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Government of Madras.

Public Works DEPARTMENT.

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23.2.37

No. 20. Read the following Reports from Colonel C. E. FABER, Chief Engineer: to H. FORBES, Esq., Acting Secretary to Government, dated 6th December 1856, No. 8662.

Report A, on an estimate for constructing a 2nd Class road from the Salt Pans at Nowpada to Tekally Ragoonadapooram on Trunk road No. 6, 5 miles 3 furlongs and 92 yards.

1. Amount of estimate Rupees (5,330) five thousand, three hundred and thirty, as follows:—

79241	Cubic yards	earthwork at	As. 0	pice 6	₱ Cubic yards	Rupees	2,476
2661	do.	Metalling at	„ 4	„ 0	₱ do.	„	665
6368	do.	Gravelling at	„ 3	„ 0	₱ do.	„	1,194
Superintendence at 10 per cent						„	434
Sundries including fractions						„	217
Compensation for 5 acres of Zemindary land at Rupees 40 per acre						„	200
4. 20 yard road dams at Rupees 36 each						„	144
						Total estimate Rupees...	5,330

2. This estimate has been prepared by the Civil Engineer 9th Division in connection with one forwarded to the Agent to the Governor in Ganjam, for a branch road from Malapetta on the Kimedy and Poondy line to Tekally Ragoonadapooram; being the most direct route from Goonapooram viâ Buttelly, through the Kimedy Zemindary, towards Nowpada.

3. At present, the approach to the Nowpada Salt Pans, the largest and best in the Ganjam and Vizagapatam Districts, is cut off during the rainy season by a swamp of 3 miles in length, on which in the dry season, the Civil Engineer observes in para. 2 of the accompanying letter, No. 845, dated 11th October 1856, "there is not one blade of grass for the thousands of "bullocks that come there for Salt."

4. The Acting Collector of Ganjam in a letter No. 339 dated 21st October 1856, which is herewith forwarded, represents the urgent necessity for this road, and the estimate having been prepared on moderate and sufficient data the Chief Engineer recommends it for entry in the Budget of 1857-58.

5. The Civil Engineer has been requested to furnish the Statement, referred to in para. 3 of his letter, of the number of bullocks employed in carrying Salt from the Nowpada Pans, the same having been omitted to be sent, but the necessity for the road being sufficiently evident from the information given by the Civil Engineer, and the Acting Collector, the Chief Engineer does not consider it necessary to delay the submission of the estimate, until the receipt of the said traffic return.

Letter from Major W. BIRDWOOD, Civil Engineer 9th Division; to Colonel C. E. FABER, Chief Engineer, dated Camp Chicacole, 11th October 1857, No. 845.

SIR,

I have the honor to forward a Survey and estimate amounting to Rupees five thousand three hundred and thirty, for the formation of a 2nd Class road 5 miles, 3 furlongs 92 yards in length from "Jekally Ragoonadporam" on Trunk road No. 6 to the Nowpada Salt Pans, the which has been prepared in connection with one forwarded to the Agent to the Governor in Ganjam for the formation of a Line from Malapetta, on the road from Kimedy to Poondy, to "Tekally Ragoonadporam" the shortest and most direct route from Goonapooram, viâ Buttelly through the Kimedy Zemindary towards Nowpada.

1. Survey.
1. Sketch Map.
1. Abstract estimate.
1. Detail Do.

There does not at present exist any one tolerable approach at any season of the year to "Nowpada." During the rainy season indeed the Salt Pans* at that place are not accessible, the country between the high ground and Nowpada (3 miles in length), being one low uncultivated hollow im-

* The largest most frequented in this part of the country.

passable swamp, on the which, in the dry season there is not one blade of grass for the thousands of Bullocks that came there for Salt.

The accompanying statement will shew the number of Bullocks &c., that frequent this place for the carrying away Salt during the year, and as no communication whatever exist across the swamp which has to be trodden by heavily laden Bullocks &c., the necessity for one or two such from different points must be apparent indeed such is absolutely necessary and will be of the greatest benefit to hordes of Brinjarries that frequent these "Salt Pans."

The dimensions of the road being a 2nd Class one only will be 6 yards of metalling with 4 Masonry works, and the rates allowed, considering the distance the metalling and gravel have to be brought, it will be seen are moderate.

Earth work.....	6 pice	per Cubic	yard.
Metalling.....	4 Ans.	do.	do.
Gravelling.....	3 Ans.	do.	do.

I hope in the course of a few days to forward estimates for another Line to the same place, from a different direction, in connection with the road from Palcondah, and Parvitapoor a line very much frequented by Brinjarries from the Jeypoor country.

The line for the which the present estimate provides being the route by which those from the north and from the Nagpoor country will come to the Salt Pans.

The Nowpada Salt Pans are the only large one in the Vizagapatam and Ganjam Districts, the Omeravelly ones near Calingapatam having been abolished and those at Ganjam in this District, and Conadah and Coopilly in Vizagapatam being of small extent.

Letter from WILLIAM KNOX, Esq., Acting Collector of Ganjam; to Colonel C. E. FABER, Chief Engineer, dated Chetterpoor, 21st October 1857, No. 339.

SIR,

I have the honor to forward herewith a Survey and Estimate for the construction of a second Class road from Ragoonathpoorum of Teckally to Nowpadah. The want of a road to a place where the wet Salt in the district is manufactured has been seriously felt for a long time. During the rains the line is not passable and even during the other months of the year the Salt traders are obliged to pay enormous rates of hire for bandies to carry their Salt to its destination, the consequence is that the Nowpada Salt the best in the district and made in the largest quantity is always sold at a very high price by the Salt traders.

No. 21. Report GG, on an estimate prepared by the District Engineer of Ganjam* for constructing bridges on the high Northern road (Trunk road No. 6) between Chicacole and Itchapore.

* Letter No, 895, dated 21st October 1856.

Amount of estimate Rupees (47,220) forty-seven thousand, two hundred and twenty, as follow.

Between Chicacole and Suntashapooram 39½ miles.

										Rs.	
2	Bridges	of 4	Arches	of 7	Yards	span.				7,980	
1	do.	of 3	do.	do.	...	...	...	...		3,470	
1	do.	of 2	do.	do.	...	...	...	...	...	2,920	
2	do.	of 2	do.	5	do.	...	...	...	...	2,840	
7	do.	of 2	do.	4	do.	...	...	...	...	6,580	
											23,790

Between Suntashapooram and Dendagedda near Itchapore 34½ miles.

										Rs.	
1	Bridge	of 4	Arches	of 12	Yards	span.	...	...	...	6,870	
3	do.	of 3	do.	5	do....	...	...	...	...	5,100	
1	do.	of 2	do.	12	do.	...	...	...	...	5,060	
2	do.	of 2	do.	5	do.	...	...	...	...	2,720	
2	do.	of 2	do.	4	do.	...	...	...	...	1,940	
2	do.	of 1	do.	5	do.	...	...	...	...	1,740	
											23,430
									Total Rupees.....		47,220

1. Items, Nos. 2 and 3 in Statement No. 1 of the Budget for 1856-57, amounting to Rupees 46,550 and 37,200 provided respectively for earth work, metalling 6 yards in width and the construction of the smaller masonry works such as tunnels and road dams between Chicacole and Suntashapooram, and the latter place, and Dendagedda near Itchapore and the estimate now submitted as directed in Extract Minutes of Consultation, No. 362, dated 10th March 1856, provides for thoroughly completing the same portions of road.

2. The Acting Collector of Ganjam in his letter No. 375, dated 6th November 1856, states that the works have his full support, and the rates allowed being moderate and sufficient. The Chief Engineer recommends the estimates for entry in the Budget of 1857-58.

Letter from Major W. BIRDWOOD, Civil Engineer 9th Division; to Colonel C. E. FABER, Chief Engineer, dated Camp Chicacole, 21st October 1857, No. 895.

SIR,

I have the honor to submit Plans and Estimates for Bridges on Trunk road No. 6, between Chicacole and Itchapoor, amounting to Rupees forty-seven thousand, two hundred and twenty, for entry in the Budget of 1857-58, which were omitted in the Budget for 1856-57, and directed to be supplied in Extract Minutes Consultation No. 362, dated 10th March 1856.

2. Plans.
2. Detailed Estimates.
2. Abstract do.

2. Streams No. 64, 79, and 89 are mountain Torrents which are not fordable after heavy showers for a few hours, traversing the plains for about 10 miles only before meeting the Sea.

3. Should the Government be pleased to sanction these large Bridges, which it was my intention to submit for entry in the Budget of 1856-57, vide my letter No. 764, dated 26th October 1854, forwarding Plans and Estimates for Trunk road No. 6; it will place this most important Road to the North, in accordance with the views of Government expressed in Extract Minutes Consultation No. 149, dated 13th April 1855, in a most efficient state, not only for the working of the Tappal, but as a local communication.

The information required regarding the principal stream No. 64 is as follows.

1. Highest water line — given in Section.
2. Section of stream — given in Plan.
3. Fall of Bed — 3′ 4″ per mile.
4. Area of Valley drained — 54 Square miles.
5. The greatest Fall of Rain in the neighbourhood, within the last 3 years is 41″ $\frac{18}{20}$.

Letter from W. KNOX, Esq., Acting Collector Ganjam; to Colonel C. E. FABER, Chief Engineer, dated Berhumpoor 6th November 1856, No. 375.

SIR,

I have the honor to forward herewith Plans and Estimates for Masonry Works required on Trunk road No. 6 between Chicacole and Itchapoor and request you will be good enough to obtain sanction for the same; the works have my full support.

No. 22. Report QQQQ, on an estimate prepared by the District Engineer of Ganjam, for constructing a District road from Aska to Rumbah on the Chilka Lake, a distance of 29½ miles.

The Estimate provides for.

		Rs.	A.	P.
1,73,607¾	Cb. Yds. Earthwork at 6 pice ₱. Cb. Yard...	5,425	3	7
18,286⅞	Metalling 4 yards wide and 6 inches thick at 6 annas do.	6,857	8	8
43,297½	Sqr. Yards Turfing at 5 pice ₱ Sqr. Yard	1,121	4	5
67,420	Clearing jungle at ₱ 1000 sqr yard Rs. 2	134	13	0
1	Wooden bridge of 20 Bays each of 15 feet span... ...	3,200	0	0

		Rs.	A.	P.
1	Do. of 10 bays of 11 feet	3,000	0	0
1	Do. of 3 bays, of 12 feet span...	370	0	0
1	Do. of 1 do. 15 do....	400	0	0
95	Tunnels varying in size, from 1 vent of 3 feet. to 1 vent of 6 feet span	6,620	0	0
2	Road dams	27	0	0
	Anticipated cost of constructing 6 miles of road through dense jungle, which could not be surveyed, at ℔ mile Rs. 500	3,000	0	0
	Superintendence and sundries	* 701	2	4
	Total Rupees.....	30,860	0	0

* An extra charge of Superintendence and sundries is included in the bridge estimates.

thirty thousand eight hundred and sixty.

1. The proposed road is to branch from Trunk line No. 6 at Rumbah, the great place fc export on the Chilka Lake, and to be carried through the Poobacondah Talook viâ Prosutpoc on the North bank of the river Rooshkoolea to join the road from Berhampore to Russelconda at Aska.

2. The District Engineer in para. 2. of his letter No. 1035, dated 12th November 185(states, that " of the Jaggery consumed by the Aska Sugar Factory, about 4,000 cart loads calcu " lated at Rupees 80,000, comes from the Poobacondah Talook. The Zemindary of Hautghu " sends about one half that amount, the factory therefore spending among the Ryots of thes " two Talooks alone about Rupees 1,20,000 annually, for the raw Materials."

3. The Jaggery from these Talooks is also stated to be much in demand by the Cuttacl Merchants, who purchase it in large quantities, often outbidding the Aska factory, and transpor it in boats from Rumbah to Pooree, where it is disposed of to the Pilgrims at Juggernaut The manufacture of Sugar is also carried on to a great extent at Ganjam.

4. In addition to the sugar, large quantities of rice and oil seeds, are conveyed throug the Poobacondah Talook to Ganjam for exportation chiefly by the European merchants trading there, a great portion of rice being also sent by the Lake to Pooree. The opening of the propo. sed road by offering increased facilities of transit, will no doubt very much increase the rate of Salt.

5. Notwithstanding that the Country between Aska and Rumbah is almost impassable in the rainy season the present track in many places passing through swampy ground, and rice cultivation, and crossing deep and muddy Nullahs unprovided with bridges, bandies half loaded, are still to be seen daily crossing it, though of course with the greatest difficulty.

6. No metalling has been allowed in the estimate for the portions of the road between Prosutpoor and Rumbah, where the soil is sandy or naturally hard, and likely to resist the wear and tear of the present traffic.

7. Of the six miles near Rumbah no regular survey has been made, in consequence of the dense jungle through which the road is to be taken and the District Engineer states that had he delayed the preparation of the estimate until the Jungle was cleared, for which moreover he had no funds at his disposal [a practical inconvenience easy of removal] it would not have been in time for entry in the Budget, the distauce however has been measured with a chain, and an allowance made for it of Rupees 500 per mile.

8. As salt timber is abundant and very cheap in the vicinity of the proposed road, wooden bridges have been provided for all streams exceeding 2 yards in breadth the cost of them being small compared with masonry.

9. The Acting Collector of Ganjam in the accompanying letter No. 404, dated 19th November 1856, strongly advocates the construction of the road; the value of which has been sufficiently shown by the District Engineer, and the estimate having been framed on moderate and sufficient data, is recommended by the Chief Engineer for entry in the Budget of 1857-58.

Letter from Major W. BIRDWOOD, Civil Engineer 9th Division; to Colonel C. E. FABER, Chief Engineer dated Camp Chicacole, 12th November 1856, No. 1035.

SIR,

I have the honor to forward a Survey and Estimate, amounting to Rupees twenty-seven thousand, six hundred and sixty (27,660) for the formation of a new line of communication, 29½ miles in length, as a District road, through the Poobacondah Talook, between Rumbah, the great place for exports on the Chilka lake, and Aska, midway between Berhampoor and Russelcondah.

1. Road Estimate
2. 6 Sheets of Survey.
3. 1 Masonry Plan.
4. 1 do. estimate.
5. 1 Abstract.
6. 1 Sketch Map.

Of the Jaggery consumed by the Aska Sugar Factory, about 4000 cart loads, calculated at 80,000 Rupees comes from the Poobacondah Talook the Zemindary of Hautghur sends about one half that amount the Factory therefore spending among the ryots of these two Talooks alone about 120,000 Rupees annually for the raw material.

In addition to this, the quantity Jaggery purchased in these talooks by the Cuttack Merchants (very often outbidding the Aska Factory and making large advances annually) and transported in Boats from Rumbah to Pooree (where it is consumed by the Pilgrims at Jagganoth) is very large; the manufacture of Sugar is carried on to a great extent also at Ganjam.

Very large quantities of Rice and Oil seeds, also are conveyed by this route to Ganjam, for exportation, chiefly by the European Merchants, trading there, as also the former, for transit by boats from Rumbah to Pooree, and no doubt will the sale of Salt at Ganjam be considerably increased, by increased facilities of transit.

The country in the wet season is almost impassable the village route in the map is in very many places, under Rice cultivation, or often a swamp, and the Nullahs are deep in places, and very often with muddy bottoms, yet daily may be seen bandies with half loads staggerring through, bad as it is.

Those portions of the road between Prosutpoor and Rumbah where the soil is sandy or hard no metalling has been allowed; should the traffic hereafter require it an estimate will be submitted for it.

Dence jungle rendered it almost impossible to survey the last 6 miles near Rumbah, but it was measured with a chain, and 500 Rupees per mile has been allowed for it in the estimate, which I trust will not be disapproved of, as there was not time, nor funds at hand to allow for the cutting a pathway preparatory to the submission of this estimate for the Budget. Wooden bridges, have been provided for all streams exceeding 2 yards in breadth the cost of which is small compared with masonry, and Sâl wood abounds and is very cheap in the neighbourhood. A project has been submitted for crossing the Mahanuddy near Aska on this line.

Sections for the different streams proposed to be bridged will be forwarded in a day or two.

Letter from WILLIAM KNOX, Esq., Acting Collector of Ganjam; to Colonel C. E. FABER, Chief Engineer, dated Kimedy, 19th November 1856, No. 404.

SIR,

I have the honor to transmit a letter dated 12th Instant No. 1035, from the Civil Engineer for a road between Aska and Rumbah, the Plans and estimates have been forwarded by banghy. This is one of the roads I mentioned as being much wanted in a former report, there will be great traffic on it up and down as noticed by Major Birdwood. In a District like this, where the rains begin as early as they do here, it is of the greatest importance to provide good roads for transport of grain to the Coast. I hope next year there will be a road made direct to Ganjam from Poorshatapoor which will more especially answer this purpose. The present road besides being valuable in a commercial view is also a very politic measure, all the petty Zemindars in the District live as their fathers did before them in the most out of the way places without making any advance or improvement, and the more roads that run through their jungles the more difficult it will be for them to resist the civilizing influence of trade and intercourse with parties independent of their petty rule.

Letter from Major W. BIRDWOOD, Civil Engineer 9th Division; to Colonel C. E. FABER, Chief Engineer, dated Camp Chicacole, 10th November 1856, No. 1021.

SIR,

I have the honor to submit for entry in the Budget of 1857-58, a Plan and estimate for the construction of a woodden bridge supported by masonry abutments, of 20 Bays 15 feet span each, amounting to Rupees three thousand, and two hundred, over the Mahanuddy river near the village of Boorgam within ½ a mile of Aska, and on the line from Rumbah to Aska, for the formation of which as a District road an estimate is being prepared for submission in the ensuing Budget.

1 Sketch Map.
1 Estimate.
1 Plan.
1 Abstract.

The advantage of so simple, and not very expensive work across this stream, will be very great, would confer a great boon on the Aska Sugar Factory, and form a most important addition in the way of facilitating commerce, as across it would be brought all the produce of the Hautghur and Poobacondah Talooks for the factory estimated at 7000 bandy loads, representing in value about 1,20,000 Rupees; and the great export trade of Rice, Sugar &c., from Goomsoor, Sooradah and other Zemindaries be conveyed by this route to the Chilka, and there shipped to Pooree, amounting to about 2 lacs annually.

Salt is now brought into the interior from Ganjam in bandies, notwithstanding the great difficulties of an unbridged village track, through paddy fields the greater part of the way, and a proper communication would of course very much increase the import.

The piles will be shod, the driving machine made, and the bolts and other iron work supplied from the Aska works, and Mr. Boothby has kindly promised every assistance.

The estimate has been prepared, as regards the iron work by Lieutenant Harington with great care in conjunction with Mr. Scott the Aska factory able Engineer who has seen much of this description of work both in America and England.

Sâl wood is easily procurable of good scantling in Goomsoor. Should the estimate meet with your approval I have to request it may be entered in the Budget for 1857-58.

Letter from W. KNOX, Esq., Acting Collector of Ganjam; to Colonel C. E. FABER, Chief Engineer, dated Kimedy, 19th November 1856, No. 401.

SIR,

I have the honor to forward the accommpanying letter No. 1021, dated the 11th Instant, from the Civil Engineer for a wooden bridge across the Mahanuddy river near Aska, the Plans and Estimates have been forwarded by banghy.

This bridge will be a most useful one and its advantages as stated by Major Birdwood, will be very great particularly to the agricultural population, If as I hope next year a road is carried from Poorooshotapore to Ganjam its usefulness will be found still greater.

No. 23. Report BBBBB, on an estimate prepared by the District Engineer of Ganjam, for excavating a navigable Canal from the Chilka Lake to the Ganjam river near the Port of Ganjam.

		Rs.
1.	The estimate provides for 4,00,797 cubic yards Earth work at 8 pice...	16,700
800	do. Rough stone in chunam at Rupee 1-4	1,000
87	Acres of land compensation at per acre Rupees 6	2,067
	Superintendence and Sundries	1,193
3	Ferry boats...	180
1	Syphon duct	610
	Total.....	21,780

twenty-one thousand, seven hundred and eighty.

1 The object of the proposed Canal which like that to Calingapatam was first suggested by Lieutenant Colonel F. Cotton, in his recent report on the Ganjam District is to complete the water communication from the Chilka Lake to the Port of Ganjam, and thus to obviate the great inconvenience at present experienced by Traders, in having to land their goods at Rumbah near the Southern extremity of the Lake, and thence to transport them at a great expence on bandies to Ganjam.

2. The exports from Ganjam are annually increasing, and a ready market being found there for Rice, Oil seeds, and other produce from the Districts bordering on the Chilka Lake, it is desirable to facilitate and cheapen as far as possible, the means of communication to it, and which cannot be done more effectually than by the proposed Canal.

3. In para. 5 of his letter No. 1063 dated 18th November 1856, the District Engineer observes "with this communication open, the Port of Ganjam will have the full advantage of "water carriage from all parts of the Lake, at a very cheap rate, and I trust the sale of Salt "will be in consequence considerably increased as no doubt it will meet with a ready sale at "Rumbah, and other inland parts of the Lake for transportation to the north and westward, "considering too that the Salt manufactured at Ganjam is of a far superior quality to that "obtained in Orissa, as also cheaper owing to the cost of manufacture." It should be observed here that the Salt at Cuttack is made by boiling, that at Ganjam by evaporation.

4. Eventually it is intended to extend the Canal from Ganjam to the Port of Munsoorcottah by the Chetterpore backwater.

5. In para. 7 of his letter the District Engineer notices the facility with which loaded boats will make their way down to Ganjam during the prevalence of the Northerly winds from December to the end of February, and in para. 8 offers some remarks on the effect of these winds combined with the floods on the level of the lake.

6. The only masonry work required on the proposed Canal is a Syphon duct for the passage of an inlet from the sea, which supplies water to the Salt Pans, the level of the inlet being 2 feet below that of the Ganjam river.

7. The Canal as shown in the plan, is to be carried in a direct line from the Lake to the river, and is to be cut to a depth of 3 feet below the level of the lowest water in the Lake, during the prevalence of the Southerly winds when, as observed in para. 8, during spring tides, the high water at Rumbah is 1¼ feet below the level at the outlet to the sea, which is at the northern end of the Lake.

8. The District Engineer does not consider that any Lock is required at present, so that the Canal will be essentially a tidal one. Its width at sole is to be 4 yards with side slopes of 2 to 1 giving an average top width of 8 yards. The soil is likely to stand without any artificial support, and the Canal is sufficiently far from the coast, not to be affected, it is supposed, by the sand-drifts, but Palmyra trees will eventually be planted along its banks.

9. As a comparison of the cost of land and water carriage the following rates are given.

One bandy carrying 6 bags of rice or 984 ℔s from Rumbah to Ganjam 9 miles costs 9 annas.

Comparative table from the above.

		Boats.			Bandies.		
One 1st Class boat carrying 20 bandy loads, costs.....	Rupees	5	0	0	11	4	0
One 2nd Class boat carrying 12 bandy loads, costs.....	„	3	0	0	6	12	0
One 3rd Class do. carrying 4 do. do. costs.....	„	1	0	0	2	4	0

The result is that the cost of the water carriage is upwards of 100 ℔ cent less than that of the land.

10. The daily traffic between Rumbah and Ganjam is given at 530 bandies 400 laden bullocks and 1424 Travellers and Cavady coolies.

11. In his letter No. 415 dated 21st November 1856, the Acting Collector of Ganjam gives his full support to the project, observing that the Canal will be the means of promoting the commercial prosperity, not only of the Ganjam District, but of the Bengal Districts bordering on the Chilka Lake from which large cargoes of grain are sent down to Ganjam for export.

12. That increased facilities of inland transport will lead to more extended cultivation and the consequent influx of a larger quantity of grain to the export market there is but little doubt, and a very important result to be expected is, that as competition increases, a corresponding fall will take place in the price of grain, the greatest blessing that could be conferred on the poorer classes.

13. The Acting Collector does not coincide with the District Engineer's views as to the importance of the Salt trade, but that is merely a difference of opinion, and not a question in any way affecting the value of the project, which in every point of view is a very desirable one, and the estimate being framed on moderate and sufficient data, is warmly recommended by the Chief Engineer for entry in the Budget of 1857-58.

Letter from Major W. BIRDWOOD, Civil Engineer, 9th Division; to Colonel C. E. FABER, Chief Engineer, dated Camp at Chicacole, 18th November 1856, No. 1063.

SIR,

1 Letter.
2 Line of Levels.
3 Plan of Chilka Lake.
4 Plan of Syphon Sluice.
5 Estimate in detail.
6 Abstract estimate.

I have the honor to forward an estimate amounting to Rupees (21,780) twenty-one thousand, seven hundred and eighty, for the excavation of a navigable Canal for the purpose of connecting the Chilka Lake, with the Port of Ganjam in the Ganjam District.

2. The exports at the Port of Ganjam, are annually increasing, and a work which will bring that Port, in closer, easier, and cheaper, communication with the different parts of the country, whence it derives its supplies chiefly, and to which, there is every reason to expect a large quantity of Salt will be taken from the Pans at Ganjam as return loads, as also other commodities, cannot be otherwise than of the greatest benefit to all parties.

3. Rumbha, the chief Port on the Chilka, is a small village, near the Southern extremity, and the principal place of landing (though bad) for all goods, seeking a market in the Ganjam District, from the North, and West, thence transported at a very high rate by Bandies, to Ganjam and Munsoorcottah.

4. Of late years the demand for Rice and Oil Seeds in Europe, has led to an increased cultivation in Orissa, as elsewhere; and as there is neither a good road from Cuttack, to the coast or a Port, for the exportation of grain, &c., the produce finds its way from Cuttack and Pooree, by water to Rumbha, on an average about 50 tons daily.

5. With this communication open, the Port of Ganjam will have the full advantage of water carriage, from all parts of the Lake at a very cheap rate, and I trust, the sale of Salt will be inconsequence, considerably increased as no doubt it meet with, a ready sale at Rumbah, and other inland parts of the Lake, for transportation to the North, and westward, considering too, that the Salt manufactured at Ganjam is of a far Superior quality to that obtained in Orissa, as also cheaper, owing to the cost of manufacture.

6. Eventually, I trust the communication will be extended from the Port of Ganjam, by a Canal, to the Port of Munsoorcottah, by the Chetterpore backwater.

7. With the northerly winds, that prevail about the end of the year, and continue till the end of February, the Traffic laden Boats will with the greatest ease, make their way down the Canal to Ganjam, from Rumbah, and other parts of the Lake.

8. At this period the Level of the Lake is raised considerably by the floods, and prevailing Northerly winds, so much so, that the rise of Tide, which at the springs at other seasons of the year is about $1\frac{3}{4}$ feet, is now $4\frac{3}{4}$ feet above low water which continues so, till about the middle

of February, when the Northerly winds relax in their strength, and the Southerly winds, begin to set in, and blow with considerable violence for several months, which no doubt together with the outlet of the Lake to the Sea, being at the Northern extremity, not direct, or free of obstruction, is the chief cause of the great reduction of the Level, at the Southern extremity of the Lake during the hot months as long before the supply could reach the South the Tide would have turned, there being a difference of level between High water at the outlet and Rumbah of $1\frac{1}{4}$ feet at the springs.

9. The line selected is, almost a continued Flat from the Southern extremity, near "Pryaghee" a village, on the Bengal Frontier, and with cultivation, during the Monsoon months, indeed dependant entirely, on the local Rains, and intersected only by one channel viz. a Salt water Inlet for the supply of the Salt Pans, and exhibiting a difference of Level, at Low water of 2 feet the Ganjam river being the higher of the two a "Syphon Duct" will be built here. The proposed Canal, will be cut to a depth of 3 feet below low water in the Chilka, at its lowest level, when under the influence of the Southerly winds and, when too, there will be a sufficient depth of water, for Passenger and Traffic laden Boats.

10. I have not provided any Locks, as I do not consider such necessary at present. The Tide at its flux and reflux will act slightly as a scour, finding too its way nearly the whole distance, as it will, from river to Lake as will also the land drainage during the Monsoon assist as a scour.

11. The section allowed for the cutting gives a bottom width of 4 yards, with side slopes of 1 to 2, and an average width at top of 8 yards; the Canal will be so far from the Coast though as direct as possible, that it will not, I imagine be affected by sand drifts, but I propose hereafter planting Palmyra trees along the banks. The soil through which the line will be cut, is not of the stiffest yet not requiring, I trust any puddling.

12. As an instance, of the saving of labour, and cost in transit, that would be effected, by such a work, I would beg to adduce the following particulars, obtained during the time I was at Rumbah.

13. The hire of a Bandy, carrying 6 Bags of Rice of 164 lbs. each, from Rumbah to Ganjam, a distance of 9 miles, is annas 9 and from Rumbah to Gopalpore Rupees 1 annas 4.

14. On the Lake there are *three* classes of Boats, one carrying 20 Bandy loads measuring 37 feet in length by 6 feet in depth and drawing $4\frac{1}{2}$ feet of water when loaded; the second 34 feet in length by $4\frac{1}{2}$ feet in depth, carrying 12 Bandy loads and drawing $3\frac{3}{4}$ feet of water; and the third 24 feet long by 3′ 6″ deep, drawing about 2 feet of water when loaded.

15. The hire of the first size carrying 20 cart loads, from Rumbah to Ganjam, being 5 Rupees the second, 12 Bandy loads = 3 Rupees the third 4 Bandy loads = 1 Rupee while the Cart hire for

	Rs.	A.	P.
20 Bandies	11	4	0
12 do.	6	12	0
4 do.	2	4	0

effecting a saving in the rates in favour of water transit.

in the 1st of	6	4	0
2nd of	5	0	0
3rd of	1	4	0

16. This was obtained from the best information at Rumbah with regard to the cost of Bandy hire I am certain, but I imagine that the Boat hire given was, very much higher than would be charged I annex a Statement shewing the amount of exports at Ganjam.

17. The daily average number of Carts passing between Rumbah and Ganjam may be estimated at 530.

Travellers and Cowry Coolies...	1424
Laden Bullocks	400

18. As the Acting Collector, to whom this Project must be referred, is at Kimedy, there may be some delay in its reaching you, prior to the 30th November, but I beg, as this is the first work of this description, for the Ganjam District, you will be pleased to receive it for entry in the Budget of 1857-58.

Letter from WILLIAM KNOX, Esq., Acting Collector of Ganjam ; to Colonel C. E. FABER, Chief Engineer, dated Kimedy, 21st November 1856, No. 415.

SIR,

I have the honor to transmit the accompanying letter from the Civil Engineer No. 1063, dated 18th Instant with Plans and estimates for a navigable Canal connecting the Chilka Lake with the Ganjam port.

2. The proposed Canal would I feel sure be the means of promoting the commercial prosperity not of this district only but of the Bengal Districts bordering on the Chilka, as it is, boats now come down the rivers that feed the Chilka for many months with cargoes of grain, and if these could be delivered without unloading at the port of the shipment of course the gain to all parties would be proportionally great. It is by the share that would fall to the merchants that this District would chiefly profit ; but the district has a large debt of gratitude to the merchant. It is by his expenditure that the price of grain is now nearly double, and every facility that can be given him to meet the fall in prices which will I fear ensue from increased cultivation, competition in other Districts and decrease in the want for Home consumption is I think money well laid out. Were there men and money at command, I would most strongly urge on you the execution of a far larger scheme. I would propose to make Munsoorcotta the part of the North of this District and have a Canal from near Poondy to the Chilka, this with small tolls would I conceive pay a fair interest on the expenditure.

3. I am afraid however Major Birdwood has given more importance to the Salt trade than will be found correct ; our export trade is chiefly to Behar and Nagpore through the hills, and I believe the Natives of Cuttack prefer the Salt made by boiling to that by evaporation as it is cleaner, if not so well adopted for carriage, but the trade may be opened and a taste for our Salt acquired and even without this there seems to me ample grounds on which to recommend this measure.

4. The estimate for the purchase of the land is I consider quite enough. It will probably be necessary to put act No. XX of 1852 in force, as the Canal will be looked on with disfavor by the Beredy Rajah to whom the boats loading at Pumba still I believe pay a Toll, though such is not a recognized impost.

No. 24. Report DDDDD, on an estimate prepared by the District Engineer of Ganjam, for constructing a District road from Jurgunghy near Bomally on Trunk road No. 6 to Juggernantpoorum on the road from Chicacole to Palcondah a distance of 22½ miles nearly.

				Rs.	A.	P.
The estimate provides for 1,59,435 cubic yards earth work @ 6 pice.				4,982	5	8
5773	Metalling 3½ yards wide and 4 inches thick @ 5 Annas			1,804	1	7
15,599	Gravelling 4 yards wide and 3 inches thick @ 4 Annas			3,899	15	0
60,980	square yards Turfing 2 Pice per square yard			635	3	4
2,46,360	Clearing jungle at ₹ 1000 square yards Rupees 4			985	7	0
1	Wooden bridge of 4 Bays of 10 feet span			600	0	0
2	Do.	do.	of 3 Bays of 12 feet span each Rupees 625	1,250	0	0
4	Do.	do.	of 3 Bays of 12 feet span each Rupees 730	2,920	0	0
8	Do.	do.	of 1 Bay of 12 feet span each Rupees 300	2,400	0	0

				Rs.	A.	P.
17 Tunnels varying in size from 1 Vent of 3 feet to 1 Vent of 6 feet span				2,150	0	0
Superintendence and sundries				622	15	5
Compensation for Enam and Zemindary lands ...				3,150	0	0
			Total Rupees...	25,400	0	0

twenty-five thousand and four hundred.

1. This road is a continuation of the line from the Nowpada Salt Pans to Bomally (the estimate for which Rupees (10,640) ten thousand, six hundred and forty, formed the subject of the Chief Engineer's Report No. 8662, dated this date and will complete the communication* to Parvatipoor, from whence the pass into the Jeypore country is perfectly practicable for loaded bullocks, a considerable traffic being already carried on along it principally by Brinjarries, from the Nagpore and Jeypore countries, who resort to Nowpada for the purchase of Salt.

* The portion of road from Juggernautpoorum to Parvatipoor is nearly completed.

2. The number of Brinjarries with their bullocks is given by the District Engineer at 91,000, and the average Revenue realized by the sale of the Salt at Rupees 2,31,600.

3. The construction of the proposed road which will pass through the town of Jullmore and the large villages of Boodethy and Nagaricutticum, is strongly advocated by the Acting Collector of Ganjam in the accompanying letter No. 413 dated 21st November 1856, and the estimate which has been framed on moderate and sufficient data is recommended by the Chief Engineer for entry in the Budget of 1857-58.

Letter from Major W. BIRDWOOD, Civil Engineer 9th Division ; to Colonel C. E. FABER, Chief Engineer, dated Camp Chicacole, 18th November 1856, No. 1051.

SIR,

I have the honor to forward a Survey and Estimate, amounting to twenty-five thousand, and four hundred Rupees (25,400) for the formation of a District road, from "Jurgenghy" near Bomally on Trunk road No. 6, to Juggerhatpooram, near Palcondah, on the Branch road from Chicacole to Palcondah, in the Wadadah Talook Ganjam District.

2 Surveys.
1 Road Estimate.
1 Masonry do.
1 do. Plan.
1 Abstract.

* Separate packet.

This line is a continuation of the one lately proposed for this years Budget, from Nowpada Salt Pans to Bomally, and is urgently required with the view to connecting the former place with Paroitapoor, on the line from Palcondah to the Jeypoor country, the direct route for Brinjarries from Nagpoor and Jeypoor, resorting to the Nowpada Salt Pans for the purchase of Salt, the Revenue of which realized amounts to on an average of Rupees 2,31,600.

From Juggernatpooram there is a line of road approaching completion as far as Parditapoor.

The proposed line will pass through the Town of Jullmoor, with the large villages of Boodethy and Negaricuttiam. The breadth of road-way allowed is 5 yards in earth work, 3½ yards metalling 4 inches thick, and 4 yards gravel 3 inches thick.

It will cross four large Irrigation Channels taken off from the Vumshadara river viz.

Jullamoor Dasey Gedda.
Prosutpoor do. do.
Thul Pillay do. do.
Basoondy do. do.

these will be spanned with wooden Bridges, on Piers of rough stone in chunam.

The Brinjarries resorting to the Salt Pans amounting with Bullocks 91,000 in number. Trusting this will meet with your approval, I have to request its insertion in the Budget for 1857-58.

Letter from WILLIAM KNOX, Esq., Acting Collector of Ganjam; to Colonel C. E. FABER, Chief Engineer; dated Kimedy, 21st November 1856, No. 413.

SIR,

I have the honor to forward the Plans and estimates of a road from Surenghy near Bomally to Juggernatpoorum near Palcondah with Major Birdwood's letter of 18th Instant No. 1051, I look on this road as one rendered most necessary by the late alterations in the Salt Department; up to this time the Brinjarries resorting to Parvatipoor have drawn their supplies from the Vizagapatam Pans, the salt was carried to Parvatipoor by low country traders and sold there to the Brinjaries, now I believe the district will hardly be able to supply its own wants and the Collector has applied to be allowed to keep up all the old Pans, if this sanction is not given him, the Salt for Parvatipoor must be obtained from Nowpada, the importance of this line therefore is most apparent, but allowing that Vizag produces as much as ever, the Nowpada Salt bears carriage better than any other in this part of the country and with a good bandy road to Parvatipoor would be so cheaply laid down there that it would be the favorite Salt of the export market and the other Salt will be used for home consumption; as a district road too, this line will be of very much use and help to feed the Port of Calingapatam. I have already alluded to the portion from Bomally to the pans. For these reasons and those adduced by Major Birdwoord, I beg leave to recommend the insertion of these two projects in the Budget.

No. 25. Read the following letter from Colonel C. E. FABER, Chief Engineer; to H. FORBES, Esq., Acting Secretary to Government, dated 23rd March 1857, No. 11178.

SIR,

I have the honor to forward with the letters noted in the margin,* a Plan and estimate of Rupees (350) three hundred and fifty, prepared by Lieutenant Palmer, Executive Engineer, for constructing a Platform bridge across the surplus channel of the Wadada Dasee Gedda, near the village of Doosee, in the Ganjam District.

* From Lieutenant Harington's letter No. 226, dated 26th February 1857. From the Acting Collector of Ganjam letter No. 91, dated 4th March 1857. with
1 Report.
1 Abstract Estimate.
1 Plan.

2. Lieutenant Harington states, that the surplus channel which is impassable in the height of the monsoon, and has nearly always water in it, crosses a much frequented District road, leading from the Zemindary of Bobilly through a rich tract of paddy cultivation, via the large and flourishing villages of Thogaram, Kulliveram, and Doosee to Chicacole.

3. The average daily traffic crossing the channel at the site of the proposed bridge, is given at 20 bandies, 199 animals, and 651 people.

4. The Collector approves of the work, stating that the Wadada Dasee Gedda supplies water to lands yielding an annual Cist of Rupees 18,768, to Government.

5. The accompanying report contains all particulars of the proposed bridge, and the estimate being framed on moderate, and sufficient data, I beg to recommend the same for entry in the Budget of 1858-59.

Letter from Lieutenant E. H. HARINGTON, Executive Engineer in charge Ganjam District; to Colonel C. E. FABER, Chief Engineer, dated Camp at Aska, 26th February 1857, No. 226.

SIR,

1. I have the honor to forward an estimate framed by Lieutenant Palmer, Executive Engineer, for construction of a Platform Bridge over the Surplus channel of the Wadada Dasee Gedda, near the Village of Doosee.

2. This Surplus channel in which there is nearly always water, crosses a much frequented District Road, leading from the rich Bobille Zemindary, via the large and flourishing villages of Thogaram, Kulliveram, and Doosee, to Chicacole. These Villages are in the midst of rich

Paddy Cultivation, and also send for exportation great quantities of Oil Seed, &c. A simple Bridge would be a valuable benefit to the numerous passengers, and coolies, who cross it. Chicacole draws from these villages large supplies of all kinds, Straw, &c. &c. For months together, there is water between 4 and 5 feet deep, and I have seen numbers of Coolies, and women with loads, and Children, struggling through it, on Chicacole fair days, in cold weather. In the height of the Monsoon, it is impassable. I therefore trust the estimate may be sanctioned.

3. Lieutenant Palmer reports from Returns lately taken a daily average of 20 Bandies, 199 animals, and 651 people, as crossing the channel.

4. The accompanying papers are forwarded.

1 Plan.
1 Estimate in detail.
1 do. in Abstract.
1 Report on the Project.

Letter from W. KNOX, Esq., Acting Collector of Ganjam; to Colonel C. E. FABER, Chief Engineer, dated Ruggoonadapoor, 4th March 1857, No. 91.

SIR,

I have the honor to transmit the accompanying letter Plan and estimate from Lieutenant Harington the Executive Engineer in charge of the District for building a Platform bridge over the surplus channel of the Wadada Dasee Gedda.

2. As Lieutenant Harington has explained fully the necessity of constructing this bridge I have nothing further to add then that the Wadada Dasee Gedda supplies water to lands yeilding an annual Cist of Rupees 18,768 to Government and for the convenience of the payers and the public. I beg to support Lieutenant Harington's application requesting sanction for the amount viz. Rupees 340 estimated for the work.

Report on an estimate far a Wooden bridge.

1. Estimate of Rupees (340) three hundred and forty for constructing a Wooden bridge of 3 bays of 10 feet span across the Wadada surplus channel on the road from Doosee to Chicacole.

2. The channel's bed is of clay and has only a slight fall per mile.

3. The foundations of the bridge are to be of brick in chunam, 4 feet deep.

4. The cutwaters of the piers need not be connected.

5. The piers are to be 2 feet thick and the abutments 2 feet, raised to a uniform height of 11 feet, there is no force of flood to be apprehended, the bridge will provide 330 square feet of water way, the section of the channel when quite full being 340 square feet.

6. The superstructure of the bridge is, abutments piers &c. Brick in Chunam, and a Wooden Platform.

7. The parapet is to be of hand rails of wooden posts, and the roadway over the bridge is to be mede horizontal, as well as approaches to it, over the bays its clear width between parapets will be 9 feet and between wing walls 10½ feet.

Civil Engineer's office, GanjamDistrict, Camp at Aska, 26th February 1857.

(Signed) E. H. HARINGTON, Lieutenant,
Executive Engineer in charge of Ganjam District.

Read the following Reports from Colonel C. E. FABER, Chief Engineer; to H. FORBES, Esq., Acting Secretary to Government, dated 6th December 1856, No. 8662.

No. 26. Report J, on an estimate prepared by the District Engineer of Rajahmundry for continuing the Embankments of the Yennamadooroo Channel to Doovah. Amount of Estimate Rupees (7,500) seven thousand and five hundred.

1. The village of Pipunoor having suffered a good deal this year, from heavy local rains, and the floods of the Yerra Calwa, it is found necessary to extend the embankments of the Yennamadooroo channel, one of the great drainage cuts, lately made to carry off the floods discharged from the Yerra Calwa, over the Doovah Calingulah.

2. The District Engineer in para. 4 of his letter No. 644 dated 25th October 1856, notes that Colonel Cotton's scheme in order to save excavation, was to carry off on the surface of the country, between Embankments, a large portion of the drainage from the higher lands. The immense body of water however, discharged over the Doovah Calungulah, rises above the banks of the Yennamadooroo escape channel and spreading over the country floods a good deal of valuable land. It becomes necessary therefore to extend the embankments for the purpose, of composing the drainage waters. The District Engineer points out that the localities will be carried off by a tunnel under the Oondee Channel into the Weyairoo.

3. The rates allowed for constructing the Embankments is moderate and sufficient, and the Chief Engineer recommends the estimate for entry in the Budget of 1857-58, as a work essential to the completion of the Irrigation system of the District.

Letter from Captain F. H. RUNDALL, District Engineer Godavery Division; to Colonel C. E. FABER, Chief Engineer, dated Camp at Dowlaishwaram, 25th October 1856, No. 644.

SIR,

Plans and estimates despatched by todays Banghy.

I have the honor to forward for submission in the Budget of 1857-58 the following estimate.

Rajahmundry District estimate No. 6 amounting to Rupees 4,080.

An estimate for Irrigation channels in the Western Delta.

2nd. This estimate is for 2 channels to be excavated from the Oondee channel for the purpose of watering the country lying between the Yennamodooroo and Bondada Drainage channels and comprising an area of 12,500 acres. Hitherto this portion has been watered by a bund being thrown annually across the Yennamodooroo drainage channel and so raising the water to the requisite level. This however has only been a temporary expedient in order that the villages which had, previous to the construction of the Annicut, been watered from the Gosta Nuddee should not be cut off entirely from their supply. Throwing a bund across a drainage channel is of course wrong in principle, as it obstructs the free flow of the water, and proves injurious to the villages alone by holding back the water which would otherwise be carried off. The proper way to water the lands in question is from the Oondee channel. The accompanying Surveys shew the localities in question.

3rd. The return from the country irrigated will be proportion to the water rate levied which if only at 1½ Rupees per acre will be Rupees 18,750.

Estimate No. 7 amounting to Rupees 7,500.

An estimate for continuing the embaukments of the Yennamadooroo channal to Doovah.

4th. The Yennamodooroo channel as it is called, is one of the great drainage cuts lately made to carry off the floods which are brought down the Yerra Calwa and discharged over the Doovah Calingulah Colonel Cottons scheme was, in order to save excavation to carry off a large portion of the drainage from the higher lands between embankments above the surface of the country. The embankments of this channel require to be commenced higher up than at present,

as the immense body of water discharged over the Doovah Calingulah rises above the banks of the escape channel and spreads over the surface of the country and swamps a good deal of valuable land, the village of Pippunoo has this year suffered a good deal, as in addition to the floods of the Yerra Calwa, the local rains have been extremely heavy. By the construction of the proposed embankments, the former will be confined, while the latter will be conveyed by a tunnel under the Oondee channel into the Weyairoo.

Estimate No. 8 amounting to Rupees 1,150.

An estimate for constructing a foot Bridge over the Doovah Calingulah.

5th. This is a very necessary work from want of which it has hitherto been impossible to work the shutters during the period when the Yerra Calwa is in full flood. The Doovah Calingulah is the principal means of escape for this river, and as it rises very suddenly it is of importance that the shutters should be capable of being handled rapidly. It is now impossible to take them out after the river has risen, as the rush of water is too great to allow of a man standing on the work. The Bridge is estimated to be constructed of Teak as being the most durable material.

Estimate No. 9 amounting to Rupees 3,170.

An estimate for excavating 2 Drainage channels in the Eastern Delta.

6th. This estimate is for excavating 2 Drainage channels in the Eastern Delta, viz., a Main Drain from near the village of Bicavole to the river Yalairoo, and another for discharging the surplus water from the Gollapaulem Calingulah into the Main Drain.

7th. The first of these works is intended for the relief of a tract of country comprising about 18 square miles, situated between the Samulcottah Canal and the ridge which separates it from the Cocanada Canal.

8th. This part of the country is every year submerged for months at a time, and therefore rendered unfit for cultivation. By cutting a drainage channel so as to discharge the accumulated waters into the river Yalairoo, this land may be redeemed and as it is commanded by both the Samulcotta and Cocanada Canals, it will receive irrigation from them when needed. Part of the water by which this tract is flooded is the surplus drainage carried over the Calingulah constructed in the bank of the Samulcottah channel near Yattapalem, and which has hitherto been allowed to find its own way to the Yalairoo. By excavating a direct channel from the Calingulah to the main drain, the water will be carried of rapidly to the river which disembogues at Cocanada, and by the combination of these two channels, it is hoped that about 9000 acres will be effectually drained, out of which 4,500 have hitherto not been cultivated, and will yield eventually 5 Rupees per acre.

9th. I have consulted the Collector personally on all these works and he expressed his entire approval of them.

No. 27. Report K, on an estimate prepared by the District Engineer of Rajahmundry for constructing a foot bridge over the Doovah Calingulah.

Amount of estimate Rupees (1,150) eleven hundred and fifty.

1. The Doovah Calingulah is the principal means of escape for the floods in the Yerra Calwa. This river rises very suddenly, and it is essential that every facility should be afforded for working the shutters readily. This at present is not the case, and the District Engineer in para. 5 of his letter No. 644, dated 25th October 1856, states that it is impossible to remove the shutters, when the river has once risen, the rush of water being too great to allow of a man standing on the work.

Letter from District Engineer Godavery Division, dated 25th October 1856, No. 644, Vide letter.

2. The bridge is to be constructed of Teak Timber, and as shewn in the accompanying Plan, and the estimate being prepared on moderate and sufficient data, is recommended by the by the Chief Engineer for entry in the Budget of 1857-58, the proposed work having the support of the Collector Mr. Purvis.

No. 28. Report O, upon an estimate for constructing one Lock and two aqueducts in the Nagaram Talook.

Amount of estimate Rupees (13,610) thirteen thousand, six hundred and ten, as follows :—

Constructing Lock on the plan of the one proposed to be built at Wadapalum

		Rupees
in the Eastern bank channel	... ...	4,010
Do. Calingulah do.	do.	1,670
Do. Aqueduct at Cuddaly ...	... ...	4,720
Do. do. at Chintlapilly ...	... ...	3,210
Total estimate Rupees...		13,610

1. The object of the Lock as stated in para. 21 of the District Engineer Captain Rundall's letter No. 622 dated 18th October 1856, is by diminishing the fall over the Gunnarum aqueduct, to admit of the boats navigating with greater safety, the branch channel from the Nuggarum Talook to the rest of the Delta, and to avoid the necessity which at present exists of all produce being taken out of the boats on reaching the aqueduct, and re-loaded on the other side. It is observed that 100 square miles of country is under the influence of this channel.

2. The proposed aqueducts are required for carrying the Kuddaly channel water across the channels, which have been cut through the sand ridges, in order to draw the two lands which lie between them, and in which the most abudant crops are always produced.

3 These works in common with others of importance, connected with the Godavery navigation scheme, are recommended by the Chief Engineer. The data on which the estimate for entry in the Budget has been framed being moderate and sufficient.

Letter from Captain F. H. RUNDALL, District Engineer Godavery Division; to Colonel C. E. FABER, Chief Engineer, dated Camp at Dowlaishwarum, 18th October 1856, No 622.

SIR,

I have the honor to forward the accompanying Plans and estimate of works for submission in the Budget of 1857-58.

RAJAHMUNDRY DISTRICT.

Navigation.

Estimate No. 1 *amounting to Rupees* 63,880.

Plans and estimates despatched by Banghy on the 19th October 1856.

An estimate for cutting a channel from near the Hospital at Dowlaishwaram to meet the Cocanada Canal near the point where it branches off from the Main Canal.

2nd. This estimate was submitted by me last year, but returned together with your Proceedings of the 27th June last, No. 4404 for the purpose of furnishing plans of bridges which had been omitted.

3rd. The estimates have been revised, and now amounts to Rupees 63,880 as I have made certain alterations in the dimensions of the bridges reducing the space from 48 to 36 feet and have also removed the cut stone floor from the Lock.

4th. The reasons for this work, as explained in my previous letter, arises from the necessity of obviating the danger now experienced during the Freshes in approaching the present Lock, near the Head sluices, occasioned by the strong current towards the annicut tending to draw all boats in that direction. The present Lock moreover is only 100 feet long, and not in unison with the Head lock at Vezaiswaram, and those in course of erection on the Coast Canal the continuation of which will be carried along the high level channels branching from the Main Canals of the Godavery and Kistna.

5th. The first few hundred yards of the new channel will be through very hard soil, the remainder through the alluvial soil of the Delta.

6th. At 370 yards from its head it crosses the main road from Dowlaishwarum to Rajahmundry, and at 190 yards further the main road to the country eastward, at these two large thoroughfares therefore bridges will be required, as both of these require to be of exactly the same dimensions I have forwarded only one plan. The difference in the estimate arising simply from the addition of the landing steps attached to the bridge on the main road which I have added both as a convenience to the Public, and a protection to the sides of the channel from the constant tread of people, who will embark and disembark at that place, in preference to the present spot below the Head sluices.

7th. Another reason for this work is that there is a Canal with an open Head which was excavated to the quarry, and which Messrs. Arbuthnot and Co., continued at considerable expense as far as their factory, across this the river embankment has to be thrown annually upon the rising of the river, and to be removed again after the Freshes, causing an expense of about Rupees 1,000 or about 1½ Rupees per cent on the proposed outlay. The embankment is up for about 4 months of the year, by which means the factory is deprived of the use of their Canal. This will be obviated by the construction of the proposed Lock.

8th. For the other small roads which the Canal crosses I have estimated only for wooden bridges one plan for both of which is also submitted.

9th. A direct return from this expenditure cannot be looked for. Its intention is to obviate a danger which at present exists to boats navigating the River at a particular season, and to ensure an uniformity with the rest of the Locks on the Eastern Coast Canal. The annual outlay in the construction and re-construction of the river embankment will however be saved, and boats which now cannot ply at that season will be then able to do so and so yield a return by the payment of toll which would not otherwise be received.

Estimate No. 2 amounting to, For Lock 150 feet and Calingula Rupees.....12,430
Do. 100 feet and Calingula ,, ... 9,610

An estimate for constructing an additional Lock and Calingula in the Cocanada Canal near Thospoody.

10th. This estimate was likewise submitted for entry in the last Budget so much water is drawn off now in the summer season for 2nd crop, that comparatively a small quantity escapes over the 1st Calingula and consequently the water on the lower sill of the 1st Lock does not stand so high as it does where there is a large discharge.

11th. Boats are therefore unable to ply with more than half loads, and as the Traffic has assumed considerable importance it becomes necessary that the Canal should be so locked up as to keep at all times at least 3½ feet of water lower sill of each Lock.

12th. I at first proposed to make the Lock similar to the low. Lift Locks in other Canals but as the Cocanada Canal is one of such importance I have on re-consideration determined on making the Lock of the same permanent model as those of larger lift.

13th. Agreeably to the instructions conveyed in your letter of the 7th September 1855, the plan has been prepared to the dimension of 150 feets by 20, but as all the other Locks on the Canal are of small size it would seem scarcely necessary to build the intermediate one any larger, for when it becomes necessary to construct a double set of Locks the new ones can then be made according to the larger plans I however forward Plans and estimates for *both* sizes, so that you may select that which you most approve.

14th. This appears to be the appropriate plan to remark on Para. 10, of your Proceedings of the 27th June last in which you state that the estimate for the new Lock on the Cocanada Canal at Chintapilly should be reforwarded. In my letter of the 25th September 1855, I explained the reason why this Lock originally proposed by Lieutenant Haig would not be necessary, as the object of raising the water on the lower sell of the upper Lock would be better obtained at a much less cost by the construction of the proposed intermediate Lock, more especially as the present Lock at Chintapilly is in good working order.

15th. The Traffic on this Canal has now reached 7,866 Boats per annum or about 157,320 Tons.

16th. This work has become absolutely necessary as without it, it will not be possible to levy a toll on boats according to their full draft of water, and I would request permission to commence this work from the general funds at my disposal so as to have it finished before the supply of water falls short in the next hot season.

Estimate No. 3, amounting to Rupees 26,650.

An estimate for constructing Low Lift Locks and Calingulas in the Eastern bank and Amlapore Channels in the Central Delta.

17th. These estimates were also farwarded by me last year but returned for want of Plans which I now beg to submit. I have revised the Plans and estimates according to data lately prepared which I have found from experience to be nearer the mark than that on which the previous estimates were framed.

18th. The Locks are for the Amlapore Talook and required to be constructed at Wadapalum and Tawralunka in the Bank channel, and at Modakòoroo, Nuddapoodee an Summanesa on the Amalapore channel.

19th. They are for reducing the fall of the channel which is at present 13 inches to 6 inches per mile so as to render them available for Navigation and also to keep the water above the surface of the ground from Irrigation.

20th. No Traffic has as yet taken place on these Canals, on account of their not having been opened for Navigation. They will affect about 400 square miles of country. The only channel which has as yet been open in the Central Delta, has been the Western bank or Gunnaram channel which affects immediately about 200 square miles. The Traffic along this has amounted to 2,689 Boats or 53,780 tons per annum. The Traffic along the new lines of Canal from which these Locks are proposed will doubtless yield a similar result at once, and increase in the same rates with the Canals already open.

Estimate No. 4, amounting to Rupees 13,610.

An estimate for constructing 1 Lock and two acqueducts in the Naggaram talook.

21st. These estimates were likewise forwarded last year the Lock is required to diminish the fall over the Gunnarum aqueduct, so as to admit of boats navigating it more safely than they can at present do. This is the only way by which the Naggaram Talook can communicate with the rest of the Delta without transhipment at present all produce is taken out of the boats on reaching the aqueduct, and is then reloaded on the otherside. The construction of the Lock will obviate this difficulty.

22nd. The produce of 100 square miles of Country will be effected by this.

Estimate No. 5.

An estimate for continuing the Palcole Canal to the Oopootair and constructing a Lock at its extremity.

23rd. This work was originally entered in Lieutenant Haig's estimate for a Junction Canal across the delta, but as the sanction of that has been so long postponed. I would beg permission to forward this as a separate work, as the Palcole Canal will be completed by the end of the year, and by its junction with the Oopootair will connect the Town of Nursapore and Masulipatam.

24th. A long this line a great trade is kept up, though there are serious obstacles to traffic in the way of unbridged Tidal Creeks. The construction of the Lock will enable goods to be carried to within 15 miles of Masulipatam.

25th. No Returns of traffic have as yet been kept on that particular line but a brisk trade has for a long time been carried on between the two places.

26th By the construction of the Lock the Salt from the pans at Buntomilla will be carried to all the Country in the neighbourhood of Nursapore which as the Mogultoor cotaur has been discontinued will prove a source of much traffic. There is no doubt but that this line will yield as great if not greater Revenue than the other Canals which have already been reported on.

27th. Plan of the Lock and a sketch of the locality accompany this letter.

28th. In conclusion I beg to add that I have consulted personally with the Collector on the subject of each and all these works and that they meet with his full concurrence.

No. 29. Report XXX, on an estimate prepared by the District Engineer of Rajahmundry, for constructing an aqueduct over a drain, crossed by the Amalapore channel.

Amount of estimate Rupees (5,400) five thousand, and four hundred.

1. It has been found necessary to construct an aqueduct to admit of the drainage of some 20 square miles of country, passing under the channel excavated in the Central Delta, past the town of Amalapoore, instead of carrying it as the District Engineer* believes was originally intended by Lieutenant Haig, parallel to the channel, by cutting entirely through the ridge, which separates it from the next natural drainage.

* Vide Extract (para. 8) from letter No. 672, dated 10th November 1856.

2. This determination, the District Engineer came to, after a careful inspection of the locality, in Company with Captain Stoddard, considering it more advantageous to allow of the drainage passing by its old course into the Cousika channel, which is the main drain of the Central Delta.

3. The accompanying sketch shows the arrangement proposed, but as the project is connected with the general scheme of the Central Delta irrigation, no distinct remunerative return is attached to it.

4. The Collector has signified his approval of the work, and the rates allowed being moderate and sufficient, the Chief Engineer recommends the estimate for entry in the Budget of 1857-58.

Letter from Captain F. H. RUNDALL, District Engineer Godavery Division; to Colonel C. E. FABER, Chief Engineer, dated Camp at Dowlaishweram, 10th November 1856, No. 672.

SIR,

I have the honor to submit for entry in the Budget of 1857-58 the following Estimates.

Plans and Estimates despatched by banghy on the 10th November 1856.

Estimate No. 37, for constructing a Calingulah at the Breach of Byanee River commonly called Bundacuttoo amounting to Rupees 9,400-0-0.

2nd. This work is for restoring Irrigation to the Villages mentioned in the margin to which remission have been obliged to be granted for 3 years past to the extent of Rupees 2,034-0-0. In Extract Minutes Consultation No. 1227 of the 21st July 1856. Government desired immediate steps to be taken for putting this work in order and in the explanation which I submitted regarding its non execution hitherto, I pointed out that the project needed some further investigation, and a work of some careful construction although it is properly speaking only a repair of an existing work, yet as the amount involved is large and the Masonary work proposed an entirely new one, I have thought it would be more correct to submit the project for entry in the Budget but I would solicit permission for its immediate commencement, as any postponement into the working season will cause further loss of Revenue, and it is only during a few months in the year that the locality is sufficiently healthy to admit of laborers being congregated there.

Byanagoodem.
Billoomilly.
Pedda Kopelly.
Rajahmundrum.
Catavaram.
Kristempolem.

3rd. The history of the work appears to be as follows.

4th. The Byanee River taking its rise in the range of Hills skirting the Godavery, and drawing an area of about 59 square miles is one of the many feeders of the Yera Calwa, and its course must have originally been through the breach called the Parungala Gundi, across this there appears to have been an earthern embankment thrown called the Bundaguttoo for diverting the stream into the irrigating channel which originally was cut to a small section as far as the Sattiate Tank, shown in the sketch. The whole River being thus diverted, and no outlet for surplus waters in heavy floods having been provided, the consequence was, that with the great fall and large body of water thus poured into a small channel, the latter became greatly deepened and widened, while the surplus found vent at 3 places where there were hollows, and across which also, small earthen embankment had been thrown. On the occurrence of a higher flood than usual, the great breach called Parungula Gundi was formed and the Irrigating channel filled up with sand and deposit.

5th. To prevent a recurrence of these accidents, and to restore the channel, I propose building at the Breach a strong Masonry Calingala calculated to discharge the whole of an extraordinary flood in the River at a depth of 4 feet. The crest of the Calingula being 4 feet above the bed of the Irrigating channel will allow of a large body of water being carried to the Tanks before any can escape over it. Mountain Streams like these fed by the local Rivers run rapidly and for only a few hours at a time. It is therefore necessary to secure the water brought by them rapidly, a greater fall than usual is from the surface of the Calingala to the first Tank receiving a supply. The Zemindar who shares the benefit of this work shares also half the cost of the repairs. The total annual loss by remission to Government is Rupees 2034.

6th. By constructing this work not only will this amount be saved, but the benefits of it can be extended to other villages. The exact amount of this last I am not at present able to state as there has not been time to investigate more than the restorations of the work for the purposes it formerly served, the total cost of this being estimated at Rupees 7,420.

7th. The Tanks in the Upper Talooks of the Rajahmundry District are almost wholly unprovided with either Masonry escapes or Irrigation Sluices. In the estimate now submitted a few of the principal Tanks have been selected. These are works necessary to preserve the efficiency of the Tanks, and to diminish the risk of Breaches which now annually occur I have forwarded these ertimates for entry in the Budget not being quite certain whether although under the sum of Rupees 500 individually I am permitted to construct them under ordinary estimates, and would therefore solicit instructions on the subject the statements of land cultivated under each Tank have been obtained from the Collector's Department but I do not feel at all sure of their correctness and am of opinion that they are far under the mark in some instances.

Estimate No. 16 and from 18 to 26, 28, 31, 32, 33. 34, 35, 36, 38, 39, 40 and 41.

Constructing Calingulas and Sluices to various Tanks in the Upper Talooks of Rajahmundry District amounting to Rupees 39,540.

Estimate No. 29.

8th. This is a small work which has been subsequently found to be necessary in order to carry the drainage of 20 square miles under the channel excavated in the Central Delta past the town of Amlapore. Lieutenant Haig I believe originally intended to carry the drainage of the tract parallel to the Canal itself by excavating entirely through the ridge which separates this from the next natural drainage, but on inspecting the locality in company with Captain Stoddard, I have come to the conclusion that it will be more advantageous to convey this drainage water under the Amlapore channel in its old course into the Cowsika channel, which is the main drain of the Central Delta. The accompanying sketch shews the locality and the site of the proposed work. As it is not a distinct project but forms part of the whole system of irrigation of the Central Delta any distinct remunerative return cannot be attached to it.

Constructing an aqueduct over a drain crossed by the Amlapore channel amounting to Rupees 5,400.

9th. The propriety of these works I have already discussed with the Collector and obtained his assent thereto.

No. 30. Report HHHH, on an Estimate prepared by the District Engineer of Rajahmundry for constructing a road from Nursapore to Utteelee 16⅛ miles through a portion of the Godavery western Delta.

		Rs.	A.	P.
1	The estimate provides for,			
100,780½	cubic yards earth work @ pice 8 per cubic yard	4,199	3	0
16,692	Do. Sanding „ annas 4 Do.	4173	0	0
1	Wooden bridge 50 feet span	566	7	4
1	Masonry Do. of 1 arch of 24 feet span...	1,699	7	9
7	Tunnels of 10 feet span each Rupees 177-10-2	1,243	7	2
6	Do. of 6 feet span each Rupees 123 4-0	739	8	0
	Superintendence and sundries...	1,268	14	9
	Total Rupees.....	13,890	0	0

thirteen thousand eight hundred and ninety.

2. The District Engineer in para. 11 of his letter No. 680, dated 15th November 1856, states, that the Survey and estimate for this line of road were undertaken at the request of Mr. Robinson when Acting Sub Collector, and that they met with the entire approval of the Collector himself.

3. The immediate object of the road is to connect the town and seaport of Nursapore with the large markets at Veeravasarum, Utteelee, Ralingee &c.. and its want is severely felt, there being no Canals in that direction which lead immediately to Nursapore.

4. By forming the road to Utteelee, many of the principal Villages such as Veeravasarum Sroongavrotchem, and Ralingee will be connected, and from Utteelee, the communication to the Godavery at Vyaiswaram will be completed by the banks of the Utteelee Canal and Nelyaoor.

5. No return of the traffic along the intended line of road can be given, as at present all access to Nursapore from the country lying north and west of it, is completely cut off during several months in the year.

6. Sand only has been allowed in the estimate for conveying the road, as gravel would be too expensive, having to be brought from Dowlaishwarum, one large bridge is allowed for the Gostanuddee, but for crossing the swamp near Veeravasarum, Captain Rundall considers, that a Ferry boat will be the cheaper arrangement. From the choultry shown in the survey, the road follows the western bank of the Palcole Canal, which it crosses by a wooden bridge lately erected at Nursapore.

7. Sufficient reasons having been advanced to show the importance of constructing the road in question, the Chief Engineer, recommends the estimates, in which the rates allowed are moderate and sufficient, for entry in the budget of 1857-58.

Letter from Captain F. H. RUNDALL, District Engineer Godavery Division; to Colonel C. E. FABER, Chief Engineer, dated Camp at Dowlaishwarum, 5th November 1856, No. 680.

SIR,

I have the honor to submit the accompanying estimates for entry in the Budget of 1857-58.

2nd. This estimate forwarded with my letter of 18th October 1855, was rejected from the Budget of the present year on account of defective information, especially I am led to conclude from the non submission of a Plan for a bridge across the river near the village of Gokarum. I have since inspected the line myself between the villages of Kottapilly and Rajahmundry, between which the principal portion of work is required.

Plans and estimates despatched by todays Banghy.

No. In constructing a road from Lurkonda to Rajahmundry in the Rajahmundry District for Rupees 27,230.

3rd. From Kottapilly to Luckionda the work consists principally in the clearing of jungle. The survey is that of the existing track. It is impossible to lay down the line as it should be eventually marked out on account of the dense jungle on either side which has to be cleared away.

4th. The river across which a bridge of 3 arches of 24 feet span is provided is that which rises in the hills beyond Luckonda and drains an area of 84 square miles. At the site chosen for the bridge the river does not overflow its banks which are steep and well defined. The exact section is indicated on the Plan.

5th. The nullah for which a bridge of 2 arches of 30 feet span is provided, is a drainage channel which has to carry off water from 60 square miles of country. From the village of Boochempetta to the nullah the ground is high with a gradual slope to the banks, on the other side the country is low, and swampy for a distance of 2 miles at a time when heavy rains occur simultaneously with the freshes in the Godavery. The water at that time spreads over the swamp, but the actual discharge will be sufficiently provided for by the bridge allowed. Allowing a rain fall of 6 inches over an area of 30 square miles during the 24 hours will give a discharge of 625,000 cubic yards per hour for which a current of 9,500 yards per hour through the bridge will be sufficient.

5th. To prevent a recurrence of these accidents, and to restore the channel, I propose building at the Breach a strong Masonry Calingala calculated to discharge the whole of an extraordinary flood in the River at a depth of 4 feet. The crest of the Calingula being 4 feet above the bed of the Irrigating channel will allow of a large body of water being carried to the Tanks before any can escape over it. Mountain Streams like these fed by the local Rivers run rapidly and for only a few hours at a time. It is therefore necessary to secure the water brought by them rapidly, a greater fall than usual is from the surface of the Calingala to the first Tank receiving a supply. The Zemindar who shares the benefit of this work shares also half the cost of the repairs. The total annual loss by remission to Government is Rupees 2034.

6th. By constructing this work not only will this amount be saved, but the benefits of it can be extended to other villages. The exact amount of this last I am not at present able to state as there has not been time to investigate more than the restorations of the work for the purposes it formerly served, the total cost of this being estimated at Rupees 7,420.

7th. The Tanks in the Upper Talooks of the Rajahmundry District are almost wholly unprovided with either Masonry escapes or Irrigation Sluices. In the estimate now submitted a few of the principal Tanks have been selected. These are works necessary to preserve the efficiency of the Tanks, and to diminish the risk of Breaches which now annually occur I have forwarded these ertimates for entry in the Budget not being quite certain whether although under the sum of Rupees 500 individually I am permitted to construct them under ordinary estimates, and would therefore solicit instructions on the subject the statements of land cultivated under each Tank have been obtained from the Collector's Department but I do not feel at all sure of their correctness and am of opinion that they are far under the mark in some instances.

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5th. The nullah for which a bridge of 2 arches of 30 feet span is provided, is a drainage channel which has to carry off water from 60 square miles of country. From the village of Boochempetta to the nullah the ground is high with a gradual slope to the banks, on the other side the country is low, and swampy for a distance of 2 miles at a time when heavy rains occur simultaneously with the freshes in the Godavery. The water at that time spreads over the swamp, but the actual discharge will be sufficiently provided for by the bridge allowed. Allowing a rain fall of 6 inches over an area of 30 square miles during the 24 hours will give a discharge of 625,000 cubic yards per hour for which a current of 9,500 yards per hour through the bridge will be sufficient.

6th. The Jellee Calwa for which a bridge of one arch of 24 feet span is allowed is only an artificial drain cut to relieve the fields of Kolaymurroo. The water never rises higher in this drain, than is shewn; and is then 3 feet below the banks.

7th. The general character of the ground through which the line passes is good, the only low portion being that between Kapavarum and Boochempetta. This it is not possible to avoid.

8th. The construction of the river embankment from Rajahmundry to the Hills will greatly relieve this plain from inundation the estimate for it is forwarded with a separate letter.

9th. The traffic as stated in my letter of the 18th October 1855, amounts to about 20,000 Bullocks as far as can be ascertained. The opening of the country between the Trunk road and Hills is much needed at present during the rains Rajahmundry is inaccessible to carts and beasts of burden even. The only way of reaching it being round by the village of Gundapillee which is 6 miles from Rajanaggrum thus making the distance between Kapawuram and Rajahmundry 24 miles instead of 12. Even at the present time my bandies had to travel that distance and it was with difficulty that I could make my way across the swamp through the cultivated lands.

10th. The other estimate from Kottapilly to Samulcottah. I have not forwarded again, as it is not so urgently required, as by opening the road as far as Kapawarum traffic can with some little difficulty find its way to Samulcottah, at all events after reaching Rajahmundry it can be shipped on boats and be conveyed by the Canal.

No. For constructing a road from "Nursapore" to Uttelee through a portion of the western Delta, Rupees 13,890.

11th. This line has been surveyed and estimated for at the request of Mr. Robinson when he was Acting Sub Collector and entirely approved of by the Collector himself. At present Nursapore is perfectly inaccessible to the villages lying north and west of it. By forming the present road to Utteelee, many of the principal villages such as Veeravasarum. Sroongavrootchem, Ralingee and Utteelee will be connected, and from Utteelee the bank of the Utteelee Canal will form the continuation on to the Weyaroo, near Chittypett and thence to the banks of the Godavery at Vezaiswaraim.

12th. The immediate object of the road however is to connect the town and seaport of Nursapore with the large markets at Veervasarum, Utteelee, Ralingee &c. The present traffic along the line cannot be stated as it is utterly cut off during several months of the year, but its want is severely felt as there are no Canals in that direction which bad immediately to Nursapore itself. I have allowed for a covering of sand only. As gravel would have to be brought from Dowlaishwarum a long distance and be very expensive. I have allowed for one large bridge across the Gostanuddee but for crossing swamp near Veeravasarum, a Ferry boat will be the cheaper of the two. The road from the Choultry to Nursapore, follows the western bund of the Palcole Canal which it crosses at Nursapore, itself by a wooden bridge lately erected there.

13th. The road across the Delta from Samulcottah to Culdindy I have postponed as being perhaps less urgently required than that ftom Nursapore to Utteelee.

No. 31. Report ZZZZ, on an estimate prepared by the District Engineer of Rajahmundry for constructing an embankment to the river Godavery from the town of Rajahmundry to the Village of Seetanagarum.

The estimate provides for embankment.

	Rs.	A.	P.
2,90,950 Cubic yards Earthwork at 8 pice	12,122	14	8
Superintendence and sundries....	1,217	1	4
1 Sluice for the Toregedda channel.	2,570	0	0
1 do. for the Sellah Calwah	5,170	0	0
Total Rupees.....	21,080	0	0

twenty-one thousand, and eighty.

1. The construction of this embankment is urgently petitioned for by the people and recommended by the Collector for the protection of an area of some 70 square miles of land, of which a large portion about 5000 acres known as the "Capawaram Awah" instead of remaining as at present a swamp will be gradually brought under cultivation.

2. New sluices are provided for in the estimate for the drainage into the river of the tract of country from Rajahmundry to Seetanagarum river, which is separated by a ridge from the delta proper. These sluices are to be kept open as long as the river is low, but directly it begins to rise above the level of the adjacent country, they will be closed and kept so, until the freshes subside.

3. No return is given by the District Engineer of the probable revenue to be derived from bringing under cultivation the 5000 acres of land noticed, but the work being otherwise of essential importance as confining the river floods, the estimate in which the rates allowed are moderate and sufficient, is recommended by the Chief Engineer for entry in the Budget of 1857-58.

Letter from Captain F. H. RUNDALL, District Engineer Godavery Division; to Colonel C. E. FABER, Chief Engineer, dated Camp at Dowlaishwarum, 22nd November 1856, No. 696.

SIR,

I have the honor to submit the accompanying estimate for enty in the Budget of 1857-58.

Estimate No. 52, for constructing an embankment to the river Godavery from the Town of Rajahmundry to the village of Seetanagaram amounting to Rupees 21,080.

It was forwarded by me last year, and as then stated, is a work which was both urgently petitioned for by the people and recommended by the Collector. Hitherto there has been no embankment in this portion of the river except in one or two localities for short distances. An area of 70 square miles will however be protected by its erection and a large portion known by the name of the Capawaram Awah which his uncultivated from being swamped will by the exclusion of the river freshes be gradually brought under cultivation. The extent of this swamp must be about 5000 acres, though above the Head of the Delta proper, the margin of the river from Rajahmundry to Seetanagaram is still the highest level and the land falls in a direction at right angles to it, until it meet the fall of the country in the opposite direction. The Drainage of this tract of country owing to a ridge which separates it from the Delta proper is carried off into the river *above* Rajahmundry by means of two water courses, for which sluices have been provided in the estimate. These sluices will be open as long as the river is low, but directly it begins to rise above the level of the adjacent country, they will be closed until the fresh has subsided.

2nd. The estimate for the continuation of the river embankment below Nursapoor which accompanied this last year I have postponed, as not being so immediately required. I trust however the one now submitted may be admitted in the Budget list.

No. 32. Report AAAAA, on an estimate prepared by the District Engineer of Rajahmundry for repairing Trunk Road No. 6 from near Nullacherla to Toonee a distance of 81 miles.

	Rs.	As.	P.
The estimate provides for 89,483⅓ cubic yard Earth work at from 7 to 9 pice per cubic yard.....	3,626	2	9
133,110¼ cubic yard metalling at from 6 to 8 Annas per cubic yard.....	66,235	7	0
61,660 cubic yard gravelling at from 1 to 8 Annas per cubic yard.....	17,895	10	0
24 Tunnels of 6 feet span each Rupees 135.....	3,510	0	0
25 do. of 3 feet do. „ „ 88.....	2,200	0	0
Repairing Old Bridges.....	155	0	0
Superintendence and Sundries.....	6,077	12	3
Total Rupees	99,700	0	0

ninety-nine thousand, and seven hundred.

1. On the 12th December 1855 the above estimate together with a letter No. 575 dated 14th November 1855 from the District Engineer of Rajahmundry was forwarded to the Collector for an opinion as to the probability of an adequate return in benefit to the country from so considerable an outlay.

2. The District Engineer observes that the estimate was prepared at the urgent request of the Post Master General in consequence of the progress of the Tappal being much impeded, the state of the road being such that there is almost a total cessation of traffic on it during the rains, between the towns of Bezoarah and Toonee.

3. In para. 3 of his letter the District Engineer considers the reasons against, and in favor of executing the repairs, and arrives at the conclusion that the important object of keeping open a good communication between the intermediate towns on the line, and the different Hill Markets is sufficient in itself to justify the expenditure.

4. It will be observed that the principal objection raised against keeping up this portion of the road, is that the distant traffic of the country will eventually be carried by the Canal now being excavated from Bezoarah to Toonee and that an excellent road will or may be opened along its banks at a comparatively small expenditure.

5. To this objection the Collector of Rajahmundry in his letter No. 270 dated 21st November 1856, para. 4 replies.

"That when a Canal is open from Bezoarah to Toonee there can be no doubt that almost "all the traffic will be taken on it, but it seems very doubtful *when* such a Canal may be availa- "ble, and judging from past experience it will, even when the Canal is ready be some time "before, even a tolerable road is available along its banks."

6. The Collector concurs in the doubts expressed by the District Engineer, as to whether the new line proposed by Captain Best offers any advantages, noticing that the cost of constructing it would far exceed that necessary for putting the present road into a good state of repair.

7. Even, with the Canal to be completed eventually from Samulcottah to Toonee, the Collector considers with the District Engineer, that the proposed expenditure should be incurred, if only to connect the important towns of Rajahmundry, Juggarapetta, Yailaiswaram, and Toonee with each other, and the Hill tracts. Yailaiswaram it is observed is a few miles to the north of the road, but is the great entrepôt of trade with the hill villages.

8. After due consideration of the reasons advanced both by the Collector and District Engineer in support of the proposed expenditure, and of the present essential necessity for keeping open the Trunk line of communication between Madras and Calcutta. The Chief Engineer resolves to recommend the estimates, in which the rates allowed are moderate and sufficient, for entry in the Budget of 1857-58.

Letter from A. PURVIS, Esq., Collector of Rajahmundry; to Colonel C. E. FABER, Chief Engineer, dated Samulcotta, 21st November 1856, No. 270.

SIR,

I have the honor to acknowledge the receipt of the Extract from your Proceedings of the 12th December last forwarding an estimate amounting to Rupees 99,700 framed by the District Engineer for the repair of the High Northern road through this District, and calling for my opinion as to the probability of an adequate return in benefit to the country from the outlay.

2. There can be no doubt that the state of the road, especially during the rainy season, or nearly six months of the year, is in many parts such as to call for considerable repair, if it is, I may almost say, to continue to be made use of as a road at all. During the wet season it is, in parts, almost impassable, and as observed by the Civil Engineer the state of it has attracted the attention of the Post office authorities. The Post Master General only a short time since addressed me on the subject.

3. The District Engineer has in his letter, copy of which was forwarded with your Proceedings under reply, given the reasons which have hitherto been urged against the propriety of any large outlay on the line of road in question.

4. On these I would observe that when a Canal is open from Bezoarah to Toony there can be no doubt that almost all the traffic will be taken on it, but it seems very doubtful *when* such a Canal may be available, and, judging from part experience; it will, even when the Canal is ready, be some time before even a tolerable road is available along its banks.

5. I see reason to concur with Captain Rundall, in thinking it very doubtful for the reasons given by him whether the new line proposed by the late Captain Best is in any way to be preferred to the line of the present road; and the expence of construction would *far* exceed that necessary to put the present road into very good repair.

6. If however there is a probability of the Canal from Samulcotta to Toony being sanctioned and commenced upon without much further delay, it will mainly, as observed by Captain Rundall, be as a road, connecting the intermediate towns with each other and the hill tracts; that the repairs of the line under notice should be urged, and I concur with him in thinking, that, if this were the sole end to be secured, the advantages which will be derived there from are sufficient to justify the expenditure proposed. Rajahmundry, Juggumpitta, Yailaiswaram and Toony are all towns of considerable trade, and should under any circumstances have a good line of land communication between them. Yailaiswaram is a few miles to the north of the road, but is the great entrepot of trade with the hill villages.

7. I trust therefore that the estimate for the repairs of the road in question may receive sanction, and I beg at the same time strongly to support the recommendation of the District Engineer for a bridge over the Yailairoo at Yeravaram.

	Going North. Carts	Animals.	Going South. Carts	Animals.
Toony.....	9 ..	25	9 ..	25
Dhurwavaram....	6 ..	6	5 ..	8

8. In the margin I have given the *daily* average traffic, taking the first ten months of the present year. at Toony and Dhurmaveram, It is doubtless much greater near Rajahmundry.

9. The papers received are returned herewith.

Read the following Reports from Colonel C. E. FABER, Chief Engineer; to H. FORBES, Esq., Acting Secretary to Government, dated 17th December 1856, No. 8932.

No. 33. Report D, on an estimate prepared by the District Engineer of Rajahmundry for constructing 2 Cells, and a cooking shed, to the Police Cutcherry at Cocanada.

The estimate provides for two Cells.

		Rs.	A.	P.
3077¾	Cb. ft. Brick in chunam A. 2 P. 1 ...	400	12	0
3200	Sq. ft. Plastering per sq. 11 Rs. 2	64	0	0
1392	Do. Tiled roof Rs. 127	173	2	1
2	Batten doors at Rs. 12 @	24	0	0
	Foundation	4	0	0
	Cooking shed.			
160½	Cb. ft. Brick in chunam A.2 P.1	20	14	4
190	Sq. ft. Plastering Rs. 2...	3	12	10
528	Do. Tiled roof Rs. 12-7	65	10	9
	Superintendence and Sundries	73	12	0
	Total Rs....	830	0	0

eight hundred and thirty.

1. On the 12th December 1855 the above estimate together with a letter No. 575 dated 14th November 1855 from the District Engineer of Rajahmundry was forwarded to the Collector for an opinion as to the probability of an adequate return in benefit to the country from so considerable an outlay.

2. The District Engineer observes that the estimate was prepared at the urgent request of the Post Master General in consequence of the progress of the Tappal being much impeded, the state of the road being such that there is almost a total cessation of traffic on it during the rains, between the towns of Bezoarah and Toonee.

3. In para. 3 of his letter the District Engineer considers the reasons against, and in favor of executing the repairs, and arrives at the conclusion that the important object of keeping open a good communication between the intermediate towns on the line, and the different Hill Markets is sufficient in itself to justify the expenditure.

4. It will be observed that the principal objection raised against keeping up this portion of the road, is that the distant traffic of the country will eventually be carried by the Canal now being excavated from Bezoarah to Toonee and that an excellent road will or may be opened along its banks at a comparatively small expenditure.

5. To this objection the Collector of Rajahmundry in his letter No. 270 dated 21st November 1856, para. 4 replies.

"That when a Canal is open from Bezoarah to Toonee there can be no doubt that almost "all the traffic will be taken on it, but it seems very doubtful *when* such a Canal may be availa- "ble, and judging from past experience it will, even when the Canal is ready be some time "before, even a tolerable road is available along its banks."

6. The Collector concurs in the doubts expressed by the District Engineer, as to whether the new line proposed by Captain Best offers any advantages, noticing that the cost of constructing it would far exceed that necessary for putting the present road into a good state of repair.

7. Even, with the Canal to be completed eventually from Samulcottah to Toonee, the Collector considers with the District Engineer, that the proposed expenditure should be incurred, if only to connect the important towns of Rajahmundry, Juggarapetta, Yailaiswaram, and Toonee with each other, and the Hill tracts. Yailaiswaram it is observed is a few miles to the north of the road, but is the great entrepôt of trade with the hill villages.

8. After due consideration of the reasons advanced both by the Collector and District Engineer in support of the proposed expenditure, and of the present essential necessity for keeping open the Trunk line of communication between Madras and Calcutta. The Chief Engineer resolves to recommend the estimates, in which the rates allowed are moderate and sufficient, for entry in the Budget of 1857-58.

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6. If however there is a probability of the Canal from Samulcotta to Toony being sanctioned and commenced upon without much further delay, it will mainly, as observed by Captain Rundall, be as a road, connecting the intermediate towns with each other and the hill tracts; that the repairs of the line under notice should be urged, and I concur with him in thinking, that, if this were the sole end to be secured, the advantages which will be derived there from are sufficient to justify the expenditure proposed. Rajahmundry, Juggumpitta, Yailaiswaram and Toony are all towns of considerable trade, and should under any circumstances have a good line of land communication between them. Yailaiswaram is a few miles to the north of the road, but is the great entrepot of trade with the hill villages.

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The estimate provides for two Cells.

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3077¾	Cb. ft. Brick in chunam A. 2 P. 1 ...	400	12	0
3200	Sq. ft. Plastering per sq. 11 Rs. 2	64	0	0
1392	Do. Tiled roof Rs. 127	173	2	1
2	Batten doors at Rs. 12 @	24	0	0
	Foundation	4	0	0
	Cooking shed.			
160½	Cb. ft. Brick in chunam A.2 P.1	20	14	4
190	Sq. ft. Plastering Rs. 2...	3	12	10
528	Do. Tiled roof Rs. 12-7	65	10	9
	Superintendence and Sundries	73	12	0
	Total Rs....	830	0	0

eight hundred and thirty.

1. The Cells are to be each 20 feet long, by 15 feet broad, and the walls are to be 12 feet high, supporting tiled roof, the cooking shed is to be an open verandah 12 feet wide.

2. The District Engineer in his letter No. 701 dated 22d November 1856, states that the Plan and Estimate have been prepared at the request of the Collector, for the purpose of providing lock up places for Europeans, who may have to be confined for misbehaviour in the streets at night much inconvenience being fell at present, from the want of them.

3. The cooking shed is required for the use of the native Prisoners, who are provided at present, with only a temporary thatched building.

4. The estimate is framed on moderate and sufficient data, and is recommended by the Chief Engineer for entry in the budget of 1857-58.

Letter from Captain F. H. RUNDALL District Engineer G. D.; to Colonel C. E. FABER, Chief Engineer, dated Camp at Dowlaishweram, 22nd November 1856, No. 701.

SIR,

I have the honor to forward for submission in the Budget of 1857-58 the accompanying estimate for a Sub-Officers Cutcherry at Borrumpolem in the Tademulla talook of the Rajahmundry District. The present shed allotted to the Sub-Officer is a ruinous building not worth repair. I have therefore at the request of the late Sub Collector had a plan and estimate for a new building prepared which will I hope receive the sanction of Government.

An Estimate No. 48 for constructing a Sub Officers Cutcherry at Borrumpolem Rs. 540.

2d. This estimate has been prepared at the request of the Collector for the purpose of providing a lock up place for Europeans who may have to be confined for misbehaviour in the streets at night. At present there is no building suited for the purpose, and great inconvenience has been felt for the want of one. The cooking shed is required for the use of the native Prisoners who have at present only a temporary building covered with thatch.

An Estimate No. 49 for constructing 2 additional cells &c. to the Police Cutcherry at Cocanada amounting to Rs. 830.

No. 34. Report E on an estimate prepared by the District Engineer of Rajahmundry; for constructing a Sub-Officers Cutcherry at Borrumpolem, in the Todemulla talook.

	Rs.	A.	P.
The estimate provides for 2,932½ Cub. feet brick in Chunam at A.1 P.7	290	3	1
2,418 Sq. feet plastering ... ...Rs. 1-10	39	4	8
232 Cb. feet Flooring A.1 P.7	22	15	4
1,064 Sq. feet Tiled roof ... ...Rs. 9-11	103	1	3
1 Batten door complete...	10	0	0
1 Iron railed window...	7	0	0
Superintendence and Sundries...	37	7	8
Total Rupees...	510	0	0

five hundred and ten.

1. The building is to contain one small room 10 feet square, and one verandah room 20½ feet long by 11½ feet broad, with an open verandah in front of them, 6 feet in width, the main walls, and pillars are to be 10 feet high, and the verandah pillars 6¼ feet, supporting a tiled roof.

1 *Letter from the Dt. Eng. G. D. dated 22d Nov.* 1856, *No.* 701. *Vide letter D.*

2. The District Engineer in his letter No. 701, dated 22d November 1856, states that the Plan and Estimate have been prepared at the request of the late Sub-Collector, the present shed allotted to the Sub-Officer, being in a ruined state, and not worth repairing.

3. The estimate is framed on moderate and sufficient data, and is recommended by the Chief Engineer for entry in the budjet of 1857-58.

Read the following Reports from Colonel C. E. FABER, Chief Engineer; to H, FORBES, Esq., Acting Secretary to Government, dated 6th December 1856, No. 8662.

No. 35. Report AA on an Estimate prepared by the Civil Engineer in the Krishnah Division for constructing a lock and Calingulah near Casarapilly, for the supply of water from the Ellore high level channel to the Boodoomair, and for the passage of boats from one to the other.

	Rs.
The Estimate provides for constructing the lock, ...	11,780.
Do. the Calingulah, ...	1,880.
Total Rupees...	13,660.

thirteen thousand six hundred and sixty.

1. The Boodoomair, which is an unimproved natural channel, exceedingly tortuous, and with a great slope, is, as observed by the Civil Engineer in his letter No. 113 dated 7th November 1856, unfavorable for traffic, but nevertheless of great value for the conveyance of the produce from the lower districts of Rajahmundry, and from around the Colair lake, during the rainy seasons, when the country is impassable for carts and beasts of burden.

2. Eventually, the high level canals will doubtless be the main connecting lines, between the Krishnah and Godavery, but at present the Boodoomair is the only water communication open through the Colair lake, and carries a very considerable, and increasing traffic.

3. The natural bed of the Boodoomair at Casarapilly is about 5 feet below that of the artificial Ellore channel, fed by the annicut, and the Civil Engineer proposes to construct a Calingulah, with sluices in its body, to regulate the supply of water which he considers it necessary to give from the latter, for the better irrigation of the extensive lands under the former.

4. Notwithstanding, that the high level canals will, as before observed, eventually command the principal traffic between the Krishnah and Godavery, the Chief Engineer considers Boodoomair to be of sufficient importance, to justify its being connected by a small lock as proposed with the Ellore high level channel.

5. The rates allowed in the estimate are moderate and sufficient, and the Chief Engineer recommends it for entry in the budget of 1857-58.

Letter from Captain C. A. ORR, Civil Engineer in charge Kistnah Division; to Colonel C. E. FABER, Chief Engineer; dated Bezoarah, 7th November 1856, No. 113.

SIR,

1. I have the honor herewith to submit an estimate amounting to Rupees 13,660, for the construction of a Calingulah and lock near Casarapilly for the supply of water from the Ellore high level channel to the Boodoomair and for the passage of boats from one to the other.

2. The Boodoomair being an unimproved natural channel exceedingly tortuous and having a great slope, does not afford very good navigation, but being the only line of water communication, yet open, between this and the Rajahmundry system of canals through the Colair lake, it has already a very considerable and increasing traffic upon it, and although much will no doubt be diverted into the more direct and more favorable high level canals, when they are completed throughout between the Kistnah and the Godavery, still a great deal of produce from the lower districts of Rajahmundry, and from around the Colair lake will continue to be carried by it during the wet season, when plenty of water will be in it and the country impassable for carts and beasts of burden. The difference of level between the artificial Ellore channel, fed by the annicut, and the natural bed of the Boodoomair, being about 5 feet at Casarapilly, a Calingulah, with sluices in its body, is necessary for regulating the discharge of water from the former to the latter, and a small lock for the passage of boats; and I recommend the insertion of the estimate in the budget of 1857-58, as the supply of the Boodoomair from the annicut, and the keeping open of the valuable line of water communication which that stream affords for so many months of the year, are essential, and of very great importance to the extensive wet cultivation dependent on it, and to the growing traffic of the country.

No. 36. Report Q Q on an Estimate prepared by the District Engineer of Rajahmundry for constructing a wooden bridge across the Tummalair river in the Tiriwoor talook of the Masulipatam District.

1. The bridge is to consist of 3 bays each of 35 feet span, and the amount of Estimate is Rupees (4,120) four thousand one hundred and twenty.

2. The bridge is to be built across the Tummalair river near the village of Gootapaud for the convenience of the traffic passing from the interior, and the principal frontier towns in the Hyderabad country, and from Badrachellum to the towns lying between the Tummalair and the Kistnah and so on to Masulipatam, and Guntoor viâ Condapilly, and Noozeed.

The road through Chintalapoody, Boorumpolem, Yernagoodem and Rajahmundry also crosses the river at the same site, so that the construction of a bridge, to obviate the inconvenience to which the extensive traffic through the country is at present subjected, is much required.

4. As good teak wood can be procured comparatively cheap in the vicinity of Gootapaud, the District Engineer is of opinion, that a wooden superstructure on masonry abutments and Piers will be the most economical, and at the same time a durable work.

5. The plan of the bridge is approved of and the Estimate, in which the rates allowed are moderate, and sufficient, is recommended by the Chief Engineer for entry in the Budget of 1857-58.

Letter from Captain F. H. RUNDALL, District Engineer, G. D.; to Colonel C. E. FABER, Chief Engineer, dated Camp Dowlaishwerum, 15th November 1856, No. 673.

Sir,

I have the honor to forward for entry in the Budget of 1857-58 the following estimates for bridges required in the District of Masulipatam,

No. . In constructing a wooden bridge across the Tummalair or Gootapaud in the Trirvoor talook Masulipatam District. Rs. 4,120.

2nd. This work has been represented by Captain Greenaway as being much needed to enable traffic to pass across the river Tummalair on its way from the interior and the principal frontier towns in the Hyderabad country and from Badrachellum to the towns lying between the Tummalair and the Kistnah, and so on to Masulipatam and Guntoor via Condapilly and Noozeed. The road through Chuctalapoody, Borrumpolum, Yeruagoodem and Rajahmundry also crosses the Tummalaira at this place, and as the banks are steep and high, and the river itself rapid while in flood it presents a considerable obstacle to traffic. As wood is comparatively cheap in that locality. I have thought a wooden Superstructure on Masonry Piers would prove the most economical work and as teak is the material employed, the bridge will be very durable.

No. . For constructing a Masonry bridge across the Julapoodee Calwa at the town of Ellore, Rupees 5,720.

3rd. This structure has also been represented by Captain Greenaway as being much needed in the town of Ellore containing between 20 and 30,000 inhabitants is sometimes cut off from all communication with the North part during the time the river runs full.

No. 37. Report RR, on an estimate prepared by the District Engineer of Rajahmundry for constructing a bridge across the Julapoodee Calwa at the town of Ellore.

1. The bridge as now designed is to consist of four segmental arches viz. 2, of 30 feet and 2, of 24 feet span, but after being authorized, will be revised for a work of only three arches of 36 feet span, elliptical instead of segmental, and the Estimate accounts to Rupees (5,720) five thousand seven hundred and twenty.

Letter from the District Engineer Godavery Division dated 15th November 1856, No. 678 vide letter.

2. At present the communication to the North from the town of Ellore containing between 20 and 30,000 Inhabitants, is completely cut off when the water runs deep in the Julapoodee Calwa. The construction of a bridge is therefore essential, and the Estimate in which the rates allowed are moderate and sufficient, is recommended by the Chief Engineer for entry in the Budget of 1857-58.

No. 38. Report FFFFF, on a estimate prepared by the Civil Engineer of the Kistnah Division for constructing a 2d class dawk bungalow, with out offices, on the North bank of the Kistnah river, on the coast road branching from the Northern trunk road.

The estimates provides, for

	Rs.	A.	P.
Bungalow, ...	1,309	1	2
Godown and cookroom, ...	398	10	8
Necessary, ...	61	14	0
Compound hedges and gate, ...	70	0	0
Varnishing doors and windows, ...	30	0	0
Superintendence and sundries, ...	130	6	2
Total Rs...	2,000	0	0

two thousand Rupees.

1. The bungalow is to be raised on a basement 2 feet 6 inches high above, foundations sunk 3 feet, and contains one main room 20 feet long by 17 feet broad, surrounded by a verandah 9 feet 6 inches width, which is divided off into 3 rooms, and 2 bath rooms, as shown in the plan.

The main walls are to be 12 feet 6 inches high and the verandah walls and pillers 7 feet 6 inches high. The roof is to be tiled.

* Vide Ex. from Pro. No. 4050, dated 2d December 1856.

2. The estimate which has been received from the Board of Revenue* was prepared by the District Engineer in accordance with the instructions of Government contained in Extract Minutes Consultation No. 932 dated 3d September 1856. The rates allowed for the work are moderate and sufficient, and the estimate is recommended by the Chief Engineer for entry in the budget of 1857-58.

Extract from the Proceedings of the Board of Revenue dated 2d December 1856, No. 4050.

Dated 14th November 1856.

Read letter from the Civil Engineer in charge of the Kistnah Division, forwarding an estimate of the probable cost of erecting a second class Bungalow on the North bank of the Kistnah accompanied by a plan of the proposed building.

(Here enter No. 518.)

Resolved that the above letter with its enclosures be forwarded to the Chief Engineer for the purpose of being submitted for the sanction of Government, in accordance with the instructions contained in Extract Minutes Consultation dated 3rd September 1856, No. 932.

(A true Extract.)

(Signed) J. D. SIM,
Acting Secretary.

No. 39. Report HHHHH, on an estimate prepared by the District Engineer of Rajahmundry for constructing an annicut with head and under sluices across the Tummilair river and excavating a supply channel to the Singasagarum tank.

The estimate provides for Excavating Channel 2,22,502 Cubic yards earth work at 1 anna.	13,906	6	0
Constructing anicut	1,310	8	11
Do. Head sluices...	1,298	8	7
Do. under do.	2,754	6	3
Superintendence and Sundries	1,920	2	3
Total Rupees...	21,190	0	0

twenty one thousand one hundred and ninety.

1. The Tummilair river rises in the Eastern range of Hills separating the valleys of the Kistnah and Godavery and drains an area, above the site of the proposed annicut of some 108 square miles.

2. The District Engineer in para. 3 of his letter No. 673 dated 10th November 1856 observes that there are the remains of an old masonry anicut across the river which formerly supplied several tanks in the Tirivoor talook, but the date of its construction and subsequent destruction he has not been able to ascertain.

3. The ryots of the Tirivoor talook have presented most urgent Petitions for the restoration of the work and have already promised to pay an additional revenue to the extent of Rs. 7,383-1-4,* the amount of remissions made in the some talook during the last 5 years has been Rs. 7,785-10-1, and for which it is hoped there will be no longer any occasion, when a certain supply of water is ensured to this tank.

* Vide accompanying Statement.

4. The head and under sluices are a necessary part of the project, the first to regulate during the high floods the quantity of water entering the channel for the supply of the tanks and the second to prevent accumulations in the bed of the river above the anicut. As the under sluices will have to be worked during the freshes they are made accessible from the head sluices.

5. The Tirivoor talook which contains the remains of many fine tanks having been long neglected and its Revenue consequently diminished, the District Engineer advocates the early construction of the proposed annicut and observes that he has deputed Captain Greenaway to examine and prepare estimates for the restoration of the several ruined works.

6. The Collector will be requested to forward his early opinion on the project, but considering that the District Engineer has advanced sufficient reasons in support of it, and not anticipating any objection on the part of the Collector, the Estimate, which is framed on moderate and sufficient data, is recommended by the Chief Engineer for entry in the Budget of 1857-58.

Letter from Captain F. H. RUNDALL, District Engineer Godavery Division; to Colonel C. E. FABER, Chief Engineer, dated Camp Dowlashwarum, 10th November 1856, No. 673.

SIR,

I have the honor to submit for entry in the budget of 1857-58 the following works of irrigation in the Masulipatam District.

Estimate No. 10.
Restoration of an annicut across the Tummilair head and under sluices and irrigating channel, amounting to Rs 21,190-0-0

*Above the site of the annicut.

2nd. The river Tummilair takes its rise in the Eastern range of hills which separates the valleys of the Kistnah and Godavery and drains an are of about 108* square miles.

3rd. There are the remains of an old masonry annicut across this river which formerly supplied water to various tanks in the Tirivoor talook commencing with that at the village of Yendapilly. The date of its construction, and subsequent distruction cannot now be ascertained but of the utility of such a work there can be no question. The villagers who will be benefitted by this work have made most urgent petitions for its restoration, and have already pormised to pay additional Revenue to the extent of Rupees 7,383-1-4. The remission hitherto made in various villages of the Tirivoor talook during the last five years have amounted to Rupees 7,785-10-1. Then it is hoped there will no longer be any occasion for, when this work has been restored and the supply of water to the tanks rendered certain thereby.

Vide Statement.

4th. As a large body of water is brought down this river in a high flood, it is necessary to regulate the quantity entering the channel for the safety of the tanks supplied and in order both to prevent silt being carried into it as also to furnish a supply in low freshes to the lower villages who have a right to a certain share. I have added a set of under slucies, and as it will be necessary to work these during the freshes, they are made accessible from the head slucies. It would be very desirable to have this work constructed as soon as possible as the Tirivoor talook has been long neglected, and its revenue consequently diminished. It contains the remains of many fine tanks which have gone to ruin, and the land below, which now consequently lies waste. The examination and restoration of all these decayed works I have confided to Captain Greenaway, and he has recommended this as one of the first that should be undertaken. I have requested the Collector of Masulipatam to communicate his views on the project direct to yourself in order to save time, as I did not myself receive the estimate in sufficient time to obtain his opinion for submission with this letter.

Estimate Nos. from 4 to 9 and from 10 to 14. Constructing Calingulas and sluices to several tanks amounting to Rupees 17,740-0-0.

5th. The tanks, in the Tirivoor and Ellore talooks of Masulipatam are similarly to those of Rajahmundry altogether without sluices and calingulas and consequently constantly liable to be breached. The accompanying estimate provides for some of the principal tanks. With respect to these works I would ask the same question as for those in Rajahmundry, viz. whether I am at liberty to commence such as are under Rupees 500 immediately or whether when the aggregate expenditure for each tank exceeds that amount their commencement is to be deferred until sanction has been received.

Statement of lands in the different villages affected by the Annicut across the Tummilair.

Names of villages.	Land.			Sist.			Land rented in 1856.			Sist of 1856.			Total sist including wet and dry.	Additional land that may be cultivated.			Total Revenue.			Total amount of remission made during last 5 years.		
	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.		Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.
Yendapilly, ...	60	4	8	2,365	0	0	15	9	8	677	11	5	935	44	11	0	2,365	0	6	812	0	0
Seevapooram, ...	25	0	0	1,048	3	0	11	5	14	414	11	9	700	13	10	2	1,048	3	9	467	0	0
Ragalpoor, ...	20	0	0	725	0	0	4	3	12	122	0	0	400	15	12	4	725	0	0	556	2	9
Mullygoodem, ...	14	12	0	631	0	0	9	2	2	385	5	9	520	5	9	14	631	0	0	1,037	0	0
Gaincherla, ...	14	11	0	532	0	0	5	14	4	213	2	3	345	8	12	12	532	5	0	500	9	0
Kantampalem, ...	16	0	0	670	0	0	5	1	6	212	8	0	230	10	14	10	670	0	0	314	4	0
Kusba Chintalapoody, ...	13	0	0	327	0	0	4	1	8	82	14	0	145	8	14	8	327	0	0	1,165	14	7
Potanoor, ...	5	6	0	226	0	0	4	4	4	189	2	10	311	5	9	12	707	8	0	184	0	0
Seegalavuncha, ...	22	2	10	921	12	6	3	14	2	200	12	1	350	18	4	8	921	12	6	741	12	7
Nursapooram, ...	24	10	0	1,330	14	0	8	3	0	436	0	0	850	16	7	0	1,330	14	0	1,288	4	0
Pootaripee, ...	9	8	0	420	0	0	5	0	0	10	0	0	10	4	8	0	420	0	0	0	0	0
Settyvareegoodem, ...	20	15	0	1,200	0	0	4	14	9	241	13	2	476	16	6	3	1,200	0	0	718	12	0
	244	5	2	10,397	10	6	79	10	5	3,186	1	3	5,272	165	24	9	10,879	3	9	7,785	10	11

(Signed) F. H. RUNDALL, Captain,
District Engineer's Office Godavery Division.

DISTRICT ENGINEER'S OFFICE GD. DN.,
CAMP AT DOWLAISHWARAM,
15th November 1856.

No. 40. Report B, on an estimate of the probable expense of diverting the Nukkavaugoo into the Nulla Mada, for embanking the latter, and for constructing tunnels to carry off the land drainage under the Coomamoor channel from the Kistnah Annicut.

1. Amount of estimate Rupees (38,100) thirty-eight thousand, and one hundred, as follows :

	Rs.	A.	P.
Embanking the Nulla Mada, 308,000 cubic yards, at 1 anna of cubic yard...	19,250	0	0
Excavating new cut for diverting the Nukkavangoo 54,000 cubic yards at 1 anna 2 p. per cubic yards	3,938	0	0
Superintendence and Sundries at 15 per cent...	3,482	0	0
	26,670	0	0
2 Drainage tunnels under embankment, Rupees 480 each	960	0	0
1 Drainage of 3 vents under the Coomamoor channel... ...	3,930	0	0
2 Drainage of 2 vents under the Coomamoor channel at Rs. 3,270 each...	6,540	0	0
Total estimate Rupees...	38,100	0	0

2. The object of this project, is fully explained in the accompanying letter, No. 94 dated 20th October 1856, from the Civil Engineer of the Kistnah Division, and the entire concurrence of the Acting Collector of Guntoor in the expediency of the works, is conveyed in a letter No. 389 dated 15th idem, a copy of which is also submitted.

3. The main features of the project for draining the country to the Westward of the Coomamoor channel, are, to divert a large portion of the land-floods from the Nukkavangoo into the Nulla Mada ; to embank the left bank of the latter duct, and to dispose of the rest of the drainage, by means of tunnels under the Coomamoor channel.

4. The Coomamoor channel which is described in para. 2 of the Civil Engineer's letter as already irrigating large tracts in the Banpettah, Prettipaud, and Poonoor talooks, and increasing yearly in value, intercepts at present a large amount of drainage from the Westward, the consequence being, that a great deal of valuable land adjoining the channel is submerged during the monsoon, and is therefore left uncultivated ; the channel banks after heavy falls of rain being moreover continually breached.

5. From the former cause the loss of Revenue this season (and which is stated to be probably the same each year) has been estimated by the Collector at Rupees 3,000, and from the latter, the actual outlay in repairing the channel banks during the last 10 years, is given at Rupees 16,128, making together an annual lost to Government of nearly Rupees 5,000, exclusive of the loss of produce to the Ryots by the injury done to their growing crops (from the want of water,) while the channel banks are under repair ; and such loss will be greater each year as the cultivation becomes more extended. Land too, it is observed, that might be taken up, is neglected, because it is known to be in a dangerous neighbourhood.

6. In para. 3, it is stated, that all the land which is now exposed to being flooded, and any times as much more, which cannot be improved until a complete system of drainage has been effected, will ere long be brought under the influence of the Kistnah Southern high level channel, and become most valuable ; but independent of this, the Civil Engineer considers, that the saving of the sum which the Collector shews to be now annually lost, would be sufficient to justify the proposed outlay. In this opinion, the Chief Engineer fully concurs considering with the Civil Engineer, that the works are essentially connected with the comprehensive scheme of Kistnah irrigation, and general improvement of the Delta.

7. In para. 5, the Civil Engineer observes, that the Nukkavaugoo receives the drainage of a large tract of the Cundaveed range of hills and of the adjacent high lands, and is consequently subject to heavy floods, which rising above its low banks, spread over the plains, until intercept-

ed by the Coomamoor channel embankments, and as this channel is now kept by the Annicut permanently full and above the level of the country, it is evident, that the drainage water, can only be carried across it by means of under tunnels.

8. This arrangement however would be so excessively costly that the Civil Engineer very judiciously proposes to divert by a cut a large portion of the floods from the Nukkavaugoo into the Nulla Mada, and thus not only prevent their doing mischief, but turn them to good account in increasing the supply of the Cherraboor, the Baupetlah and other tanks.

9. The cut is proposed to be made where the two channels approach each other within a distance of 1,200 yards, a little below the village of Annapurroo; and though the bed of the Nullah Mada is on a lower level than that of the Nukkavaugoo, the ground, as shown in the Section, sloping from the former to the latter, renders the construction of an embankment necessary, to prevent the united streams passing back in the event of an overflow. This embankment it is remarked in para 7, will be serviceable as a road also, in a locality where such accommodation is greatly required.

10. As remarked in para. 6, the overflow of the Nukkavaugoo being prevented, the remaining drainage may be discharged without difficulty by three ordinary tunnels *under* the Coomamoor channel.

11. Paras. 8, and 9, refer to certain remarks contained in paras. 6 and 7 of the Acting Collector's letter, the first, being a question of drainage, stated by the Civil Engineer to be a perfectly distinct project and to be considered next year; and the second, one of extending the irrigation by means of the improvements now recommended is stated to be already under investigation.

12. In para. 4 of his letter, the Acting Collector, in illustration of the injurious effects of the floods in question, observes, that the Korlimerla Ryots, whose lands adjoin the Coomamoor channel had thrown up about 600 acres of land assessed at about Rs. 1,000, and that it was reported, that lands assessed at upwards of about Rs. 2,000 more, had been submerged in several other villages in that neighbourhood.

13. In para. 5 after noticing the inconvenience and loss to the Ryots from only being able to undertake portions of the land after the floods have subsided, and being thus prevented from applying to the best advantage their whole agricultural means, the Acting Collector refers to the loss to Government "not only in the extent of remissions granted on lands remaining unfit for "cropping but in the impoverishment of the resources of the Ryots, from whence the assess-"ment is drawn."

14. In para. 9 the Acting Collector notices the value of the Nulla Mada embankment as a road.

15. The rates entered in the estimate are moderate and sufficient and the Chief Engineer most warmly recommends the project, which is planned with Captain Orrs usual care and ability for the sanction of Government and for entry in the Budget of 1857-58.

Letter from Captain C. A. ORR, Civil Engineer in charge Kistna Division; to Colonel C. E. FABER, Chief Engineer, dated Guntoor, 15th October 1856, No. 94.

SIR,

1. I have the honor herewith to submit a project for draining the country to the Westward of the Coommamoor channel, by diverting a large portion of the land-floods from the Nukkavaugoo into the Nulla Mada, and by disposing of the rest below the Coommamoor channel by means of under tunnels. The plan and estimate* having been submitted to the Collector have met with his approval, and I annex copy of his letter returning them, and showing part of the financial effect of the outlay.

* Rupees 38,100.

2. The Coommamoor channel, which irrigates already large tracts in the Banpetlah, Prettipaud and Poonoor talooks and is yearly increasing in value, crosses and intercepts a very large amount of drainage, for the effectual disposal of which, either by diversion or other means no effectual measures have been taken. The consequence is that a great deal of valuable land adjoining the channel is submerged during the monsoon and rendered unculturable, and the channel banks are continually being breached after heavy falls of rain. The Collector has estimated the loss of Revenue this season from the former cause at Rupees 3,000 and it is probably as much every year, and he gives the actual outlay incurred in the repair of breaches in the channel banks during the last ten years at Rupees 16,128, making together a yearly loss to Government of nearly Rupees 5,000 exclusive of the loss of produce to the Ryots, and of the injury done to growing crops for want of water while the channel is being repaired, of which no account has been taken, though it must be considerable even at present, and will become an intolerable evil when the cultivation under the channel has increased for a few years at the rate it is now doing. Land too that might be taken up is neglected, because known to be in a dangerous neighbourhood.

3. Such a state of matters demands immediate remedy, and would justify the outlay I propose, if no greater results were looked for than the saving of the sum which the Collector shows is now lost, but, as all the land that is now exposed to being flooded, and many times as much more that cannot be improved without a complete system of drainage be first carried out, will ere long be brought under the influence of the Kistnah southern high level channel, and be made of the utmost value, it is absolutely necessary in my opinion to undertake the works I propose, in connection with the comprehensive scheme of Kistnah irrigation and through general improvement, and I accordingly recommend it as an essential portion of that project.

4. The remedial measures I propose are 1st, the diversion of the Nukkavaugoo, a most troublesome stream, into the Nulla Madda. 2ndly, the embankment of the left bank of the latter and 3rdly, the construction of three large drainage tunnels under the Coommamoor channel.

5. The Nukkavaugoo receiving the drainage of a large part of the Condaveed range of hills and of the adjacent uplands, is subject to heavy floods, which, rising above its low banks, spread over the neighbouring plains and sweep to the left, down a succession of hollows tending towards and closed by the Coommamoor channel embankments, and it is therefore necessary for their security and for the preservation of the cultivation adjoining, and dependent on the channel, that ample scope be provided, or that the stream be turned into another course, where it can do no mischief, and be controlled. The Coommamoor channel being now kept by the annicut permanently full above the level of the country, the only mode of giving passage across it to drainage water is by under tunnels. But since to build masonry under tunnels of sufficient capacity to carry off the overflow of the Nukkavaugoo would be so excessively costly as to be out of the question, the alternative is to turn aside the stream, and I adopt that plan, as it is extremely easy, and the Nukkavaugoo, by being diverted into the Nulla Mada, instead of doing Mischief may be turned to the best account in increasing the supply of the Cherrakoor, Baupetlah and other tanks, which receive water from the Kistnah it is true, but consume so much as to render this improvement of their other sources of supply a matter of importance, before the extension of irrigation throughout the Delta enhances the value of water from the annicut. I propose therefore making a cut from the Mukkavaugoo into the Nulla Madda, where they approach each other within a distance of 1,200 yards, a little below the village of Annapurroo, and constructing an embankment along the left bank of the latter from the bund of the Annapurroo tank to the bank of the Cherrakoor supplying channel. The bed of the Nulla-Madda being deeper, and on a lower level than that of the Nukkavaugoo, this diversion is easy, as the ground slopes from the former towards the latter (as shown in the cross section) the embankment is required to prevent the overflow of the united streams passing back towards the Nukkavaugoo over all the lands which it is so desirable to drain.

6. The overflow of the Nukkavaugoo being prevented, the remaining drainage will not be difficult to deal with, and may be all discharged by the three ordinary sized under tunnels, for the construction of which I have provided in the Estimate.

7. The Plan and Sections will sufficiently illustrate the project. The most costly part of it is the construction of the Massive Nulla Madda embankment, but it is essential for the attainment of the end in view, which is not merely the saving of the Rupees 5,000 that are now annually spent or lost but the reclaiming of a large tract of rich land now neglected as swamp, the fitting it for improvement in connexion with the Kistnah Annicut irrigation project, and the turning to good account, for the better supply of several highly valuable tanks, a vast quantity of water which is now allowed to run to waste, and in doing so to occasion immense mischief. The embankment will be serviceable as a road likewise where such accomodation is greatly required.

8. With reference to the point referred to by the Acting Collector in the 6th para. of his letter, I would explain that as the waters of the Nukkavaugoo and Nulla Madda when united in the latter stream, can only reach the Baupetlah swamp through the tank, the drainage he alludes to is a perfectly distinct project, which will be taken up and examined by me next year.

9. The scheme mentioned in the 7th para. of the Collector's letter for extending irrigation by means of the better supply of water which the carrying out of the improvement now recommended will afford, is already under investigation and will also be submitted next year.

From H. NEWILL, Esq., Acting Collector of Guntoor; to Captain C. A. ORR, Civil Enginneer in charge Kistnah Division, dated Guntoor, 15th October 1857, No. 389.

SIR,

1. I have the honor to acknowledge the receipt of your letter of the 25th Ultimo forwarding me a Plan and Estimate* relating to the regulation of the Nukkavaugoo and Nulla Madda streams with reference to the Kistnah annicut irrigation.

* *Returned.*

2. The object and necessity of these works are so clearly described in your letter that it is unnecessary for me to dilate upon them, but I may confine myself to the expression of entire concurrence in their expediency, and to supplying the information bearing in the financial effect of their execution.

3. The enclosed statement shews the expenditure on the repairs of the Coommamoor channel for the last ten years, chiefly incurred in stopping breaches or strengthening the banks to prevent them.

4. It will be difficult to represent in a figured statement the injurious effects of the uncontrolled floods of the two large streams in question, but a simple illustration may however be given in the circumstance of the Korlimerla ryots, whose lands adjoin the Coommamoor channel, having thrown up about 600 acres of land assessed at about Rupees 1,000, while it is reported that lands assessed at upwards of about Rupees 2,000 more have been submerged in several other villages in that neighbourhood.

5. It is true that a large portion of this land may eventually be cultivated after the floods have subsided and brought under the usual assessment, but it is obvious that the inconvenience and loss to the ryots is considerable in preventing their application of their agricultural means to the best advantage, and that thus the Government as the landlord suffers loss not only in the extent of remissions granted on lands remaining unfit for cropping, but in the impoverishment of the resources of the ryots from whence the assessment is drawn.

6. There is one observation I may venture to make on the project and you may probably have already had it under consideration though it is not alluded to in your letter. It is this the Nukkavangoo floods being diverted into the Nullamadda and the latter stream being confined by the embankment on the left side, a large quantity of the drainage which formerly found its way to the sea by the Boddum Calingulah and the salt water creek to Nizampatam, will probably

be thrown Southwards into the large swamp running on the North of the coast road from the Baupetlah tank down to the Romperoo near Chinna Ganjam. This will require some provision for the protection of the existing cultivation in that neighbourhood and would seem to bear upon the proposition submitted in my letter of the 1st April 1856 for the drainage of the swamp, which can be turned into very valuable cultivation.

7. It has occurred to me that it would be desirable to connect the embankments of the Cherkoor, Mooroocondapaud and Oorpatoor tanks and carry on the line of embankment through Carrmchede towards Swerna so as to retain a supply of water from the Nullamadda and other streams for the underlying swamp lands as well as to protect them from floods on this side, but I am not prepared to offer more than the bare suggestion at present.

8. In considering the present large project for drainage, it is difficult to separate it from the general view in which it has been looked at, but I would not wish to embarrass your present proposition by bringing forward what has now been said in any way to delay the submission of the estimate for sanction.

9. Referring again to the embankment of the Nullamadda, I would observe that it would be valuable as a raised road for which its breadth of 7 yards, seems sufficient, though it may remain unmetalled. It does not appear whether it is intended that the Nullamadda should act as a supplying branch for the future High level channel to the Cherrakoor and Baupetlah tanks, but for the present it seems desirable to improve if possible, their present connection with the Coommamoor channel, which in the past season, could scarcely be brought to bear upon the former, sufficiently to mature the crop.

Statement of expenditure incurred in the repair of the Coommamoor channel during the last ten years in the District of Guntoor.

No.	Names of villages under the irrigation of the channel.	Years.	Expenditure. Rs.	A.	P.
1	Coommamoor	1846	822	0	0
2	Nundoor	1847	2,639	0	0
3	Poonla	1848	2,475	0	0
4	Appecutla...	1849	342	0	0
5	Enagurteepaud..	1850	4,093	0	0
6	Gopapooram.	1851	2,882	0	0
7	Murreepoody...	1852	900	0	0
8	Ratoor	1853	1,040	0	0
9	Appapooram	1854	505	0	0
10	Baupetlah.	1855	430	0	0
		Total...	16,128	0	0
		Average per annum...	1,613	0	0

Guntoor, Collr's. Office, 15th October 1856.

(Signed) H. NEWILL,
Acting Collector.

No. 41. Report BB, on an estimate prepared by the Civil Engineer of the Krishnah Division for constructing a Calingulah with regulating sluices across the Toongaboodra Nullah, near the head of the Coommamoor channel.

Amount of Estimate Rupees (2,800) two thousand and eight hundred.

1. The object of the proposed Calingulah, as explained in the accompanying letter No. 120 dated 11th November 1856, is to regulate the supply of water for the irrigation of lands under the Coommamoor channel in the Poonoor and Baupetlah talooks.

2. The Coommamoor channel being only brought into communication with the anricut by means of a few miles of the Toongaboodra Nullah, the practice at present is to throw a temporary dam across the latter to turn the water into the former.

3. This dam however intercepting more drainage than the Coommamoor channel, can always carry off, is frequently breached after heavy falls of rain, and from time to time it has to be removed to allow of water passing down the Toongaboodra for the supply of the sandole tank.

4. The frequent formation and removal, or accidental breaching of this dam causes a great waste of both labor, and money, and is altogether attended with so much inconvenience, more especially during the cultivating season, that the construction of a permanent work is strongly advocated,

5. The Calingulah is to be provided with a small platform bridge, which with the one it has been thought necessary to place, in close proximity to it, across the Coommamoor channel near Jagurlamoody, will complete the accommodation required for the traffic crossing these two streams.

6. The work being an important improvement connected with the Krishnah irrigation scheme, and the rates allowed being moderate and sufficient, the Chief Engineer recommends the Estimate for entry in the budget of 1857-58.

Letter from Captain C. A. ORR, Civil Engineer in charge Krishnah Division; to Colonel C. E. FABER, Chief Engineer; dated Bezoarah, 11th November 1856, No. 120.

SIR,

1. As the Coommamoor channel, which already waters a great deal of land in the Bonoor and Baupetlah talooks of the Guntoor District and is rapidly increasing in importance, is only brought into communication with the annicut by means of a few miles of the Toongaboodra Nullah, it is necessary to throw a dam across the latter, immediately below the head of the former, in order to prevent the stream following its natural course instead of towards Coommamoor. This dam has to be removed from time to time to allow water to flow down the Toongaboodra for the supply of the Sandole tank, and as it intercepts more drainage than the Coommamoor channel can always carry off, it is periodically and frequently breached after heavy falls of rain whether intentionally cut or accidentally breached, the formation and removal of this dam causes so great a waste of labor and money, and gives so much trouble just at the time when, cultivation being in full progress, workmen are difficult to procure, that it is very desirable some permanent structure like a Calingulah, with regulating shutters and under sluices, should be substituted, and I therefore herewith submit a plan and estimate of such a work. As I think will suit the situation, and answer the purpose of regulating the suppply of the Coommamoor channel at the same time that it will give free passage to the floods and to all surplus water.

2. The Calingulah, being designed to carry a small platform bridge over it, will afford accommodation to traffic crossing the Toongaboodra, which is at present almost impassable whenever the dam giving way or being removed, allows the water to flow down the old channel; and as it has been thought necessary to put a platform bridge close at hand near Jagurlamoody over the Coommamoor channel it seems advisable to complete the accommodation afforded by erecting the one proposed.

3. The Estimate amounts to Rupees 2,800, and I request that, although unavoidably submitted so late, you will include it in the budget of 1857-58, and support it with your recommendation as a very useful, and necessary improvement, connected with the irrigation dependent on the Krishnah Annicut.

No. 42. ORDER THEREON, No. 2128; dated 19th November 1857.

Para. 1. The Right Honorable the Governor in Council proceeds to pass orders on the several reports of the Chief Engineer, as above recorded, submitting estimates for the sanction of Government.

GANJAM.

Report A, *on estimate for Rupees* 5,330.

2. The estimate forwarded with this report is for constructing a second class road from the Salt pans at Nowpada, to Tekally Ragoonadapooram, on Trunk road No. 6, in length 5 miles, 3 furlongs and 92 yards. This is a very useful cross road, and the main object of it is to render the Salt pans at Nowpada easily accessible to the Brinjarries who frequently resort to that place for the purchase of Salt. Nowpada is by far the largest and most frequented Salt Depot in that part of the country, and there exists no tolerable approach to it. It is stated that, during the rainy season, the road is quite impassable, being cut off by a swamp of three miles in length. The Government consider the work desirable, and accordingly sanction its entry in the Budget of 1858-59, at the estimated cost of Rupees (5,330) five thousand, three hundred and thirty. It appears from Major Birdwood's letter, that he has sent up an estimate to the Agent for connecting this road with the Purla Kimedy and Poondy line now under construction, by a branch from Tekally to Malapetta. The Government wish to be informed what has been done with this estimate, and whether its amount is intended to be disbursed out of the surplus Zemindary funds.

Report GG, *on estimate for Rupees* 47,220.

3. This estimate provides for completing, with the requisite bridges, two portions of Trunk road No. 6, in the Ganjam District; viz. from Sunthoshapoorum to Dendagedda, and from Chicacole to Sunthoshapoorum, for the improvement of which, estimates amounting together to Rupees 83,750, have been sanctioned by the Honorable the Court of Directors in their Despatch communicated to the Chief Engineer with Extract Minutes Consultation of the 24th August last, No. 1628. The work being obviously necessary for thoroughly completing the roads in question, the Government direct that it be entered in the Budget of 1858-59 for the orders of the Government of India, as promised in para. 10 of the letter to that Government, dated, 20th October 1857, No. 1960.

4. In respect to the portion of the Trunk road No. 6 between Chittivulsa and Chicacole in the Vizagapatam District, marked as item No. 4 in the Budget of 1856-57, it is observed, from para. 57 of the Report on that Budget, that provision was not made in the estimate for that project, for bridges over two large rivers; the Government request therefore that this omission be supplied at convenience. They would further wish to be informed, whether the Project No. 5 in the same Budget, provides for all the masonry works required on the further portion of the line in that District, viz. between Soobaram and Chittivulsa.

Report QQQQ. *on estimate for Rupees* 30,860.

5. With this Report, the Chief Engineer forwards an estimate for constructing a District road from Aska to Rumbah on the Chilka lake, a distance of 29½ miles. The road is to be

2. The Coommamoor channel being only brought into communication with the anricut by means of a few miles of the Toongaboodra Nullah, the practice at present is to throw a temporary dam across the latter to turn the water into the former.

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39

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4. In respect to the portion of the Trunk road No. 6 between Chittivulsa and Chicacole in the Vizagapatam District, marked as item No. 4 in the Budget of 1856-57, it is observed, from para. 57 of the Report on that Budget, that provision was not made in the estimate for that project, for bridges over two large rivers; the Government request therefore that this omission be supplied at convenience. They would further wish to be informed, whether the Project No. 5 in the same Budget, provides for all the masonry works required on the further portion of the line in that District, viz. between Soobaram and Chittivulsa.

Report QQQQ. *on estimate for Rupees* 30,860.

5. With this Report, the Chief Engineer forwards an estimate for constructing a District road from Aska to Rumbah on the Chilka lake, a distance of 29½ miles. The road is to be

carried through the Poobahcondah Talook, via Prosutpoor on the north bank of the river Rooshkoolia, and will, it is stated, offer great facilities to traffic. The Government consider this to be a very useful and desirable project, but they defer sanctioning it, until the Plans and Estimates are laid before them in a more complete shape. Dense jungle, it is stated, rendered it impracticable to survey the last six miles of road near Rumbah, but the distance it appears was measured with a chain, and an allowance made for it of Rupees 500 per mile. This mode of proceeding is very unsatisfactory, and may lead to the eventual submission of a supplemental estimate; the Government desire therefore that a regular and careful survey be made of this portion of the road. It is also observed that portions of the road between Prosutpoor and Rumbah are not intended to be metalled, in consequence of the soil in that locality being sandy or hard; but looking to the probable amount of cart traffic on the line, the Government are of opinion that no part of it should be left unmetalled. It appears also very desirable that a masonry bridge should be built across the Mahanuddy which the road crosses near Aska, instead of the wooden one, proposed by Major Birdwood. The Government therefore request that the Chief Engineer will issue instructions to have revised Plans and Estimates prepared with reference to the above observations, which he will be good enough to forward for entry in the Budget of 1859-60.

Report BBBBB, *on estimate for Rupees* 21,780.

6. The estimate forwarded with this Report is for excavating a navigable Canal from the Chilka lake to the Ganjam river, near the Port of Ganjam. This work was first suggested by Lieutenant Colonel F. Cotton in his report on the Ganjam District of 12th* July 1856, (para. 87) and its object is to extend the water communication by the Chilka lake to the Port of Ganjam; and thus obviate the inconvenience experienced by traders using the lake in having to land their goods at Rumbah and transport them thence at much expense, on bandies to the Port of Ganjam. The Acting Collector in giving his support to the undertaking, observes that the proposed Canal would be the means of promoting the commercial prosperity, not only of the Ganjam District, but of the Bengal Districts bordering on the Chilka lake. The Government consider this to be an excellent project, and direct its being entered in the Budget of 1858-59, at the estimated cost of Rupees (21,780) twenty-one thousand, seven hundred and eighty.

* Vide E. M. C. dated 4th November 1856, No. 2050.

Report DDDDD, *on estimate for Rupees* 25,400.

7. With his Report MMMM dated 6th December 1856, the Chief Engineer forwarded an estimate, amounting to Rupees 10,640, for constructing a road from the Nowpada Salt pans to the town of Bomally on Trunk road No. 6, and the estimate forwarded with the above Report DDDDD, is for continuing this line to Juggernautpoorum on the road from Chicacole to Palcondah. The former Report, which, with several others, was returned to the Chief Engineer with Extract Minutes Consultation of the 3rd January 1857, No. 11, has not since been reforwarded, and as no reason appears for treating the two projects separately, theGovernment request that one estimate may be submitted for the whole line for entry in the Budget of 1859-60. This estimate should be prepared with care, for on looking into the one now before Government, some doubt is entertained as to its sufficiency, the country being, it is believed, very difficult during the rains.

Letter dated 23rd March 1857, *No.* 11178, *with estimate for Rupees* 350.

8. The estimate submitted with this letter, amounting to Rupees (350) three hundred and fifty, for constructing a platform bridge across the surplus channel of the Wadada Dasee Gedda near the village of Doosee, is sanctioned for entry in the Budget of 1858-59.

RAJAHMUNDRY.

Report J, *on estimate for Rupees* 7,500.

Report K, *on do. for* „ 1,150.

9. The first of the above Reports is on an estimate for extending the embankments of the Yennamadooroo channel to Doovah. This work appears to be very necessary to admit of the

channel effectually carrying off the floods discharged from the Yerra Calva over the Doovah Calingulah. The estimate forwarded with the second report is in connection with the above work and provides for constructing a wooden foot bridge over the Doovah Calingulah, from the want of which, the District Engineer reports that, it is impracticable to "work the shutters during the period when the Yerra Calva is in full flood." The Government sanction the entry of the two works in the Budget of 1858-59, at the estimated cost respectively of Rupees (7,500) seven thousand and five hundred, and (1,150) one thousand, one hundred and fifty.

Report O, *on estimate for Rupees* 13,610.

Report XXX, *on do. for* „ 5,400.

10. The estimate forwarded with the first of the above Reports is for constructing a Lock and two Aqueducts in the Nuggarum Talook; the former with a Calingulah at a cost of Rupees 5,680, and the two Aqueducts, one at Kuddaly and the other at Chintalapilly, at an outlay respectively of Rupees 4,720 and 3,210. The Lock is intended to diminish the fall over the Gunnarum aqueduct, and thus to admit of boats navigating it with greater safety; and the aqueducts are necessary for carrying the Cuddalay channel water across the channels which have been cut through the sand-ridges, in order to drain the lands lying between them, and which, it is stated, yield abundant crops. The work reported upon in the second of the above papers, has been found necessary to admit of the drainage of some twenty square miles of country passing under the channel excavated in the Central Delta, past the town of Amalapore. All these works appear to be necessary in connection with the Godavery Annicut Project, and the Government sanction, for entry in the Budget of 1858-59, the two estimates submitted, amounting respectively to Rupees (13,610) thirteen thousand, six hundred and ten, and (5,400) five thousand and four hundred.

Report HHHH, *on estimate for Rupees* 13,890.

11. With this Report, the Chief Engineer forwards an estimate for constructing a road from Nursapore to Utteelee, through a portion of the Godavery Western Delta, a distance of 16⅛ miles. The object of this road is to connect the town and Sea port of Nursapore with the large markets at Veeravasarum, Utteelee, Ralinghee, &c. and the want of it is stated to be much felt, from there being no Canals in that direction leading immediately to Nursapore. From Utteelee, the communication, it is further stated, will be continued on to the Godavery at Vijaiswarum by means of the banks of the Utteelee Canal and Nelyaoor. The Government admit that the proposed communication is one very much needed, but they cannot approve of the Project in its present shape. The District Engineer it is observed, proposes to use only sand for covering the road, but this sort of metalling will never stand in alluvial soil, such as that on which the road will have to be formed. The Chief Engineer is therefore requested to instruct the District Engineer to prepare a revised estimate for entry in the Budget of 1859-60, providing for more durable road metal; and in laying this document before Government, Colonel Faber will be good enough to forward also a sketch map shewing the direction of the road. The survey referred to in para. 6 of the Chief Engineer's Report, has not been received in this office, nor is it entered in the list of enclosures given at the foot of the Report.

Report ZZZZ, *on estimate for Rupees* 21,080.

12. This is an Estimate for constructing an embankment, with sluices, to the river Godavery from the town of Rajahmundry to the village of Seetanagrum. The work is required to ensure from inundation an area of about seventy square miles of land; of which a large portion lying at present uncultivated from being swamped, will, it is stated, by the exclusion of the river freshes, be gradually brought under cultivation. From the District Engineer's letter it appears that the proposed embankment was long ago urgently petitioned for by the people, as also recommended by the Collector, and as the work has been shewn to be very necessary, the Government sanction its entry in the Budget of 1858-59 at the estimated cost of Rupees (21,080) twenty-one thousand and eighty.

Report AAAAA, *on estimate for Rupees* 99,700.

13. With this Report, the Chief Engineer forwards an estimate for repairing Trunk road No. 6 from near Nullacherla to Toonee, a distance of eighty-one miles. This portion of the road has never been made, and the estimate now submitted, which provides for earthwork, metalling, and gravelling with minor masonry works at no less a cost than Rupees 99,700 or about Rupees 1,231 a mile, must necessarily be for the construction of the road, and not for mere repairs, as stated by both the Chief Engineer and District Engineer.

14. In para. 16 of his letter of the 14th November 1855, Captain Rundall states that a bridge is much required across the Yalairoo at Yenaveram, and that he has prepared a separate estimate for the work. The Government think it preferable that the estimate for the road should make provision for the bridge also, and they request therefore that this be done, and a revised estimate submitted for entry in the Budget of 1859-60, accompanied by a sketch of the road for eventual transmission to the Government of India.

Report D, *on estimate for Rupees* 830.

Do. E, *on do. for* „ 510.

15. The estimates forwarded with these Reports, and providing for the works specified below, are sanctioned for entry in the Budget of 1858-59.

D. Constructing two Cells to the Police Cutcherry at Cocanada to serve as lock-up-places for Europeans	666	
Do. a cooking shed to do. for the use of the Native Prisoners	164	
		830
E. Constructing a Sub Officer's Cutcherry at Boorumpollem in the Tademulla Talook	510	

MASULIPATAM.

Report AA, *on estimate for Rupees* 13,660.

16. The project brought forward in this Report is for constructing a Calingulah and Lock near Casarapilly, at a cost respectively of Rupees 1,880, and 11,780, to regulate the supply of water from the Ellore high level channel to the Boodoomair, and to admit of the passage of boats from one to the other. The necessity for the works is satisfactorily explained in the Report, as well as in the District Engineer's letter forwarded with it; and the Government sanction the estimate submitted, amounting to Rupees (13,660) thirteen thousand, six hundred and sixty, for entry in the Budget of 1858-59.

Report QQ, *on estimate for Rupees* 4,120.

17. This report is on an estimate for constructing a wooden bridge across the Tummilair river at Gootaypaud in the Tirwoor Talook. The river being rapid while in flood, and its banks steep and high, should certainly be bridged, for the convenience of the extensive traffic passing over it; but the Government are of opinion that a masonry work would be preferable, and they therefore request the Chief Engineer will obtain and forward a revised estimate to be included in the Budget of 1859-60.

Report RR, *on estimate for Rupees* 5,720.

18. This is an estimate for constructing a Bridge across the Julapoodee Calvah at Ellore, with the view of keeping always open the communication from that town to the north. The project, as designed by the District Engineer, is to consist of four segmental arches, of which two are to be of 30 feet, and the other two of 24 feet span, but from the Chief Engineer's Report, it would appear that that Officer prefers a bridge of only three arches of 36 feet span to be elliptical, instead of segmental. The Government defer sanctioning the work for the present, and they request that a revised plan and estimate prepared in accordance with Colonel Faber's suggestions may be laid before them for entry in the Budget of 1859-60.

Report FFFFF, *on estimate for Rupees* 2,000.

19. In Extract Minutes Consultation of the 3rd September 1856, No. 932, Revenue Department, the Government approved a proposal which was submitted by the Board of Revenue, at the instance of the Collector of Masulipatam, for constructing a Second Class Bungalow on the north bank of the Kistnah river on the coast road branching from the northern Trunk line, and they at the same time called for an estimate for the work. The estimate submitted by the Chief Engineer with the above Report in pursuance of this order, and amounting to Rupees (2,000) two thousand, is now sanctioned for entry in the Budget of 1858-59.

Report HHHHH, *on estimate for Rupees* 21,190.

20. With this Report, the Chief Engineer forwards an estimate for constructing an Annicut with head and under sluices across the Tummilair river, and excavating a supply channel to the Singasagarum tank. The District Engineer reports that the remains of an old masonry annicut exist, across the river, which formerly supplied several tanks in the Tirvoor Talook, and that the Ryots, who have presented urgent petitions for the restoration of the work, have promised to pay additional Revenue to the amount of Rupees 7,383. It further appears that the remissions made to the Ryots, amounted during the last five years to about Rupees 7,786; and this, it is expected, will be saved when a supply of water to the tanks is rendered certain by the proposed work. The Collector, it is observed, has not been consulted in respect to the present project; the Government therefore direct that the opinion of that Officer be obtained and forwarded, and the estimate re-submitted for entry in the Budget of 1859-60.

GUNTOOR.

Report B, *on estimate for Rupees* 38,100.

21. The above Report is on an estimate for diverting a large portion of the land floods from the Nukka Vaugoo in the Nulla Mudda, for embanking the latter, and disposing of the rest of the drainage by means of tunnels under the Coommamoor channel. This channel is described to be yearly increasing in value, but by its intercepting a large amount of drainage from the westward, much valuable land is submerged during the monsoon, and rendered unfit for cultivation; and the channel banks moreover are continually breached after heavy falls of rain. The loss from the first of the abovementioned causes is estimated by the Collector at Rupees 3,000, and the expenditure on repairs to the channel banks is stated to amount during the last ten years to Rupees 16,128 or about Rupees 1,613 per annum; thus making the annual loss to Government, about Rupees 5,000. The measures contemplated by the Civil Engineer of the Kistnah Division appear to be well calculated for the attainment of the end in view, which that Officer observes "is not merely the saving of the Rupees 5,000 that are now annually spent or "lost, but the reclaiming of a large tract of rich land now neglected as swamp, the fitting it "for improvement in connexion with the Kistnah annicut irrigation project, and the turning to "good account, for the better supply of several highly valuable tanks, a vast quantity of water "which is now allowed to run to waste, and in doing so, to occasion immense mischief." The proposed embankment to the Nulla Mudda will also, it is stated, prove serviceable as a road, in a locality where such accommodation is much needed. The Collector, it is observed, fully approves of the project, and the Government concur with the Chief Engineer, as well as with Captain Orr, in considering the work as a necessary part of the system of the Kistnah irrigation. The estimate submitted amounting to Rupees (38,100) thirty-eight thousand and one hundred, is accordingly approved for entry in the Budget of 1858-59, for the sanction of the Government of India.

Report BB, *on estimate for Rupees* 2,800.

22. The estimate forwarded with this Report is for constructing a Calingulah with a Platform Bridge and Sluices across the Toongabuddra Nullah, near the head of the Coommamoor channel. The object of the Calingulah and Sluices is mainly to regulate the supply of water for the irrigation of the extensive lands in the Poovoor and Baupetlah Talooks, under the channel, and the bridge is intended to afford accommodation to the traffic crossing the Toongabuddra. The necessity for the works is satisfactorily explained in the above report, as also in the District Engineer's letter forwarded with it; and the Government sanction the estimate amounting to Rupees (2,800) two thousand and eight hundred, for entry in the Budget of 1858-59.

23. The estimates sanctioned in these orders for entry in the Budget of 1858-59, and those for which sanction has been deferred, are as follow:

Date of Chief Engineer's Report or letter.	Work.	Amount.
		Rs.
	For entry in the Statement No. 1.	
	GANJAM.	
GG, dated 6th Decr. 1856.....	Constructing bridges on Trunk road No. 6 from Chicacole to Sunthoshapoorum... 23,790	
	Do. do. on do from Sunthoshapoorum to Dendagedda near Itchapoor 23,430	
		47,220
	GUNTOOR.	
B, dated 6th do.	Draining the country to the westward of the Coommamoor channel by diverting the Nukka Vaugoo into the Nulla Mudda, embanking the latter and constructing tunnels under the Coommamoor channel	38,100
		85,320
	For entry in the Statement No. 2.	
	GANJAM.	
A, dated 6th do.	Constructing a second class road from the Salt pans at Nowpada to Teckally Ragoonadapoorum on Trunk road No. 6... ...	5,330
BBBBB, 6th do.....	Excavating a navigable Canal from the Chilka Lake to the Ganjam river near the Port of Ganjam.	21,780
Letter dated 23d Mar. 1857, No. 11178...	Constructing a platform bridge across the surplus channel of the Waddada Dasee Gedda near the village of Doosee... ...	350
	RAJAHMUNDRY.	
J, dated 6th do.	Extending the embankments of the Yennamadooroo channel to Doovah...	7,500
K, dated 6th do.	Constructing a wooden foot bridge over the Doovah Calingulah.	1,150
O, dated 6th do.	Do. a Lock in the Nagarum Talook... ... 4,010	
	Do. a Calingulah in do. 1,670	
	Do. an aqueduct in do. at Kaddaly... 4,720	
	Do. do. in do. at Chintalapully... 3,210	
		13,610
XXX, dated 6th do.	Do. an aqueduct over a drain crossed by the Amalapore channel...	5,400
ZZZZ, dated 6th do.	Do. an embankment with sluices to the river Godavery from the Town of Rajahmundry to the village of Seetanagram...	21,080
D, dated 17th do.	Do. two Cells to the Police Cutcherry at Cocanada, to serve as lock-up-places for Europeans ... 666	
	Do. a cooking shed to do. for the use of the Native Prisoners 164	
		830
E, dated 17th do.	Do. a Sub Officer's Cutcherry at Boorumpolliem in the Tademulla Talook	510
	MASULIPATAM.	
AA, dated 6th do.	Constructing a Calingulah near Casorapilly... ... 1,880	
	Do. a Lock near do. 11,780	
		13,660
FFFFF, dated 6th do.	Do. a second class Bungalow on the north bank of the Kistnah river on the coast road, branching from the northern Trunk road...	2,000
	GUNTOOR.	
BB, dated 6th do.	Do. a Calingulah with a platform bridge and sluices across the Toongabuddra Nullah, near the head of the Coommamoor channel...	2,800
		96,000
	Total for Nos. 1& 2.....	1,81,320

Estimates deferred.

Date of Chief Engineer's Report or letter.	Work.	Amount.
		Rs.
	GANJAM.	
QQQQ dated 6th December 1856.	Constructing a road from Aska to Rumbah on the Chilka lake.	30,860
DDDDD, dated do.	Do. do. from Bomally on Trunk road No. 6 to Juggernautpooram on the road from Chicacole to Palcondah.	25,400
	RAJAHMUNDRY.	
HHHH, dated do.	Constructing a road from Nursapoor to Utteelee through a portion of the Godavery Western Delta.	13,890
AAAAA, dated do.	Do. Trunk road No. 6 from near Nullacherla to Toonee...	99,700
	MASULIPATAM.	
QQ, dated 6th do.	Constructing a wooden bridge across the Tummilair river at Gootaypaud in the Triwoor Talook...	4,120
RR, dated 6th do.	Do. a bridge across the Julapoody Calvah at Ellore ...	5,720
HHHHH, dated do.	Do. an annicut with head and under sluices across the Tummilair river and excavating a supply channel to the Singasagarum tank	21,190
	Total.....	2,00,880

(Signed) H. FORBES,
Acting Secretary to Government.

No. 22. Read the following letter from Colonel A. COTTON, Commandant of Engineers; to H. FORBES, Esq., Acting Secretary to Government, dated 24th September 1857, No. 494.

SIR,

In obedience to the orders contained in the Extract from the Minutes of Consultation No. 602 dated 1st April 1857. I have the honor to forward two plans and a memo. of the origin, early history and subsequent alterations of Fort Saint George, drawn up by the Garrison Engineer.

A MEMORANDUM OF THE EARLY HISTORY OF FORT ST. GEORGE.

In March 1639, the Rajah of Chundgherry invited Mr. Francis Day, the Chief of the English Factory at Armagon, to remove his establishment southwards; and granted him a piece of ground five miles long, and one broad, on the sea cost at the small village of Madras, whereon to build a Town and Fort.

This new Town was called Chinnapatam, after Chinnapa the father of the then Naick or local Governor. Without waiting for orders from the Court of Directors, Mr. Day at once proceeded to erect his new Factory, surrounding it by a slight wall which was defended with four ill constructed bastions, and as many batteries. He gave the fortification the name of Fort Saint George. At this period there were not more than a few fishermen's huts at Madras, but to encourage the natives to settle in the English possession it was proclaimed, "that for the "term of 30 years no custom on any thing to be eaten, drank or worn, should be taken from "any of the town dwellers." This appears to have had the desired effect of rapidly colonizing the new British settlement. Houses for the merchants and servants of the Factory soon sprang up outside the Fort, to the south and south-west, which the Natives called the "White Town," in contradistinction to their own residences in "Black Town." In 1644 the money expended on the fortifications amounted to £2,294; and it was computed that 2,000 £ more would be necessary to render them impregnable to the native powers. At this period the Fort was garrisoned by 100 European Soldiers, but in 1652 there were only 26, whilst shortly after the number was further reduced to a permanent guard of ten men. The Agent and Council of each factory were entrusted with Martial Law for the Government of the troops kept for its defence. Messrs. Greenhill and Chambers had been respectively holding the position of Chief Agent, but in 1653 Madras was raised to a Presidency; and Sir Edward Winter was appointed the first Governor. In 1662 a number of Africans were introduced into the British service, and trained to the use of arms. In 1665 a ship arrived from England with recruits, bringing out Mr. Foxcroft to supercede Sir Edward; the latter, however, imprisoned Foxcroft and retained possession of the Fort till August 1668, when he delivered it to Commissioners sent purposely from England. Mr. Foxcroft then assumed the Government and held it till 1671, when he was succeeded by Sir James Langhorne. For subsequent Governors, see Male Asylum Almanac for 1857.

In 1672 the garrison was increased by the enlistment of sailors from the ships. In 1676 advices were received of another batch of recruits having been sent out; and the Court of

Directors prohibited the custom of training natives to the use of arms, and the removal of any Officer from a Civil to a Military situation. In the following year the Mahratta Chief, Sevajee, hovered within fifteen miles of Madras, intending to make a dash upon it, if opportunity offered; but finding none, quitted the Carnatic soon after.

In 1681 the first detachment of thirty Soldiers was sent to Bengal from the Fort St. George. In 1686, the Governor was in anxiety for the safety of the Fort, which was constantly threatened by Arungzebes Army. In 1690, a troop of Horse, and a Company of European Artillery were added to the strength of the Garrison; and during the succeeding two years the country round about Madras was in a most unsettled state.

In 1693-94, the Court of Directors dispatched recruits with orders to strengthen the fortifications of Fort St. George; but no trace of what was done is to be found in any of the records. In 1696, the Revenues at Madras amounted to 40,000 pagodas.

The first war at Madras occurred in 1702, between the English and Mahomedans. Davoudkhan, Arungzebes General, blockaded the place, and said he had orders to demolish it; he was, however, easily repulsed. Gun powder was first made in Madras; and in 1703 the manufacture was so much improved that no more was sent from England.

In 1706-7 Governor Pitt was apprehensive of being attacked by the Arab fleet, and strongly represented the weakness of the Fort. In 1703 there were petty disputes between the right and left hand castes, each threatening to retire to St. Thomé, if superiority were not granted.

In 1709-10, Davoudkhan was succeeded by Saadut Olla, as Nabob of the Carnatic, but nothing particular connected with Madras appears to have occurred during his reign. In 1723 the Court authorized a Mint to be erected, and the Gun powder Factory to be repaired and enlarged. The Fort was also repaired. The Mint was erected inside the Fortress near the present Royal Bastion. The Gun Powder Manufacture was carried on by contract at the present side of the Mint in Black Town until blown up by Lally in 1758.

In 1741 a large Army of Mahrattas appeared before the Fort and demanded tribute, but the English replied by the fire of their Guns and drove them off. In 1742 more Troops arrived and the Directors directed the Governor to put the Fort in the best posture of defence, and to give contributions to neither Moors nor Mahrattas.

In the following year an Engineer named Smith submitted plans for strengthening the Fort, and increasing its area from 15 to 30 acres; and he defined this additional area by a wet ditch which he dug and faced with bricks. He traced out 4 new bastions, one on each side of the north west and south west flanks, and two on the west. These were afterwards called the Royal or Mint bastion; Pygots, Lawrence and the Nabab's bastions. All these works were carried on as high as the berm, but from financial reasons were then discontinued; and Orme states that at the commencement of hostilities, "the naked ditch remained neither an obstruction nor defence." On the breaking out of the war between England and Francc in 1746, Dela Bourdannais the Governor of Mauritius, appeared in the offing with a large fleet and cannonaded the town, but without doing much damage. At this period the trade with England had raised Madras to great opulence and reputation. There were 250,000 native inhabitants in the Company's territories, while the English did not exceed 300 in number, 200 of whom were the soldiers of the garrison.

In the following September the French Squadron again appeared before Madras with 3,500 Troops, consisting of 1,100 Europeans, 400 Caffres and 400 Natives; with 1,600 European mariners. They landed at St. Thomé and bombarded the Fort on the west side from a battery of nine pounders and on the south from five mortars; and on the east from the ships in the roads. On the 10th the Fort capitulated when it was agreed that the English should surrender themselves prisoners of war, and the town be delivered up, subject to ransom. The English only lost four or five men, and the French none. Dela Bourdannais and Duplex, the Governor of Pondicherry, differing as to the terms of the ransom, it was eventually declared null. The English were compelled to deliver up unconditionally the keys of the Fortress and every thing belonging to it, except personal clothes and jewels, and it is stated that the French realized by plunder £ 2,00,000. Some of the English refused their parole and escaped to Fort St. David; while the Governor and several of the principal inhabitants were taken prisoners to Pondicherry. At the end of the year the Moors, under Maphurze Khan, threatened to attack the French at Madras, and proclaimed their intention of assisting the English. A plan is hereto attached shewing the contour of the old Fort, and the works which were contemplated when the place was surrendered to the French. Paradis was appointed French Governor, and he added considerably to the strength of the fortifications.

Fort Saint George, Public Works Consultation of 10*th November* 1857.

On the loss of Fort St. George, the British Presidency was transferred to Fort St. David, and about this period the natives were first enrolled as Sepoys under the English banner. In 1748 Major Lawrence arrived at Madras, with re-inforcements, but on proceeding southwards was taken prisoner before Areancopang and carried to Pondicherry. In 1749 hostilities ceased. Lawrence was released and he, together with Wynch and Westcott, were appointed Commissioners to receive back the Fortress.

The fortifications were found to have been much improved during the two years they were possessed by the French. The bastions and batteries had been enlarged and strengthened; part of Black Town had been destroyed, and with its ruins an excellent glacis on the north side had been formed, and palisades and covert ways in front of the two north gates had been constructed. A glacis on the south had also been commenced; but still the defences were very inferior and incapable of making much resistance against a regular European force; nor had any extension been made of the internal area, which until 1756 did not exceed 15 acres.

In 1750, Mr. Benjamin Robins arrived from England as Engineer General. He immediately planned the improvement of Fort St. George, but did not live to carry the work out. Some considerable time elapsed before any thing was done, but in 1756 the apprehension of another attack from the French, compelled the Governor in Council to strengthen the fortification. For the next two years 4,000 work people were constantly employed in partially carrying out the work proposed by Robins. The trace of the Fort at the commencement of the last war in 1758 was a semi decagon, closed at the gorge by the sea face. The state of the fortifications at this period is minutely described in the following account from Orme, Vol. 3 page 402.

"To join the new rampart with the old bastion to the south-west and to gain the ground in the new area which was occupied by the river, its bed was filled up, beginning from the south-west bastion, with earth dug from the edge of the rising ground of the Black Town to the north-west, which the excavation removed 40 yards farther from the works: but only two-thirds of the bed of the river under the old wall had been choked up. The river, stopped in its former channel, was directed in another, which environed the west and part of the south face of the new works, washing in some places the foot of the glacis, until it rejoined its former bed at the head of the spit of sand. The old wall of the western side still remained as a retrenchment to captulate on, in case the outworks should be carried. The new extension on this side comprised three large bastions and their out works. The southern of these three bastions communicated with the old bastion, which stood before on the south-west angle, by the curtain

raised across the former channel of the river; and this curtain increased the south face of the Fort from 130 to 210 yards. Nevertheless, the works on this side were much less defensible than those to the west and north; but the surface of water and quagmire in the river before it, rendered this front inaccessible, excepting by the labours of a much greater Army, than the present attack. The ground on the north of the Fort gave the besieger much more advantage than on the other sides; and this face was therefore strengthened in proportion: the two former bastions and rampart, as improved and left by the French, were suffered to remain; but the ditch and glacis which they had dug and raised, were the one filled up, and the other removed further out, to admit better works. In the front of the north-west bastion was raised another capable of mounting 28 guns; each of the faces were 100 yards in length, and a battalion might be drawn up on its rampart, although a large vacancy was left in the gorge, or back part, to increase the interval towards the former bastion behind, which this was intended to cover: it was, from its superior strength, called the "Royal Bastion." A demi bastion, corresponding with the Royal, was raised before the old north-east bastion, that stood on the beach of the sea, which, however, the demi bastion did not entirely envelop; for its right hand or east face extending in a line parallel to the sea, adjoining to the shoulder angle of the northern face of the old bastion, leaving this face free to fire forward, but confining the extent of ground it commanded to the same width as the space between the east face of the demi bastion and the sea: to the westward, the old bastion had two guns clear of the demi bastion, which supplied the defence on this side by four guns in the flank, and seven in its northern face. The two new bastions communicated with each other by a broad faussebray that passed along the foot of the old rampart and bastions; this faussebray was defended by a stout parapet seven feet high, which adjoined to the flanks of the new bastions. The ditch on this front was dry, because the ground here was seven feet higher than the level of the Canal which supplied the ditches to the west and south; but a cuvette or trench, seven feet deep and 25 feet broad, was dug the whole length of the ditch, which before the faussebray was 180 feet wide, and before the bastions, ninety. The covered way of this front was broad and well pallisaded, and contained between the two bastions a large ravelin capable of 18 guns, nine in each of its faces. The glacis was excellent, and little was wanting to complete the defences on this side, excepting Mines, which the want of time and bricklayers had not allowed. The western face had likewise its covered way pallisaded and glacis, and contained three ravelins, of which that in the middle was the largest. The eastern face extended along the beach of the sea within twenty yards of the surf; but ships could not approach near enough to batter it with any effect; and no guns could be brought to bear upon it by land. Before the sea gate, which stands in the middle of the curtain, was a battery of 13 guns; fifty yards on the right of this battery was a platform of old standing, with 14 guns to return salutes, which had hitherto been left without a parapet: the original curtain, although nothing more than a brick wall four feet thick, had never been strengthened; but a trench, six feet deep and ten wide, had lately been dug before it; and a ditch, with pallisades, was intended to have been carried round the battery and the platform, but had not been executed at either. The only danger on this side was from a sudden assault or surprize, which would rarely come by boats landing unawares across the surf; but always, and with ease by a body of men passing on the edge of it by either of the bastions at the extremeties; to prevent which, a row of anchors, backed by pallisades, and a trench were extended from the neck of each bastion quite into the surf. No buildings, excepting sheds had been raised in the new ground taken in to the westward; and in those of the old, the bombproof lodgments were not sufficient for the security of the garrison."

The foregoing was the state of the fortifications in December 1758, when the French Army appeared under the personal command of Lally. It consisted of 3,500 Europeans, 2,000 Sepoys

and 2,000 Native and European Cavalry. In all 7,500. The defenders of the garrison on the other hand amounted to only 3,978, of whom 1,605 were English, 153 Topases and Caffres, and 2,000 Sepoys; besides 150 Non-Military British residents and about 200 of the Nabob's Horse. The defence was entrusted to Governor Pigot, asssisted by Lawrence. The attack commenced on the 12th December 1758, and was almost exclusively confined to the north side of the Fort. The enemy's largest battery, consisting of 15 guns and 6 mortars, was placed near the present office of Parry and Co. from whence zigzags and parallels were pushed forward to the north-east bastion. Another battery of 4 guns was planted at the Obelisk near Popham's Broadway. A third, of 10 guns, 500 yards, to the north-west near the present Patchapah's Hall; and a fourth close to the present General Hospital. There was also a battery of two heavy guns on the south side of the Cooum bar, which was manned from a detachment which had taken possession of the Company's gardens, the site of the present Government House.

Mr. J. Call was the Chief Engineer on the side of the British, and his journal of the siege will be found in Cambridge's War in India, published in 1762, together with a detailed plan of the Fort as it then stood. The siege was raised on the 17th February after the garrison had been shut up 67 days, and the enemies' batteries had been opened 46. The sudden arrival in the road of a convoy of British ships doubtless hastened the enemies retreat, who after setting fire to the Gun Powder Manufactory decamped towards Pondicherry; leaving behind 52 guns, most of their ammunition, and *all* their wounded. During the siege the Fort fired 26,554 rounds of cannon; 5,702 shells, and 1,990 hand grenades. The musketry expended 2,00,000 cartridges, 1,768 barrels of gun powder were used and 30 pieces of cannon and five mortars had been dismounted. The French fired 8,000 shells chiefly directed against the buildings in the Fort, in which nearly every house was demolished. The British lost in killed, wounded and prisoners, 592 Europeans, and 346 natives, besides 400 deserters, but the French loss was never correctly ascertained.

Thus ended the last seige of Fort Saint George, since which time it has never been attacked although occasionally threatened by the French, and approached very near by Hyder Ally in 1767 and 1781. As was to be expected on the close of so memorable a defence, the Fort was found to be in the most dilapidated state, and it was eventually determined by the Court of Directors and the Madras Government, that it should be thoroughly repaired upon the most approved plans and according to the best modern system of fortification; at the same time the utmost economy was strictly ~~enjoyed~~ enjoined. In 1760 the Court ordered compensation to be granted to the inhabitants of Black Town for their houses destroyed to clear the Espianades, and that for the future no encroachments should be allowed.

The records of the office of the Commandant of Engineers commence with a letter from Mr. J. Call the Chief Engineer in 1761, wherein that Officer deplored the inefficient state of the works and the slow progress made; and he recorded his opinion that great blame and responsibility would rest upon the authorities if ever Madras was again placed in the same dangerous insecurity as it was in 1758. From the removal of the Presidency from Fort Saint David to Fort Saint George in April 1752, Pagodas 6,32,234 or 22⅛ lacs fo Rs. had been expended on the fortifications, but part of this sum had been incurred for the siege, while all the disbursement for Military stores was also included. Mr. Call considered it would take ten years to render the Fort, thoroughly defensible, and complete with Barracks, Magazines, &c., and that some idea of the enormous cost might be guessed by the expenditure already incurred.

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to the north-west bastion within the demi one; the continuation of the north curtain to the middle gate; the parapets and embrasures there, and those at the Royal bastions, including the bombproofs and magazines; the fausse bray between the Royal and demi bastion, and a gate way opened through to the north ravelin; the caponier with its banquets on each side, and the traverses near the gorge; the wet ditch 50 feet broad and 7 deep had been faced all round on both sides before the demi bastion; also the Royal bastion and the bombproofs, the Officers barracks, together with considerable repairs and renewals to the Civil buildings in the Fort.

After thus enumerating the above completed works, Mr. Call proceeded to recommend that the ditch around St. George's ravelin should be at once finished; but that in consequence of the general financial pressure, the monthly expenditure on the fortifications might be limited to 2,000 Pagodas.

In the same year 1769, that Officer urged on Government the necessity for having a permanent fortification around Black Town, instead of the then temporary pallisades, and insecure defence; and he submitted plans for the work now in existence. He calculated that the whole would be completed at a cost of 1,50,000 Pagodas; and recommended that the esplanades should be cleared for a distance of 300 yards all round the intended fortification. Accordingly the Black Town fortification was actively begun and nearly completed in 1770. The great utility of the work is stated to have become daily more apparent and the Court suggested that the inhabitants should pay a portion of the expense, but which proposition was afterwards overruled. During the progress of the Black Town fortification little was done to the Fort works, but on the completing of the former the latter were again vigorously resumed.

In the following year Mr. Call was succeeded by Colonel Ross "a gentleman of great character and repute in his profession" who submitted revised plans for the completion of all the fortifications as they now exist, and by whose energy and skill they were successfully brought to completion in 1787.

For further particulars regarding the description, armament and present state of the fortifications, I beg to refer to the following documents already submitted to Government by Colonel Faber, late Commandant of Engineers with his letter No. 91 of 23rd April 1856.

1. Description of Fort St. George.
2. Statement of the supposed cost of the fortifications.
3. Memorandum shewing the number of Guns mounted on the encieinte and outworks, and the number required to complete its armament and cots and men that can be located within the curtain and outworks.
4. Extract from the reports of the Annual Committees on the Fortifications from the year 1800 to 1851.
5. Notes on the state of the dilapidations of the Fortifications of Fort St. George.

Fort St. George,
29th July 1857.

(Signed) H. W. RAWLINS, Captain,
Garrison Engineer.

No. 23. ORDER THEREON, No. 2068; dated 5th November 1857.

Ordered that the above letter and the papers accompanying it be forwarded to the Military Department, with reference to para. 7 of an Extract from the Minutes of Consultation in that Department dated 4th June 1856, No. 1354, and that the several enclosures received with the Town Major's letter of the 29th April 1856, be printed and brought on the Proceedings of Government.

(Signed) H. FORBES,
Acting Secretary to Government.

Letter from Captain T. THOMPSON, Town Major; to J. D. BOURDILLON, Esq., Secretary to Government, D. P. W., dated 29th April 1856, No. 1483.

SIR,

I am directed by the Right Honorable the Governor to forward to you the accompanying letter from the Chief Engineer Department Public Works and Commandant of Engineers, No. 90 of the 23rd Instant, together with Plans and Estimates connected with the Fortress and Fortifications, for submission to the Right Honorable the Governor in Council.

Letter from Colonel C. E. FABER, Chief Engineer; to Captain T. THOMPSON, Town Major, dated 23rd April 1856, No. 90.

SIR,

For submission to His Excellency the Governor and Commander in Chief of Fort Saint George, I do myself the honor to transmit a voluminous series of documents connected with the present state of the Fortress and Fortifications, together with 22 estimates, amounting in aggregate to Rupees 14,48,470 and 23 illustrative drawings, in one of which, the general one is exhibited in yellow, the portions of the Fortifications at present in a state of dilapidation.

Comprised in 12 sheets.

2. I shall be very much obliged by your obtaining his Lordship's permission to forward the whole of these papers to the Secretary to Government in the D. P. W. with the letter to that functionary of this day's date, No. 91, from the Commandant of Engineers; and I hope you will feel at liberty to support with your recommendation the proposition contained in the final para. respecting the early nomination of a Garrison Engineer to have charge of the extensive and important operations of which I have endeavoured to shew the necessity; and which I cannot doubt you will represent to His Lordship as quite indispensable in several cases, and highly expedient in all.

Letter from Colonel C. E. FABER, Chief Engineer and Commandant of Engineers; to J. D. BOURDILLON, Esq., Secretary to Government, D. P. W., dated 23rd April 1856, No. 91.

SIR,

1. After a much longer delay than I had at first reason to expect, and which as regards the despatch of the Annual Budget for 1856-57, I particularly regret, I am enabled at length to forward for submission to the Right Honorable the Governor in Council a series of highly important, and unavoidably must voluminous papers, connected with the present state of the Fortifications of Fort Saint George; together with separate estimates (22 in number) each illustrated by a drawing, marked with its own letter, of the probable expense of restoring each of the several dilapidated works to a condition of effective repair.

2. It will presently be seen, that the measures now called for, in order to place this Fortress on a footing of complete efficiency, are both so extensive and so costly, that a very particular consideration of the general question of maintaining the Fortifications in a defensive position would seem to be necessary. In point of fact, matters have now arrived at such a state, that the continued existence of Fort Saint George in a condition to fulfil the purposes of its original construction invites, or rather indeed, it demands a careful and comprehensive examination into

the present posture of the works, as regards defence and offence; into the effect on the Fortifications, which may properly be attributed to the numerous valuable structures, other than Military or contributing to the accommodation of the Garrison, which have been built within the walls, into the practical alteration insensibly caused by a gradual departure from the rule regarding encroachments on the outside space within the range of fire; into the observance or non-observance of the Military practices and precautions commonly enforced in fortified places; and lastly, into the very greatly changed political circumstances of the present day, which, perhaps, may safely be said to exclude the idea of an attack upon the Fort from any quarter but the seaboard.

3. Through the diligence and exertions of the Acting Adjutant of Engineers, Captain Hitchins, I hope I have been enabled to collect, and place before you all the documents which the Government may be desirous of consulting in order to arrive at sound conclusions on the several points now awaiting decision. These papers as regards arrangement and examination are not placed in the consecutive series which would best have subserved the purpose of reference; but I do not think, that any information has been kept back which the members of Government might wish to have at hand whilst taking the subject generally into consideration.

4. From 1 to 4, the enclosures consist of Extracts which have been made with great care and much labor from the Records of the Chief Engineer's office since the commencement of the present century. The object of these tedious compilations is to supply a history of each particular work during the last fifty-five years, by tracing through successive years, the opinions that have been placed on record by the Annual Committee on Fortifications, so that of the estimates now sent, its title may be identified with antecedent reports, and it may at once be ascertained what expenditure has taken place, and for what particular purpose on each. It is no small advantage to have this authentic information tabulated for ready reference, and whilst several discrepancies and inconsistencies may be detected in works almost condemned by one Committee, being represented by a subsequent one as in good order, owing to the practice still in vogue of hiding structual defects by superficial external repairs, it will still be manifest, that dating from a comparatively early era, much larger expenditures and much more extensive reconstructive measures were adopted in former times than has been the case in these latter days. I am not prepared to say whether in all permanently fortified places, equally great dilapidations are common; but the Government will clearly observe from the 4 sheets of Extracts, now forwarded, that the Fortifications of Fort Saint George on their present scale and plan, have, till comparatively lately, been a source of large yearly outlay. I have requested the Accountant General to favor me with moneyed returns corresponding with the extracts from Annual Commitees since the year 1800, but the above named functionary having has yet only prepared the account expenditures from 1800 to 1806, the probable further delay has prevented my detaining these papers, until the list of expenditures can be completed for each of the succeeding years. If the ratio of previous expenditure shall be ascertained to have been excessive, I should be much disposed to attribute such excess to the unaccountable omission of appointing, what, elsewhere seems an invariable practice, a Garrison Engineer to be placed in professional charge of the works, whose opinion would surely have been much more accurate and valuable than those of annual Committees, composed of ex-officio members, who amidst their own pressing avocations, devoted a very brief season of each year to a partly pro formâ examination and report, on the Fortifications of Fort St. George. I notice, that in Bengal and Bombay, no such grave omission has taken place, and I cannot doubt that the usual advantage of distinct personal responsibility has been reaped in these Presidencies.

5. The next paper, No. 5, is a brief description of the Fortifications, connected with which is No. 6, shewing the number of guns intended for the armature of the Fortress, and also the number of cots and of men off duty. The chief purpose of these documents is to convey a clear idea of the class that Fort St. George belongs to as a place of defence, of its strength, and of the value of its works. Without any thing definite on which to ground the opinion; I incline to the belief that the completeness of the Fortress, its lines of defence, flanking fire, and merits generally and commonly a good deal underrated. But neither professional science and

skill, nor profuse expenditure have been withheld to render the Fortress respectable, as a place of Arms, capable of offering a strict resistance to any such attack as could have been anticipated, when the construction was confided in 1775 to the ingenious and once well known Mr. Robins the inventor of the Balistic Pendulum, and of many improvements in the art of gunnery, as it then existed. It must of course be admitted, that in the lapse of more than three-quarters of a century, many of the conditions essential to fully carrying out the views of the projector have been overlooked and departed from; so that in the accumulation of valuable Government buildings within the place, and in the approach of both public and private structures, out side the walls, it has become a question, whether after the surrender of so much essential, to a good defence, it is now worth while, in deference to original traditions, to incur a large expenditure for maintaining Fort St. George as an effective Fortress. In order to somewhat guide the judgment in regard to the present and future treatment of the Fortifications, document No. 8 has been prepared, to show approximately, the Dead Stock value of the works; and having used the greatest care in making the computations from a variety of data which it would be tedious to enumerate, it will be seen that no less a sum than two crores of Rupees represents the cost of the Fortifications, so that assuming the valuation to be tolerably accurate, there is no difficulty in striking a per-centage on the principal, for the repairs and maintenance at present requisite.

6. To prevent the present report, which must unavoidably run to a considerable length, from being encumbered with a large mass of professional explanations and technical details. Document No. 7 has been drawn up, and it consists of notes describing, as succinctly as possible the state of the several dilapidated portions of the Fortifications. The copious illustrations of the Draughtsman will further explain the extent to which the dis-repair has extended; but during the very preparation of these voluminous papers, the quarterly repairs in progress on the permanent allowance, hide from any, but very keen observation, much on the sea face that had previously attracted general attention.

7. With these preliminary observations, I have now to solicit your attention to the detailed estimates and plans forwarded herewith. The whole of these are strictly for works either of reparation, or of re-construction, with the single exception of a new Tunnel, proposed by me, on the east front, to supply the ditch with fresh water from the sea, so as to keep it fresh and sweet, and thus, to obviate the serious evils threatened by the loss of the work through which water was originally drawn into the wet ditch, and which has been given up for the general sewerage of Black Town to Her Majesty's Justices in Session, and also by the loss of those daily accessions of tidal water which used to be received (though by no means purposely) by infiltration through the counterscarp wall on the sea face, until by the construction of the groins recommended by the special professional Committee of June 1854, the sea was thrown to so great a distance as to be no longer in contact with the outworks. The cost of the proposed Tunnel is Rupees 11,260, agreeably to the detailed plan submitted with it; and I strongly recommend that this work should be sanctioned for immediate execution, lest consequences, disastrous to the health of the Garrison should arise from the impracticability of renewing the present already offensive water of the ditch.

8. Without entering into a detailed examination of each of the numerous estimates, which it may be considered has been done in the notes numbered 7, I beg leave to observe, that with respect to the estimate for the South Redan on the sea face, marked A, I consider it indispensable to do much more than had been intended by the Superintending Engineer, when the superstructure was dismantled to prevent its total downfall. The estimate framed by the Superintending Engineer, Presidency Division, amounting to Rupees 15,595, provided merely for rebuilding that, which has been taken down; but the supposed original defect would thus be left untouched. Not only therefore in the estimate marked A, but in the whole series now forwarded, a very prominent feature throughout is the description of work proposed for the foundation in conformity with the views enforced in the Proceedings of the special professional Committee of June 1854, of the two methods described by those officers, namely piles with a timber platform of a durable wood, and piles with a thick footing or bed of concrete, the preference is justly given to the latter, provided always, that it can be made up at Madras of unexceptionable kind

and eminently possessing the specific qualities of that most useful compound, the first of which is induration in a high degree primarily, and subsequent insolubility in moist situations, or even when totally submersed. For the South Redan ; piles are to be driven in the interstices between the old wells, and around them, and a layer of concrete, three feet in thickness, is then to be placed on the top of them (after being driven home by the patent Pile Driving Machine.) The excellent hydraulic cement of Madras manufacture is then to be used, instead of common Mortar in the foundations, and the brick work with this material is to be carried to an average height of three feet above high water level ; so that for the main works, there are to be 12 feet below, and 3 feet above water mark, of brick set in water cement. I entertain little, or indeed no doubt in my own mind, that the extensive dilapidations may be generally attributed to the use of a lime unable to resist the action of sea water, acting often too under a high hydraulic pressure ; and that however great the first expense attending a liberal use of hydraulic cement, it would have proved true economy in the end.

9. But I ought to have particularly stated in this Report (although it may be gathered from my notes marked No. 7) that *all* the estimates now sent in, are far from being of equal urgency, or rather necessity. There are some of the proposed measures, which, though fully recommended, may for the present be safely deferred without danger, and without much ultimate increase of expenditure. But when I first undertook this matter of thoroughly examining the present state of the Fortress, early in November last (and some hours of each day since that time have been given to the subject) I found that the business increased so rapidly upon me, and that such numbers of additional requirements were being discerned, almost with the examinations of each day, that at length I came to the conclusion it would be more satisfactory to the Government, that nothing should be left undone, so that to whatever extent the Right Honorable the Governor in Council may be pleased to authorize immediate active operations being taken on some portions of the present Report, there should be once for all, a full set of estimates and plans at hand, which can be taken up at any time hereafter, that may be thought desirable. At first, I had expected that the labour of the Commandant of Engineers would be light and quickly disposed of, although the Report of the last Annual Committee on Fortifications in January 1854, which represented the necessity of a total expenditure of 5 lacs of Rupees, had prepared me for the discovery of a very general state of disrepair. Unfortunately no estimate, nor even measurements in support of the Committee's recommendation can be discovered, and the Stipendiary Member of the Military Board has no recollection of having seen any actual calculations. It was under these circumstances, that the plan was adopted which I have presumed of taking one work after another, and testing its condition in every practicable manner, so as to ascertain exactly what was really required in each case; and as the results multiplied, threatening an eventual aggregate far in excess of what had originally seemed so large a proposed outlay by the Annual Committee of 1854. I saw no other course to adopt, but that of disregarding all antecedents, and of following up the investigations, till the whole work was completed, as now it is in all its details. The sum total of emergent work, (which I am clearly of opinion should either be authorized for immediate execution, or else, to prevent probable fatal accidents the extent of which, in so thronged a place as the Fort, cannot be predicted, the works should be dismantled forthwith) is fortunately not very great, namely, Rupees 2,76,260, and is comprized in the following six estimates, viz.

		Rs.
South Redan sea face marked	A...	34,500
North do. do. do.	B...	34,500
North east Demi Bastion do.	C...	43,000
St. Thome Ravelin (very dangerous) do.	D...	75,000
Do. Caponiere	E...	40,630
South Sunette of St. George's Ravelin	F...	48,630
	Total.....	2,76,260

The amount of the other estimates aggregates 11,60,950 and amongst the 15 estimates forming this total, that marked G for the Berm round the Fort amounts alone to Rupees 3,67,500

the necessity for which is shewn in paper No. 7. If to these two sums, be added the proposed new Tunnel described already in para. 7, the estimate for which amounts to Rupees 11,260, the Grand Total is Rupees 14,48,470, or in round numbers 14 lacs and a half, being 7½ per cent. on the Dead Stock valuation of 2 crores in paper No. 8.

10. I have now but little more to add; in regard to the delay that has occurred, I beg leave to offer my strongest assurances that it has been unavoidable. The voluminous papers now forwarded (it has occurred to me whilst writing that a copy of the special Committee's Report should further swell the number of accompaniments) in a great measure tell their own tale ; but it is further to be explained for the information of the Right Honorable the Governor in Council, that the matter of the Fortress does not come within the Department of Public Works, presided over by the head selected by Government as Chief Engineer. It is a subject belonging to the Regimental Commandant of Engineers, you are aware on how reduced a scale the Commandant's Office Establishment is now placed ; its strength being barely that required for writing the returns and carrying on the formal correspondence of the Regiment. Hence the only available means properly at my disposal have been the Acting Adjutant of Engineers, and the Regimental Serjeant Major, the former Officer having other executive duties of his own as well as the charge of the Hydraulic Cement experiments to which I owe the highly successful further manufacture of the concrete which is to take so important a place in the projected operations. The specimen concrete blocks now in the office for examination leave nothing to be desired in the way of facility of management, cheapness and excellence of quality ; and Mr. pensioned Engineer Serjeant Major Walsh is already on adept in the preparation both of the concrete and Hydraulic Cement. It is most desirable that the valuable services of this intelligent Pensioner should be secured for the Government and fortunately his health has been so re-established by a residence on the Neilgherries, that he is both able and I believe willing also, to encounter all the fatigue and exposure that would follow his appointment to the Civil grade of "supervisor" for which I would recommend him as connected with the Fortress.

11. Reverting to the heavy demands upon the exertions of Captain Hitchins, the Officiating Adjutant and Engineer Serjeant Major Curley, whose zeal, industry and intelligence have been very conspicuous, I should have felt at liberty to allot some of the estimate makers, Draughtsmen and copyists of the Central Office of Public Works to reinforce the reduced Establishment of the Commandant ; but besides that there is only too much reason to apprehend that the strength of the Department Public Works has been fixed generally at too low a scale, especially amongst the Draughtsmen, I found that until the numerous plans, estimates and Reports connected with the outgoing Budget for 1856-57, were despatched, I could not venture to give Captain Hitchins any additional assistance. Latterly however this has been done, and the 23 elaborate drawings now forwarded will give an idea of the amount of time consumed in preparing all the documents required for the full illustration of the subject now at length brought before you.

Comprised in 12 sheets.

12. In conclusion, I would revert to the highly dangerous state of the north east Demi Bastion which will probably fall into the ditch during the next monsoon, and to the hardly less critical state of the St. Thomè Raveline and Caponniere which may or may not give way, either opinion being easily sustainable ; I would also point out how highly necessary it is that we should possess the means of renewing the Sea water in the ditch for sanitory reasons ; so that under the fact of the Honorable Court having expressed their approval of the measures recommended by the Professional Special Committee of June 1854, (copy of the Report sent herewith) and having regard to the arrival of the Steam Pile driving apparatus in charge of a managing Engineer engaged by the Court, I would now respectfully solicit that early orders be issued for the commencement of the work ; and in order that the numerous preliminary arrangements may be made by a competent Officer without loss of time, I would venture to recommend that His Lordship the Right Honorable the Governor in Council should be pleased to nominate a Garrison Engineer on the same footing as that functionary holds in Fort William at Calcutta and Fort Saint George at Bombay, for this Fortress, subject to the confirmation of the Government of India. I would further ask permission to propose that such appointment if approved of by His Lordship in Council, should take effect from the 1st Instant.

EXTRACTS FROM THE REPORTS OF THE ANNUAL COMMITTEES ON THE FORTIFICATIONS OF FORT ST. GEORGE, FROM THE YEAR 1800 TO 1851.

Sea Face.

South Spur.

V.

1803.—A crack in the west face, otherwise in good condition.

1804.—The part of the exterior revetment between the angles moved outwards. An alarming crack in the flank.

1805.—* Rebuilt on a foundation of wells.

1818.—In good conditions generally, the re-entering angle of the counterscarp has sunk.

1819.—In good condition.

1834.—Cracks in the revetment.

1835.—In good order.

1840.—In tolerable order.

Counterscarp.

H.

1802.—In good condition.

1803.—In good condition, except in the salient angles where the surf beats with violence against it and destroys the masonry.

1805.—There are six small cracks through it, but not of any consequence if attended to in time.

1806.—In good order, the cracks having been cut out and the wall united with long pieces of granite.

1810 and 1811.—In some places the weight of the materials appear to have sunk the general mass.

1812.—Now under repair.

1813 and 1814.—Counterscarp cracked in several places.

1815 and 1816.—In good condition.

1817.—In tolerable good condition, with the exception of some small cracks in the counterscarp.

1818.—Generally in good condition.

1819.— Do. do. the bulwark sustained some injury during the storm in October, chiefly at the salient angles.

There are some cracks in the counterscarp.

1821.—Generally in good condition, there are some cracks in the counterscarp. The bulwark sustained some injury in the storm of October 1818.

1823 to 1827.—In generally good condition, some cracks in the counterscarp.

1828.—Much damaged by the late hurricane.

1829 and 1830.—There are some serious cracks in the counterscarp.

1831.—Generally in good condition.

1834, 1845 to 1851.—Counterscarp of the re-entering angles of covertways cracked and admit sea sand into the ditch.

South East Demi Bastion.

W.

1802.—A crack in the exterior revetment.

1804.—A crack through the exterior revetment of the south face.

1805.—In good condition.

1813 to 1817.—The salient angle of this bastion has been progressively failing by the settling of its foundation and is much cracked and separated from the curtain.

1818.—This work has undergone frequent partial repairs but to no effect, it sunk considerably since last year.

1819 and 1821.—The salient angle has been progressively failing by the settling of its foundation and is much cracked and separated from the curtain.

1822, 1824 to 1827.—Salient angle has

Sea Face—continued.

South East Demi Bastion—continued.

been progressively failing by the settling of its foundation and is much cracked and bulged as is also a part of the sea line adjoining which has caused the cisterns underneath to leak. The scarp of the ditch at the salient angle has also failed and is much cracked and rent.

1828.—No apparent change in this work since the report of last year.

1829 to 1832 and 1834.—The crack has been filled up and there does not appear to be any immediate necessity for the repair of this work.

1835 and 1836.—A large crack in the east face, does not appear to have enlarged since the inspection of last year.

1837 to 1839.—The crack is of long standing, has not increased and may be neglected without injury.

1840.—A bad crack in the retaining wall of the berm opposite, crack in the east scarp of the bastion. The sea face near the salient angle is also badly cracked and sunk.

1841 and 1842.—The sea face near the salient angle is much cracked and bends considerably out.

1843.—The cracks have considerably increased within the last year and endangers the safety of the bastion.

1845.—* In good order, having been taken down and rebuilt.

Ramparts and Casemates.

1804 and 1805.—South east angle has two considerable cracks through the whole ramparts and part between the cracks moved forward from its original position.

1806.—There are two considerable cracks through the whole ramparts and part between the cracks has moved forward from its original position. There is also a crack through the 3d cistern but it does not yet extend to the foundation.

1807.—The whole of the line is in excellent condition, the south east angle which to an extent of 52 feet has moved out from its original position, and also two small cracks through the exterior revetment. The crack through the 3d cistern was repaired.

1808.—An extent of 52 feet has moved out from its original position at the south east angle. There are also two cracks through the revetment, but not yet of any consequence.

1809 and 1810.—At the south eastern extremity a part of the face has moved out but from constant attention in keeping the cracks well filled in, the defect is not of much consequence.

1811 to 1817.—Several of the bombproofs are cracked and in a leaky state.

1818.—Under repair.

1819, 1821 to 1826.—In good condition, except that part connected with the south east demi bastion.

1827 to 1830.—Several cracks in the casemate, some of them are considerable.

1831.—In good condition.

1845 to 1847.—The casemates occupied by the Town Major's office and by the Contractor for Army Clothing are cracked in several places and leak a good deal.

1848 to 1850.—The casemates occupied by the Town Major's office, Deputy Adjutant General of Her Majesty's Forces and Contractor for Army Clothing are cracked in several places and leak a good deal.

1851.—The casemates occupied as the offices of the Military Fund, the Deputy Adjutant General of Her Majesty's Forces and the Contractor for Army Clothing are cracked and leaky, the guard room near the sea gate is also slightly cracked and leaky.

A fresh crack has made its appearance in the Military Fund office since last report, in continuation of the old one running perpendicularly down the east side, and, that in the Army Clothing Contractor's office is increasing considerably.

SEA FACE—CONTINUED.

Cisterns.

1812 and 1813.—Two of the cisterns are in a defective state the principal walls being cracked and the water leaking through into the gallery of communication.

1814 and 1815.—In tolerable condition.

1816.—In tolerable condition with the exception of the two southernmost ones which are cracked from the failing of south east demi bastion.

1817.—In good condition, the two southernmost cisterns are being repaired.

1841.—In good order, two cisterns cracked immediately under where the wall has failed showing a general sinking of the foundation of this part.

NORTH FACE.

North East Demi Bastion.

1805 and 1806.—There is a small crack through the arch of the expense Magazine under the ramp.

1807.—There is a small crack which extends through the arch of the expense Magazine and in the northern face of this work.

1808.—In very good condition. The crack noticed last year had been filled into the foundation with strong cement.

1809.—In good condition.

Scarp, Counterscarp, Gallery and Traverses.

G., H. and M.

1802.—Part of the covertway before the north east lunette has failed.

1803.—The traverse at the sortie is much cracked, owing to the foundation having sunk.

1806.—There are some cracks in the counterscarp.

1811 and 1812.—The arch of the gallery settled and cracked in many places and the floors in many parts are upon so low a level, that the water from the berm falls into it.

1813.— Do. do. the scarp of the ditch has cracked and failed near the salient angle of the royal bastion.

1815 and 1816.—The scarp and counterscarp are rent in several places.

1817 to 1819, 1821 to 1823.—Several rents both in the scarp and counterscarp, some of which are very large.

1824.—In good condition, the scarp and counterscarp had been thoroughly repaired since last report.

1827.—Generally in good condition, the gallery is cracked. Some cracks in the traverses.

1828 to 1831.—Some old cracks in the traverses.

1832.—In good condition.

1840.—A few cracks in the galleries.

1841 and 1842.—The galleries very much sunk.

Royal Bastion.

1805.—There is a small crack in the west face of this work, which has been caused by a failure in the scarp of the ditch.

1806.—There are two cracks in the exterior revetment near the salient angle of the north and west faces caused by a failure of the scarp of the ditch which has also failed near the N. E. Orillon.

1807.—There is a small crack in the eastern Orillon, also 2 cracks in the exterior revetment near the salient angle.

1814.—Casemate on the south west flank cracked and admit much water.

1817.—In tolerable condition, it has a small crack in the west face.

1818.—Cracked in some places.

NORTH FACE—CONTINUED.

Royal Bastion—continued.

1819.—In general good condition.

1840 and 1841.—Orillon flank slightly cracked, revetment of beem at shoulder angle cracked, scarp of both faces slightly cracked near the salient angle.

1842.—Orillon flank cracked revetment of the berm at shoulder angle cracked, scarp of both faces slightly cracked.

1843.—In tolerable good order.

Detached Demi Bastion.

C.

1805 to 1807.—The salient angle cracked owing to a failure in the scarp of the ditch.

1809.—In good order.
1841.— Do. do.

North Caponniere.

S.

1805 and 1806.—Two cracks in the western retaining wall.
1807.—In good order.

1847 to 1850.—The retaining wall in east side sunk and cracked.

North east spur with blind before it.

BLIND MARKED X.

1801.—Retaining wall of the barbette in bad condition, a fissure through the exterior revetment of the north east face near the salient angle.

1804.—A very alarming crack through the exterior revetment.

1805.—Cracks greatly enlarged, two other cracks crossing each other at nearly a right angle have separated the work entirely from east to west and from north to south.

1806.—The cracks have increased much, it is now completely disunited except the western extremity.

1807.—The repair of this work is now in hand.

1811, 1812 and 1814.—The casemate much rent and cracked admitting the water in all parts. The new work having settled from the old.

1815.—In good condition.

1818.—Some small cracks.

1819 and 1821.—In general good condition.

1822 to 1824.—Two or three cracks in the exterior revetment of the blind.

1825.—Has been repaired and plastered with Parker's cement since last report.

1826.—Generally in good condition.
1830 and 1831.—A few cracks in the blind.

1832.—In good condition.

1843.—Spur in good orders, blind cracked and bulged the crack extending to the counterscarp opposite where it is very bad.

1845 to 1851.—The spur in good order. The blind cracked and bulged in two or three places some of the cracks extend to the counterscarp opposite, where they are very bad.

NORTH FACE—CONTINUED.

North East Counterguard.

1803.—Several large cracks in various places particularly two through the eastern revetment of the north face.

1804.—This work appears to be in a very dangerous state having large cracks 6″ wide through the exterior revetment of the north face and north west flank. The cracks of the east face are also much opened.

1805.—The cracks in this work appear to have enlarged.

1806.—Unserviceable.

1807.—*This work has been re-built.

1813 and 1814.—Exterior revetment slightly cracked near the salient angle.

1815.—Exterior revetment cracked in both faces near the salient angle.

1816 to 1818.—In good condition with the exception of the galleries of the mines which have fallen in.

1819.—Under repairs.

1821.—In good condition.

1827 to 1831.—Leaks much inconsequence of cracks in the arch of the casemate.

1832.—In good condition.

1840.—In general good order, a repaired crack near the salient angle of north scarp is re-opening.

1841 and 1842.—Cracked near the salient angle.

1843.—Cracked near the salient angle and casemates leak. The crack extends across the ditch to the counterscarp.

1845 and 1846.—Cracked near the salient angle.

1848 to 1851.—Two slight cracks near the salient angle on north face.

North East Lunette.

1801.—Part of this work with traverse in the re-entering angle and part of the gallery and counterscarp before it generally rent.

1803.—several small cracks appear in the revetment.

1804.—Both flanks of this work in a very dangerous state having parted from the body of the work. A crack also on the west face.

1805.—Repairs commenced upon.

1806.—Serviceable condition.

1811 to 1814.—The arched passage to the casemate through the N. W. face is cracked and leaky.

1815.—In good condition.

1830.—Cracked in several places and leaky.

1832.—In good condition.

1843.—Cracked slightly.

1845.—In tolerable order.

North West Lunette.

1802.—Part of this work and of the gallery and counterscarp before it together with the traverse in the re-entering angle of the covert-way sunk and greatly ruined.

1803.—Now under repairs.

1804 to 1806.—The part of the north face constructed last year in excellent order. The casemate of the west face and arch of the passage on the south flank cracked.

1807 and 1808—A crack in the arch of the western casemate and in the passage of the south flank.

1811 to 1814.—The arch of the casemate cracked longitudinally through the whole crown and admits the water abundantly.

1817.—In tolerably good condition.

1818.—The arch of the passage of the flank cracked throughout.

1819.—In general good condition.

1826.—In general good condition, with the exception of a large crack.

1827.—In tolerable good condition.

1840 to 1843 and 1845.—A slight crack all down the east scarp of both faces near the salient angle.

1846.—In tolerable order, the cracks have been filled up.

NORTH FACE—CONTINUED.

North East blind upon east face of east Lunette.

Y.

1825 and 1826.—Generally in good condition with the exception of a large crack.

1827 and 1828.—A large crack through it at one end.

1829.—In good condition.

North Ravelin.

1805.—The counterscarp of the main ditch at its exterior extremities irrepairably cracked and sunk.

1806.—The counterscarp of the main ditch at its south western extremity in ruins.

1813.—The exterior revetment cracked.

1814.—Under repair.

1815.—In good condition.

1817.—In tolerably good condition, it has a few cracks in it.

1818.—In tolerably good condition, the scarp of the berm near the bridge of communication to the west lunette has bulged and sunk, the arch of the gateway is cracked.

1819.—The arch of the gateway cracked.

1821.—The east Escarp in front of the salient angle is very much cracked and bulged out.

1822.—In good condition.

NORTH WEST AND SOUTH WEST FACES.

St. George's Ravelin.

1804.—A crack has lately appeared through the arch and piers of the gallery and four cracks in the exterior revetment, those of most consequence are at the salient angle.

1805.—The greater part of the west face of this work in ruins recommended to be re-built entirely.

* 1806.—In excellent order, lately re-built.

1817.—In good condition, with the exception of a few cracks in the revetment.

1818.—In good condition.

Lunette North of St. George's Ravelin.

J.

1803.—A crack in the north face.

1804.—This work is in a very dangerous state and requires immediate attention. There are seven cracks in the exterior revetment, but those which threaten the downfall of the work are at the north east flank and immediately opposite that part of the counterscarp ordered to be re-built.

1805.—Crack cut out and filled with masonry and united with granite. The revetment of the north face has moved considerably forward from its original position.

1806.—There are several cracks in the exterior faces which have been cut out and filled in with masonry and united with granite. The revetment of the north face has moved considerably forward from its original position.

1807 and 1808.—The revetment of the north face has moved forward nearly a foot from its original position and there are besides 7 cracks in its exterior faces, one of which goes through the body of the work.

1809.—In very bad condition, the cracks in the revetment increasing in every monsoon.

1810.—In good condition.

1814 to 1816.—The revetment of both faces settled outwards towards the ditch.

1817 to 1819.—The revetments of both faces much cracked and settled outwards towards the ditch, this work must be re-built upon a foundation of wells.

NORTH WEST AND SOUTH WEST FACES—CONTINUED.

Lunette North of St. George's Ravelin—continued.

1821.—In tolerably good condition.

1822 to 1826.—The revetments of both faces bulged, should be repaired for the present in the usual manner.

1827 to 1832.—The revetment near the salient angle slightly bulged, no danger is apprehended.

1834 to 1843.—In good condition.

1840.—In good order, excepting a crack near the gorge of the north face and a slight crack in both faces of scarp near the salient angle.

1845.—In good order.

Lunette South of St. George's Ravelin.

F.

1802.—A settlement in the exterior revetment near the salient angle.

1803.—A crack in the exterior revetment.

1804.—The exterior revetment cracked near the salient angle and south flank.

1805.—Both faces have moved forward which is particularly evident near the salient angle.

1806.—The exterior faces have moved forward, the south face particularly is much cracked and disunited.

1807 and 1808.—The south face is much cracked and disunited and both exterior faces are moved forward from their original position.

1809.—Several cracks in the exterior revetment and in the arch of the bombproofs.

1810.—The arch of the bombproofs cracked in several parts and not waterproof.

1811 and 1812.—The arch of the Bombproof cracked in several parts and not waterproof.

1813.—Do. do. the exterior revetment cracked at the eastern extremity.

1814.—Arch of the casemate cracked and admits the water.

1815.—In good condition.

1816 and 1817.—In very bad condition, it is apprehended that no dependance can be placed on this work, unless it is re-built.

1818 and 1819.—Much cracked from the failure of the foundation, must ultimately be re-built on wells, but in the mean time the cracks should be repaired.

1821 to 1829.—The revetments of both faces much cracked and bulged outwards.

1830.—In good condition, has been repaired since last report.

1840.—The north face near the gorge is cracked and bulged, the parapet sunk slightly inconsequence, both faces of the scarp bulged and cracked. The cracks on both faces have been repaired, but appear to be opening again.

1841 to 1843.—Both faces of the scarp are bulged and cracked and the parapet near the gorge has sunk slightly.

1845.—In tolerable order.

St. George's Caponniere.

1802.—A small settlement near the angle of the north face.

1803.—A small crack in the north face.

1804.—A crack in the north face.

1805.—In good order, repaired.

1821.—The exterior parapet wall in very bad condition, should be re-built.

1822.—Generally in good condition, has been repaired since last report.

1845.—Slightly cracked in several places.

1846.—In tolerable good order, cracks have been filled up.

NORTH WEST AND SOUTH WEST FACES—CONTINUED.

Wallajah Ravelin.

O.

1804.—A small crack through the exterior revetment of the north west face.

1805 and 1806.—Much cracked. The arch of the gate split and part of the south face has moved out.

1807.—A part of the south face has moved out a little and there are some cracks in its exterior revetment as well as an alarming one over the door next to the gateway of the southern bombproof which is sunk so much as to prevent the door being opened.

1808 and 1809.—There are a few cracks in the exterior revetment, one over the door of the bombproof next to the gate way.

1810.—The arch of the casemate cracked.

1811 to 1815.—The arch of the casemate cracked. The ravelin cracked in a slight degree from top to bottom.

1816.—In good condition.

1817.—There is a slight crack from top to bottom on both sides of the salient angle.

1818.—In good condition generally.

1821.—The revetments of both faces cracked and bulged outwards. The cracks should for the present be cut out and filled in the usual manner.

1822 to 1827.—The revetments of both faces near the salient angle cracked and bulged outwards, should be repaired in the usual manner until the rebuilding of them is determined on.

1828.—The exterior revetment much defaced.

1829.—Has been pointed since last report.

1830.—In good condition.

1840.—The sally port of the south face cracked all along from the traverse in the covertway and extends to the south lunette opposite south face of ravelin. Escarp of both faces badly cracked near the salient angle. South face appears to be generally cracked, the cracks in the sally port and south face are connected apparently.

1841 and 1842.—A crack down the counterscarp of south face extends from the traverse in the covertway to the south lunette opposite. The south face appears to be generally cracked and there are considerable cracks near the salient angle in the escarp of both faces.

1843.—In tolerable order, cracks having been repaired.

1851.—Cracked on west and south faces near the salient angle. The cracks extend to the foundation.

Lunette north of the Wallajah Ravelin.

P.

1802.—A settlement in the south west face near the salient angle and 3 small cracks on the north west face.

1803.—The revetment in bad condition being much decayed, some cracks appear in the retaining walls.

1804.—Four cracks through the exterior revetment.

1805.—The revetment cracked in every direction and the work entirely disunited. The south face has moved outwards, the transverse cracks near both flanks very alarming.

1806.—Unserviceable.

1807.—Bombproof sunk so much as to prevent the door being opened.

*1808.—The whole of this work except the western bombproof has been rebuilt on a foundation of wells.

1810 to 1813.—A rent in the south face. The arch of the casemate also cracked.

1814.—A rent in the south face. The arch of the casemate also cracked. A rent in the place of arms before ditto.

1815.—In good condition. The place of Arms before this work, has its retaining wall considerably rent in one place.

1816.—The revetment of both faces much cracked and settled outwards towards the ditch. This work must be rebuilt on a foundation of wells.

1817.—In tolerably good condition.

1827 to 1829.—Casemates leak in two places near the angle.

1830.—In good condition.

NORTH WEST AND SOUTH WEST FACES—CONTINUED.

Lunette South of the Wallajah Ravelin.

N.

1803.—A crack in the arch of the bomb-proof.

1805 and 1806.—The south face of this work moved out considerably, also a serious crack through this face.

1807.—There is a very alarming crack through the rampart which divides the whole work, and its south face has moved forward. There are several cracks in its western face.

1808.—Very much cracked, one in particular which divides the work and its south face moved out a little.

1809.—The south face of this work is very much cracked and moved out.

1810 to 1814.—The arch of the casemate cracked through.

1815.—In good condition.

1816 to 1818.—In very bad condition. It is apprehended that no dependance can be placed on the work unless it is rebuilt on a foundation of wells.

1819, 1821 to 1826.—The revetment much cracked, this work must ultimately be rebuilt on a foundation of wells, should be repaired until the rebuilding be determined upon.

1827 to 1829.—The arch much cracked and leaky.

1830.—In good condition.

1837.—In good order with the exception of the cracks.

1838.—Generally in good order, part of the south face has bulged and occasioned a crack, and there is another bulge adjoining the salient angle.

1840 to 1842.—Part of the south face has bulged and occasioned some cracks, there is another bulge adjoining the salient angle, there is also a bad crack in the west face near the gorge.

1843.—In tolerable order. The cracks having been repaired.

1851.—Parapet cracked and sunk. The crack on the west side extends to the foundation.

Wallajah Caponniere.

1806.—Cracked in several places.

1821.—Exterior parapet wall in very bad condition, should be rebuilt.

1822.—Generally in good condition, has been repaired since last report.

1829 to 1831.—Generally in good order, but a few slight cracks appear.

1832.—In good condition.

1838.—Contains some cracks of considerable extent.

1839.—In good order.

1845.—A good deal cracked.

1846.—In tolerable order, cracks having been filled up.

1851.—Cracked in two places at the west end.

Berm.

G.

1803.—The earth immediately in the rear of the scarp of the ditch sunk.

1804.—The earth in the rear of the scarp of the ditch sunk from the water of the ditch getting through the cracks in the scarp wall.

1805.—In many places in very bad condition being sunk particularly opposite the faces of the bastion where their foundations are getting gradually undermined.

1806.—In bad order, it being sunk in many places.

1807.—Very much sunk in many places.

1808.—The berm has been raised since last survey.

1839.—Two cracks in the counterscarp wall.

1840 to 1842.—A bad crack in the revetment of the salient angle of the Nabob Wallajah's bastion, another in the revetment opposite west face of Wallajah caponniere.

NORTH WEST AND SOUTH WEST FACES—CONTINUED.

Scarp and Counterscarp of the South West and North West Faces.

1802.—A settlement in the couterscarp of the re-entering angle of the covertway at the north Wallajah lunette.

1803.—There are a good many cracks which allow the water of the ditch to get behind the scarp and counterscarp.

1804 and 1805.—Several cracks in the scarp and counterscarp.

1806.—A number of small cracks in the scarp and counterscarp and the latter particularly opposite the Wallajah ravelin much undermined by the action of the water in the ditch.

1811 to 1814.—The casemates in the salient angle of St. George's bastion are cracked and leak.

1815.—In good condition, with the exception of the counterscarp before the salient angle of St. George's bastion which is rent in several places.

1816.—In tolerable condition, there is a considerable crack in the counterscarp opposite the south face of the Wallajah ravelin near the re-entering angle of the place of Arms.

1817.—In general good condition, there is however a large crack in the counterscarp of the re-entering place of Arms opposite the Wallajah ravelin.

1818 and 1821.—Do. do. Cracked in several places.

1822.—Do. do. * The Committee takes this opportunity of again reporting favorably on the trials which were made of the durability of Parker's cement as an incrustation on the counterscarp of the salient angle of the St. George's south lunette which still continues in high preservation though it was applied 9 years ago.

1823.—Cracked in several places.

1824.—In tolerable condition, repaired since last report.

1838.—In good order, except a few cracks in the counterscarp.

1840 to 1842.—In good order, except two large cracks in the berm, a bad crack opposite west face of south lunette of Wallajah ravelin. Both of the traverses here have bad cracks extending through them.

Galleries and Traverses.

M.

1802.—The greater part of the traverses and particularly on the north west front much rent, the traverse in the re-entering angle of the covertway in part of the Royal bastion in a ruinous condition.

1804.—The re-entering angle of the counterscarp opposite the west face of St. George's bastion sunk. The crack 4 inches in width. The traverses opposite the north faces of both lunettes of the Wallajah front completely in ruins, and the galleries of the mines of the right and left much cracked, several small cracks in the whole of the traverses of this front but not of much consequence.

1805.—Failures considerably increased.

1806.—Under repairs. Gallery of the Wallajah ravelin and lunettes undermined.

1811 to 1813.—The arch of the galleries are cracked in several places.

1814.—The arch of the gallery settled and cracked in many places.

1815.—The arch of the gallery settled and cracked in many places.

1816 and 1817.—Several of the traverses are cracked considerably as are also the arches of the galleries.

1818, 1821 and 1822.—In tolerably good condition.

1823.—Galleries in good order having been repaired since last report, the traverses are out of order.

1824.—In good condition.

1838.—A small crack in the crown of the arch opposite the salient angle of the south lunette of the north west ravelin, and a bad crack opposite south west face of the same lunette.

NORTH WEST AND SOUTH WEST FACES—CONTINUED.

Galleries and Traverses—continued.

1840.—A bad crack opposite the south west ravelin, being a continuation of a crack already noticed in the traverse. Some cracks of slight importance opposite St. George's bastion running along the crown of the arch where the gallery passes under the Wallajah sally port. There is a considerable depth of water in those parts of the gallery opposite the outworks which makes them damp, a bad crack in the re-entering angle opposite the south face of the south west ravelin.

1841 and 1842.—The gallery cracked in several places and the traverses are generally in a dilapidated state.

Cisterns.

1812.—Cistern in the Wallajah bastion has fallen greatly to decay, and is incapable of containing water.

SOUTH FACE.

Caponniere.

E.

1804 and 1805.—A small crack through the exterior wall to the eastward.

1807.—In tolerable good condition, there are several cracks in it.

1818.— In good condition.

1834 and 1835.—Generally in good order, but the counterscarp on the east side has a bad crack and has bulged.

1836.—In good order.

1838.—Two bad cracks.

1839.—In good order.

1840 and 1841.—A slight crack in both faces.

1842.—In good order.

1843 and 1845.—An extensive crack in it extending across the ditch to the counterscarp.

1846.—Two very extensive cracks in it extending across the ditch to the opposite counterscarp.

1847 and 1848.—The cracks had been filled up and are re-opening again.

1849 and 1850.—The cracks have opened very much.

1851.—Considerable cracks on both sides, the earth sunk and carried into the ditch.

West Lunette.

K.

1801.—A settlement in the revetment and arch of the bombproof in the north flank.

1802.—Several settlements in the exterior revetment and crack in the arch of the west flank.

1803.—Much cracked.

1804.—There are 3 very serious cracks through the face of this work; also through bombproof.

1805.—In very bad condition, the bombproof of the west face in ruins. To be rebuilt.

1806.—*A new work constructed on wells.

1816.—A crack in the revetment of the west face, otherwise in good order.

1817.—In good condition, there are some slight cracks in the revetments of each face of the work.

1818.—The salient angle has settled a little and occasioned small cracks.

1819.—In general good condition.

1827.—A small crack in the western extremity of the arch and another near the middle.

1828 to 1831.—A small crack in the western extremity of the arch, and another near the middle.

1832.—In good order.

1836.—In good order with the exception of the cracks.

1838.—In good order.

1840.—In good order, the old repaired cracks on the south face near the salient angle appear to be re-opening.

1841 and 1842.—A crack on the south face.

SOUTH FACE—CONTINUED.

West Lunette—continued.

K.

1843 and 1845.—Crack on the south and west faces and gun platform, the scarp badly cracked in two places.

1846.—Badly cracked in both faces. The platform of the north embrazure on the west is much sunk and a large crack extends from it all down the escarp.

1847 to 1850.—The cracks have been filled up but are opening again.

1851.—Two cracks on the west and two on the south face.

East Lunette.

1802.—A settlement in the revetment of the east face near the salient angle and in the flank.

1803.—Much cracked.

1804.—In ruins.

1805.—This work is now re-building and nearly completed.

1806.—*A new work constructed on wells.

1814.—The arch of the casemate is defective and admits the water.

1815.—In good condition.

1818.—Generally in good condition, but the casemate leaks.

1819.—In general good condition.

1827 and 1828.—A new crack in the exterior revetment.

1829 and 1830.—In generally good order, but leaks in some places.

1831.—In good order, repaired since last report.

1843.—A crack down the exterior slope of the rampart.

1846.—Cracked on both faces.

1847.—In tolerable order, the cracks having been filled up.

Saint Thomé or South Ravelin.

D.

1802.—A small crack in the west and south faces and in the bombproof.

1805.—Several alarming cracks have appeared in this work since last survey. The east face has moved forward from the body of the work. There is also one through the western face which continues to increase.

1806.—The north western extremity is very much cracked. The failures on the eastern face have not increased.

1807.—The cracks which were in the north western extremity have not increased since last survey.

1808.—The cracks have been cut out to the foundation and built up.

1813.—The exterior revetment cracked near the salient angle and moved out.

1814.—Casemates admit water abundantly.

1815 and 1816.—The exterior revetment rent in several places.

1817.—In bad condition, there are several cracks in the revetment.

1818.—In bad condition there are several cracks in the revetment. This work must be re-built on foundation of wells.

1828.—Has been partially repaired.

1829.—Generally in good order, but leaks in some places.

South Bonnette.

L.

1803.—A crack in the west face.

1805.—Cracked.

1806.—In good condition.

1807.—There are some small cracks in the exterior face, but not of much consequence.

1814.—The arch of the casemate cracked and admits water abundantly.

1815.—In general good condition.

1827.—Cracks in several parts of the casemates.

1828.—Do. do. the repairs should be performed with Roman cement.

1829.—In good condition, has been repaired since last report.

1847.—The casemate is cracked and leaks, and the crack extends through the scarp.

1848.—In good order, having been repaired.

SOUTH FACE—CONTINUED.

South East Counterguard.

I.

1801.—The greater part of this work has given way from the severity of the weather.

1802.—In ruins, the foundations gave away during the storm.

1803.—Now being demolished with the view to re-build it.

1804.—The new foundation of this work was laid before the monsoon and the superstructure is now in hand.

1805 and 1806.—*A new work in perfect order.

1817.—In good condition, with the exception of a few small cracks.

1818.—In good condition, but the floor of the casemate is too low and the water lodges there.

1819.—In general good condition.

1821.—Several cracks in this work, particularly at the salient angle.

1822.—In good condition, has been repaired since last report.

1828 and 1829.—The counterscarp opposite is cracked.

1830.—Generally in good condition, but is damp and leaky.

1831.—In good condition, repaired since last report.

1838.—Cracks of considerable extent in the salient angle.

1839.—In good order.

1840.—A very large crack extending from the embrazure on the sea face to the salient angle and down the rampart on both faces, the work appears to be in a frail state, but no effective repairs can be undertaken untill it falls.

1841.—A large crack extending from the embrazure on the sea face to the salient angle and down the rampart on both faces. This cannot be repaired till the south east demi bastion is complete.

1842 and 1843.—A large crack extending from the embrazures to the salient angle and down the escarp on both faces.

1845.—Several cracks extend down each face, and the work generally is not in good order.

1846.—In good order, the cracks having been filled up.

1848 to 1850.—The cracks which were filled up are gradually opening.

1851.—Two slight cracks, one on the east and one on the south face.

Berm.

G.

1803.—Sunk in many places.

1804.—Several small cracks in the wall.

1805 to 1807.—Many holes in it, particularly near the scarp where the water of the ditch gets in and saps the foundation of the work.

1808.—The berm has been raised and is in good condition.

1830 to 1832.—Generally in good order, a portion of this face adjoining the south east demi bastion has bulged.

1834.—Generally in good order.

1838 and 1839.—Has two cracks in the counterscarp wall.

1840 and 1841.—A bad crack opposite the east face of caponniere.

1842, 1843 and 1845.—A rent opposite the east face of the caponniere. This crack has been filled, but is again opening.

1846.—Cracked in many places.

1847.—Retaining wall of berm in front of face and flank of south east demi bastion sunk, slightly thrust out and cracked in 8 places.

Retaining wall of berm in front of faces and flanks of Wallajah bastion slightly sunk, thrust out and cracked in four places.

Do. of berm in front of detached orillon, demi bastion sunk, thrust out and cracked in 6 places.

1848 to 1851.—Retaining wall of berm in front of face and flank of south east demi bastion sunk slightly, thrust out and cracked in 3 places.

Retaining wall of berm in front of faces and flanks of Wallajah bastion slightly sunk, thrust out and cracked in four places.

Retaining wall of berm in front of detached orillon demi. bastion sunk, thrust out and cracked in six places.

SOUTH FACE—CONTINUED.

Covertway, Traverses, Scarp, Counterscarp and Galleries.

M.

1803.—A few cracks in the scarp and counterscarp.

1804.—Several small cracks in the gallery and traverses, but the most serious is in that part opposite the south face of Coat's counterguard which is in ruins.

1805.—Several small cracks in the traverses, scarp and counterscarp. *The part opposite Coate's counterguard has been re-built on a foundation of wells.

1806.—The repairs of the traverses and counterscarp are now in hand.

1817.—Several traverses are much cracked.

1819.—In good condition.

1821.—Scarp and counterscarp cracked in several places.

1822.—In good condition, has been repaired since last report.

1823.—Counterscarp is cracked.

1824.—In tolerable good condition.

1827 to 1830.—Some small cracks in several places.

1831.—Generally in good order.

1840.—A bad crack in the gallery in the re-entering angle of covertway opposite the west face of the south bonnette.

1841.—A crack in the gallery has been repaired outside. The interior has not as yet been completed.

1842.—In generally good order.

1843, 1845 to 1847.—Galleries cracked and sunk in several places, those opposite the north east counterguard are sunk considerably. Traverses opposite both faces of south lunette of Wallajah ravelin sunk and cracked right through. The crack in the south traverse is very bad extending over the covertway to the counterscarp. Traverse opposite the west face of west lunette of south ravelin cracked right across to the covertway opposite.

1848.—Do. do. counterscarp in front of south face lunette on the west of St. Thomé ravelin cracked, sunk and thrust out, counterscarp in front of west and south face of Wallajah bastion cracked and sunk, the crack in front of the south face very large. There are two cracks in front of the north face of north east counterguard, the counterscarp is sunk. There are two cracks in front of blind of north spur and part of the counterscarp is thrust out. There is one crack in front of Family Payment office, and in front of Town Major's office, one in front of Clothing Contractor's godown and a large one which extends through the counterscarp in front of the south spur, one in front of south east demi bastion and two in front of south east counterguard.

1849 to 1851.—Do. do. gallery sunk and cracked very much right through the archway in front of the bonnette. The crack extends right along the gallery to the part opposite the Wallajah ravelin. The gallery in front of the west face of the Wallajah ravelin cracked right through the archway and flooring sunk. That opposite the north east counterguard is sunk.

(Signed) C. E. FABER, Colonel of Engineers,
Chief Engr. D. P. W., and Comdt. of Engrs.

DESCRIPTION OF FORT ST. GEORGE.

Fort Saint George is situated on the Sea Coast about midway between the Northern and Southern extremities of the city of Madras.

Its works form somewhat more than a Semi Octagon the Gorge of which is closed by the sea face.

The sea face consists of a succession of Redans, threeof these are placed together at the centre of the face so as to project a little beyond its general line.

The main works on the four land faces are as follows:

1. North Face which includes.
   1st. The northern demi bastion in front of which is a detached Orillon bastion.

2d. The curtain connecting the north demi bastion with the Royal bastion in the centre of which there is a cavalier.

3d. Half of the mint bastion in front of which there is an Orillon bastion connected with the one in front of the North demi bastion by a fussebraie.

2. The North West face which includes

1st. The West half of the mint bastion and the detached Orillon bastion in front of it.

2nd. The curtain connecting the last with Saint George's bastion.

3rd. Half of Saint George's bastion which is complete in itself and has no Orillon bastion in advance of it.

3. The South West face which includes

1st. The Southern half of Saint George's bastion.

2nd. The curtain which connects it with the Wallajah bastion.

3rd. Half of the Wallajah bastion.

4. The South face which includes

1st. Half of the Wallajah bastion.

2nd. The curtain which connects it with the Saint Thome demi bastion.

The outer works with the exception of one bonnette in advance of the Saint Thome ravelin consist of a system of ravelins and lunettes screened by a Covertway and glacis, the ravelins are placed in front of the curtain and have each two lunettes attached to them, one on each face.

A wet ditch encircles the main works, including the sea face and the ravelins and lunettes, with the exception of the lunettes on the North face and the bonnette on the South face, which have dry ditches.

A mining gallery about 6 feet in height and 4 feet in width is carried round under the covert way from sea to sea, but not under the seaface: short branch galleries have been carried out from this main gallery.

The main works are casemated through out those on the sea face and on the flanks of the bastions are furnished with embrasures for heavy guns.

About 6,000 men are required for the defence of the Fort.

The water cisterns built under the casemates of the sea face are capable of supplying that number of men with drinking water for 4 months at the rate of 3 quarts a day.

The sea face measures 1,250 yards from the foot of the glacis, on the north to the foot of the glacis on the south.

The interior of the Fort measures 204,600 square yards or nearly 42 acres, its greatest length is 620 yards from north to south, and its greatest width from east to west is 330 yards.
The whole Fort including outworks covers about 102 acres or nearly $\frac{1}{6}$th of a square mile.

There are four land entrances into the Fort, one by the north gate, another on the south or Saint Thomé gate, another on the north west or Saint George's gate, and the fourth on the south west or Wallajah gate, these entrances pass through the glacis, a ravelin and the main body of the work crossing the wet ditch of the ravelin and the main ditch by draw bridges.

The Fort contains the grand Arsenal Barracks for an European Regiment, including quarters for the Officers and several Offices, Civil and Military, the principal of which is the Government Office, it contains also a Garrison Church.

Chief Engineer's Office,
Fort St. George,
23rd April 1856.

(Signed) C. E. FABER, Colonel of Engineers,
Chief Engr. D. P. W., and Comdt. of Engrs.

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MEMO. SHOWING THE NUMBER OF GUNS MOUNTED ON THE ENCEINTE AND OUTWORKS OF THE FORT AND THE NUMBER REQUIRED TO COMPLETE ITS ARMAMENT.

Locality	56 Pounders.	8 Inch Gun.	No. of mounted guns with their Calibre. Pr. 42	32	24	18	12	9	6	Wanting to complete.	Total.
Sea Face-	4	2	11	13	1	...	...	...	...	70	101
Casemates under the Sea Face	...	...	...	4	...	...	...	...	...	85	89
North front Body of Place-	...	...	...	...	...	4	...	1	4	25	34
Do. do.	...	...	...	3	1	10	...	...	4	5	23
South West do.	...	...	...	...	12	2	...	...	...	15	29
Do. do.	...	...	...	...	...	6	...	...	...	13	19
South East Spur-	...	...	...	...	...	...	...	...	...	5	5
Do. do. Counterguard	...	...	...	...	...	3	...	...	...	7	10
East Lunette of Saint Thomé Ravelin	...	...	...	...	...	2	...	...	...	7	9
Saint Thomé Ravelin-	...	...	...	...	...	...	...	...	...	4	4
West Lunette of Saint Thomé Ravelin-	...	...	...	...	...	3	...	...	...	4	7
Bonnette-	...	...	...	...	...	1	...	...	...	13	14
South Lunette of Wallajah Ravelin-	...	...	...	...	1	2	...	...	...	5	8
Wallajah Ravelin	...	...	...	...	...	1	...	...	...	9	10
North Lunette of Wallajah Ravelin	...	...	...	...	2	...	...	...	...	6	8
South Lunette of Saint George's Ravelin	...	...	...	...	2	2	...	...	...	4	8
Saint George's Ravelin-	...	...	...	...	...	2	...	...	...	6	8
North Lunette of Saint George's Ravelin-	...	...	...	...	1	3	...	...	...	4	8
Royal Bastion-	...	...	...	...	1	1	...	...	...	19	21
West Lunette of North Ravelin-	...	...	...	...	...	...	3	...	...	8	11
North Ravelin-	...	...	...	...	...	...	1	...	...	13	14
East Lunette of North Ravelin-	...	...	...	...	...	1	...	...	...	7	8
North East Counterguard-	...	...	...	...	...	...	...	...	...	15	15
Orillon Demi Bastion-	...	...	...	1	...	...	..	...	...	23	24
North East Blind-	...	...	...	...	...	...	...	...	...	9	9
Faussebroie-	...	...	...	...	...	...	...	...	...	5	5
South East Covertway-	...	...	...	6	...	...	...	...	...	.....	6
North East Covertway-	...	...	...	6	...	...	...	...	...	.....	6
Saluting Battery.	...	...	...	...	21	...	...	...	...	.....	21
	4	2	11	33	42	43	4	1	8	386	534

Fort Saint George,
23rd April 1856.

(Signed) C. E. FABER, Colonel of Engineers,
Chief Engr. D. P. W. and Comdt. of Engrs.

MEMO. OF COTS AND MEN THAT CAN BE LOCATED WITHIN THE CURTAIN AND OUTWORKS OF THE FORT.

Locality	No. of Cots.	No. of Men.
Casemates within the Sea Face...	400	500
„ Saint George's Bastion.	400	500
„ South Spur...	16	20
„ South East Counterguard	36	50
„ East Lunette of South Rvelin	50	75
„ South Ravelin...	20	30
„ West Lunette of South Ravelin	70	100
„ Bonnette...	40	60
„ South Lunette of Wallajah Ravelin	70	100
„ Wallajah Ravelin...	50	75
„ North Lunette Wallajah Ravelin.	71	100
„ South Lunette of Saint George's Ravelin	71	100
„ Saint George's Ravelin...	50	75
„ North Lunette Saint George's Ravelin	71	100
„ Royal Bastion...	70	100
„ West Lunette North Ravelin...	65	90
„ North Ravelin...	39	50
„ East Lunette North Ravelin...	75	100
„ Orillon Demi Bastion...	164	200
„ North East Counterguard...	80	100
	1,908	2,525

Fort Saint George, 23rd *April* 1856.

(Signed) C. E. FABER, Colonel of Engineers,
Chief Engr. D. P. W. and Comdt. of Engrs.

NOTES ON THE STATE OF THE DILAPIDATED PORTIONS OF THE FORTIFICATIONS OF FORT SAINT GEORGE.

A. and B.—South Redan.

A. The South side of this work was in such a dangerous state of dilapidation, that the scarp had to be taken down to the level of the water.

B.—North Redan

The north face has three cracks in it extending to the foundation, one of them runs obliquely and longitudinally through the arch of the casements. The east face has two cracks in it running down to the foundation. The casemates are cracked in every direction, and the Terreplein sunk.

This work has been progressively failing for a number of years, and every means that could be thought of for checking it, have, from time to time, been tried with but little success.

C.—North East Demi Bastian.

The terreplein of this work has sunk on the east side, the revetment has bulged about a foot, is cracked in every direction, and is likely to fall outwards in the course of the next monsoon. By looking through the large cracks in the revetments, it will be seen that a great portion of the work has been built with brick in mud, which is one of the causes of its utter failure. This is of the most emergent character, and should be immediately removed.

D.—Saint Thomé Ravelin.

This work is in a state of utter dilapidation, about 100 feet of its east face is sunk and gone out about one foot; the remaining portion of it is bulged out about six inches. The embrasures, parapet, terreplein, and banquette, are sunk and cracked in several places. The banquette of the saliant angle has sunk below the level of the terreplein, opposite to which there are extensive chasms in the rampart and at this spot, the scarp revetment, has, to an extent of four feet, sunk eighteen inches. The south face is in an equally bad state, with the addition of a longitudinal crack in the rampart. The embrasures are sunk nine inches in some places. There is a very large crack in the N. W. Gorge, through which can be seen, from the rampart, the floor of the arched passage underneath; this crack after passing two feet inwards assumes a forked shape enclosing a large mass of earth which has sunk one foot below the level of the surrounding parts, the crack then runs N. E. cutting off the angle of the work, which has bulged outwards about one foot.

E.—Saint Thomé Caponniere.

The retaining walls have sunk one and a half feet, are cracked and bulged; the parapet walls, at the north end, are cracked, sunk, and several masses have fallen. The banquette has also sunk and is broken up into large masses.

F.—South Lunette of St. George's Ravelin.

Both faces are much cracked and thrust out, the south face is in a very bad state, one portion of the scarp having separated from, and projecting about a foot beyond the other. The parapet, embrasures, and plat forms, on the east end of this face, are cracked, sunk, and disunited.

G.—Berm round the Fort.

The berm on the south side is very much cracked and has gone into the ditch in some places, three, two, and one foot, nine and six inches, and some parts have fallen in altogether.

The portion opposite the Wallajah curtain on the west side is cracked, sunk and thurst out in many places.

That round the N. E. demi bastian has a strange undulating appearance, the retaining wall in some places is four feet above the present level of the water in the ditch, from which it sinks gradually down to the waters edge, rises again three feet, then sinks to within one foot of the water, and so on all the way round the bastian, it has also bulged out in many places, as much as three feet, and has several cracks in it.

The part round the north ravelin has sunk from one, to one and a half foot, is thrust out and cracked in several places.

H.—Counterscarp Sea Face.

This part of the Fortress is forced inwards as much as four feet at some points. There are cracks at almost the whole of the re-entering angles, whilst the saliant angles appear quite undisturbed.

I.—South East Counterguard.

Both faces of this work are cracked and thrust outwards. The embrasures, banquette and stone plat forms are cracked and sunk. The earth in the parapet is sunk.

J.—Lunette North of St. George's Ravelin.

Portions of both faces are thrust out, the cracks that formerly appeared had been filled up and the work seems to be in tolerable condition.

K.—West Lunette of St. Thomé Ravelin.

There are three cracks in each face of this work, one running inwards from the north east Gorge and obliquely southwards also towards the foundation. The sides and soles of the embrasures are sunk in several places, scarp revetment bulged out nine inches, terreplein sunk and cracked in many parts. There are also a number of cracks in the arches of the casemates.

L.—South East Bonnette.

There is a crack in the east face near the N. E. gorge of this work which extends to the foundation, and arch of the casemate, also two small cracks in the same face.

M.—Galleries and Traverses.

The arch of the Galleries south of the bonnette has fallen in, and the counterscarp revetment is thrust inwards nearly three feet: thirty feet of the banquette of the covertway has fallen in, and is broken into large masses. The traverse walls on the north and south sides present the same appearance as the banquette: the earth of the traverses has sunk about six feet. The gallery, banquette, and traverse on the south west face of Saint Thomé west lunette, are al-

most in the same condition. The gallery south of the Wallajah south lu nette has bulged inwards eighteen inches, which caused a large crack across the banquette and traverse, through which a man could pass into the gallery. The crack extends a considerable distance to the right and left.

Those on the west face of the same lunette are in a similar condition.

About sixty feet of the gallery east of the traverse in front of the Wallajah ravelin has fallen in, and the other portion of the gallery, the traverse, and banquette, are in the same state as those already described.

There are several large cracks in the traverses and counterscarp in front of the lunette north of the Wallajah ravelin.

N.—South Lunette of Wallajah Ravelin.

The whole of the revetment of this work, with the exception of about twenty feet from the salient angle on each face, has sunk, is cracked in every direction, and bulged out about eighteen inches at the north side.

The flooring and faces of three of the embrasures are cracked, and have partly fallen in. It has been recently repaired and plastered, and although in the condition above described, appears to be in tolerable order.

It would be exceedingly dangerous to fire from it.

O.—Wallajah Ravelin.

The south face of this work has sunk and bulged out one foot. The embrasures and rampart are sunk in several places, the west face is thrust out in the same manner as the south side, at the portion situated between the salient angle and entrance gate.

P.—North Lunette of Wallajah Ravelin.

This work has a crack one inch wide, extending down the scrap to the water's edge; there are several small cracks in the parapet and embrasures, which are of no importance.

S.—North Caponniere.

The revetments of this work are bulged towards the ditch as much as four feet in the centre, and are sunk in some places to the water's edge, and at one spot, one and a half foot below the surface of the water.

V.—South East Spur.

The scarp of both faces of this work has bulged out about nine inches. The terreplein, parapet and banquette are cracked and sunk in several places. The arch of the casemate underneath is much cracked and admits the rain almost as quick as it falls.

W.—South East Demi Bastian.

This work was re-built in 1844, and there is now a crack were the new and old parts meet, about three inches broad, in the south scarp, running from top to bottom, and two others in the old work more to the west. There are two cracks on the east face running from top to bottom of scarp. The interior of the parapet, banquette, embrasures, and stone plat forms are cracked and sunk. The three cisterns underneath are cracked and leaks.

X.—North East Blind in front of North Spur.

The parapet and revetments of this work are cracked in several places, the latter is thrust out altogether on the north side, and the whole work is in a dilapidated state.

Y.—Blind in front of East Lunette of North Ravelin.

The revetments are cracked and thrust out and generally in a dilapidated state.

Z.—Lunette West of North Ravelin.

The parapet, embrasures and plat forms are much cracked and sunk.

Fort Saint George,
23rd April, 1856.

(Signed) C. E. FABER, Colonel,
Chief Engineer, D. P. W. Comdt. of Engineers.

STATEMENT OF THE SUPPOSED COST OF THE FORTIFICATIONS OF FORT ST. GEORGE.

			Rupees.
Main body of the place	... ...	26,300 feet at 300 Rs. per foot...	78,90,000
Out works	...	5,430 ,, at 206 ,, per ,, ...	11,18,500
Berm	...	9,900 ,, at 105 ,, per ,, ...	10,39,500
Galleries	...	7,100 ,, at 110 ,, per ,, ...	7,81,000
Faussebray	...	450 ,, at 200 ,, per ,, ...	90,000
Blind	...	135 ,, at 106 ,, per ,, ...	14,310
Fraverses	...	750 ,, at 100 ,, per ,, ...	75,000
Caponniers	...	1,200 ,, at 150 ,, per ,, ...	1,80,000
Covertway and Pallisades ...	...	7,300 ,, at 100 ,, per ,, ...	7,30,000
Draw bridges, Sluices, &c.	... ...	... ...	1,00,000
			1,20,18,310
Add half as much more for Retaining walls, &c. &c.		... ...	60,19,150
		Total.....	1,80,37,460
Supervision, contingencies, &c.	... ...	... ...	19,62,540
		Grand Total.....	2,00,00,000

Fort St. George,
23rd April 1856.

(Signed) C. E. FABER, Colonel of Engrs.
Chief Engr. D. P. W., and Comdt. of Engrs.

Proceedings of a Committee of Engineer Officers assembled by order of the Right Honorable the Governor for the purpose of inspecting and reporting upon the condition of the Sea face of the Ramparts of Fort Saint George and of suggesting measures for securing and strengthening them.

President.

Major J. T. Smith.

Members.

Major T. T. Pears, C. B., Captain J. H. Bell.

Para. 1. The Committee having met and examined the works and attentively considered the various points communicated in the letter from the Town Major, dated 7th June, upon which they have been called to offer an opinion, have agreed upon the following report.

2nd. The annexed list shows the number and dimensions of the masses of masonry cracked and separated from the ramparts and walls of the Sea face of the Fort which are referred to in this report.

	feet.
North Demi Bastion. ...	156
North East Counterguard. ...	135
North of the Flag Staff Redan. ...	53
South of ditto. ...	53
North East Demi Bastion. ...	80
Berm near South East Demi Bastion. ...	320

		feet.
Do.	do. North East Counterguard.	
Do.	do. do. do. ...	37
Do.	do. do. do. ...	15
Retaining wall North East. ...		426
Ditto.	near North East Blind. ...	100
Ditto.	South of Flag Staff Redan. ...	30
Ditto.	do. do. do. ...	55
Ditto.	do. do. do. ...	15
Ditto.	near South East Counterguard. ...	85
	...	55½

In addition of which the following cracks exist in the crown of the arch of the casemates, though the list by no means shows the whole extent of them, as they have been from time to time filled in and whitewashed and thus hidden from view.

	feet.
South Face North East Blind length of cracks. ...	52
North East Curtain do. ...	20
Old Town Major's Office in Bombproof outside. ...	450
Outside the Bombproof under the Flag staff. ...	55
Do. Army Clothing Godown. ...	465
South East Demi Bastion.	

3rd. Causes. In regard to the causes of the above dilapidations, the Committee have experienced the same difficulty in forming a decisive judgment which has been felt on former occasions, there being no information procurable as to the nature or depth of the foundations of this part of the works prima facie; it would seem to be certain that the injuries have been occasioned by the gradual settlement or subsidence of the fore part of the revetments, but whether this has been occasioned by the gradual deterioration of the structure of the wells, on which they probably stand or the disturbance of the soil by the action of the underground currents, cannot be ascertained.

4th. Subsequent to the repair of the south east Demi Bastion which failed in a manner very similar to the worst parts of those now referred to, the Chief Engineer (Colonel Sim) reported that the failure of that work was not occasioned, as had been conjectured, by the sinking of the foundations; for the wells on which they stood had been found in generally good order, and the soil beneath them was hard river sand; but it was attributed to the weakness and insufficiency of the revetment to withstand the lateral pressure of the earth behind it.

20th September 1844.

5th. This explanation will not however apply to the worst portion of the sea face now reported upon, where the revetment has failed although there is a comparatively small pressure behind it and the Committee have ascertained by boring to the depth of 21 feet below the level of the ditch that the soil is of a similar quality to that just mentioned though of fine grain. They

therefore conclude that the failures must have been caused in part or altogether by one or other of the causes mentioned, in para. 3rd, namely the gradual decay of the substance of the wells, or the disturbance of the soil they stand in, which though otherwise capable of affording a good foundation is exceedingly treacherous when subject to the action of springs, which, there is reason to believe, may occasionally exist in this locality.

6th. In addition to the above causes there can be little doubt, as regards the various failures of the counterscarp wall, that the great weight of the mass of stones piled up against it, to form the bulwark has tended to overset and destroy the masonry.

7th. Remedies. The Committee agree with the Military Board in thinking that it would be desirable as an auxiliary to other measures of restoration, to extend the works which have been successfully tried of late, for the recovery of a beach in front of the Sea Custom House, and previously in front of the Marine Villa and Chepauk Palace; and they would suggest the propriety of connecting these two systems of works, north and south of the Fort, by a similar series in front of it, calculated to extend the beach 50 yards beyond the salient angles of the covered way.

8th. The Committee are of opinion that this improvement would have the effect of materially diminishing any injurious effects, which the works may have suffered from the action of springs underneath the foundations, and check that cause of dilapidation, to whatever extent it may have been in operation in times past. They would recommend that, for the formation of the proposed groynes, the upper part of the materials forming the present bulwark should be removed and the counterscarp wall relieved from the pressure to the depth of 12 or 14 feet below the crest of the parapet. By this proceeding, one of the main causes of the dilapidation of the counterscarp will be removed, and at the same time the expense of constructing the groynes considerably diminished.

9th. The Committee have not overlooked the circumstance, that the formation of a solid beach in front of the sea face of the Fort should be viewed, not only in the light of the benefit which may be derived therefrom by the protection of the foundation of the ramparts from the action of springs, but also in a Military point of view in reference to any danger or injury which might accrue to the defences of the Fort, by facilities afforded to its attack; in which light they have given the subject their best consideration. They are however of opinion that a narrow beach such as is proposed, would be by no means injurious to the defence of the Fort, but the contrary by affording scope for subsidiary works for repelling an attack by sea, which, covered as they would be by the fire from the ramparts in their immediate vicinity, would be of infinitely more value to the garrison than they could be to an enemy. The Committee have therefore no hesitation in recommending the formation of the beach as a subsidiary means of strengthening the present defences, and diminishing or counteracting one of the causes of their past gradual decay.

10th. The expence of the requisite number of groynes to cover the sea face, the Committee have not the means of accurately calculating but they think that with assistance gained by making use of the materials removed from the present bulwark, the expense would probably not exceed 20 or 30,000 Rupees. It is important to observe that the groynes ought to be kept low, in order to avoid the risk of interfering with the fire from the lower embrasures of the Fort.

11th. Repairs. Various measures have suggested themselves for the repair of those parts of the works most in need of renovation and the prevention, as far as possible, of further injury to those which are at present in comparatively good order. The chief of them are:—

1st. Connecting the front and rear walls by means of strong iron tie rods, 2 in diameter inserted beneath the spring of the arched roof.

2ndly. Counteracting any further outward thrust of the masonry, by driving a row of "Erroob" wood piles touching one another as near as possible to the foot of the escarp wall and connecting them with a similar row driven in close, to the counterscarp 3 feet apart, by means of horizontal beams acting as shores, and transmitting the thrust from stringing pieces on the one side to the other, and

3rdly. Effecting the same object by means of an inverted cement masonry arch, passing across the ditch, below the level of the present floor and transmitting the thrust in the same manner as the wooden shores abovementioned are proposed to do.

12th. The absence of positive information as to the cause of dilapidation, renders the selection of remedies for the existing defects in some degree a matter of uncertainty. The Committee have given their best consideration to the different cases which call for particular notice and in order to provide for their separate treatment, they would beg to recommend that an early, opportunity be taken to remove and rebuild the worst portion, the south Flag staff Redan, both the main body of the work, and counterscarp where injured.

13th. As they observe that the south east Demi Bastion, which was rebuilt on wells in 1844, has again begun to fail, they would suggest that on this occasion the foundation be of "Erroob" wood piles, driven as deep as they will go, and filled in with concrete, if any such of a really binding quality can be obtained, if not, on a plat form of the same wood—and that the lowest portion of the masonry, to 3 feet above the water-mark, be constructed of brick in cement. The Committee think that, although this construction will probably be more expensive than rebuilding the work on wells, yet that as the latter have been proved to be insufficient, it is worthy of trial whether well driven piles, would not afford a more durable foundation; and as they consider, it would be out of question, to attempt to drive the piles, without the aid of proper machinery for the purpose, the present appears to them to be a proper opportunity, in reference to this reconstruction, the repairs of the Fortress generally, and the many works in which such an instrument is required, to propose that a Nasmyth's steam pile drivng apparatus be procured and made over to the Superintending Engineer as part of the necessary appliances of his Department.

14th. It may be reasonably expected that the information which will be gained in taking down and reconstructing the South Flag Staff Redan will be of much value, in determining the causes of failure, and the best remedies to be applied in other parts of the works, and the Committee would suggest that no further steps be taken untill that restoration has been in part or altogether accomplished. After that, should the measures appear to be then advisable, the Committee would recommend that the North Flag Staff Redan, which is in a very bad condition, though not so bad as the south one, should be strengthened by the methods 1 and 2 above detailed and that a portion, about 100 yards, of the Sea face, which may appear most to require it, should be strengthened by the methods 1 and 3.

15th. It may be proper to mention that the iron tie rods and end plates, if approved of, must be procured from England, and a pair of models should accompany the Indent, shewing the shape of the plates which must fit the slope of the masonry; one end of the tie rods must be tapped with a very strong thread and screwed into the centre of the plate, which should be five or six inches thick in that part on the side imbedded in the wall.

16th. The Committee are of opinion that, coupled with the benefit to be derived by the removal of the action of the Sea to greater distance, there is fair probability that one of the combinations just adverted to may be sufficient, and they would give the preference to the latter [1 and 3 combined] if the uncertainty as to the cause of the dilapidation did not create some doubt as to its efficiency, from which the first [1 and 2] and more expensive plan is free. By giving a trial to both, these doubts would probably be solved, and future operation rendered certain.

17th. The Committee would also suggest as worthy of consideration, whether it would not be advisable, in respect to those parts of the works which have suffered the most injury, to construct platforms [upon which the Guns, as now mounted, could traverse] so as to extend all across the arch beneath, and thus distribute the shocks occasioned by their recoil over a larger surface.

18th. The following summary comprises all the recommendations which the Committee have now the honor to offer.

1st. That Groynes be erected, suited to cause an extension of the beach for 50 yards eastward to be kept low.

2ndly. That an early opportunity be taken to reconstruct south Flag staff Redan, the foundations on pile and concrete, or a platform; and the lower part of the masonry, to 3 feet above the water-mark, in cement masonry, with the view to the execution of this and other works of the kind that the Superintending Engineer be furnished with a Nasmyth's steam pile driving machine and 150 air light cases of the best Roman cement.

3rdly. That on the completion of these works the subject be again considered, such temporary repairs being executed in the mean time, as may be necessary to avert accidents, or to prevent inconvenience from leakage in those parts of the works which may be inhabited.

19th. The Committee have the honor to forward herewith a bill amounting to Rupees 81-6 on account of some contingent expenses, which they have been under the necessity of incurring, in order to make their examination complete and satisfactory, and which they trust will receive the sanction of the Right Honorable the Governor in Council.

Fort Saint George.
18th July 1856.

(Signed) J. F. SMITH,
Major of Engineers.
„ T. T. PEARS,
Major of Engineers.
„ J. H. BELL,
Captain of Engineers.

(True Copy.)

(Signed) C. E. FABER, Colonel of Engineers,
Chief Engr. and Comdt. of Engrs.

(True Copy.)

(Signed) H. W. HITCHINS, Captain,
Acting Adjutant of Engineers.

Specification of a Tunnel proposed to be erected on the Sea face, from the counterscarp opposite the South face of the Flag staff redan, running into the sea parallel to the groin to a distance of 180 *feet to be composed partly of teakwood and partly of masonry the portion that will come within the influence of the surf to be* 140 *feet long, composed of teakwood and protected by rough laterite stone in a junglewood frame, and the other portion of brick in cement.*

The piles on which the tunnel is to be erected should be 20 feet long and to be driven so far as to allow of the bottom of the cistern, or head of tunnel, to be half an inch higher than the level of the water in the ditch, and the bottom of the mouth to be half an inch lower than the head. They are to be driven at the intervals of 3 and 4 feet from centre to centre as shewn in the plan. On their heads are to be dovetailed longitudinal teakwood frames of 8″ × 6″ and cross frames of the same dimensions to be halved in, and on these are to be fastened 2″ teak wood planks with jagged iron nails. The head of the tunnel is to be 7′ × 6′ × 5′ the framing of which, as well as of the wooden portion, to be of 5″ square teak wood, and completed with 2″ teakwood planks, the whole to be well secured with iron clamps and nails, which, previous to being used should be galvanised by being heated and plunged into melted lead. The masonry portion is to be a semicircular arch of 3′ rise and two bricks thick, built of brick in cement and plastered with cement.

Fort St. George
23rd April 1856.

(Signed) FABER, Colonel,
Chief Engineer and Commandant of Engineers.

ABSTRACT OF ESTIMATES FOR REMOVING AND REBUILDING THE DILAPIDATED PORTION OF FORT SAINT GEORGE.

				Rupees.	Rupees.
Estimate for the South Redan	marked	-	A.	34,500	
Do. North do.	do.	-	B.	34,500	
Do. North East Demi Bastian	do.	-	C.	43,000	
Do. Saint Thome Ravelin	do.	-	D.	75,000	
Do. Saint Thome Caponniere	do.	-	E.	40,630	
Do. South Lunette of St. George's Ravelin	do.	-	F.	48,630	
					2,76,260
Do. Berms round the Fort					
Do. Counterscarp Sea face	do.	-	G.	3,67,500	
Do. South East Counterguard	do.	-	H.	2,02,500	
Do. Lunette North of Saint George's Ravelin	do.	-	I.	43,240	
Do. do. West of St. Thome do.	do.	-	J.	48,630	
Do. South East bonnette	do.	-	K.	62,340	
Do. Galleries and Traverses round the Fort	do.	-	L.	17,700	
Do. Lunette South of Wallajah Ravelin	do.	-	M.	87,100	
Do. Wallajah Ravelin	do.	-	N.	85,710	
Do. North Caponniere	do.	-	O.	68,690	
Do. South East Spur	do.	-	S.	36,480	
Do. South East Demi Bastian	do.	-	V.	30,200	
Do. North East Blind in front of North Spur	do.	-	W.	57,900	
Do. Blind in front of Lunette East of N. Ravelin	do.	-	X.	28,710	
Do. Lunette West of North Ravelin	do.	-	Y.	21,400	
	do.	-	Z.	2,850	
					11,60,950
Do. Proposed Tunnel No. 22 - - - - - - -					11,260
Total Company's Rupees.....					14,48,470

Fort St. George,
23rd April 1856.

(Signed) C. E. FABER, Colonel,
Chief Engineer and Commandant of Engineers.

MILITARY DEPARTMENT.

No. 1354.

Extract from the Minutes of Consultation under date the 14*th June* 1856.

Read the following Extract from the Minutes of Consultation in the Public Works Department.

Forwarding a communication from the Town Major giving cover to a letter and its enclosures from the Chief Engineer on the re-construction of the dilapidated portions of Fort St. George. } (Here enter 5th May 1856.)

The Governor in Council approves of the foregoing Report of the Commandant of Engineers which is very complete, and sanctions the estimate No. 22 referred to in para. 7, for immediate execution on emergency.

2. His Lordship also authorises the immediate adoption of such course in regard to the North East Demi Bastion, and Saint Thome Ravelin, and Caponniere, as the Commandant of Engineers may consider necessary for the prevention of accidents, reserving further operations until the sanction of the Government of India has been obtained.

South Redan sea face marked	A	Rs.	34,500
North do do	do B	„	34,500
North East Demi Bastion	do C	„	43,000
St. Thome Ravelin (very dangerous)	do D	„	75,000
Do. Caponniere	E	„	40,630
South Lunette of St. George's Ravelin	F	„	48,630
Total...			2,76,260

3. The early sanction of the Government of India will be at once applied for to the Estimates noted in the margin, in accordance with Colonel Faber's recommendation as noted in para. 9.

4. The Governor in Council will be prepared to nominate an Officer of Engineers for the Superintendence of the above works, as soon as the necessary sanction for their being proceeded with has been received.

5. The proposed employment of Mr. Walsh in the Civil grade of supervisor, will be considered in the Department Public Works.

6. The Governor in Council wishes the whole of the papers above recorded to be submitted, in a printed from, to the Honorable Court, and the Government of India, with the least possible delay.

7. It is desirable that the Commandant of Engineers should cause a sketch of the origin, early history, and subsequent alterations &c. of the fortress, to be drawn up to accompany these papers. Its preparation however need not delay the printing of the papers above recorded.

(Signed) H. MARSHALL, Lieut. Col.,
Dy. Secretary to Government.

Comdg. of Engineers Office.

85

N: 494.

From,

Colonel A. Cotton.

Commandant of Engineers.

To,

The Secretary to Government

Public Works Department.

Sir,

In obedience to the orders contained in the Extract from the Minutes of Consultations N: 602 dated 1st april 1857 I have the honor to forward two plans and a sketch of the original early history and subsequent alterations of Fort Saint George drawn up by the Garrison Engineer.

I have the honor to be
Sir,
Your most obedient Servant.

Fort Saint George,
24th September, 1857.

A. Cotton Colonel
Commandant of Engineers.

Ld. 7th April 57 No. 16.

Public Works 1857 Department
Ld. 10th Corps 15th April 1857 No. 1807

1857 Sept.

From

Colonel A. Cotton.
Comdg. Engrs.

To

The Lieut. Col. Engrs.
Chatham

Dated 24th
Rec'd

Enclosure

Forwarded to the Engr.
and a Memo. of the
origin, early History
and Subsequent alts.
& Additions of Fort
George.

Letter and order
No 2068.

No. 2068.

Ordered that the above
letter and the papers accompany-
ing it be forwarded to the Military
Department with reference to Paras
of an Extract from the Minutes of
Consultation in that Department
dated 5th June 1856 No. 1354 and
that the several Enclosures received
with the Covering Letter of 22d
29th April 1856 be printed
and brought on the Proceedings of

Fort George
5th Nov. 1857

Postponed to the Only Case
Case 26

a/c 22 & 23.

Clk Cotton R 21st

Coms 7th April 57 No 16

Madras 1857 Depart
Sp. to Cons 10th November
No 1897

From
Colonel A Cotton
Comdt of Engineers
To
The Secretary to Govt
P.W.D.

Dated 24th } 1857
P.W. }

No 494

Encloses 1 Memo
2 Plans

91

Coms. 24 Nov/57. No 7748.

Forwards 2 Plans
and a Memo of Col
Engrs Corps Vicinity and
Subsequent Alterations
for Fort St George

No 22 & 23.

Noted on Cover
Cons. 2168 10th Nov

89

No 94

From
Captain C.S.I. Orr
Civil Engineer in Charge Vizt. Dn
To
The Chief Engineer
in the D.P. Works
Madras.

Sir,

1. I have the honor herewith to submit a project for draining the Country to the Westward of the Coonnamoor Channel by diverting a large portion of the land floods from the Pookka aungro into the Vella Vadda and by disposing of the rest below the Coonnamoor Channel by means of under tunnels. The plan and Estimate having been submitted to the Collector have met with his approval and I annex copy of his letter returning them and showing part of the financial effects of the outlay.

× Rs 36,570

2. The Coonnamoor Channel which irrigates already large tracts in the Banjerlah Pettipaud and Ponnoor talooks and is yearly increasing in value, crops and interests a very large amount of drainage, for the effectual disposal of which, either by

Cont

diversion or other means an effectual
measures have been taken. The Consequence
is that a great deal of valuable land ad-
joining the Channel is submerged during
the monsoon and rendered uncultivable,
and the Channel banks are continually being
breached after heavy falls of rain. The
Collector has estimated the loss of Revenue
this season from the former cause at Rs.
3000 and it is probably as much every year
and he puts the actual outlay incurred in
the repair of breaches in the Channel banks
during the last ten years at Rs. 16,128,
making together a yearly loss to Government
of nearly Rupees 5000 exclusive of the
loss of produce to the Ryots, and of the
injury done to growing crops for want of ir-
rigation while the Channel is being repaired,
of which no account has been taken, though
it must be considerable even at present,
and will become an intolerable evil when
the cultivation under the Channel has in-
creased for a few years at the rate it is
now doing. Land too that might be taken
up is neglected, because known to be in a
dangerous neighbourhood.

3. Such a state of matters demands
immediate remedy, and would justify the
outlay I propose, if no greater benefits were
looked for than the saving of the sums
which the Collector claims is now lost,
but as all the land that is now liable
to being flooded, and many times as much
more that cannot be improved without a
complete system of drainage be first car-
ried out, will be brought under the
influence of the Kistnah Southern high
Level Channel, and be made of the utmost
value, it is absolutely necessary in my
opinion to undertake the works I propose
in connection with the comprehensive scheme
of Kistnah irrigation and thoroughly perfect
improvement, and I accordingly recom-
mend it as an essential portion of that
project.

4. The remedial measures I propose
are 1st. The diversion of the Gutkha Vaigoo,
a most troublesome stream, into the Gudla-
vadda Drain, the embankment of the
left bank of the latter, and 3rdly the
construction of three large drainage tun-
nels under the Commaum Channel.

overflow of the united streams, keeping back towards the Pukkavangoo canal the lands which it is so desirable to drain.

6. The overflow of the Pukkavangoo being prevented, the remaining drainage will not be difficult to deal with, and may be all discharged by the three ordinary sized under tunnels, for the construction of which I have provided in the Estimate.

7. The Plan and Sections will sufficiently illustrate the project. The most costly part of it is the construction of the masonry Mulla mudda Embankment, but it is essential for the attainment of the end in view, which is not merely the saving of the Rs. 5,000 that are now annually spent or lost but the reclaiming of a large tract of rich land now neglected as swamp — the fitting it for improvement in connexion with the existing Anicut irrigation project, and the turning to good account, for the better supply of several highly valuable tanks, a vast quantity of water which is now allowed to run to waste, and in doing so to occasion immense mischief. The embankment will be serviceable as a road likewise where such accommodation is greatly required.

7. With reference to the point referred to by the Acting Collector in the 6th para of his letter, I would explain that as the waters of the Pukkavangoo and Mulla-vaiyaru when united in the latter stream, can only reach the Kanjeeliah swamp through the tank, the drainage be alluded to is a perfectly distinct project, which will be taken up and determined by us next year.

8. The schemes mentioned in the 7th para of the Collectors letter for extending irrigation by means of the better supply of water which the carrying out of the improvements now recommended will afford, is already under investigation and will also be submitted next year.

I have the honor to be Sir
Your most obed. Servant
Arthur T. Cotton
Civil Engineer in charge Tanjore

Bezwada
21st October 1856

No. 389

Guntur
Collectors Office
15th October 1856

From J. Wood Esq
Acting Collector of Guntur

To
Captain C.S. Orr
Civil Engr in charge Kistnah Dt

Sir,

1. I have the honor to acknowledge the receipt of your letter of the 25th ultimo forwarding me a plan and estimate relative to the regulation of the Buccavanjor and Pulla madoo streams with reference to the Kistnah District irrigation.

2. The object and benefit of these works are so clearly described in your letter that it is unnecessary for me to dilate upon them, but I may confine myself to the expression of entire concurrence in them and to supplying the information bearing on the financial effect of the operation.

3. The enclosed statement shows the expenditure on the repairs of the Commercanal channel for the last ten years, chiefly occurring in stopping breaches or strengthening the banks to prevent them.

4. It will be difficult to represent in a figured statement the injurious effects of the uncontrolled floods of the two large streams in question, but a simple illustration may however be given in the circumstance of the Kortimeda ryots whose lands adjoin the Commanoor Channel having thrown up about 600 acres of land assessed at about Rs 1000, while it is reported that lands assessed at upwards of about Rs 2000 more have been submerged in several other villages in that neighbourhood.

5. It is true that a large portion of this land may eventually be cultivated after the floods have subsided and brought under the usual assessment, but it is obvious that the inconvenience and loss to the ryots is considerable in preventing their application of their agricultural means to the best advantage, and that thus the Government as the landlord suffers loss not only in the extent of remissions granted on lands remaining unfit for cropping, but in the impoverishment of the resources of the ryots from whence the assessment is drawn.

6. There is one observation I may venture to make on the project and you may probably have already had it under consideration

Could scarcely be brought to bear upon the former sufficiently to mature the Crop.—

I have the honor to be

Gentlemen

Your most obedient Servant

Signed/ H. Irwin

Acting Collector

15th October 1856

Statement of Expenditure incurred in the Repair of the Commanoor Channel during the last Six years in the District of Gantoor.

No.	Names of villages under the irrigation of the Channel	Year.	Expenditure R. A. P.
1	Commanoor	1846	822 . .
2	Nindoor	1847	2639 . .
3	Poonla	1848	2195 . .
4	Upparetla	1849	342 . .
5	Imagurtapaud	1850	1093 . .
6	Sopaporam	1851	2582 . .
7	Murrupurdy	1852	900 . .
8	Ratoor	1853	1440 . .
9	Appapuram	1854	505 . .
10	Banjarlah	1855	430 . .
			16128 . .
	Average per annum		1613 . .

Gantoor
Collectors Office
15th October 1856

Signed/ H. Irwin
Acting Collector

True Copies
Charles R. Prole
Civil Engineer & Superintendent

Cuttack Decr/56 No 8662

B,

No 1253

From
The Civil Engr in charge
Cuttack Dt
To
The Chief Engr P.W.
Dated 20th } October/56
Recd 25 }

Do 94

Esti - 1
Plans - 3

P.W. 2762/56

Submitting a project for draining the Country to westward of the Commamoor Channel by diverting a large portion of the land floods from the Sukkavangee into the Mulla madda and by disposing of the rest below the Commamoor Channel by means of under tunnels. Estimate Rs 36,570-

Central Office of P.W.
Fort St George
No 8662

183

Ganjam District
Public Work
Extraordinary
Public Roads

Report on an Estimate for constructing a 2nd Class Road from the Salt Pans at Nowpada to Tekkally, Ragoonadpooram on Trunk Road No 6 - 5 Miles, 3 furlongs and 92 Yards.

1- Amount of Estimate Rupees (5,330...) five thousand, three hundred and thirty, as follows.

79241 Cub. Yards Earthwork @ 0-5 ₽ Cub. Yard Rs	2476 - ..
2661 — do — Metalling @ 4-0 ₽ — do —	665 - ..
6368 — do — Gravelling @ 3-0 ₽ — do —	1194 - ..
Superintendence at 10 ₽ Cent	434 - ..
Sundries including fractions	217 - ..
Compensation for 5 acres of Zemindary land at Rs 40 ₽ Acre	200 - ..
4. 20 Yard Road dams @ Rs 36 each	144 - ..
Total Estimate Rupees	5,330 - ..

2- This Estimate has been prepared by the Civil Engineer 9th Division in connection with one forwarded to the Agent to the Governor in Ganjam for a branch road from Malapetta on the Kimedy and Poondy line to Tekkally Ragoonadpooram, being the most direct route from Goonapooram via Buttelly, through the Kimedy Zemindary, towards Nowpada.

3- At present, the approach to the Nowpada Salt Pans the largest and best in the Ganjam and Vizagapatam Districts, is cut off during the rainy season by a swamp of 3 miles in length, on which in the dry season, the

Carried over Rs

the Civil Engineer observes in para 2 of the accompanying letter No 845 dated 11th October 1836, "there is not one blade of grass for the thousands of bullocks that come there for salt."

4.- The Acting Collector of Ganjam in a letter No 339 dated 21st October 1836, which is herewith forwarded, represents the urgent necessity for this road, and the Estimate having been prepared on moderate and sufficient data, the Chief Engineer recommends it for entry in the Budget of 1857/58.-

5.- The Civil Engineer has been requested to furnish the Statement referred to in para 3 of his letter, of the number of bullocks employed in carrying salt from the Nowpada pans, the same having been omitted to be sent, but the necessity for the road being sufficiently evident from the information given by the Civil Engineer, and the Acting Collector, the Chief Engineer does not consider it necessary to delay the submission of the Estimate until the receipt of the said traffic return.-

Central Office of R.W.
Fort St George
6 Dec/56

Wm Taber Colonel
Chief Engineer

To
The Secretary to Government
R.W. Department.

Sick

List of Enclosures.

A 1 1.- Letter from the Civil Engineer Dt No 845 dated 11th October 1836.-
A 2 1. Letter from the Acting Collector of Ganjam dated 21st October 1836 No 339.-
A 3 1.- Abstract Estimate.
A 4. 1.- Survey of the proposed line between Nowpada and Tekally.-
A 5. 1. Sketch Map.-

Carried over Rupees 760 23660

Public Works Dept.
Dy. to Govt 24th Nov. 57.
No 2761

A

From the Chief Engineer
To the Secretary to Government
P.W. Department

Dated 6th Nov. 56.

5 Enclosures Returned
4 Enc.

No 8662

Forwards for entry in the Comptl of 1857/58 an Estimate of Rupees 3330 Three thousand three hundred and thirty for constructing a Cart Road from the Sutt Pans at Bowpaul in the Gunjam District to Tekally Ragoonaddpoonam on Trunk Road No 5 Miles 3 furlongs and 92 yards.

No 520.

Rupees

Cr 25th April 1st Item

107

No 375

To
Coll. C. R. Faber
Chief Engineer, &c &c &c
Fort St. George

Sir

I have the honor to forward herewith the Plans and Estimates for Masonry Works required on Trunk Road No 6 between Chicacole and Ichapoor and request you will be good enough to obtain Sanction for the same. The works have my full support.

I have the honorable
Sir
your most obedt Servt

Gunjam District
Collrs Cutcherry
Berhampoor
6th November 1856

Acting Collector

Carried over Rupees 760 2660

Ganjam District

Public Bridges.

Letter No. 895 dated 21st October 1856.

Report on an Estimate prepared by the District Engineer of Ganjam for constructing bridges on the high northern road (Trunk Road No. 5) between Chicacole and Itchapore.

Amount of Estimate Rupees (47,220) forty seven thousand two hundred and twenty as follow.

Between Chicacole and Suntashapooram. 39½ miles.

2 Bridges of 4 Arches of 7 yds. span	Rs 7,980	
1 — do — of 3 — do — do —	3,470	
1 — do — of 2 — do — do —	2,920	
2 — do — of 2 — do 5 yds. do —	2,840	
7 — do — of 2 — do 4 — do —	6,580	23,790

Between Suntashapooram and Dendaledda near Itchapore. 34½ miles.

1 Bridge of 4 Arches of 13 yds. span	Rs 6,870	
3 — do — of 3 — do 5 — do —	5,400	
1 — do — of 2 — do 12 — do —	3,060	
2 — do — of 2 — do 5 — do —	2,720	
2 — do — of 2 — do 4 — do —	1,940	
2 — do — of 1 — do 5 — do —	1,740	23,430
Total Rupees		47,220

1\. Items Nos. 2 and 3 in Statement No. 1 of the Budget for 1856/57 amounting to Rupees 45,550 and 37,200 provided respectively for Earth work, metalling 6 yards in width, and the construction of the smaller masonry works such as tunnels and road dams between Chicacole and

Carried over Rupees 760 27660

No. 8862

Ganjam District

Public Bridges.

Letter No. 895 dated 21st October 1856.

Report on an Estimate prepared by the District Engineer of Ganjam for constructing bridges on the high northern road (Trunk Road No. 5) between Chicacole and Itchapore.

Amount of Estimate Rupees (47220) forty seven thousand two hundred and twenty as follow.

Between Chicacole and Suntashapooram 39½ miles.

2 Bridges of 4 Arches of 7 yds. span Rs.	7980	
1 do of 3 do do	3470	
1 do of 2 do do	2920	
2 do of 2 do 5⅓ do	2840	
7 do of 2 do 4 do	6580	23790

Between Suntashapooram and Dendakedda near Itchapore. 34½ miles.

1 Bridge of 4 Arches of 13⅓ yds span Rs.	6570	
3 do of 3 do 5 do	5400	
1 do of 2 do 12 do	3060	
2 do of 2 do 5 do	2720	
3 do of 2 do 4 do	1940	
2 do of 1 do 5 do	1740	23430
Total Rupees		47220

1\. Items Nos. 2 and 3 in Statement No. 1 of the Budget for 1856/57 amounting to Rupees 45550 and 37200 provided respectively for Earth work, metalling 6 yards in width and the construction of the smaller masonry works such as tunnels and road dams between Chicacole and

Carried over Rupees 760 27660

Govt. 6 Dec. 1856 No. 8862

1856 GG2

Revenue Department

The Acting Collector of Ganjam

To

The Chief Engineer

Fort St. George

Dated 9 November

Received 21 do

No. 67

Transmitting plan and Estimate for the [illegible] works between Chicacole and Itchapore.

P.W.C. 27/93/56

and Suntashapooram; and the latter place and Dendagedda near Itchapore; and the Estimate now submitted as directed in Extract Minutes of Consultation No 362 dated 18th March 1856 provides for thoroughly completing the same portions of road.

2. The Acting Collector of Ganjam in his letter No 375 dated 6th November 1856 states that the works have his full support, and the rates allowed being moderate and sufficient. The Chief Engineer recommends the Estimate for entry in the Budget of 1857/58.

Central Office of Exns
Fort St George
6 Decr 56.

Lt Colonel
Chief Engineer

To
The Secretary to Government
R.W. Department.

List of Enclosures

1 Letter from the Supt Engr & Sy dated 21 Octr 1856 No 805. ---------- GG1
1 Do from the Actg Collector Ganjam dated 6th Novr 1856 No 375 ---------- GG2
2 Abstract Estimates ---------- GG3&4
2 Plans ---------- GG5&6

Carried over Rupees

Cons: 11th March/56 Ks 89.
" 13th April/55 — " 18-19.
" 8th May — " — " 13-14.
" 19th June — " — " 7 C9.
" 17th July — " — " 40-41.

GG
Public Works Dept.
Dto Cons 24th Nov. /57.
No 2793
From the Chief Engineer
To the Secretary to Government
P.W. Department

Dated 6
Rcd 9th 3 Decr./56.
6 Enclosures

No 8862

Towards forming in the Budget of 1837/58 an Estimate of Rupees 47220 for constructg Bridges on the high Northern Road (Trunk Road No 6) between Chicacole and Cuttack

No 21.

Public (roads) (New Work)

Abstract of Estimate No of 185 /5

Road No

District: Ganjam.

Work. Making a new road from Aska to Trunk Road No 6 near Rumbah 8 Miles 4 Chs

Quantities	Description of Work	Rate			Amount	Amount for each part
C. Yds.		Rs	as	P.	Rupees	Rupees
	Making a new Road from Aska to Trunk Road No 6 near Rumbah					
17360	C. Yds of Earthwork — Cyd	"	"	6	5425	
18286	" of Metalling — "	"	6	"	6858	
43297	Sq Yds of Turfing — Syd	"	"	5	1121	
67420	" " of Clearing Jungle 100	2	"	"	135	
						13539
	Sundries & Superintendence including fractions —					704
	Anticipated last of const. 6 Miles of road through dense Jungle which could not be surveyed at 500 Rs p Mile —					3000
	3 Wooden Bridges over the Nullahs					
	each	1000	"	"	3000	
2	Do — Do — "	185	"	"	370	
5	Do — Do — "	80	"	"	400	
72	Tunnels — "	60	"	"	4320	
23	Do — Do — "	100	"	"	2300	
	One Road Dam No 13 "	12	"	"	12	
	One Road Dam No 81 "	15	"	"	15	
						10417
	Pile Bridge of 20 Bays of 15 ft. span over the Mahanuddy river near Boojam Aska					
380	C. Yds Rough Stone in chunam	1	8	"	570	
38	Piles @	5	"	"	190	
	Carried over Rupees				760	27660

c 27 April to 12th May

Quantities	Description of Work	Rate Rs	As	P	Amount Rupees	Amount for each part Rupees
C. Yds.						
	Brought over Rupees				760	2760
	38 Transverse Beams &c	3	8	"	133	
	38 Horizontal diagonal pieces	2	8	"	95	
	38 Diagonal with corbels	2	"	"	76	
	60 Longitudinal Beams	3	"	"	180	
3600	Sq.ft. of planking 4 in thick					
	Per Sq.ft.	"	1	4	300	
630	Running ft. of Hand rail	"	2	"	79	
100	Maunds of well wrought					
	Iron including bolts					
	Nails shoes & Piles &c	5	8	"	550	
	1 Pile driving Machine				180	
	Labour for working do					
	&c &c per day	5	"	"	100	
	Earthwork					
21,00	Cds Filling in Approaches	"	1	"	150	
320	" Excavating foundation	"	1	"	20	
150	" Rivetting with					
	rough stone in chunam	"	8	"	75	
164	Metalling on roadway					
	of Bridge & Approaches	"	6	"	62	
	Superintendence at 10 p cent				276	
	Sundries at 5 p cent including fraction				164	
						3200
	Total Engineer's Rupees					30860

Central Office of P.W.
Jas. L. George
6 December 1856

H. E. Sankey Colonel
Chief Engineer P.W.

QQQQ5

Enclosure

Sine Report

From

The Chief Engineer
D. P. W.

To

The Secretary to Govt
D. P. W.

Dated 6th December 86
Received 9th
P.W. 2855/51

No 8662

Abstract Estimate of the
Expense of Making a new
Road from Aska to Gunta
Road No 6 near Rumbak
and Poosatapoor 4 1/4
Miles in the District of
Ganjam Aska to Rd 38 Miles

No 8662

Ganjam District

Public
Roads

Report on an Estimate prepared
by the District Engineer of
Ganjam, for Constructing a
District Road from Aska to
Pumbah on the Chilka Lake,
a distance of 29½ miles.

The Estimate provides for.

	Rs.
173,607 3/4 Cb. Yds Earth work at 6 pice pr Cb. Yard	5,425-3-7
18,286 Rg. Metalling 6 Mls inde and 6 inches thick at 6 annas do	6,857-8-0
63,297 6 Sqrs. Yds Turfing at 5 pice pr Sqre Yard	1,921-5-0
64,20 clearing Jungle at pr 1000 Sqre Yds Rs 2	134-13-0
1 wooden bridge of 20 Bays each of 15 feet span	3,200-0-0
1 do of 10 bays of 11 feet	3,000-0-0
1 do of 3 Bays of 12 ft. span	370-0-0
1 do of 1 do 15 do	400-0-0
95 Culverts varying in Size, from 1 Vent of 3 ft, to 1 Vent of 6 feet span	6,620-0-0
2 Road Bound	27-0-0
Carried forward.	27,155-13-8

cultivation, and cropping deep and muddy Nullahs unprovided with bridges, bamboos half loaded, are still to be seen daily croping it, though of course with the greatest difficulty.-

6. No metalling had been allowed in the estimate for the portions of the road between Perumbore and Pumbaly, where the soil is sandy or naturally hard, and not likely to resist the wear and tear of the present traffic.-

7. Of the six miles near Pumbaly no Regular survey had been made, in consequence of the dense jungle through which the road is to be taken and the District Engineer states that had he delayed the preparation of the Estimate until the Jungle was cleared, for which moreover he had no funds at his disposal [a practical inconvenience easy of removal] it would not have been in time for entry in the Budget: the distance however has been measured with a Chain and an allowance made for it of Rupees 500 per mile.-

8. As Sal timber is abundant and very cheap in the vicinity of the proposed road, wooden bridges have been provided

(1905)

12

for all streams exceeding 2 Yards in breadth the cost of them being small compared with masonry.-

9. The Acting Collector of Ganjam in the accompanying letter No 4 dated 19th November 1856, strongly advocates the construction of the road; the value of which has been sufficiently shown by the District Engineer, and the estimate having been framed in moderate and sufficient state, is recommended by the Chief Engineer for entry in the Budget of 1857/58.-

Central Office of Rs
Fort Saint George
6th November 1856.

Actg Lieut Colonel
Chief Engineer

List of Enclosures

1 Letter from the Actg Engr dated 12 Novr 1856 No 1035 - QQQQ 1
1 Do from the Actg Collector Ganjam dated 19 Novr 56 No 4 - QQQQ 2
1 Do from Do Engr dated 10 Novr 1856. No 1021 - QQQQ 3
1 Do from the Actg Collector Ganjam dated 19 Novr 56 No 5 - QQQQ 4
2 Estimates - - - - - - - - - - - - QQQQ 5 & 6
6 Sheets of Survey - - - - - - - - QQQQ 7, 8, 9, 10, 11 & 12
2 Plans - - - - - - - - - - - - - QQQQ 13 & 14
2 Sketch Maps - - - - - - - - - - QQQQ 15 & 16
1 Section - - - - - - - - - - - - QQQQ 17

QQQQ

Public Works 1836 Deptt
Dated Cuttack 24th Nov. 36.
No 2855.
From the Chief Engineer
To the Secretary to Government
1st Department

Dated 6th December 1836.
Read 9th December 1836.
Enclosures 17 Returned to Exd

No 8662

Mr Ward for Subsidy on Bridge Estimate 1837-38 in Return Rupees 30,860 for construction of Cuttack Road from Chilka Rumbeck on the Chilka a distance of 99½ Miles in the Ganjam District.

No 22.

27th April 12th May

123

No 8662

Ganjam District
Public
Navigable Canal.

Report on an Estimate prepared by the District Engineer of Ganjam for excavating a navigable Canal from the Chilka Lake to the Ganjam River near the Port of Ganjam.—

1 The Estimate provides for

4,00,797 C. Yds Earth work at 8 —	Rs	16,700-
800— do Rough Stone in chunam at Rs 4-		1000
87 Acres of land compensation at Rs 24 per Acre Rs.		2067
1 Superintendence & Sundries		1193
3 Ferry boats. —		180
1 Siphon duct. —		640
Total Rupees		21,780-

twenty one thousand, Six hundred and eighty

Rs

1. The object of the proposed Canal which like that to Calingapatam was first suggested by Lieutenant Colonel F. Cotton in his recent Report on the Ganjam District is to complete the water communication from the Chilka Lake to the Port of Ganjam, and thus to obviate the great inconvenience at present experienced by Traders, in having to land their goods at Rumbah near the Southern extremity of the Lake, and thence to transport them, at a great expence on bandies to Ganjam.—

2. The exports from Ganjam are annually increasing, and a ready market being found there for Rice, Oil Seeds, and other produce from the Districts bordering on the Chilka Lake, it is desirable to facilitate and cheapen as far as possible, the means of communication to it, and which cannot be done more effectually than by the proposed canal.

3 In para 5 of his letter dated 1st 1863

dated 18th November 1856, the District Engineer observes "with this communication open, the Port of Ganjam will have the full advantage of water carriage from all parts of the Lake, at a very cheap rate, and I trust the sale of Salt will be in consequence considerably increased. we can doubt it will meet with a ready sale at Rumbah, and other inland parts of the Lake for transportation to the North and West-ward, considering too that the Salt manufactured at Ganjam is of a far superior quality to that obtained in Orissa, as also cheaper owing to the cost of manufacture".— It should be observed here that the Salt at Cuttack is made by boiling, that at Ganjam by evaporation.

4. Eventually it is intended to extend the Canal from Ganjam to the Port of Munsoorcotta by the Chetterpore backwaters.

5 In para: 7 of his letter the District

Engineer

Engineer notices the facility with which loaded boats will make their way down to Ganjam during the prevalence of the Northerly winds from December to the end of February, and in para: 8 offers some remarks on the effect of these winds combined with the floods on the level of the lake.—

6. The only masonry work required on the proposed Canal is a Siphon duct for the passage of an inlet from the Sea, which supplies water to the Salt pans, the level of the inlet being 2 feet below that of the Ganjam River.—

7. The Canal as shown in the plan, is to be carried in a direct line from the Lake to the River, and is to be cut to a depth of 3 feet below the level of the lowest water in the Lake, during the prevalence of the Southerly winds, as observed in para: 8, during Spring tides, the high water at Chumbab is 1½ feet below the level at the outlet to the Sea, which is at the

the northern end of the Lake.—

8 The District Engineer does not consider that any Lock is required at present, so that the Canal will be essentially a tidal one. Its width at sole is to be 4 yards with side slopes of 2 to 1, giving an average top width of 8 yards. The soil is likely to stand without any artificial support, and the Canal is sufficiently far from the coast, not to be affected, it is supposed, by the Sand-drifts, but Palmyra trees will eventually be planted along its banks.—

9. In a comparison of the cost of land and water carriage, the following rates are given.

One bandy carrying 6 bags of rice or 98 lbs from Chumbab to Ganjam 9 Miles each 9 Annas.

Comparative table from the above.

	Boats	Bandies
One 1st Class boat carrying 20 bandyloads, each	Rs 5	11-4

one

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the northern end of the Lake.—

8 The District Engineer does not consider that any Lock is required at present, so that the Canal will be essentially a tidal one. Its width at sole is to be 4 yards with side slopes of 2 to 1, giving an average top width of 8 yards. The soil is likely to stand without any artificial support, and the Canal is sufficiently far from the coast, not to be affected, it is supposed, by the Sand-drifts, but Palmyra trees will eventually be planted along its banks.—

9. In a comparison of the cost of land and water carriage, the following rates are given.

One bandy carrying 6 bags of rice or 98 lbs from Chumbab to Ganjam 9 Miles each 9 Annas.

Comparative table from the above.

	Boats	Bandies
One 1st Class boat carrying 20 bandyloads, each	Rs 5	11-4

one

	Track.	Bandies
One 2d class boat carrying 12 bandy loads, cost	Rs 3	6-12
One 3d class do carrying 4 do do	1	2-4

The result is that the cost of the water carriage is upwards of 100 per cent less than that of the land.

10 The daily traffic between Chumbole and Ganjam is given at 230 bandies. 400 laden bullocks and 1400 Travellers and Cavady coolies.

11 In his letter No 415, dated 21st November 1856 the Acting Collector of Ganjam gives his full support to the Project, observing that the Canal will be the means of promoting the commercial prosperity, not only of the Ganjam District, but of the Bengal Districts bordering on the Chilka Lake from which large cargoes of grain are sent down to Ganjam for export.

12. That increased facilities of inland transport will lead to more extended cultivation and the consequent influx of a larger quantity of grain to the export market, there is but little doubt, & a very important result to be expected is, that as competition increases, a corresponding fall will take place in the price of grain, the greatest blessing that could be conferred on the poorer classes.—

13. The Acting Collector does not coincide with the District Engineers views as to the importance of the Salt trade, but that is merely a difference of opinion, & not a question in any way affecting the value of the Project, which in every point of view is a very desirable one, & the Estimate being framed on moderate & sufficient data, is warmly recommended by the Chief Engineer for entry in the Budget of 1857/58.—

Central Office of Pub. Works.
Fort St. George.
6th December 1856

W. Lester Colonel
Chief Engineer N. P. W.
To The Secretary to Govt. P.W.D.

BBBBB 1 ... 1 List of Enclosures
BBBBB 2 ... 1 Letter from the Chief Engr 2d Div dated 18 Nov 1856 No 1063
BBBBB 3 ... 1 do from the Acting Collector Ganjam dd 21 Oct. No 415
BBBBB 4&5 ... 2 Plans
BBBBB 6 ... 1 Level

Public Works 1836 Deptt. BBBBB
Dº to Cons 24th Nov 57.
No 28667.

From the Chief Engineer
to the Secretary to Government
P.W. Department

Dated 6th December 1836
Recd 9th Do

Enclosure & Returned &c &c

No 8662

Forwards for entry in the Budget of 1837/58 an Estimate of Rupees 21780 for excavating a Navigable Canal from the Chilka Lake to the Ganjam river near the port of Ganjam in the Ganjam District.

No 23.

24th April 1837 Mary

No. 8662

13

Ganjam District
Public
Road.

Report on an Estimate prepared by the District Engineer of Ganjam for constructing a District Road from Jurgunghy near Bomally on Trunk Road No 6 to Juggernaut Poorum on the Road from Chicacole to Palcondah - a distance of 22½ miles nearly.

The Estimate provides for

159,435	cbyds	earth work @ 6	Rupees 4,982-5-8.
5773	"	Metalling 3½ yards wide and 4 inches thick @ 5as	1804-1-9.
15,599	"	Gravelling 4 yds wide and 3 inches thick @ 4as	3899-15-.
66,980	sqyds	Turfing 2 pr sqyd	635-8-4.
246360	"	Clearing jungle at Rs 1000 sqyds	985-7-.

worden

1 wooden bridge of 4 Bays
of 10 feet span ——— 600-0-0
2 Do. Do. of 3 Bays
of 12 feet span each Rs 625 — 1,250-0-0
4 Do. Do. of 3 Bays of
12 feet span each Rs 730 — 2,920-0-0
8 Do. Do. of 1 Bay of 12
feet span each Rs 300 — 2,400-0-0
17 tunnels varying in size
from 1 Vent of 3 feet to 1 Vent
of 6 feet span ——— 2,150-0-0
Superintendence and Sundries 622-15-5
Compensation for Inam
and Zemindary Lands — 3,150-0-0
Total Rupees 25,400-0-0

twenty five thousand four
hundred.

1. This Road is a continuation of the line from the Nowpada Salt pans to Bimally (the Estimate for which Rupees 10,640/ ten thousand six hundred and forty, formed the subject of the Chief Engineer's Report No. 8662 dated the date. —— and will complete the communication* to Parvatipoor, from whence the pass into the Jeypore Country is perfectly practicable for loaded bullock Rs considerably

* The portion of road from Jugger-naikpuram to Parvatipoor is

considerable traffic being already carried on along it principally by Brinjarries, from the Nagpore and Jeypore countries, who resort to Nowpada for the purchase of salt.-

2. The number of Brinjarries with their bullocks is given by the District Engineer at 9,000, and the average Revenue realized by the sale of the salt at Rupees 2,31,600.-

3. The construction of the proposed Road which will pass through the town of Jellimore and the large villages of Boodathy and Nagaracutteam, is strongly advocated by the Acting Collector of Ganjam in the accompanying letter No. 413 dated 21st November 1856, and the Estimate which has been framed on moderate and sufficient data is recommended by the Chief Engineer for entry in the Budget of 1857/58.-

Central Office of P. Works
Fort Saint George
6th December 1856.

A. Cotton Colonel
Chief Engineer

List of Enclosures.
1 Sketch Map ——— DDDDD 7
1 Letter from the Chief Engr. 2 Do. dated 15 Nov. 1856 No. 1057 DDDDD 1
1 Do. from the Acty. Collector of Ganjam " 21 Do. No. 413 DDDDD 2
1 Abstract Estimate ——— DDDDD 3
1 Plan ——— DDDDD 4
2 Surveys ——— DDDDD 5/6

Central Office of P.W.
Fort St. George 23d March 1837.

No 1117.

"Public" Bridges

From The Chief Engineer
To
The Secretary to Government
P.W. Department.

Enclosures 5

Sir.

I have the honor to forward with the letters noted in the margin* a Plan and Estimate of Rupees (350) Three hundred and fifty, prepared by Lieutenant Palmer, Executive Engineer for constructing a platform bridge across the Surplus Channel of the Wadadda Dasee Geddda, near the village of Doosee, in the Ganjam District.

* From Lieut. Harington Letter No. 226 dated 24th Feby 1837
From the Ag. Coll. of Ganjam Letter No. 91 of 4th March 1837
with
1 Report
1 Abstract Estimate
1 Plan

2.- Lieutenant Harington states that the Surplus Channel which is impassable in the height of the Monsoon and has nearly always water in it, crosses (owns) a much frequented District road leading from the Zemindary of Bobilly through a rich tract of paddy cultivation, viâ the large and flourishing villages of Thogaram, Hulliveram, and Doosee to Chicacole.

3.- The average daily traffic crossing the channel at the site of the proposed bridge, is given at 20 bandies, 199 animals and 651 people.

4.- The Collector approves of the work

work, stating that the Wadada Dasee
Ecclola supplies water to lands yielding
an annual cust of Rupees 1878 to Government.
5.- The accompanying report contains
all particulars of the proposed bridge, and
the Estimate being framed on moderate
and sufficient data. I beg to recommend
the same for entry in the Budget of 1858/59.-

I have the honor to be
Sir
Your most Obed.t Servant

Central Office of Wks
Fort St George
23 March 1858.

A. Fraser Colonel
Chief Engineer

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PUBLIC WORKS DEPARTMENT.

Public.

Pub. Works 1837 Dept.
Dy 6 Cons 24th Sheet 1
No. 593

From the Chief Engineer
To the Secretary to Government
P.W. Department.

Dated 23d
Recd 24th March 1837.
5 Enclosures Rec'd.
No. 111/58

Forwards an Estimate of Rupees
350 prepared by Lt. Palmer 3d Assist.
Engineer for constructing a pile & plank
bridge across the surplus channel
of the Wadacka Nadee Feeder
near the Village of Cornee in
the Tanjam District and
recommends the same for entry
in the Budget of 1838/39.—

No. 25.

C. 25th April 1837 Answd

1837

carried off by a tunnel under the Doudee Channel into the Weyainoo.

3. The rates allowed for constructing the Embankments is moderate and sufficient and the Chief Engineer recommends the Estimate for entry in the Budget of 1857/58. as a work essential to the completion of the irrigation systems of the District.-

Central Office of P.W.D.
Fort St George
6 Decr./56

Actg Superintending Engineer
Chief Engineer

To the Secretary to Government
P.W. Department

List of Enclosures.

J1/ Letter from the District Engr Godavery dated 25 Octr/56 No 644
J2/ Abstract Estimate
J3/ Survey Plan

Public Works 1836 Detail J
Dt. to Cons 24 Nov. 57.
No 2770

From the Chief Engineer
to the Secretary to Government
R&O Department.

Dated 6th Dec. 1857
Recd 7th Dec. 1857

3 Encls: Returned
17/12/57

No. 8662

143

No. 7

Rajahmundry District

Revenue
Irrigation

Report on an Estimate prepared by the District Engineer of Rajahmundry for constructing a foot Bridge over the Doovah Calingulah.

Amount of Estimate Rupees (1150) Eleven hundred and fifty.

1. The Doovah Calingulah is the principal means of escape for the floods in the Cora Calwa. This river rises very suddenly, and it is essential that every facility should be afforded for working the shutters readily. This at present is not the case, and the District Engineer in para 5 of his letter No 644 dated 25 October 1856. states that it is impossible to remove the shutters, when the river has once risen, the rush of water being too great to allow of a man standing on the work.

2. The bridge is to be constructed of Teak Timber, and as shewn in the accompanying Plan, and the Estimate being prepared on moderate and sufficient data, is recommended by the Chief Engineer for entry in the Budget of 1857/58. the proposed work having the support of the Collector Mr Purvis.

Central Office of R&W
Fort St George 6th Dec 1856

Wd Taylor Colonel
Chief Engineer

To the Secretary to Government
R&O Department.

List of Enclosures
1 Letter from the Asst Engr Godavery Dr dated 25 Octr 1856 - No 644 - Vide Letter J1
1 Estimate - - - - - - - - - - - K1
1 Plan - - - - - - - - - - - - K2

No. 8662

No. 26.

Forwarded for entry in the Budget of 1857/58 an Estimate of Rupees (1150) of Eleven hundred and fifty for constructing a Foot Bridge over the Doovah Calingulah in the Rajahmundry District.

Chief Engineer 2d.

Chief Asst Engineer

Public Works 1836 Dept.
Do to Cons 24th Nov 157 K
No 2771

From the Chief Engineer
To the Secretary to Government
Public Department

Dated 6th Recd 9th Jan. 1836

2 Encls. Returned 17/12/5

No. 8662

Forwarded for entry in the Budget Gross 55 an Estimate of Rupees 1150 for constructing a foot bridge over the Doorah Calingulah in the Rajahmundry District.

27th April 1836

No 8662

Rajahmundry District

Public.

Nowgabie Canal.

Report upon an Estimate for Constructing one Lock and two Aqueducts in the Nuggarum & Talook.

Amount of Estimate Rupees (13,610) Thirteen thousand six hundred and ten, as follows.

Constructing Lock on the Plan of the one proposed to be built at Wadapalum in the Eastern Bank	Channel	Rs 4,010
Do	Caliguelah	do do 1,670
Do	Aqueduct ah Cuddaly	4,720
Do	do at Chuntalapilly	3,210
	Total Estimate	Rs 13,610

1. The object of the Lock as stated in para 21 of the District Engineer Captain Rundall's letter No 32 dated 18th October 1835 is by diminishing the fall over the Gunnarum Aqueduct, to admit of the boats navigating with greater safety. The branch Channel from the Nuggarum Talook to the rest of the Delta, and to avoid the necessity which at present exists of all produce being taken out of the boats on reaching the Aqueduct, and reloaded on the other side. It is observed that 100 square miles of country is under the influence of this Ch

2. The proposed Aqueducts are for carrying the Huddaly Channel

across the Channels which have been cut through the sand ridges in order to drain the two Lands which lie between them, and in which the most abundant crops are always produced.

3. These works in common with others of importance connected with the Godavery Navigation Scheme are recommended by the Chief Engineer. The data on which the Estimate for entry in the Budget has been framed being moderate and sufficient.

Central Office of R.W.
Fort St. George
6 December 1886

Lt. Col. Colonel
Chief Engineer

To
The Secretary to Government
R.W. Department

List of Enclosures.

From Dist. Engr. Godv. Br. dated 18th Oct. 86 No. 522. Also letter No 1
Extract Estimate 01
Plans . . . . . 02 & 3

Public Works 1856 Detail
Dto Nos 24 to Nos 57.
No 2775

From The Chief Engineer
To The Secretary to Government
R.to Department

Dated 6th December 1856
Read 9th

3 Enclosures Returned

No 8662

No 28.

Forwards for entry in the Budget of 1857/58 an Estimate of Rupees 1,3510- for constructing One Lock and two Aqueducts in the Nuggarum Salt R.of Rajahmundry Dist

Rec.d 12th May

No 8662 VII 149

Rajahmundry District

Revenue

Drains.

Report, on an Estimate prepared by the District Engineer of Rajahmundry for constructing an Aqueduct over a Drain crossed by the Amalapore Channel.

Amount of Estimate Rupees (5400) five thousand and four hundred.

1.- It has been found necessary to construct an Aqueduct to admit of the drainage of some 20 square miles of Country passing under the Channel excavated in the Central Delta past the Town of Amalapoore, instead of carrying it as the District Engineer believes was originally intended by Mr Haig, parallel to the Channel by cutting entirely through the ridge which separates it from the deeper natural drainage.

* See Extract from Letter No 672 dated 15th November 1856.

2.- This determination, the District Engineer came to, after a careful inspection of the locality in Company with Captain Stoddard considering it more advantageous to allow of the drainage passing by its old course into the Coonika Channel, which is the main drain of the Central Delta.

3.- The accompanying sketch shows the arrangement proposed, but as the Project is connected with the general scheme of the Central Delta irrigation, no distinct remunerative return is attached to it.

4.- The Collector has signified his approval

approval of the work, and the rates allowed being moderate and sufficient, the Chief Engineer recommends the Estimate for entry in the R Budget of 1857/58.

Central Office of Ord
Fort St George
6 Decr 1856

W. Eustace Colonel
Chief Engineer

To
The Secretary to Government
R.W. Department

List of Enclosures.

1 Letter from the District Engr. Cuddapah
dated 10 Nov 1856 No 672 ---- XXX1
1 Abstract Estimate ---------- XXX2
1 Plan ---------- XXX3
1 Sketch ---------- XXX4

Encs 2 Estimates &c &c &c

XXX 1856 Deptt.

Public Works 1856 Depart-
Do 4 Encs 24 Nos. 157.
No 2836

From the Chief Engineer
& the Secretary to Government
P.W. Department

Dated 6 Dec 1856
Rec'd 9th Dec 1856

Enclosures 4 Returned
17.12.56

No 8662

Public, [roads] [New Work]

Abstract of Estimate No of 185 /5

Road No

District. Rajahmundry.

Work. Making a road from the Choultry near Nursapoor to Veeravasaram & Nuttelee.

Quantities	Description of Work	Rate			Amount	Amount for each part
C. Yds.		Rs	as	P.	Rupees	Rupees
100780	C. Yds. Earthwork — Pcly —	"	"	8	4199	
16692	— " — Sanding — " —	"	4	"	4173	
	16 M. 1 F & 118 Yds 1 Wooden Bridge 50 ft span excluding Superintendence				566	
	1 Bridge of 1 arch 24 ft span same as that proposed to be built at Katanoor excluding Superintendence				699	
	7 Tunnels 10 ft span — (a) —	177	10	2	1244	
	6 — Do — 6 ft span — " —	123	4	"	740	
						12621
	Superintendence & Sundries					1269
					Total Company's Rupees Thirteen Thousand Eight hundred and Ninety	13890

Central Office P.W.
Fort St George
6 December 1856

Abel Tates Colonel
Chief Engineer D.P.W.

Amount for Building in the Budget of 1857/58 an Estimate of Rupees 5,400 for constructing an Aqueduct over a Drain crossed by the Umalapoor Channel in the Rajahmundry District.

No 29.

27th April 1857

27th April 1857

Quantities	Description of Work	Rate			Amount	Amount for each part
C. Yds.		Rs	As	P.	Rupees	Rupees

HHHH

Enclosure.

In a Report

From

The Chief Engineer
E. S. D.

To

The Secretary to Govt
E. S. D.

Dated. 6th } December 1856
Received. } or 28th/56

No. 8662

Abstract Estimate of the expense of making a road from the Chintilly mandal to Razoor to Nursapore and Attrelee in the District of Rajahmundry Amtg to Rs 13590-

No. 8662

157

Rajahmundry District

Public

Roads

Report on an Estimate prepared by the District Engineer of Rajahmundry for Constructing a road from Nursapore to Attrelee 16½ miles through a portion of the Godavery western Delta.

1 The Estimate provides for,

100780⅓ Cb yards Earth work @ 8/7 Cb yd	Rs.	4199-3-0
16692 — Do — Sanding 4 — Do —		4173-0-0
1 Wooden bridge 50 feet span		566-7-4
1 Masonry Do of 1 arch of 24 feet span		1699-7-9
7 Tunnels of 10 feet span each Rs 177-10-2		1243-7-2
6 — Do — of 6 feet span each Rs 123-4-0		739-8-0
Superintendence and sundries		1268-14-9
Total Rupees		13,890-0-0

Thirteen thousand eight hundred and Ninety-

2. The District Engineer in para: 11 of his letter No. 680, dated 15th November/56, states, that the Survey and Estimate for this line of road were undertaken at the request of Mr. Robinson when acting Sub Collector, and that they met with the entire approval of the Collector himself.

3. The immediate object of the road is to Connect the town and Seaport of Nursapore

Mursapore with the large markets at Veeravasarum, Utteelee, Ralingee &c. and its want is severely felt, there being no Canals in that direction which lead immediately to Mursapore.

4 By forming the Road to Utteelee, many of the principal Villages such as Veeravasarum Sroonyavvootchem, and Ralingee will be Connected, and from Utteelee, the Communication to the Godaveny at Vyaiswaram will be Completed by the banks of the Utteelee Canal and Nelyaoor.

5 No return of the traffic along the intended line of road can be given, as at present all access to Mursapore from the Country lying north and west of it, is Completely Cut off during several months in the year.

6 Sand only has been allowed in the Estimate for Covering the Road, as gravel would be too expensive, having to be brought from Dawlaiswerm. One large bridge is allowed for the Gostanuddee, but for Crossing the Swamp near Veeravasarum, Captain Rundall Considers, that a Ferry boat will be the Cheaper arrangement. From the Choultry shewn in the Survey, the road follows the westom bank of the Palcole Canal, which it Crosses by a wooden bridge lately erected at

at Mursapore.

7 Sufficient reasons having been advanced to shew the importance of Constructing the road in question, the Chief Engineer recommends the Estimate, in which the rates allowed are moderate and sufficient for entry in the budget of 1857/58.

Central Office of P W
Fort Saint George
6th December 1856

H.M. Taber Colonel
Chief Engineer

List of Enclosures

1 Letter from the Select Cmtee Godavery dated 15 Nov 1856 No 680 - Vide Letter See GGGG1
1 Abstract Estimate - - - - - - - - HHHH1
1 Plan - - - - - - - - - - HHHH2

HHHH

Public Works 1836 Dept.
Do to Cons 24 Nov. 57.

No 2866

From the Chief Engineer
to the Secretary to Govermt.
P.W. Dept.

Dated 6th December 1836.
Recd 13

Enclosures Returned/Cons

No 8662.

No 8662.

Rajahmundry District

Revenue
Embankments.

Report on an Estimate prepared by the District Engineer of Rajahmundry for constructing an Embankment to the Eastern Godavery from the town of Rajahmundry to the Village of Seetanagarum.

The Estimate provides for Embankment.

290,950 C.Y.ds Earthwork at 8 piece ——— Rs. 12,122-14-8

Superintendence & Contingencies — 1217-1-11

1 Sluice for the foregoing Channel ——— 2570 "

1 do for the Seetah Cawah ——— 5170 "

Total Rupees 21080 "

Twenty one thousand, and Eighty.

The Construction of this Embankment is urgently petitioned for by the People and recommended by the Collector for the protection of an area of some 70 square miles of land, of which a large portion about 5000 acres known as the "Caparavaram Amaldaid" of remaining as at present a swamp

mill

Memo for Entry in the Estimate Book of 1837/38 the Estimate of Rupees 13890 for constructing a road from Kuttapore to Nellutla 10¾ miles through a portion of the Godavery Western Delta in the Rajahmundry District.

No 8:

27 April 1837

...ill be gradually brought under Cultivation.-

New sluices are provided for in the Estimate for the drainage into the River of Tract of Country from Rajahmundry to Tallavajaram River, which is separated by a ridge from the delta proper. These sluices are to be kept open as long as the River is low, & directly it begins to rise above the level of the adjacent Country, they will be closed & not kept so, until the freshes subside.-

No return is given by the District Engineer of the probable Revenue to be derived from bringing under Cultivation the 5000 acres of Land noticed, but the work being of essential importance as conserving the river floods, the Estimate in which the rates allowed are moderate and sufficient, is recommended by the Chief Engineer for entry in the Budget of 1857/58.-

Central Office of P.W.
Fort St. George
6. December 1856.

A.B. Foster Colonel
Chief Engineer.

To The Secretary to Government
R.W. Department.

List of Enclosures

1 Letter from the Dr Engr Corps dated 22d Nov 1856 No 696. ---------- ZZZZ1
1 Abstract Estimate ---------- ZZZZ2

ZZZZ 1836 Deptt
Public Works-1856 Depart,
No. 2864
Rec'd 24th Nov 57.

From the Chief Engineer
To the Secretary to Govern
R.W. Department

Dated 6th December 1856
Rec'd 9th "

Enclosures 2 Returned
17/12/57

No 8662

Forwarded for entry in the Budget of 1857/58 an Estimate of Rupees 21080 for constructing an Embankment to the river Godavery from the town of Rajahmundry to the village of Seetanagaram in the Rajahmundry District.

No. 31.

c 27 April 12th May

165

Public [roads] [New Work]

Abstract of Estimate No of 185 /5

Road No

District Rajahmundry

Work repairing the High Road No 6 from near Nullacherla to Tooneo a distance of 81 miles-

Quantities	Description of Work	Rate Rs	As	P.	Amount Rupees	Amount for each part Rupees
C. Yds.						
52883	Earth work	"	"	7	1928	
3360	D:	"	"	8	140	
33240	D:	"	"	9	1558	
131690	Metalling	"	8	"	6845	
1000	D:	"	6	"	375	
420	D:	"	"	7	15	
17200	Gravelling	"	4	"	4800	
11000	D:	"	1	6	1031	
21200	D:	"	6	"	7950	
4360	D:	"	8	"	2180	
3000	D:	"	5	"	938	
2900	D:	"	5	6	997	
	26 Masonry Tunnels of 6 ft. Span Each	135			3510	
	25 D: D: 3 ft. D: do	88			2200	
	Repairing to Bridges				155	
	Superintendence & Contingencies				6078	
	Total Company's Rupees					99700

Central Office of Ptk,
Fort Saint George,
6th December, 1856.

Captain
Actg Supt Engineer D Ptk
Northern Circle

Quantities	Description of Work	Rate			Amount	Amount for each part
C. Yds.		Rs.	As.	P.	Rupees	Rupees

Enclosure

In a Report

From,

The Chief Engineer
D.P.W.

To,

The Secretary to Govt.
D.P.W.

Dated 6th
Recd. 9th } December 1856

GW 2865/56

No. 8662

Abstract Estimate of Repairing the 81 miles of High Road in the District of Rajahmundry, Amounting to Company's Rupees 99700 ---

Rajahmundry District

Public Roads

No. 8662

Report on an Estimate prepared by the District Engineer of Rajahmundry for repairing Trunk Road No 6 from near Nullacherla to Joonee a distance of 81 miles.

The Estimate provides for.

89,183⅓ Cb.Yds. Earthwork @ from 7 to 9 pice ₹ Cub.Yd. — R 3,626.2.9

133110⅔ Cb.Yds. Metalling @ from 6 to 8 annas ₹ Cb.Yd. — 66235.7.-

61660 — do — Gravelling @ from 1 to 3 annas ₹ Cb.Yd. — 17895.10.-

24 Tunnels of 6 ft. span @ Rs 135 — 3510.---

25 — do — of 3 ft. do — 88 — 2200.---

Repairing old Bridges — 155.---

Superintendence and Sundries 6077.12.3

Total Rupees 99700.---

Nineteen thousand and Seven hundred.

1.— On the 12th December 1835 the above Estimate together with a letter No 575 dated 14th November 1835 from the District Engineer of Rajahmundry was forwarded to the Collector for an opinion as to the probability of an adequate return in benefit to the Country from so considerable an outlay.

2.— The District Engineer observes that the Estimate was prepared at the urgent request of the Post Master General in consequence of the progress of the Tappal being much impeded, the state of the road being such that there is almost a total cessation of traffic on it during the rains, between the towns of Bezwarah and Joonee.

In

3.- In para 3 of his letter the District Engineer considers the reasons against, and in favor of executing the repairs, and arrives at the conclusion that the important object of keeping open a good communication between the intermediate towns on the line, and the different Hill Markets is sufficient in itself to justify the expenditure.-

4.- It will be observed that the principal objection raised against keeping up this portion of the road, is that the distant traffic of the Country will eventually be carried by the Canal now being excavated from Bezwarah to Tonee and that an excellent road will or may be opened along its banks at a comparatively small expenditure.-

5.- To this objection the Collector of Rajahmundry in his letter No 270 dated 21st November 1856. para 4 replies.

"That when a Canal is open from Bezwarah to Tonee there can be no doubt "that almost all the traffic will be drawn "on it. but it seems very doubtful when such "a Canal may be available, and judging "from past experience it will, even when "the Canal is ready be some time before a "tolerable road is available along its "banks".

6.- The Collector concurs in the doubts expressed by the District Engineer, as to whether the new line proposed by Captain Best offers any advantage, and being that the cost of constructing it would far exceed that necessary for putting the present road into a good state of repair.

7.- Even with the Canal to be completed eventually from Samulcottah to Tonee, the Collector considers with the District Engineer that the proposed expenditure should be incurred, if only to connect the important towns of Rajahmundry, Injgarapetta, Gailaiswaram and Tonee with each other, and the Hill tracts. Gailaiswaram it is observed is a few miles to the North of the road, but is the great entrepot of trade with the hill villages.-

8.- After due consideration of the reasons advanced both by the Collector and District Engineer in support of the proposed expenditure, and of the present essential necessity for keeping open the Trunk Line of Communication between Madras and Calcutta, The Chief Engineer resolves to recommend the Estimates, in which the rates allowed are moderate and sufficient, for entry in the N Budget of 1857/58.-

Central Office of R&D
Fort St George 6th December 1856.

The Hon'ble Colonel
Chief Engineer
To The Secretary to Government
R&D.

Enclosures
1. Letter from the Collector of Rajahy dated 21st Nov/56 No 270. AAAAA 1
1 Abstract Estimate ---------- AAAAA 2
1 Plan ---------- AAAAA 3

Public Works Rs 1836 Detail AAAAA
Dto Cwo 24th Nov/57
No 2865 —

From the Chief Engineers
To the Secretary to Government
R.W. Department

Dated 6th December 1836.
Rec'd 9th "

Enclosures 3 Returned 2

No 8662

Transmitted for entry in the Budget of 1837/58 an Estimate of Rupees 99,700 for repairing from N.C. Road No 6 from near Nulla Cherla to Tonee a distance of 87 Miles in the Rajahmundry District.

No 32.

C 27th April/57 R 25th May

Rajahmundry Dt

Public
Establishments

No 8932 173

Report on an Estimate prepared by the District Engineer of Rajahmundry for construction 2 Cells and a Cooking Shed to the Police Cutcherry at Cocanada.

The Estimate provides for.

Two Cells.

3077¾ Cft. Brick in Chunam 2.12	R	400.12
3200 Sq.ft. Plastering ½ Rs		64 —
1392 — do — Tiled Roof Rs 12½		173-2
2 Batten doors ea Rs 12		24 —
Soundations		4 —

Cooking Shed.

1160½ Cft. Brick in Chunam 2.1		20-14-4
190 Sq.ft. Plastering Rs 2		3.12.0
528 — do — Tiled roof Rs 12½		65-10-0
Superintendence and Sundries		73-12 —
Total Rupees		830 — —

Eight hundred and thirty.

1.— The Cells are to be each 20 feet long by 15 feet broad, and the walls are to be 12 feet high, supporting tiled roof. the Cooking shed is to be an open Verandah 12 feet wide.

2.— The District Engineer in his letter No 701 dated 22d November 1836, states that the Plan and Estimate have been prepared at the request of the Collector, for the purpose of providing lock up places for Europeans who may have to be confined for misbehaviour in the streets at night, much inconvenience being felt at present from

the

the want of them.

3. The Covering shed is required for the use of the Native Prisoners who are provided at present with only a temporary thatched building.

4. The Estimate is framed on moderate and sufficient data, and is recommended by the Chief Engineer for entry in the Budget of 1857/58.

Central Office of R.W.
Fort Selenge
17th December 1856.

A.B. Tibbet Colonel
Chief Engineer

To
The Secretary to Government
R.W. Department.

List of Enclosures
1 Letter from the District Engr Gaya dr
Dated 29th Nov 1856 No 701 ---- D1
1 Abstract Estimate ---- D2
1 Plan ---- D3

D

Public Works 1856. Dept
Dated Cuna 24th Nov 56

No. 2983

From The Chief Engineer
To The Secretary to Govt
Pub Dept

Rcd 17th December 1856
Read 19th
3 Encls. Returned 10/12/57

No. 8932

Entered for Entry in the Budget of 1857/58. and Estimate of Rupees 830. for Constructing 2 Cells and a Sentry Shed for the Police Cutcherry at Pedapadoo in the Rajahmundry District.

No 33.

Cy 4/Pol 22nd Jany

No 8932.

17

Rajahmundry District

Revenue Cutcherries

Report on an Estimate prepared by the District Engineer of Rajahmundry for constructing a Sub Officers Cutcherry at Borrumpolem in the Todemulla Taloor.

The Estimate provides for

2932½ Cub: ft. Brick in Chunam @ 1-7	290	3 1
2418 Sq: ft. Plastering Rs 1.10	39	4 8
232 Cb: ft. Flooring 1-7	22	15 4
864 Sq: ft. Tiled roof Rs 9-11	103	1 3
1 Batten Door complete	10	- -
1 Iron railed window	7	- -
Superintendence and Sundries	37	7 8
Total Rupees	510	- -

Five hundred and ten.

1. The building is to contain one small room 15 feet square, and one verandah room 20½ feet long by 11½ ft. broad, with an open verandah in front of them. 6 feet in width. the main walls and pillars are to be 10 feet high, and the verandah pillars 6¾ feet supporting a tiled roof.

2. The District Engineer in his letter No 701. dated 22d November 1856. states that the Plan and Estimate have been prepared at the request of the late Sub Collector. the present shed allotted to the Sub Officer. being in a ruined state, and not worth repairing

3. The Estimate is framed on moderate and sufficient data, and is recommended by the Chief Engineer for entry in the Budget of 1857/58.

Lieut Colonel
Chief Engineer

Sick of Sir Lemmy
1 Letter from the Dy Sr Engr PD. dated 22d November 56 No 701 with Enclosure etc. ..... D
1 Abstract Estimate ..... E
1 Plan E2

Central Office 17th December 1856.

To The Secretary to Government PW Department.

Public Works 1857-58. Detail
Do to Comm. 24th Nov/57.
No 2984.
From the Chief Engineer
To the Secretary to Government
P.W. Department

Dated 17th December
Read 19th
2 Encls. Rec'd 17/12/57

No 8932.

Forwards for entry in the Hond'ble Board's Proceedings the Estimate for Rupees 510 for constructing a Sub Officers Cutcherry at Bommapalem in the Talemadle Talook of the Nujakamundry District.

No 34.

Capt Haig R.E. Secy

Capt Cotton R.E.

Public [roads] [New Work]

Abstract of Estimate No of 185 5

Road No

District Masulipatam.

Work. Constructing a Calingulah and Lock near Casarpilly for the supply of water from the Nellore High Level Channel to the Boodamaik.

Quantities	Description of Work	Rate			Amount	Amount for each part
C. Yds.		Rs	as	P.	Rupees	Rupees
	Lock					
1892 3/8	Stone in Chunam ——— @ C.yds. 9	3	"	"	5677	
145 7/9	Stone in Chunam ——— @ D° 1	4	"	"	583	
86 5/16	Cut Stone in Chunam ——— @ D° 1	7	"	"	604	
13 11/16	Stone in Chunam ——— @ D° 1	3	"	"	41	
139	Flooring in Chunam ——— @ D° 1	7	"	"	978	
	2 Sets of Lock Gates Complete				2000	
	2 Shutters for Sluices - D°					
	110 Wells ——— Each	7	"	"	770	
7467	Excavating Foundation ——— @ C.yd. 1	"	"	9	350	
	Superintendence, plastering and Sundries ——— at 10 per Cent	7	"	"	777	
						11780
	Calingulah					
298 1/2	Stone in Chunam ——— @ C.yd. 1	3	8	"	1045	
25	Cut Stone in Chunam ——— @ D° 1	7	"	"	175	
80	Front Apron Loose Stone ——— @ D° 1	1	"	"	80	
	4 Cast Iron posts ——— Each	10	"	"	40	
	6 Shutters (Small) ——— @ D° 1	4	"	"	24	
	2 D° (Large) ——— @ D° 1	9	"	"	18	
	Carried Over ———				1382	11780

Quantities	Description of Work	Rate			Amount	Amount for each part
C. Yds.		Rs	As	P	Rupees	Rupees
	Brought forward				1382	11780
	Palmyra planks - for Bridge, Rails &c				80	
6	Beams over piers - Each	12	"	"	72	
	Excavating foundation &c				100	
	Superintendence and Sundries at about 7 per cent	15	"	"	246	
						1880
	Total Company's Rupees					13660

Central Office of D.P.W.
Fort St George
6 December 1856.

Lt Colonel
Chief Engineer D.P.W.

Quantities	Description of Work	Rate			Amount	Amount for each part
C. Yds.		Rs	As	P	Rupees	Rupees
	Brought forward				1382	11780
	Palmyra planks - for Bridge, Rails &c				80	
6	Beams over piers - Each	12	"	"	72	
	Excavating foundation &c				100	
	Superintendence and Sundries at about 7 per cent	15	"	"	246	
						1880
	Total Company's Rupees					13660

Central Office of D.P.W.
Fort St George
6 December 1856.

Lt Colonel
Chief Engineer D.P.W.

Enclosure
In a report

From
The Chief Engineer
D. P. W.

To
The Secretary to Govt.
D. P. W.

Dated 6th December 1856
Received P.W. 2787/56

No. 8662.

Abstract Estimate for Constructing a Calingalah and Lock near Casarapilly for the Supply of Water from the Ellore High Level Channel to the Boadamair and for the passage of boats from one to the other in the District of Masulipatam

Amounting to Rs. 13660—"—

Masulipatam District

Public
Navigable Canal

No. 8662

183

Report on an Estimate prepared by the Civil Engineer in the Krishnah Division for constructing a Lock and Calingulah near Casarapilly for the supply of water from the Ellore high level Channel to the Boodoomair and for the passage of boats from one to the other.

The Estimate provides for
Constructing the Lock Rs 11782...
—Do— the Calingulah. 1880...
Total Rupees 13660...
thirteen thousand six hundred and sixty.

1.— The Boodoomair, which is an unimproved natural Channel, exceedingly tortuous, and with a great slope, is, as observed by the Civil Engineer in his letter No 113 dated 7 November 1856, unfavorable for traffic, but nevertheless of great value for the conveyance of the produce from the lower districts of Rajahmundry, and from around the Colair Lake, during the rainy seasons, when the country is impassable for Carts and beasts of burden.

2.— Eventually, the high level Canals will doubtless be the main connecting lines between the Krishnah and Godavery, but at present the Boodoomair is the only water

water communication open through the Colair Lake, and carries a very considerable, and increasing traffic.-

3.- The natural bed of the Boddoomair at Casaragilly is about 5 feet below that of the Artificial Ellore Channel, fed by the Anicut, and the Civil Engineer proposes to construct a Calingulah, with Sluices in it's body, to regulate the supply of water which he considers it necessary to give from the latter, for the better irrigation of the extensive lands under the former.-

4.- Notwithstanding, that the high level canals will, as before observed, eventually command the principle traffic between the Krishnah and Godavery, the Chief Engineer considers Boddoomair to be of sufficient importance to justify its being connected by a small Lock &c proposed, with the Ellore high level Channel.-

5.- The rates allowed in the Estimate are moderate and sufficient, and the Chief Engineer recommends it for entry in the Budget of 1857/58.-

Central Office of P.W.
Fort St. George
1st December 1856.

I have &c
Colonel
Chief Engineer

To
The Secretary to Government
P.W. Department

List of Enclosures

1 Letter from the Supt Engr Krishna Dr
dated 7 Nov 1856 No 113 - - - - AA 1

1 Abstract Estimate - - - - - - AA 2

2 Plans - - - - - - - - - - - AA 3 and 4.

Cuttings Open | 253 | 1309

Public Works 1857 Dept.
Dated 24th Nov. 57. 1A.
No. 2784

From the Chief Engineer
To the Secretary to Government
Rio Department

Recd 6th
Read 3rd
December 1856

4 Enclosures Returned
3 Enc.

No. 8662

No. 35.

Forwards for entry in the Budget of 1857/58 an Estimate of Rupees 13,000-- for constructing a Lock and Culvert near Casarapilly for the supply of water from the Ellore High level Channel to the Boodamair and for the passage of boats from one to the other in the Masulipatam District.

27th April 57 12th May

No. 8662

187

Masulipatam District
Public
Bridges

Report on an Estimate prepared by the District Engineer of Rajahmundry for constructing a wooden bridge, across the Summalair River in the Tirwoor Talook of the Masulipatam District.

1. The bridge is to consist of 3 bays each of 35 feet Span, and the amount of Estimate is 4 Rupees (4120) four thousand one hundred and twenty.

2. The bridge is to be built across the Summalair River near the village of Gootapaud for the convenience of the traffic passing from the interior, and the principal frontier towns in the Hyderabad Country, and from Badrachellum to the towns lying between the Summalair and the Kistnah and so on to Masulipatam, and Guntoor viâ Condapilly, and Noogued.

The

Carried Over 253 1309

Public Works 1857 Dept.
Dated 24th Nov. 57. 1A.
No. 2784

From the Chief Engineer
To the Secretary to Government
Rio Department

Recd 6th
Read 3rd
December 1856

4 Enclosures Returned
3 Enc.

No. 8662

No. 35.

Forwards for entry in the Budget of 1857/58 an Estimate of Rupees 13,000-- for constructing a Lock and Culvert near Casarapilly for the supply of water from the Ellore High level Channel to the Boodamair and for the passage of boats from one to the other in the Masulipatam District.

27th April 57 12th May

No. 8662

187

Masulipatam District
Public
Bridges

Report on an Estimate prepared by the District Engineer of Rajahmundry for constructing a wooden bridge, across the Summalair River in the Tirwoor Talook of the Masulipatam District.

1. The bridge is to consist of 3 bays each of 35 feet Span, and the amount of Estimate is 4 Rupees (4120) four thousand one hundred and twenty.

2. The bridge is to be built across the Summalair River near the village of Gootapaud for the convenience of the traffic passing from the interior, and the principal frontier towns in the Hyderabad Country, and from Badrachellum to the towns lying between the Summalair and the Kistnah and so on to Masulipatam, and Guntoor viâ Condapilly, and Noogued.

The

Carried Over 253 1309

3.

The road through Chintala-
=poody, Boorumpolem, Gernagoodem and
Rajahmundry also crosses the River at
the same site, so that the construction of
a bridge, to obviate the inconvenience to
which the extensive traffic through the
Country is at present subjected, is much
required.

4. As good teak wood can be
procured comparatively cheap in the
vicinity of Godapaud, the District
Engineer is of opinion, that a wooden
superstructure on masonry abutments
and Piers will be the most economical
and at the same time a durable work.

5. The plan of the bridge is ap-
=proved of, and the Estimate, in which the
rates allowed are moderate, and sufficient,
is recommended by the Chief Engineer for
entry in the Budget of 1857/58.

Central Office of P. W.
Fort Saint George
6 Jan 1856

Lt Colonel
Chief Engineer

List of Enclosures

1Q1 1 Letter from the Rt Engr dated 15th Nov 55 No 678
1Q2 1 Abstract Estimate
1Q3 1 Plan

Pub. Works 1836 Deptt
Dr 6 Cons 24 Nov. 107. QQ

No 2803

From the Chief Engineer
To the Secretary to Government
P.W. Department

Dated 6
Recd 9th December 1836.

3 Encls. Returned

No 8662

Forwarded for entry in the Budget of 1837/38 an Estimate of Rupees 4,120 for constructing a wooden Bridge across the Immulaw river in the Masulipatam District.

No 36.

C 27 April 1837 Mary

Masulipatam District No 8662,

191

Report on an Estimate prepared by the District Engineer of Rajahmundry for constructing a bridge across the Sulapoodee Calwa at the Town of Ellore.-

Public.-

Bridges.-

1. The Bridge as now designed is to consist of four segmental arches viz: 2 of 30 feet and 2 of 24 feet span, but after being authorized, will be raised for a work of only three arches of 36 feet span, elliptical instead of segmental, and the Estimate amounts to Rupees 5,720/ five thousand seven hundred and twenty.-

2. At present the communication to the North from the Town of Ellore containing between 20 and 30,000 inhabitants, is completely cut off when the water runs deep in the Sulapoodee Calwa. The construction of a bridge is therefore essential, and the Estimate in which the rates allowed are moderate and sufficient, is recommended by the Chief Engineer for entry in the Budget of 1837/38.-

Central Office of P.W.
Fort Saint George
6th December 1836.

P.M. Tulloh Colonel
Chief Engineer

List of Enclosures
QQ. 1 Letter from the Dy Engr Grjs Dn Dated 15 Nov/36 No 678 Ellore Letter
RR. 1 Abstract Estimate
JR. 1 Plan

Carried Over — 253 — 1309

RR Pt 1856 Detail
Dated 24th Nov. 1857.
No 2804

From the Chief Engineer
to the Secretary to Government
Rev. Department

Dated 6th December 1856
Read 9th
2 Encls. Returned

No 8662

Inwards for entry in the Budget of 1857/58 an Estimate of Rupees 5,720 for constructing a Bridge across the Jalapooda Culvert at the town of Allore in the Masulipatam District

No 37.

C 27 April 812 Mem

Buildings ( ) (New Work)

Abstract of Estimate No of 185 /5

District Masulipatam

Work Constructing a 2nd Class Public Bungalow with Out Offices on the North bank of the Kistnah River at Sullapully Tal

Quantities	Description of Work	Rates			Amount	Amount of such part
C. Yds		Rs	As	P	Rupees	Rupees
221	Brick in Chunam	3	"	"	666	
1568	Plastering one Coat of Chunam & whitewashing	1	4	"	86	
1375	Flooring with Jelly & plastering with 2 Coats of Chunam	2	8	"	34	
2119	Sqft. of Roofing with teakwood rafters ripers flat & pantiles & Chunam borders	15	"	"	318	
7	Venetian Doors Complete	15	"	"	105	
1	Do Do	10	"	"	10	
1	Do Do	7	"	"	7	
4	Venetian windows Complete	10	"	"	40	
2	Do Do	8	"	"	16	
7	Breastsummers Each 12 ft long	2	8	"	17	
2	Do 8 Do	2	"	"	4	
100	Cs of Earthwork for Excavating foundation	"	1	"	6	
						1309
	Godown and Cookroom.					
74	Brick in Chunam	3	"	"	222	
1629	Plastering one Coat of Chunam & whitew	1	4	"	31	
	Carried Over				253	1309

Quantities	Description of Work	Rates			Amounts	Amounts of each part
C Yds		Rs	As	P	Rupees	Rupees
	Brought Over				253	1309
448	Flooring with Jelly & Plastering with 2 Coats of Chunam	2	8	"	11	
812	Roofing with Palmirah rafters battens flat Pantiles & Chunam borders	13	"	"	106	
	2 Panned Doors Complete	10	"	"	20	
	3 Breastsummers 10 ft long	2	4	"	7	
40	Cgs of Earth work for Excavating foundation	"	1	"	2	
						399
	Necessary					
13	Brick in Chunam	3	"	"	41	
448	Plastering with one Coat of Chunam & whitewashing	1	14	"	9	
44	Flooring with jelly & plastering with 2 Coats of Chunam	2	8	"	2	
88	Roofing with Palmirah rafters rafters flat & pantiles & Chunam borders	13	"	"	11	
						62
	Gate & planting hedges					70
	Varnishing doors & windows					30
	Superintendence & Sundries &c					130
	Total Company's Rupees					2000

Central Office of P.W.
Fort Saint George
6th December, 1856.

Chief Engineer & Secretary
Chief Engineer F.W.D.

FFFFF.

Enclosure

In a

From,

The Chief Engineer
G.P.W.

To,

The Secretary to Govt.
G.P.W.

Dated 6th December 1856.
Recd. 9th
PW 2870/56

No. 8662.

Abstract Estimate for Constructing a 2d Class Public Bungalow with Out Offices on the North Bank of the River Kistnah in the District of Masulipatam - Amounting to Company's Rupees 2000-

No. 8662

Masulipatam District
Public
Dawk Bungalows

Report on an Estimate prepared by the Civil Engineer of the Kristnah Division for constructing a 2d Class Dawk Bungalow, with out Offices, on the North bank of the Kristnah river, on the Coast road branching from the Northern Trunk road.-

The Estimate provides for

Bungalow	Rs	1309	1 2
Godown and Cookroom		398	11 8
Necessary		61	14 0
Compound hedges and Gate		70	0 0
Varnishing doors and Windows		30	0 0
Superintendence and Sundries		130	6 2
Total Rupees		2000	0 0

Two thousand Rupees.

1. The Bungalow is to be raised on a basement 2 feet 6 inch: high above foundations sunk 3 feet, and Contains one Main room 20 feet long by 17 feet broad, surrounded by a Verandah 9 feet 6 in: width, which

which is devided off into 3 rooms, and 2 baths rooms, as shown in the plan - The main walls are to be 12 feet 6 Inc: high and the Verandah Walls. and pillars 7 feet 6 Inc: high - The roof is to be tiled. —

2. The Estimate which has been received from the Board of Revenue* was prepared by the District Engineer in accordance with the instructions of Government Contained in Extract Minutes Consultation No. 932 dated 3d September 1856 - The rates allowed for the work are moderate and sufficient, and the Estimate is recommended by the Chief Engineer for entry in the Budget of 1857/58. —

*Vide &c: from Board's No. 4050 dated 2d December 1856

Central Offices of L.W.
Fort Saint George -
6th December 1856 -

A.H.E. Lester Colonel
Chief Engineer

Encl. of Enclosures.
1 Extract from the Proceedings of the Board of Revenue No 4050 dated 2nd dec. 1856 - FFFFF1
1 Estimate ---------- FFFFF2
1 Plan ---------- FFFFF3

60.

Rd. Cons: 9th Sept. 56 No. 7 x 8.

Public Works 1856. Departt.
Dto Cons 24th Nov. 57. FFFFF
No. 2870

From the Chief Engineer
To the Secretary to Government
Departt. Public Works

Dated 6th December 1856.
Recd. 9th
Enclosures - 3 Returned 2 Encs
17/12/57
No. 8662

Forwards, for entry in the Budget of 1857/58. an Estimate of Rupees [2,000] Two thousand, for constructing a 2d Class Dawk Bungalow, with out Offices on the North bank of the Koitnah river, on the Coast road branching from the Northern Trunk road in the Masulipatam District.

No 38.

C 27 April/57 Rd 12th May

No. 8662

Masulipatam District:

Revenue
Anicut

203.

Report on an Estimate prepared by the District Engineer of Rajahmundry for constructing an Anicut with Head and under sluices across the Tammilairu river and excavating a supply Channel to the Singavagarum Tank.

The Estimate provides for.

Excavating Channel:
2,22,502 6/9ths Earth
work at 1/ cubic yd. ——— 1,396-6-0
Constructing Anicut ——— 1,310-8-11
——do—— Head sluices — 1,298-8-7
——do—— under——do——— 275½-6-3
Superintendence and Sundries 1720-2-3.
Total Rupees 21,190-0-0
twenty one thousand one hundred and ninety.

1. The Tammilairu river rises in the Eastern ranges of Hills separating the valleys of the Kistna and Godavery and drains an area, above the site of the proposed Anicut of some 108 Square miles.

2 The District Engineer in para 3 of his Letr No. 673 dated 10th November/56 observes

observes that there are the remains of an old masonry Anicut across the river which formerly supplied several tanks in the Jirivoor Taluk, but the date of its construction and subsequent destruction he has not been able to ascertain.-

3. The ryots of the Jirivoor Taluk have presented most urgent petitions for the restoration of the work and have already promised to pay an additional Revenue to the extent of Rs. 7383-1-½, the amount of Assessments made in the same Taluk during the last 5 Years has been Rs. 7788-10-1, and for which it is hoped there will be no longer any occasion, when a certain supply of water is secured to this tank.-

4. The Head and under sluices are a necessary part of the Project; the first to regulate during the high floods the quantity of waters entering the Channel for the supply of the tanks and the second to prevent accumulations in the bed of the river above the Anicut: as the under sluices will have to

* Vide accompanying Statement

be

to be worked during the freshes they are made accessible from the Head sluices

5. The Jirivoor Taluk which contains the remains of many fine tanks having been long neglected and its Revenue consequently diminished, the Distt. Engr. advocates the early construction of the proposed anicut and observes that he has deputed Capt. Greenway to examine and prepare Estimates for the restoration of the several ruined works.-

6. The Collector will be requested to forward his early opinion on the Project, but considering that the District Engineer has adduced sufficient reasons in support of it and not anticipating any objection on the part of the Collector, the Estimate, which is framed on moderate and sufficient data, is recommended by the Chief Engineer for entry in the Estimate of 1857/58.-

Central Office of P.W.
Fort Saint George
6th December 1856.

The Inter Colonel
Chief Engineer

To The Secretary to Government
P.W. Department

List of Enclosures

1 Letter from the Dist. Engr. Godavery dated 10 Nov/56 No 6735
1 Estimate ---------- HHHHH 1
1 Plan ---------- HHHHH 2
1 Sketch ---------- HHHHH 3
1 Survey ---------- HHHHH 4
HHHHH 5

Public Works 1856 Dec. HHHHH
Dated 24th Nov. 56.
No 2872
From the Chief Engineer
to the Secretary to Government
P.W. Department.

Dated 6th December 1856.
Rec'd 9th "
No 8862
Enclosures Returned

No 39.

Forward for subj in the Madpa
Ry 1837/58 an Estimate of Rupees 21190
for constructg an Ancut with
Head and under Sluices across
the Tummelan river and ex.
cavating a supply channel
to the Singa Sagaram Tank
in the Masulipatam District

27 April/57 A12 Trans.

Revenue. [New Work]

Abstract of Estimate No of 185 .p

Road No

District Guntoor

Work diverting the Nukka Vaugoo into the Nulla-ellada for embanking the latter and for constructing Tunnels to carry off the land drainage.—

Quantities C. Yds.	Description of Work	Rate Rs	As	P.	Amount Rupees	Amount for each part Rupees
308000	Earthwork ——— @ 1/16	"	1	"	19250	
54000	Earthwork ——— @	"	1	2	3938	
	Superintendence Sundries & Establishment	15	"	"	3482	
						26670
	Drainage Tunnel under Embankment					
93	Stone in Chunam ——— @ 1/4	4	"	"	372	
13 1/3	Archwork to Tunnel Brick in Chunam ——— @ 1/16	3	"	"	40	
	Shutter ———				4	
	Excavating Foundation ———				4	
	Superintendence Sundries & Establishment @ 15 p Cent	15	"	"	60	480
	For another similar Tunnel ———					480
	Tunnel under Coomamoor Channel of 3 Vents					
803 14/27	Stone in Chunam ——— @ 1/16	3	8	"	2812	
137 1/2	Archwork Brick in Chunam @ 1/16	3	"	"	413	
160	Loose Stone ———	1	"	"	160	
	Carried Over ———				3385	27630

Quantities	Description of Work	Rate			Amount	Amount for each part
C. Pfds.		Rs	As	P.	Rupees	Rupees
	Brought forward				3385	27630
1636	Cft. Earthwork ——— 2 Cft.	"	"	9	77	
	Superintendence Tea — at about 15 ℘ Cent ———	"	"	"	468	3930
	For two similar Tunnels but of 2 Vents at 3270 Each					6540
	Total Company's Rupees					38100

Central Office of P. W.
Fort St George
6 December 1856

A. Fraser Colonel
Chief Engineer D. P. W.

B2

Enclosure
in a Report

From

The Chief Engineer
D. P. W.

To

The Secretary to Govt.
D. P. W.

Dated 6 Dec 1856
Received 9 Dec 1856
P.W. 2762/56
No. 1062.

Abstract Estimate for diverting the Nuk.Ka Vaygoo into the Nulla Mada for embanking the latter, and for constructing Tunnels to carry off the Land Drainage under the Coomamoor Channel in the District of Guntoor.—

Amounting to Rs. 38100 . . —

Central Office 6 Dec 1856
Fort St. George 6 Dec/56

Kistnah Division
Guntoor District

No. 1062

Public Works
Extraordinary
Revenue
Embankments and
Drains.

Report on an Estimate of the probable expence of diverting the Nukkavaygoo into the Nulla Mada for Embanking the latter, and for constructing tunnels to carry off the land drainage under the Coomamoor Channel from the Kistnah Anicut.

1.— Amount of Estimate Rupees (38,100) thirty eight thousand, and one hundred, as follows.—

Embanking the Nulla Mada 308000
Cub. Yards @ 1 Anna ¼ Cub Yard ... Rs 19250 . . .
Excavating new cut for diverting the
Nukkavaygoo 54000 Cub Yds @ 1-2 ¼ Cub Yd . . . 3938 . . .
Superintendence and Sundries @ 15 ℘ Cent . . . 3482 . . .
2660 . . .

2. Drainage tunnels under Embankment, Rupees 480 each ... Rs 960 . . .
1. Drainage of 3 Vents under the Coomamoor Channel ... 3930 . . .
2 Drainage of 2 Vents under the Coomamoor Channel @ Rs 3270 each . . . 6540 . . .
Total Estimate Rupees 38100 . . .

2.— The object of this project, is fully explained in the accompanying letter, No 94 dated 28 October 1856, from the Civil Engineer of the Kistnah Division, and the entire concurrence of the Acting Collector of Guntoor in the expediency of the works, is conveyed in a letter No 389 dated the 15 idem. a copy of which is also submitted.

The —

3.- The main features of the project for draining the country to the Westward of the Coomaoor Channel, are to divert a large portion of the land-floods from the Nuk Kabaugo into the Nulla Nadai to Embank the left bank of the latter duct, and to dispose of the rest of the drainage by means of tunnels under the Coomaoor Channel.-

4.- The Coomaoor Channel which is described in para 2 of the Civil Engineer's letter, as already irrigating large tracts in the Bauptettah, Prettipaud, and Poonoor Talooks, and increasing yearly in value, intercepts at present a large amount of drainage from the westward, the consequence being, that a great deal of valuable land adjoining the Channel is submerged during the monsoon, and is therefore left uncultivated.- the Channel banks after heavy falls of rain being moreover continually breached.-

5.- From the former cause, the loss of Revenue this season (and which is stated, to be probably the same each year) has been Estimated by the Collector at Rupees 3,000, and from the latter, the actual outlay on repairing the Channel banks during the last 10 years is given at Rupees 16128 making together an annual loss to Government of nearly Rupees 5000, exclusive of the loss of produce to the Ryots by the injury done to their growing crops from the inroad of water, while the Channel banks are under repair, and such loss will be greater each year

as the cultivation becomes more extended.- Land too, it is observed, that might be taken up, is neglected, because it is known to be in a dangerous neighbourhood. 213

6.- In para 3, it is stated, that all the land which is now exposed to being flooded, and on many times as much more, which cannot be improved until a complete system of drainage has been effected, will ere long be brought under the influence of the Kistnah Southern high level channel, and become most valuable; but independent of this, the Civil Engineer considers, that the saving of the sums which the Collector shews to be now annually lost, would be sufficient to justify the proposed outlay.- In this opinion the Chief Engineer fully concurs considering with the Civil Engineer, that the works are essentially connected with the comprehensive scheme of Kistnah irrigation and general improvement of the Delta.-

7.- In para 5, the Civil Engineer observes, that the Nuk Kabaugo receives the drainage of a large tract of the Condaveid range of hills, and of the adjacent high lands, and is consequently subject to heavy floods, which rising above its low banks, spread over the plains, until intercepted by the Coomaoor Channel Embankments. And as this Channel is now kept by the Ament permanently full of water above the level of the country, it is evident, that the drainage water can only be carried across it by means of under tunnels.- This

8.- This arrangement however would be so excessively costly that the Civil Engineer very judiciously proposes to divert by a cut a large portion of the floods from the Nuttha Vaugoo into the Nulla Madoo, and thus not only prevent their doing mischief, but turn them to good account in increasing the supply of the Cherraboor, the Banpettah and other tanks.

9.- The cut is proposed to be made where the two channels approach each other within a distance of 1200 yards, a little below the village of Annapirroo; and tho' the bed of the Nulla Madoo is on a lower level than that of the Nutt Vaugoo, the ground, as shown in the Section, sloping from the former to the latter, renders the construction of an Embankment necessary, to prevent the united streams passing back in the event of an overflow.- This Embankment, is remarked in para 7, will be serviceable as a road also, in a locality where such accommodation is greatly required.-

10.- As remarked in para 6, the overflow of the Nutt Vaugoo being prevented, the remaining drainage may be discharged without difficulty by three ordinary tunnels under the Coomanoor channel.-

11.- Paras 8, and 9, refer to certain remarks contained in paras 6 and 7 of the Acting Collectors letter, the first being a question of drainage, stated by the Civil Engineer

and Engineer to be a perfectly distinct project, to be considered next year; and the second one of extending the irrigation by means of the improvements now recommended, stated to be already under investigation.-

12.- In para 4 of his letter, the Acting Collector, in illustration of the injurious effects of the floods in question, observes, that the Korlimerla Ryots, whose lands adjoin the Coomanoor Channel, had thrown up about 600 acres of land assessed at about Rupees 1000, and that it was reported that lands assessed at upwards of about Rupees 2000 more, had been submerged in several other villages in that neighbourhood.-

13.- In para 5, after noticing the inconvenience and loss to the Ryots from only being able to undertake portions of the land after the floods have subsided, and being thus prevented from applying to the best advantage their agricultural means, the Acting Collector refers to the loss to Government "not only in the extent of remissions granted "on lands remaining unfit for cropping, but "in the impoverishment of the resources "of the Ryots, from whence the assessment "is drawn."

14.- In para 9 the Acting Collector notices the value of the Nulla Madoo Embankment as a road.-

15.- The rates entered in the Estimate are moderate and sufficient,

and

and the Chief Engineer most warmly recommends the project, which is planned with Captain Orr's usual care and ability, for the sanction of Government and for entry in the Budget of 1857/58.

Central Office of R.W.
Fort St. George
6 December 1856.

Allan Taylor Colonel
Chief Engineer

To
The Secretary to Government
R.W. Department.

List of Enclosures.

1 Letter from the Civil Engr Trichinopoly Dr
dated 29th Octr 1856 with one from
the Asst Collector of Guntoor No 389
dated 15th Octr 1856.

2. 1 Abstract Estimate

3 Plans

Public Works 1856 Dept.

B

Pondicherry 24th Nov. 56.

2762

To The Chief Engineer

& Secretary to Government

Public Department

9th Dec 56

3 Encls. (Returned.

4 Encs

2862

Encls an Estimate

(38100) Thirty eight Thousand

for sanction for the ordering the

Water to go into the Canal

and for undertaking the latter

part of connecting the Tunnels to

carry off the Final drainage

under the Commamore Channel

to the Bay of Bengal in the Budget of 1857/58

Pondicherry District -

No 40.

27th April

No 8662

Quittor District

Revenue

Irrigation

Report on an Estimate prepared by the Civil Engineer of the Krishnah Division for constructing a Calingulah with regulating Sluices across the Toongaboodra Nullah, near the head of the Coommamore Channel.

Amount of Estimate Rupees (2800) two thousand and eight hundred.

1.- The object of the proposed Calingulah as explained in the accompanying letter No 120 dated 11 November 1856, is to regulate the supply of water for the irrigation of lands under the Coommamore Channel in the Poonoor and Vaupettah Talook Rs.

2.- The Coommamore Channel being only brought into communication with the Anicut by means of a few miles of the Toongaboodra Nullah, the practice at present is to throw a temporary dam across the latter to turn the water into the former.

3.- This dam however intercepting more drainage than the Coommamore Channel can always carry off, is frequently breached after heavy falls of rain, and from time to time it has to be removed to allow of water passing down the Toongaboodra for the supply of the Sands & tanks.

4.- The frequent formation and removal or accidental breaching of this

dam

dam causes a great waste of both labor and money, and is altogether attended with so much inconvenience, more especially during the cultivating season, that the construction of a permanent work is strongly advocated.-

5.- The Calingulah is to be provided with a small platform bridge, which with the one it has been thought necessary to place in close proximity to it, across the Coonamanore Channel near Jaguralamoody, will complete the accommodation required for the traffic crossing these two streams.-

6.- The work being an important improvement connected with the Krishnah irrigation scheme, and the rates allowed being moderate and sufficient, the Chief Engineer recommends the Estimate for entry in the Budget of 1857/58.-

Central Office of P.W.
Fort St. George 3rd Feby 58

I have &c
Lieut. Colonel
Chief Engineer

To
The Secretary to Government
P.W. Department

List of Enclosures

BB 1 Letter from the Asst Engr Theviandy dated 11 Novr 1856 No 120.
BB1 Abstract Estimate
BB1 Plan

S/P

Public Works Dept
Section 24 Item 67
No 2988 BB

From the Chief Engineer
to the Secretary to Government
Pub. Dept Despatch No

Dated 6th Sept 58
Received 8 Sept 58
Answered

(A)

Proceedings for entry in the Budget of 1859/60 and 1860/61 of the undermentioned Estimate for constructing a Cart Road from the Salt plat formed at Kompoda to the General road at Tickaly Pagoon near Chicacole to Suntoshapooram 9 Miles 4 Furlongs and 190 Yards

Dr from Suntoshapooram to Donda Jedda near Itchapoor 2 Miles 5 Furlongs and 60 Yards

Making a new Road from Road No 12 to No 6 near Rumbacia Soorsalapoor

Cutting a Canal from the Chilka Lake to the Ganjam River near the Port of Ganjam

Rs. 1,47,220

Rs. 30,860

Rs. 21,780

Ganjam

District and description of work	Amount of Estimate	Letter, date and number of the Chief Engineer's report	Orders of the Members of Government.
	Rs.		
Ganjam			
Constructing a second class Road from the Salt plat formed at Kompoda to the General road at Tickaly Pagoon near Chicacole to Suntoshapooram 9 Miles 4 Furlongs and 190 Yards	5,330	A 6th December 1856 No 2761	A very useful cross-road - should be connected with the Purlakimedi Road now under construction or carried direct to P. Kimedi itself with the surplus Govt funds Mg
Constructing Road from Chicacole to Suntoshapooram 9 Miles 4 Furlongs and 190 Yards	23,790	IIIII	
Dr from Suntoshapooram to Donda Jedda near Itchapoor 9 Miles 5 Furlongs and 60 Yards	23,430	GG Dr No 2793	This be entered - See AA & BB Mg
Making a new Road from Road No 12 to No 6 near Rumbacia Soorsalapoor	30,860	QQQQ Dr No 2855	This is a very useful & deserving project but the plans &c estimates are incomplete - My line has not been fully surveyed - I should propose of a wooden bridge across the Mahanaddy & I think looking to the amt of probable cart traffic the whole shd be metalled Mg
Cutting a Canal from the Chilka Lake to the Ganjam River near the Port of Ganjam	21,780	RRRRR Dr No 2866	An excellent project Mg

List of Estimates proposed for entry in the Budget of 1857-58 now sent in circulation

27 April 1858

District and description of work	Amount of Estimate	Letter, date and number of the Chief Engineer's report	Orders of the Members of Government.
	Rs.		
Ganjam (Canto)			
Constructing a Road from Bomulty on Trunk Road No 6 to Juggunnathpoor on the Road between Chicacole and Palacondah	25,400	6666 DDDDD 6th December 1866 No 2868	Left Mr Grant to this proposal but doubt if the Estimate is right the Country is very different indeed in the Ganjam. If the road is made the Capelly Salt pans in Vizag. be entirely ruined where the salt is very bad may be immediately abolished Mg.
Repairing and Improving 20 Miles of Trunk Road No 6 between Kommaram and the Bengal frontier	14,540	:C: IIIII Do No 2873	This was an excellent made road when I passed along it in 1854 it necessary to enter Repairs in the Budget? I think not Mg
Constructing a plat form bridge across the surplus channel of the Wadada Dasee Gedda near the village of Dasee.	350	Letter dated 23rd March 1857 No 593	
Rajahmundry			
Constructing the bunds of the Yennamoor-dooroo drainage Channel to Doorvaka-	7,500	J 6th December 1866 No 2770	Necessary to regulate the drainage of the Yenn calve Mg

District and description of work	Amount of Estimate	Letter, date and number of the Chief Engineer's report	Orders of the Members of Government.
	Rs.		
Constructing a Bridge over the Ca-linguluka at Doorvaka	1,150	K 6th December 1866 No 2771	Do in Connection with J. Mg
Constructing a Lock in the Nagaram Talook	4,010		
Do Calingulaka Do	1,670	13,610 O Do No 2775	
Do Aqueduct at Cuddaly	4,720		
Do Do at Chintapilly	3,210		
Constructing an aqueduct on the Ko-mere Channel near Annalapoor	5,400	XXX Do No 2836	This seems necessary Mg
Making a Road from the Chowltry near Narsapoor to Veeravasaram and Attila 16½ Miles through a portion of the Godavery Western Delta	13,890	HHHH Do No 2846	The proposed communi is very much needed but I cannot approve of this project. A road metalled road will never stand in such alluvial soil. It shd be returned for revision Mg

District and description of work	Amount of Estimate	Letter, date and number of the Chief Engineer's report	Orders of the Members of Government.
	Rs.		
Rajahmundry (Contd.)			
Constructing river embankments and Building Sluices from Rajahmundry to Seethanagarum	21,080	ZZLL 6th December 1856 No. 2864	very necessary W.G.
Repairing Trunk Road No. 6 from near Nallacherla to Tooree a distance of 81 Miles	99,700	AAAAA Do. No. 2865	This can not appear for the road has never been made. Strike out the letters. i.e. GG. AA. B.
Constructing 2 Additional Cells to the Police Cutcherry at Coconada	830	D 17th December 1856 No. 2983	Does not appear W.G.
Constructing Sub Officers Cutcherry at Boorempoleni	510	E Do. No. 2984	Approve W.G.
Masulipatam			
Constructing High Northern road Trunk Road No. 6 from Bazaar to Ellore	106,800	R 6th December 1858 No. 2778	Enter — Can not be Q W.G.

District and description of work	Amount of Estimate	Letter, date and number of the Chief Engineer's report	Orders of the Members of Government.
	Rs.		
Constructing a Calingulah & Lock near Casarapully for the supply of water from Ellore High Level Channel to the Boddanair and for the passage of boats.	13,660	AA 6th December 1856 No. 2787	To be entd. Can Bnk on B W.G.
Constructing a Wooden Bridge over the Tenmmalair River in the Trivoor Taloork	4,120	QQ Do. No. 2803	A very necessary work but think a stone bridge would be preferable W.G.
Constructing a Masonry Bridge across the Joulepoody calvahe at Ellore Taloork	5,720	RR Do. No. 2804	I know this to be a very necessary work, having felt the want of it. for which fund the Engr Report W.G.
Constructing a 2d Class Public Bungalow with Outoffices on the North Bank of the Kristna River.	2,000	FFFFF Do. No. 2870	Req. Ests to be sent for W.G.
Constructing an Anniout across the Tenmmalair and Cutting an Irrigation Channel.	21,190	HHHHH Do. No. 2872	This appears a useful & profitable work & Pro to be entered W.G.

District and description of work	Amount of Estimate	Letter, date and number of the Chief Engineer's report	Orders of the Members of Government.
	Rs.		
Guntoor			
Diverting the Nuk2Ra Vagoo into the Nulla Inada for embanking the latter and for constructing tunnels to carry off the lateral drainage under the Coonamoor Channel.	38,100	B 6th December 1856 No 2762	Shd. be entered in the Budget as a necessary part of the System of Kistna irrigation for an improved drainage &c NG
Constructing Eight Northern road Trunk road No. 6 from Guntoor to Sunkola a distance of 6 2 miles	1,32,800	Q Do No 2777	Recommd. to complete the Gr. N. Road NG
Constructing a Calingulah Bridge and Sluice across the Tsonga Voodara near the head of the Coonamoor Channel.	2,800	BB Do No 2788	Noted entered: see Rem. on B NG

To be kept with C.B.C.
No. 2328 – 19th Nov. 57.

List of Estimates pro-
posed for entry in the
Budget of 1858–59
now sent in circula-
tion –

Q. 25th April 1858

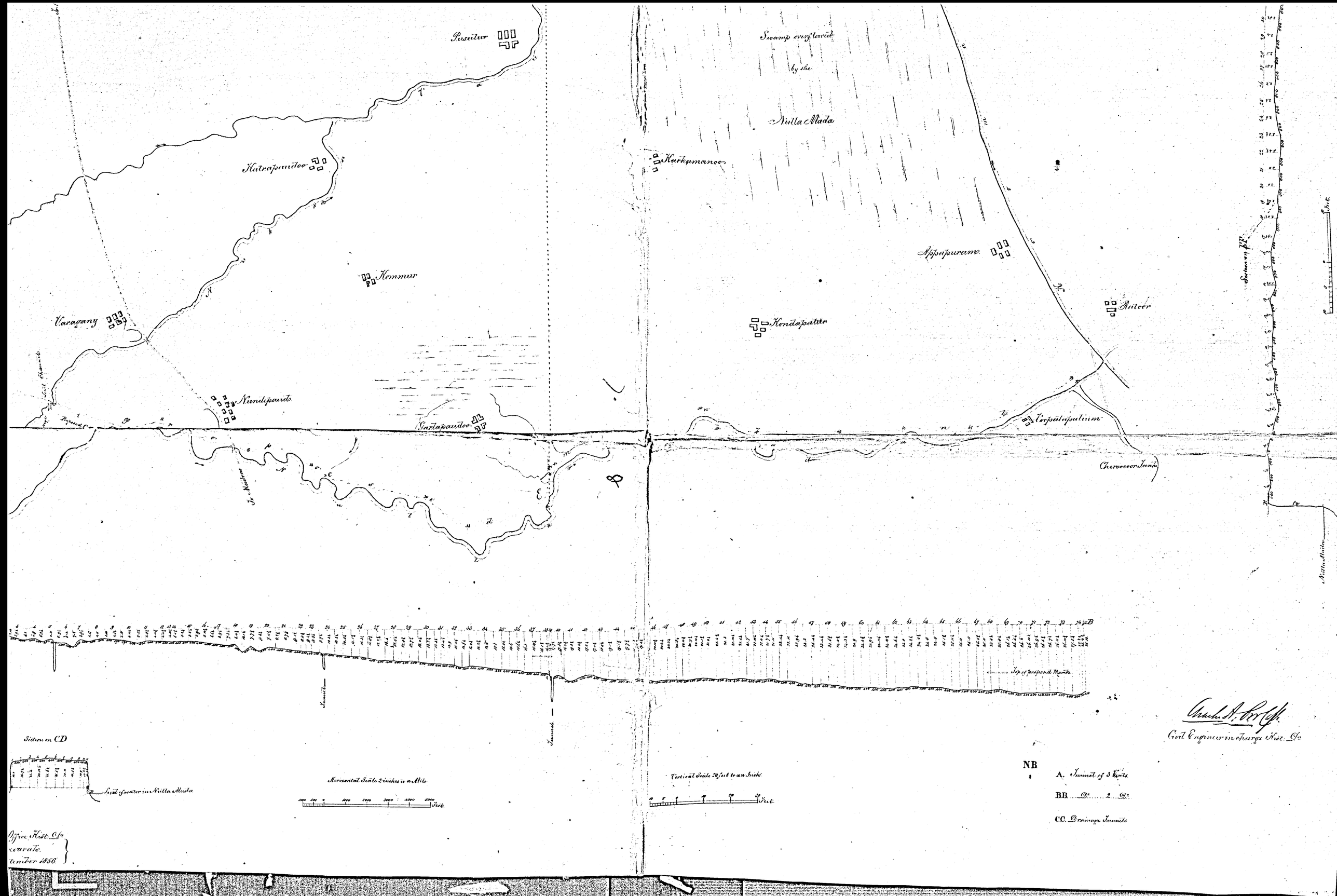
Glen and Adler Co.

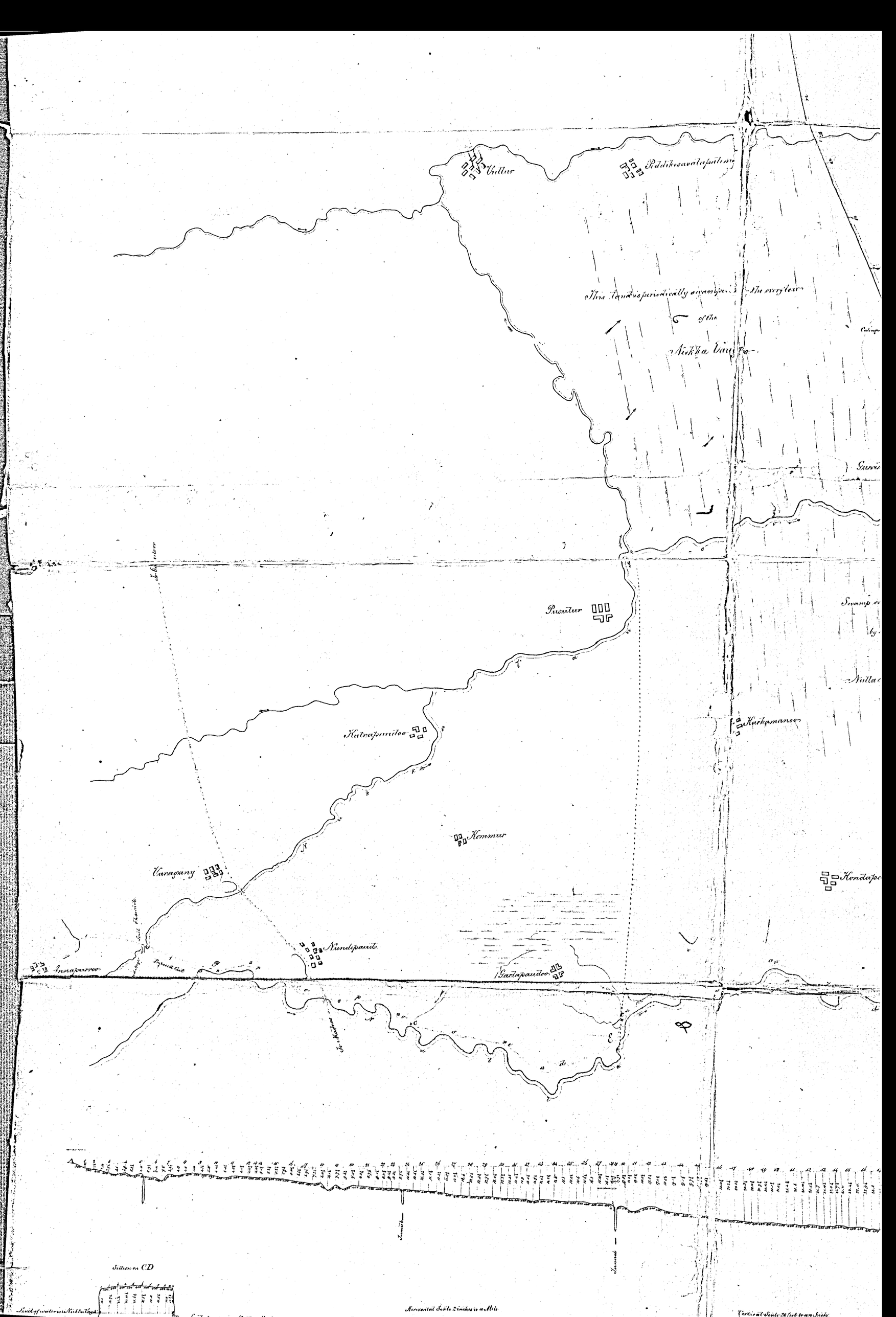
Wallachia County

Showing the Village Limits and the Civil Wards

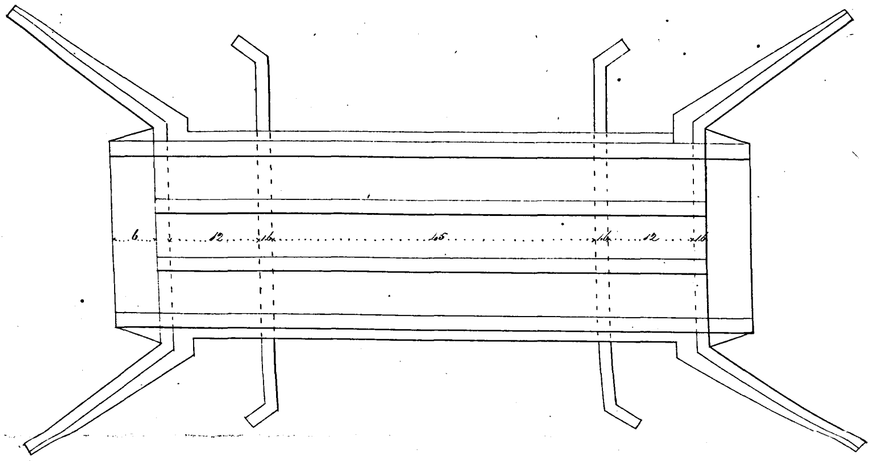
and for surveying Land drawings under the Central Inspection

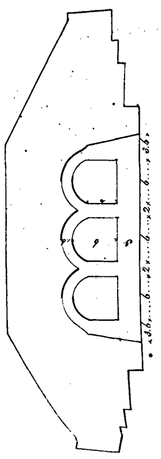
by Himself


Swamp overflowed by the Nulla Mada
Kathrapandoo
Kemmar
Varagany
Kandapandi
Garlapandoo
Karkamanoo
Kondapattu
Appapuram
Ruiteer
Cheruveer Tank
Section AA
Section BB
Section CC
Horizontal Scale 2 inches to a Mile
Vertical Scale 20 feet to an Inch
Top of prospected Mounds
Level of water in Nulla Mada
Civil Engineer in charge Kist. &c.
NB
A. Summit of 3 Locks
BB. Ditto 2 Ditto
CC. Drainage Summits

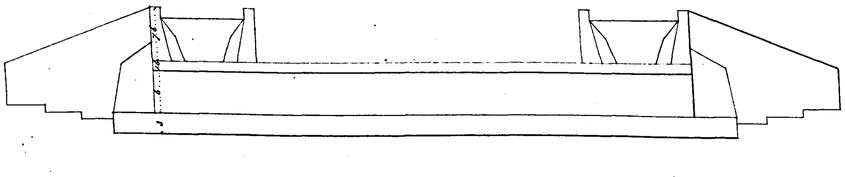

Vellur
Reddikrsavalupillem
Mrss Land is periodically swamped
The every low
of the
Nikka Lake
Pusattur
Kattrapunnloo
Kurkpamanoo
Kommur
Varagany
Kondapa
Nundepandi
Innapurroo
Gurlapaudoo
Section on CD
Level of water in Nikka Lake
Horizontal Scale 2 inches to a Mile
Vertical Scale 20 feet to an Inch

Plan and Sections
of
Under Tunnels
proposed to be built for conveying drainage under the
Coomamoor Channel









Foundation Stone in Channel.
Vert. Material
Estimate Rupees 3540...

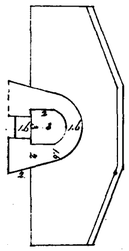
Civil Engrs Office Kist. Dn
Camp Bijoarerh
25th September 1856.

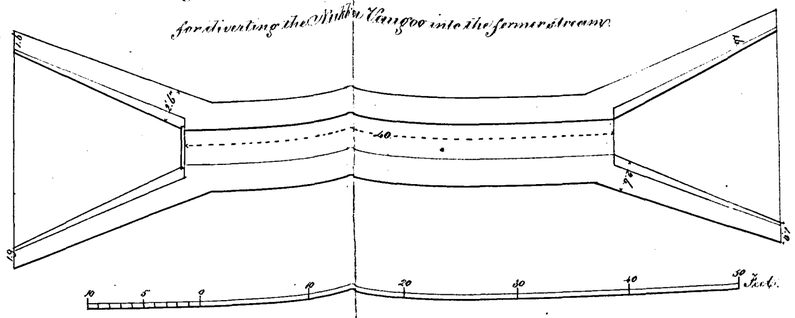
Civil Engineer in charge Kist. Dn

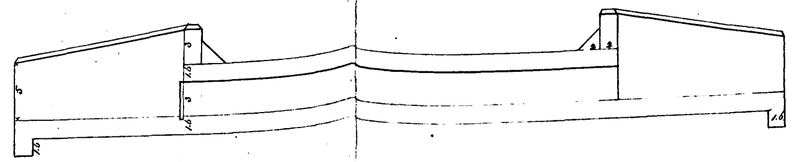
Public Works Department

251

Plan and Sections
of a
Drainage Tunnel
to be built in the proposed embankment
of the Nulla Mada in connection with a project
for diverting the Mutha Cangoo into the former stream.







Foundation Stone in Chunam.
Work Allowed
Estimate Rupees 500.....

Civil Engineer's Office Kotah Cty
Camp Bazeerah
25th September 1856.

Charles A. Ward Capt
Civil Engineer in charge Kotah Cty

The sanction of Government
Gangain
Report A on Estimate for
Rupees 5330.

Public Works Department

255

No: 2128

Extract from the Minutes of Council dated
the 19th November 1857.

Read the following Letter.

Reports from the Chief Engineer A, GG, QQQQ
BBBBB DDDDD, dated 6 December 1856 No 8662,
Letter dated 23d March 1857 No 1170, Reports J, K, O,
XXX HHHH Z, V, V, AAAAA, dated 6 December 18
No 8662 D, E, dated 17 December 1856 No 8932, AA, CC, RR,
FFFF, HHHHH, B, BBB, dated 6 December
1856 No 8662

Read: The Right Honorable
the Governor in Council proceeds to pass orders on the
several Reports of the Chief
Engineer, as above recorded,
submitting Estimates for
the sanction of Government.

Ordered:

Report A an Estimate for

Rupees 5,330.

The

2 The Estimate forwarded with this Report is for constructing a second class road from the Salt pans at Nowpadar, to Tekally Ragoonadapooram, on Trunk road No 6, in length 5 miles 3 furlongs and 92 yards. This is a very useful cross road, and the main object of it is to render the Salt Pans at Nowpada easily accessible to the Banjarries who frequently resort to that place for the purchase of Salt. Nowpada is by far the largest and most frequented Salt Depot in that part of the country, and there exists intolerable approaches to it. It is stated that during the rainy season, the road is quite impassable, being cut off by a swamp of three miles in length. The Government consider the work desirable, and accordingly sanction its entry in the Budget of 1858/59, at the estimated cost of Rupees 15,330) Fifteen thousand three hundred and thirty. Mr Spearman Major Rundall's letter that he has sent up an Estimate to the Agent for connecting this road with the Purla Ringody and Poondy line upon under construction, by a branch from Tekally to Malapettie

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the Government wish to be informed what has been done with this Estimate, and whether its Amount is intended to be distributed out of the surplus Zemindary funds.

Report G.G. on Estimate for Rupees 47,220

3 This estimate provides for completing with the requisite Bridges, — two portions of Trunk Road No 6 in the Cyanjaur District; viz from Sooltanpoorum to Bandagedda and from Chicacole to Soompa Cashapoorum, for the improvement of which, estimates Amounting together

together to Rupees 83,750, have been sanctioned by the Honorable the Court of Directors in their despatches commencing with Exclusive date of the 2d Augt. last to 1828. The being already necessary for thoroughly completing the road in question, the Government direct that it be rendered in the Budget of 1858/59 for the orders of the Government of India, as promised in Para 10 of the letter to that Government dated 29th Octr 1857 No 1960.

4 Imperfect portion of the Trunk Road No 6 between Chittivalsa and Chicacole in the Vizagapatam District, marked on

defer sanctioning it, unless all the plans and Estimates are laid before them in a more complete shape.

Double jingle, it is stated, rendered it impracticable to survey the last six miles of road near Rumbah, but the distance it appears was measured with a chain, and an allowance made for it of Rupees 500 per mile. This mode of proceeding is very unsatisfactory, and may lead to the eventual submission of a supplemental Estimate, the Government desire

Therefore

3

therefore that a regular and careful survey be made of this portion of the road. It is also observed that portions of this road between Rampoor and Rumbah ——— are not intended to be metalled, in consequence of the soil in that locality being sandy & hard, but looking to the probable amount of ——— cart traffic on the line, the Government are of opinion that no part of it should be left unmetalled. It appears also very desirable that a masonry bridge should be built across the Nuha immediately which the road crosses

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crosses mas Aska, instead of the wooden ones proposed by Major Birdwood. The Government therefore requested the Chief Engineer will issue instructions to have revised plans and Estimates prepared with references to the on board observations, — which he will be good enough to forward for entry in the Budget of 1859/60.

2 Report BBBBB on Estimates for Rupees 21,780 —

6 The Estimates for — recorded with this Report — for excavating a navigable Canal from the — Chilka lake to the Ganjam river, near the Port of Ganjam. This work was first suggested by Lieutenant Colonel

* Vide Gellatly's Comm 2/56 Nov 1856 No 2050

Colonel Cotton in his report on the Ganjam District of 12th July 1854, (Para 87) and its object is to extend the water communication by the Chilka lake — to the Port of Ganjam; and thus obviate the inconvenience experienced by boats crossing the lake in having to land their goods at Rumbah and transport them thence, at much expense, to boats in the Port of Ganjam. The acting Collector, in giving his support to the undertaking, observed

observes that this proposed Canal would be the means of promoting the commercial prosperity, not only of the Tanjore District, but the Bengal District bordering on the Chilkadeke. The Government consider this to be an excellent project, and direct its being entered in the Budget of 1858/59, at the Estimated cost of Rupees (21,780) Twenty one thousand seven hundred

hundred and Eighty.

Report D.D.D.D.D on Estimate for Rupees 35,400:—

To this his Report MMMM.— dated 6th December 1858, the Chief Engineer forwarded an Estimate, amounting to Rupees 10,620, for constructing a road from the Sattiyam to the town of Bavani, and Trunk road etc. and the Estimate forwarded with the above Report D.D.D.D.D. is for completing this line to Juggeranaikenpoorum on the road from Chinnacoodalee to Palamcotta.

The

The former Report,
inclosing with several
others, was returned
to the Chief Engineer
with Extract Minute,
Consultation of the
3d January 1857 No 11,
has not since been
recommended, and
as no reason appears
for treading the two
projects that Govt request
Estimate may be
submitted for the
whole line for entry
in the Budget of
1859/60. This Estimate
should be prepared
the units care, for one

looking into the one now before
Government, some doubt is
entertained as to its sufficiency
the country being, it is believed,
very difficult during the rains.

Letter dated 23d March 1857 No 11178.
with Estimate for Rs 350.

8 The Estimate submitted
with this letter, amounting to
Rupees 350/ Three hundred and
fifty, for constructing a plat-
form bridge across the Surplus
Channel of the Wadada Dasee
Godda near the village of
Dooree, is sanctioned for entry
in the Budget of 1858/59.

Rajahmundry.

Report I on Estimate for Rs 7500.
Report K on —do— for Rs 1150.

9 The first of the above
Reports is on an Estimate for
extending the embankments
of the Yennamadoo channel
to Coonoor. This work appears
to

to be very necessary to admit
of the channel effectually en
carrying off the floods dis-
charged from the Yerra Valley
over the Doonah Eslingerlah.
The Estimate forwarded en
with the second report is ex-
in connection with the ab-
above work, and provides for
constructing a wooden foot
bridge over the Doonah in
Eslingerlah, from the want
of which, the District Engineer
reports that it is impracticable
to work the Shutters during
the period when the Yerra
Valley is in full flood. In
The Government Sanction
the entry of the two works
in the Budget of 1858/59.
at the estimated cost respec-
tively of Rupees (1,500) Seven
thousand and five hundred,

and (1150) One thousand one
hundred and fifty.

Report No. on Estimate for Rupees 1361a.

Report XXX on Estimate for Rupees 5400.

No. The Estimate forwarded
with the first of the above
Reports is for constructing
a bell mouthed two aqueducts
in the Ringgerum Talao C.
the former with a Eslingerlah
Sluice at a cost of Rupees 1680,
and the two aqueducts, one at
Kudaloly and the other at
Chintadapilly, at an outlay re-
spectively of Rupees 4720 and
3210 The Sluice is intended to
diminish the fall over the
Ringgerum aqueduct, and
thus to admit of boats
navigating it with greater
safety, and the aqueducts
are necessary for carrying
the Kudaloly channel water
across the channels which
have

house been cut through the Sandridges, in order to drain the Lands lying between them, and which, it is stated, yield abundant crops. The work reported upon in the Second of the above papers, had been found necessary to admit of in the drainage of some twenty Square miles of Country, passing under the Channel excavated in the central Delta, past the town of Coconada. All these works appear to be necessary in connection with the Godavery Anicut Project, and the Government sanction, for entry in the Budget of 1858/59, the two Estimates submitted, amounting respectively to Rupees (13,610) Thirteen thousand six hundred and ten

and

and (3,400) Three thousand four hundred.

Report HHHH on Estimate for Rs. 13890.

With this Report, the Chief Engineer forwards an Estimate for constructing a road from Nursapore to Ellore, through a portion of the Godavery Western Delta, a distance of 16 Miles. The object of this road is to connect the town and Seaport of Nursapore with the large Inundated Tracts between Penumatrum, Ellore, Palnigherum and the want of it is stated to be much felt, from there being no roads in that direction leading immediately to Nursapore. From Ellore, the communication it is further stated, will be continued on to Rajamundry

Godavery

Goolowery, at Vizianagrum by means of the banks of the Illeiker Canal and on Nellyoor. The Government admit that the proposed communication is one very much needed, but they cannot approve of the Project in its present shape. The District Engineer it is observed proposes to use only sand for covering the road, but this sort of Metalling will never stand in alluvial soil, such as that on which the road will have to be formed. The Chief Engineer is therefore requested to instruct the Dist. Engr. to prepare a revised Estimate for entry in the Budget of 1859/60

providing

providing for more durable road metal; and in laying this document before Govern: ment, Colonel Faber will be good enough to forward also a sketch map shew: ing the direction of the road. The Survey referred to in para 6 of the Chief Engineer's Report, has not been received in this Office nor is it entered in the en: list of Enclosures given at the foot of the Report.

Report ZZZZ on Estimate for Rs 21080.

12 This is an Estimate for constructing an Embank: ment, with Sluices, along river Goolowery from the town of Rajahmundry to the village of Seetanagrum. The work is required to ensure

ensure from inundation
an area of about seventy
square miles of land; of
which a large portion lying
at present uncultivated &
from being swamped, will
it is stated, by the exclu-
sion of the River fresher,
be gradually brought to
under cultivation. From
the District Engineer's letter
it appears that the proposed
embankment was long

ago urgently petitioned
for by the people, & also
the ro recommended by the Collr
form and as the work has been
is the shown to be very necessary,
instru the Government sanction
to prep its entry in the Budget
for e of 1858/59 at the Estimated
cost of Rupees (21,080) Twenti-
one

one thousand and eighty.

Report &c. &c. &c. on Estimate for
Rupees 99,700.

With this Report
the Chief Engineer for-
wards an Estimate for
repairing Trunk Road &c &c
from near Mullacherla
to Toomeer, a distance
of eighty one miles. This
portion of the road has
never been made, and
the Estimate now sub-
mitted, which provides
for Earthwork, Metal-
ling, and gravelling
with minor masonry
works &c &c amounts
to the sum Rupees 99,700
or about Rupees 1231 a

Mile,

mile, must be necessarily
be for the construction
of the road, and not
for mere repairs, as
stated by both the
Chief Engineer and
District Engineer.

11. In para 16 of
his letter of the 14th Novem
ber 1855, Captain Rum
dall states that as
Bridge is much requir
ed across the Jalaun
at Janiawaram, and
that he has prepared
a separate Estimate
for the work. The
Government think
it preferable that in
the

the Estimate for the
road should make
provision for the Bridge
also, and they request
therefore that this be
done, and a revised
Estimate submitted in
for entry in the next
Budget of 1859. '60 a.c
accompanied by a
Sketch of the road,
for eventual transmi
=ssion to the Govern
=ment of India.

Report on Estimate for
Rupees 830.

do E. on Estimate for
Rupees 510.

The Estimates
to be forwarded

forwarded with the
three Reports, and
providing for the
works specified below
are sanctioned for
entry in the Budget
of 1858/59.

D. Constructing two
Cells to the Police
Cutcherry at
Coconada to serve
as lock-up places
for Europeans —— 666.
Do a cooking shed
to be for the use of the
Native prisoners —— 164. 830.

E. Constructing a Sub
Officer's Cutcherry
at Doorumpollum
in the Tondamulla
Taluk —— 510.

Masulipatam.

Report 21 on Estimate for Rs 13,660

The Report brought for-
ward in this Report is for construct-
ing a Calingulah and Look mar-
Casarapilly Gate-vast respectively
of Rupees 1880 and 11780, to
regulate the supply of water
from the Colair high level
channel to the Bandar main,
and to admit of the passage of
boats from one to the other. The
necessity for the works is satis-
factorily explained in the Dis-
trict Engineer's letter forwarding this
and the Government sanction
the Estimate submitted amount-
ing to Rupees (13,660) Thirteen
thousand six hundred and sixty
for entry in the Budget of 1858/59.

Report 22 on Estimate for
Rs 4,120.

This report is on an Esti-
mate for constructing a wooden
bridge across the Summileiruvu
at-

with the above Report in pursuance of this order, and amounting to Rupees (2400) Two Thousand, is now sanctioned for entry in the Budget of 1858/59.

Report HHHHH on Estimate for Rupees 21.190

20. With this Report, the Chief Engineer forwards an Estimate for Constructing an Anicut with Head and under Sluices across the Tummilar river, and excavating a supply Channel to the Singasagaram tank. The District Engr reports that the remains of an old masonry anicut exist across the river, which formerly supplied several tanks in the Taluq of Salcotty, and that the ryots, who have presented an urgent petition for the restoration of the work, have promised to pay additional revenue to the amount of Rs 1/38.3. It further appears that the remissions made to the Ryots amounted during the last five years

to about Rupees 7786, and this, it is expected, will be saved when a supply of water to the tanks is rendered certain by the proposed work. The Collector, it is observed, has not been consulted in respect to the present Project, the Government therefore direct that the opinion of that officer be obtained and the Estimate re- forwarded, and the Estimate submitted for entry in the Budget of 1859/60.

Guntoor

Report B on Estimate for Rupees 38.100

21. The above Report is on an Estimate for diverting a large portion of the land floods from the Vuttera Vaugoo

Vangoo into the Nulla
Madda, for embanking
the latter, and disposing
of the rest of the drainage
by means of tunnels under
the Coaminanoor Channel.
This Channel is described
to be yearly increasing in
value, but by its intercep-
ting a large amount of
drainage from the westward,
much valuable land is
submerged during the
mawsam, and rendered
unfit for cultivation;
and the Channel banks
moreover are continually
breached after heavy falls
of rain. The loss from
the first of the above
mentioned causes is esti-
mated

mated by the Collector at Rupees
3,000, and the expenditure on
repairs to the Channel
banks is stated to amount
during the last few years
to Rupees 1,125 or about
Rupees 113 per annum;
thus making the annual
loss to Government
about Rupees 5000. The
measures contemplated by
the Civil Engineer of the
Festival Division appear
to be well calculated for the
attainment of the end in
view, which that officer
observes "is not merely the
"saving of the Rupees 5000
"that are now annually
"spent or lost, but the re-
"claiming of a large tract

of

"of rich land now neglected
"as swamp, the filling in
"for improvement in con-
"nexion with the Kistnah
"Annicut irrigation pro-
"ject, and the turning to
"good account, for the better
"supply of several highly
"valuable tanks, a vast
"quantity of water which
"is now allowed to run to
"waste, and in doing so, to
"occasion immense mischief."

The proposed embankment
to the Nulla Mudda will
also, it is stated, prove ser-
viceable as a road in a
locality where such accom-
modation is much needed.

The Collector, it is observed,

fully

"fully approves of the Project
and the Government concur
with the Chief Engineer,
as well as with Captain —
Orr, in considering the work
as a necessary part of the
system of the Kistnah irriga-
tion. The Estimate sub-
-mitted amounting to Rs.
Thirty eight thousand and one hundred
(38100) is accordingly approved
for entry in the Budget of
1858/59 for the sanction of
the Government of India.

Report BB on Esto-
-mate for Rs 2800.

22 The Estimate for-
-warded with this Report
is for constructing a Culver
-pulah with a Platform
Bridge

Bridge and Sluices across the Soongabuddra Nullah near the head of the Coaumaumaar Channel. The object of the Calingulah and Sluices is mainly, to regulate the supply of water for Irrigation of the Tanjore and Banjee Nullah Kalaakoo under the Channel, and the Bridges are intended to afford accommodation to the traffic crossing the Soongabuddra. The necessity for the work is satisfactorily explained in the above Report, as also in the District Engineers letter forwarded with it, and the Government sanction the Estimate Amounting to Rs (2500) Two thousand and eight hundred for Entry in the Budget of 1858/59.

The Estimate sanctioned in these orders for entry in the Budget of 1858/59, and those for which sanction has been deferred, are as follow.

Date of Chief Engrs Report or letter	Work.	Amount Rupees.	
	For entry in the Statement No 1.		A
	Ganjam.		
6 Dy 16 Dec 1857	Constructing Bridges on Branch road No 6 from Chicacole to Nundlam	23770	
	Chaussee ditto ditto ditto to Nundlam		
	Do Do on Do from Nundlam to Dendayaddamar	23630	XXX
	Chaussee ditto to Dendayaddamar		47220
	Stone Chaussee		XXXX
	Guntoor.		
B dy 16 Do	Draining the Country to the westward of the Commaumaar channel by diverting the Nukkea Vaigoo into the Nulla Muddy embanking the latter and constructing tunnels under the Commaumaar Channel	38100	C
		85320	X
	For entry in Statement No 10		
	Ganjam.		AA
A dy Do	Constructing a second class road from the Salt pans at Nodipada to Seebally	3330	
BBB dy 16 Do	Regonadaporum on Trunk road No 6		
	Excavating a navigable Canal from the Chilka lake to the Ganjam river near the Port of Ganjam	21780	
	Carried over	24110	

Date of Chief Engrs Report or Letter

Works.

Amount Rs.

Brought over 27,110

Ganjam Contd.

Meredale 23d March 1859 No 1178. Constructing a platform bridge across the surplus channel of the Maddada Dasee Gedda near the Village of Doosee. 350

Rajahmundry.

J dy 6th Dec 1850. Extending the embankments of the Yennamadoora Channel to Doovah. 7,500

K dy 6th Do. Constructing a Wooden foot bridge over the Doovah Calingulah. 1150

O dy 6th Do. Do a Lock in the Nagarum Talook. 4010

Do a Calingulah in Do. 1690

Do an aqueduct in Do at Maddaly 4720

XXX dy 6th Do. Do Do in Do at Chintalapilly 3210 13,110

Do an aqueduct over a drain crossed by the Amalapore Channel. 3400

Z Z Z dy 6th Do. Do an embankment with sluices to the river Godavery from the Town of Rajahmundry to the Village of Seetanagrum. 2,050

D dy 17th Do. Do two Cells to the Police Cutcherry at Cocanada, to serve as Lock up places for Europeans. 666

Do a Cooking shed to Do for the use of the Native Prisoners. 164 830

E dy 17th Do. Do a Sub officers Cutcherry at Boorumpollem 310

Do the Vadamilla Talook.

Masulipatam

AA dy 6th Do. Constructing a Calingulah near Casarapilly 1880

Do a Lock near Do 11,780 13,110

FFFFF dy 6th Do. Do a second class Bungalow on the north bank of the Westvaloo river on the Coast road branching from the Northern Trunk Road. 1,120

Guntoor.

BB dy 6th Do. Do a Calingulah with a platform bridge and Sluices across the Doongabuddra Nullah, near the head of the Coonnamoor Channel. 2800

96000

Rs 131320

293

Estimates deferred.

Amount Rs.

Date of Chief Engrs Report

Works.

Ganjam.

9999 dy 6th Dec 1856. Constructing a road from Ashwalla Rewalaboo the Chilka lake. 3,956 60

DDDDD dy 6th Do. Do Do from Bonnelly on Trunk road to Juggernaut Pantoon on the road from Chicacole to Calingulah. 23,400

Rajahmundry.

HHHH dy 6th Do. Constructing a road from Cursapore to Allee Seer through a portion of the Godavery Western Delta. 13,590

AAAAA dy 6th Do. 67 Miles Trunk road No 6 from near Sullavalla to Vizianagram. 19,700

QQ 16th Do. Constructing a Wooden bridge across the Swarnalaireroo to Gontay pond on the Vizianagram Talook. 4,120

RR dy 6th Do. Do a Bridge across the Jalapaudu Canal at Maro. 3,920

HHHHHH dy 6th Do. Do an Amicut with head and under Sluices across the Swarnalairoo and separating a supply Channel to the Singavaram Tank. 2,110

20,080

Copies to the Chief Engr

Superintending Engr for information

Public Works 1857 Dep.t
Dr. to Cons 24th Nov.r

№ 2128.

Extract Mins of Cons:
Dep.t 19th Nov.r 58

From the Chief Engineer 4th January 58
C. № 183 in 16 Pds
From Mr. Dep.t Sec.y 21st Oct.r 58 Rec.d 28th ditto
in Cons 7th Nov.r
From do 18th July / 59 Oct.r 1858 Cons
From the Dy Chief Engr Dy 13th Augt
1859 C № 2140 in Cons
From the Offg Chief Engr 20th 22d Nov.r
C № 2804 in Cons 30th Nov.r 58
№ 146-147

Passing orders on the
usual petns of the Chief Engineer
& remitting Estimates for Public
Works in the Districts of Ganjam
Vizagapatam, Masulipatam
and Guntoor.

№ 20 at 42.

From the Chief Engineer 9th Oct.r 58
C. № 2273.

Public Works 1857 Dep.t
Dr. to Cons 24th Nov.r

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