2,000 acres, and of this about 500 acres is planted near the canal and lagoon with two and three crops annually; all this land is below high tide level; for this purpose the ryots place an earthen dam across the canal at 3,400 feet south of 7th mile post and at Ticadavoo, 2,066 feet south of the 19th mile post, to exclude salt water, and here a staff of watchers are maintained to pass boats over a slip; both bunds are now farmed out by Collector. This, of course, makes the navigation very imperfect; after the monsoons are over when the bunds are made they cannot of course be kept up during the monsoon. The ridge on the west, or sea side, rise from 7 to 14 to 19 feet, where it terminates 3,625 feet south of the 18th mile post and where the weir for discharging surplus water is proposed as per plans. The coast road runs on top of this ridge to Chowghaut where it crosses the canal. There is no wheel traffic in the vicinity of canal, and the coast road is little used now. The ridge on the east rises from 7 to 15 feet above mean sea and terminates at the Chetwye river, the coast road running along it.

6. The estimate for this section amounts to Rupees 4,36,270, a distance of 17 miles 226 feet, and would represent a cost per mile of Rupees 25,663; but it also opens the line clear to Edattoority, a distance of thirty-one miles, and would therefore represent a cost per mile of Rupees 14,073; to regulate the flood and tidal water locks with double gates are necessary on both rivers

as per plans, and an embankment from the weir around the margin of the waterspread at Tica-davoo; this bund may appear tortuous, but it connects all the binds and is the line of roadway to all the houses and outlying hamlets, and is the easiest plan to follow. An examination of the plans will show this more closely. The crest of the surplus weir will be 6" + high water, and it is provided with clean grooved cast-iron posts and common shutters, but perhaps self-acting shutters would be preferable; it will discharge with safety up 4 feet, but no such head will ever come upon it. I have allowed in the circulation the highest value—these papers accompany plans, estimates, and specifications—it discharge over a low piece of firm ground and the north fortment rests in solid ground 18 feet above mean sea. The locks will work both ways, using fresh water both for navigation and irrigation as long as it will last. It is difficult to arrive at an accurate calculation of the lockage and how far it will go to keep up a constant supply from December to June; in a dry season like the present it will not do so, but there is no need to apprehend any miscarriage on that account, for the water may be so regulated as to give a constant supply and navigable depth through canal during all seasons without injury to cultivation. At present the salt water is not solely excluded and never can be by the rude means adopted. I have seen salt making up to Chowghaut along the canal line in January and February, the very months only when water is used for third crop cultivation, and this area is limited but never exceeds 300 acres as far as I could make out and I have examined all carefully.

7. A sum is allowed of Rupees 30,000 to widen and strengthen and deepen the cut between Edatoority and Madalagum. This portion of the canal requires no masonry and simply requires sectioning as proposed. I was unable to complete the survey of this portion, but it can easily be done in the dry season; it runs solely through the territory of His Highness the Rajah of Cochin, and I had numerous applications to include this in my estimate from all the people. The Trichoor takes off from Edatoority and his Highness' Government will willingly bear half the cost of all improvements; this brings the canal into the large tidal backwater of Kodungalore and opens the line to Cochin, a further distance of 24 miles, or 80 miles in all, making the total cost of internal water-communication between the Railway Station at Tirroor and Cochin 6,25,000 Rupees, or per mile Rupees 7,812-8-0, which cannot be considered excessive.

8. *Description of the present Canal.*—The large backwater from the Railway Station at Tirroor has a depth of 5 feet water at low water throughout except in a very limited extent in one or two places and a least width of 100 feet; it is very crooked, but nothing could be done to improve the alignment without great expense and it is not necessary. The only improvement required is a proper landing place at the Railway Station at Tirroor. The distance from Tirroor to Ponany canal entrance is fifteen miles.

9. The boats plying on this canal are flat-bottom dhonies and the common canoes and dugouts; the latter carry from one to two tons each and the larger sized boats carry from five to ten tons. A mast of bamboo with a sail of coir matting set up in the prow of the boat sails it along, and the sail is so arranged that suits itself to any but a dead head wind, when the two men in the boat pole or row till the wind is again favorable; towing is never attempted, and never will be on the backwaters of the West Coast.

10. The artificial cut between Ponany and Veliangode rivers is a mere ditch as crooked as a ram's horn, and only canoes and the smallest sized boats can pass it, a distance of 2 miles 3,660 feet. After getting through this portion of the line, the Veliangode river is entered; it is broad and deep enough, and passing up it eastward for a distance of 3,800 feet, the canal entrance between this river and Chetwye is entered; the first seven miles is entirely artificial through the higher ground of a valley between two ridges, the rest passes through a lagoon and wheels; the water is deep enough in the lagoon but the first four miles from the Veliangode river is silted in every year to such an extent as to seriously impede the waterway, and navigation is sometimes stopped till the bed is cleared of the silt; nor is this all, at near the 7th mile on the north and near the 19th mile on the south bunds are erected immediately after the monsoon to maintain a fresh water lagoon within the length of the twelve miles enclosed by these bund through the lowest part of this valley; as the depth diminishes during the dry season the borders of the tank are planted with a second crop of paddy. Nothing but the smallest sized boats can pass this

portion speedily or safely; it is, as regards navigation and communication, a constant source of complaint, and even small boats are detained within this section for three days at a time, whereas they ought to pass in twelve hours easily.

11. After passing out of this section into the Carooanoor river at Chetwye, there is a splendid broad and expansive river and backwaters with a constant depth of not less than 6 feet throughout, and a width of upwards of 100 feet any where down to Edatoority, a distance of 10 miles, where there is a cut from the Monim river into the Madalagum backwater. This cut is mostly deep enough but wants widening and straightening down to Madalagum, a distance of 10 miles. Boats can pass at present, but, as it is at this place also the Trichoor canal takes off, there are always a great number of boats in the vicinity, and it is troublesome and even dangerous passing through it at night. Passing Madalagum the canal enters the large backwater from Pallipott, and from this to Cochin, a distance of twenty-four miles, nothing is required but probably to buoy out the line of navigation in places through the expansive backwater and to urge on the Government of His Highness the Rajah the necessity for the removal of large stakes, driven across the backwater, coming into Cochin; they are very dangerous and many boats have been upset by them, and lives have been lost in my own time at these stakes.

12. *Traffic.*—From the imperfect returns now before me, it is difficult to give a correct statement of traffic on the line of canal between Tirroor and Cochin, but I learn from statements from the Deputy Collector and Tahsildar that about 15,000 tons per annum pass; the value thereof is set down at ten lakhs of rupees. Paddy, rice, cocoanuts, coppra, cotton, and tobacco chiefly, and the cost per ton per mile may be set down at 1½ Annas. During the monsoon the traffic is greater; in fact, for traffic the canal as at present is only available for half the year, and, if the improvements are carried out, it is not too much to expect that the traffic will increase to twice what it is at present, say 30,000 tons per annum, and the cost of carriage will be reduced to one anna per ton per mile; if only one-half of the saving be charged as toll it would represent a return of Rupees 37,280 or 6 per cent; this is a low estimate now that the Warkully barrier is nearly completed which opens a line of internal water-communications from Travandrum in latitude 8°-29' to Tirroor in latitude 10°-55'.

13. Moreover, there is one point which I would beg to bring prominently to notice and that is the manufacture of salt. In these parts there are vast expanses of land available at Chetwye and Yennamakul where salt is at present manufactured at an enormous waste of labor. No proper system; of course it is illicit manufacture, but I have seen as many as 2,000 people employed at it along the line, the wretched condensing and evaporating pans being in some cases filled with chatties; however I estimate that some two or three lacs of maunds are made annually, and, of course, sold; it cannot be prevented I believe at present; but if this line of communication was opened up, and if the manufacture of salt was farmed out, I believe ten lacs of maunds might be made annually, but taking it at five lacs only, which represents a revenue of Rupees 11,56,775, taking the whole at 18,000 tons and at a toll of ½ Anna per mile for 50 miles in any direction to Tirroor, we get a further sum of Rupees 15,000, which brings the revenue derivable from the canal up to Rupees 52,280, or 8½ per cent, besides the indirect returns that may be derived from this work. I think it is worthy of careful consideration.

14. A copy of this report will be forwarded to the Collector of Malabar, from whom I have received every assistance applied for, and who will, I am encouraged to hope, strenuously advocate the execution of a work calculated to promote so much the prosperity of the district and raise the depressed condition of the people in these parts so badly off for free communication.

CALCUT,
24th May 1876.

(Signed) T. D. HARRIS,
Special Executive Engr.,
Cochin Range.

(True Copy.)

(Signed) W. LOGAN,
Collector.

2. As a means of:

2. As a means of improving the important line of communication by water along the West Coast, the scheme referred to deserves cordial support, especially with reference to the proposed extension of the canal to the north of Baddigherry through Mahé, Tellicherry, and Cannanore to Mangalore, but it does not appear that the irrigational advantages are likely to be very considerable. From the District Engineer's report it appears that the fresh water kept back by the temporary dams used for two months in the year to irrigate a third crop, but only to a limited extent, not exceeding 300 acres, and the Board do not suppose that the substitution of locks for dams will lead to any considerable extension of irrigation, though the tidal lock will doubtless offer a better protection against the influx of salt water, whilst the convenience afforded to navigation by the removal of the dams will be a vast improvement.

(True Copies and Extract.)

To the Secretary to Government, Revenue Department.
Copy to the Collector of Malabar.

Acting Secretary.

Exd. W. J. Lewis.

Communicated to the Dept. Public
works, where the scheme will
receive consideration

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Board of Revenue,
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Received

17 August 1896

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No. 1,942.

Wes. Coast Canal—in Maunabo District.—Submitting to Government, with Board's views, remarks of Collector on importance of propose scheme for improving portion of — betw. Cochin and Tiiruro Railway Station.

With me
Chas. May 21. 1849