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Selection from the Records
of the Mads. Crout. Reports
on important Public Works. 1851

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SELECTIONS
FROM
THE RECORDS
OF
THE MADRAS GOVERNMENT.

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REPORTS
ON
IMPORTANT PUBLIC WORKS,

FOR

1851.

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புதுக்கோட்டை

* செப்பனிடவதற்காக எடுத்தல் *

* கொள்ளப்பட்ட *

* 1989 வரும் *

* செப்பனிட முடிந்த *

* 1990 வரும் *

* இராயச்சி உதையாளர் *

* அகியாப்பம் *

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REPORT UPON IMPORTANT WORKS EXECUTED DURING THE YEAR 1851.

1st.—During the year 1851, there were no irrigation works of any importance executed, as on my arrival in the division at the close of 1850, I found no estimates for fresh works had been submitted during the year, but that the department had been occupied in carrying out the various projects previously framed by Captain Collyer in 1848, the results of which were submitted in the report for the year 1850.

2d.—The following are the works that were executed during the year 1851.

1. The road between Vizianagram and Bimlipatam, costing.....	Rs. 8,506
2. The bridge across the Bimlipatam river—Estimate. „	9,042
3. Repair to the Trunk road near Anakapilly.....	696
4. New Serjeants' Quarters at Vizianagram.....	1,606
5. New Pay Office at Vizagapatam.....	2,197
6. Improvements and additions to the Military Hospital at Berhampore.....	2,054
7. New Infantry Barracks at Russellicoudah.....	5,118
8. Alterations and additions to Hoozoor Cutcherry at Chitterpore.....	1,944

VIZIANAGRAM ROAD.

3d.—The first mentioned work is one of great importance, and was executed entirely by means of private subscription, at a cost of about Rupees 8,500, of which H. H. the Rajah of Vizianagram contributed Rupees 5,000, and G. Narrain Row of Vizagapatam, Rupees 2,000, the remainder being made up by various small sums from the merchants of the neighbouring towns.

4th.—Its object is to connect the town of Vizianagram with the port of Bimlipatam, from whence produce to the amount of 9 lacs of Rupees is annually exported.

5th.—The town of Vizianagram is large and populous, and is moreover the point at which several roads from the interior meet. The route formerly pursued by bandies was wholly impassable in the wet weather, owing to a few bad nullahs being unbridged. The traffic was therefore necessarily confined to the dry months of the year. The line in which the new road has been carried is over favorable ground, with good material close at hand nearly the whole distance. The road was made in all 40 feet broad—a centre portion of 20 feet and 2 side portions of 10 feet each along which it was intended that bandies should travel, those going to keep to one side, and those returning to the opposite side. The road was made equally good throughout the whole width, but when it was opened for traffic, it was found impossible to keep the bandy men to the side road. I regret to say that the returns of traffic along this line which I took for one month have been mislaid—but as soon as the bridge is thrown open, I shall be able to ascertain it exactly, and hope to let the Board have the particulars in my report for 1852.

6th.—As before stated, there are 3 lines of roads which all meet at Vizianagram, and the traffic along which is finally carried by this new road to the port. They convey the produce respectively from Parvatipore by Guzzaputty Nagarem from Palcondah and from Chicacole. Parvatipore is a great depot for produce obtained from the Jayapore Zemindary, and between it and Vizianagram is an exceedingly richly cultivated country, supplying grain of all kinds, sugar, oil seeds, &c. Another great depot is the town of Guzzaputty Nagarem, to which the produce of the neighbouring Zemindaries of Saloor, Chemoodoo, &c. finds its way to be ultimately conveyed to the port.

7th.—Of the two former lines, that portion which lies within the limits of the Vizianagram Zemindary, the late Special Agent Mr. Crozier put into passable order and greatly reduced the difficulties formerly experienced; the result of which has been, I am told, a considerable reduction in the rate of bandy hire. Beyond these limits however, I regret to say, that the lines in question have had nothing done to them, and are utterly impassable excepting during the dry months of the year. It is right, however, to state, that the Bobbili Zemindar has consented to put the portion lying within his Zemindary into good order, and that Government have intimated their readiness to improve the line from thence to Parvatipore.

8th.—The line from Bodam (the boundary village of the Vizianagram Rajah's estate) to the town of Palcondah, is in a wretched state, but it is hoped that the repairs for this also may be sanctioned, as soon as the estimates are submitted. The road from Chicacole to Vizianagram, has never had any money expended upon it. It is however intended to carry the Trunk Road from the bridge over the Bimlipatam river, in land nearly along the present tract which

leads from Vizianagram to Chicacole, and this will be a very necessary work, as it is required to convey all the produce of the country lying along the line, north and south of it to Bimlipatam. It will have to be connected with Vizianagram by a short branch, which the Rajah formerly intimated to Mr. Crozier his willingness to execute.

9th.—The line from Vizianagram to Bimlipatam being thus the one, along which all the traffic from the 3 abovementioned roads is ultimately conveyed to the port, shows its extreme importance and the usefulness of the

BRIDGE ON THE BIMLIPATAM RIVER,

Which is the 2nd work enumerated in the List.

10th.—This bridge was originally designed to be one of 9 arches, each of 10 yards span, with piers of $2\frac{1}{2}$ yards in height, the rise of the arch being $\frac{1}{4}$ of the span. In 1851 the bridge was completed as far as the piers and abutments, the arches being left by order of the Superintendent of Roads to be constructed during the following year. Though no flooring was entered in the plan and estimate forwarded from the late Superintendent's office, yet knowing the velocity of the current in the river freshes, I had one of rough stone laid all under the arches, and extending 4 yards beyond the ends of the cutwaters. The southern approach to the bridge was made by a high embankment over the ground, which from the information that could be obtained was understood not to be flooded except in extraordinary seasons, and that even then, the water was nearly stagnant over the whole extent. It happened however that in 1851 one of the heaviest floods on record occurred, and to shew how little information can be relied on, not only was the ground in the neighbourhood of the bridge flooded to a much greater extent than had been pointed out, but there was besides a considerable current along the whole breadth—so that instead of the section of the river between the banks affording a criterion of the quantity of water flowing down it—it did not show more than $\frac{1}{3}$ of what actually found its way to the sea during 1851. The consequence was that the water-way of the bridge which was confined to the apparent section between the banks, was insufficient, to discharge the quantity brought down, and the river accordingly rose until a head of 2 feet had accumulated on the upper side, and had overtopped the embankments. The velocity through the bridge could not have been less than 11 miles per hour, which proved too severe for the rough stone apron which was swept away, and the piers consequently undermined, 7 out of 8 being completely destroyed.

11th.—In the following year the injury was repaired, 2 new arches being added to the original bridge, and a new one of 3 arches of 10 yards span each, built in the breach made in the embankment. The bed of the river at the

side of the bridge being very little above the level of tide water, the foundations rested on wells sunk to a depth of 4 feet. The solid masonry being 3 feet above, there was built of rubble stone laid in mortar made from nodulous limestone burnt on the spot, and used fresh from the kila every day. In the foundations the lime was mixed with one part of brick dust and one of river sand, previous experiments with the lime having led me to think that the brick dust increased its hydraulic properties. The bridge as rebuilt in 1852 though subjected to the trial of another exceedingly heavy fresh was not at all injured, and the additional water-way that had been given was found sufficient. The apron or flooring was laid the 2d time in rubble masonry but extended for 5 yards above the bridge as well as 6 yards below it, and was further protected by an apron of rough stone beyond, of 4 yards in width. The surface velocity of the river is about 7 miles per hour.

REPAIRS OF TRUNK ROAD OF ANAKAPILLY.

12th.—The 3d work consisted simply of filling up a large breach in the Trunk Road distant about 1 mile from the town of Anakapilly and in metal-ling and gravelling the portion of road between it and the town. This piece of road is carried across an extensive plot of irrigated land, and is the outlet of a very large traffic. For years this breach had been left unrepaired and it was perfectly impassable for bandies as long as the rains lasted. Bullocks used to pass it by having their loads removed and carried on men's heads. The repair of this piece of road has been of the utmost service to the traffic of the neighbouring country.

NEW SERJEANTS' QUARTERS AT VIZIANAGRAM.

13th.—The new Serjeants' Quarters at Vizianagram were built at a cost of Rupees 1,500. They were constructed after a standard plan furnished from the Chief Engineer's office, and consist of 2 large rooms and 2 verandah rooms with bath room in each half of the building, and are intended for the occupation of 2 separate families.

PAY OFFICE AT VIZAGAPATAM.

14th.—The Pay Office at Vizagapatam was built at a cost of Rupees 2,350.

15th.—It consists of 8 rooms with a verandah running all round the building. The walls are of brick laid in chunam, and the whole is covered in with a sloping tiled roof.

MILITARY HOSPITAL AT BERHAMPORE.

16th.—*Military Hospital at Berhampore.*—The improvements to this building consisted in adding a bridge of the same size as the original one—and in raising the verandahs which formerly were a continuation of the slope of the roof of the main building, and terracing them. The climate

of Berhampore being for three months of the year excessively cold, glazed windows were substituted for the original venetianed and battened ones, an arrangement which has proved beneficial, and of much comfort to the patients who principally suffer from fever and ague, contracted while on duty in the neighbouring hill tracts of Orissa.

NEW INFANTRY BARRACKS AT RUSSELLCONDAR.

17th.—These buildings were required for the use of the Regiment stationed at Russellcondar; those originally made being only of a temporary nature. They consisted of a Place of Arms, Serjeants' Quarters, Powder Magazine, Solitary Cells, &c. A saving in the estimate was effected by the judicious arrangements of the Station Staff Officer under whose superintendence the buildings were constructed.

HOOZORE CUTCERRY, GANJAM DISTRICT.

18th.—The improvements to the Cutcherry consisted in adding 2 rooms to the Sheristadar's department, which hitherto had had too contracted a space allotted to it.

19th.—The above constituted the principal works carried on in the Sub-division during the year 1851. Though no new important works of irrigation were executed, more attention was paid to the existing works which were greatly in need of repairs. The ordinary estimates which hitherto had been only Rupees 4,000 and 2,500 in Vizagapatam and Ganjam respectively, were this year increased about to Rupees 6,500 and 14,000, of which Rupees 4,500 and 12,600 were duly executed.

20th.—The department present in the Sub-division up to the month of May, consisted of 2 Officers, 1 European Overseer, and 1 Surveyor—after that date; of 1 Officer, 2 Overseers, and 1 Surveyor. The Officers were engaged in planning new works and inspecting repairs, 1 Overseer was engaged with the Vizianagram road and bridge over the Bimlipatam river, and the other with the Surveyor in surveying and estimating for various lines of roads, and inspecting and measuring the ordinary repairs in the Talooks. With respect to the present state of the two districts comprising the Sub-division as regards the irrigation works, I think I may fairly state, that the

repairs which have been executed during the last two years* to the existing works have tended to

* 1851 and 1852.

place them into a more secure state than they were formerly, and that though no immediate and direct return in increased revenue may have resulted to Government, yet the expenditure of the money, and increasing the efficiency of the works, by increasing their security, must have indirectly proved beneficial, by enabling the ryot to improve the cultivation of his crops, and giving him a greater return from his land, thereby increasing his

consequently his ability to meet the demands levied from him in the district of Vizagapatam have been principally confined to the work of Survasiddy, as the greatest number of irrigation works are there. The Golcondah Talook is also capable of being very much improved, as it is hoped that as the ryots who were driven away during the late disturbances, are beginning to return, this Talook also may be brought into better order than it is at present.

21st.—In the district of Ganjam no new works of any magnitude have been attempted, but the existing works have been improved especially in the Sub-Collectorate. They are still however, far from being in an efficient state on the whole, and much more requires to be done in the way of regulating the water flowing down the several river channels, as well as in projecting fresh works for more extended irrigation.

22d.—The great want in both districts is that of proper communication during the present year however several estimates have received sanction which will help to improve the state of the roads in both districts, and estimates for opening up fresh lines are in course of preparation, and will be submitted during the year.

23d.—The ports in the Sub-division are all open roadsteads with the exception of Vizagapatam, where there is a large backwater with a depth of 9 feet over the bar at high spring tide, and cargo boats are obliged to be loaded in the surf. The construction of piers on the screw pile principle would be of the greatest advantage to those ports like Pambapatam, where there is a large amount of valuable exports annually taking place. The returns of trade of the last 10 years cannot be submitted with the present report, but I trust that they may be received in time from the Collector to be forwarded with the report for the year 1852.

24th.—Since writing the above, I have found the returns of traffic along the Vizianagrum road above alluded to. During the latter end of November and beginning of December, when the traffic can scarcely be said to have commenced, as the crops are not cut till the latter end of January, the traffic crossing the river at the site of the bridge gave a daily average of

63 bandies,
256 bullocks,
597 foot passengers.

F. H. RUNDALL, LIET.,
1st Asst. Civil Engineer, Sub-division.

Civil Engineer's Office, Sub-division,
Vizagapatam District, Camp at
Davarapilly, 10th May 1853.

No. 248.

Civil Engineer's Office, Kistnah Division,
Camp at Bezoarah, 9th September 1853.

FROM CAPTAIN C. A. ORR,

Civil Engineer in charge Kistnah Division.

TO CAPTAIN J. H. BELL,

Secretary to the Board of Revenue,

Department of Public Works, Fort St. George.

SIR,

Within the districts composing the present Kistnah division, few works of any importance were under execution during the year 1850-51, because what little attention the Civil Engineer's department could spare from the extensive operations in progress at the Godavery was necessarily, almost exclusively, given to the supervision of the ordinary annual repairs, or to such minor undertakings as could not be postponed without inconvenience or loss of revenue. Moreover the project of the Kistnah aqueduct being under reference, the consideration of all less thorough schemes of improvement was in abeyance. Lieutenant Steele of the 6th Regiment Native Infantry and Lieutenant Applegath of the 33d Regiment Native Infantry, Assistant Civil Engineers, were respectively in charge of the Guntoor and Masulipatam portions of the division, the former assisted by Assistant Revenue Surveyor Bance.

2. The following is the expenditure on Public Works in this division during the year 1850-51.

Works of irrigation.			Buildings.			Bridges and roads, canals, &c.			Total.		
A.	P.	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.	Rs.
10	7	5,904	3	8	6,512	5	3	89,547	3	6	

3. The construction of a series of self-acting sluices in the banks of the Toongaboodra, and the widening of that channel were proceeded with during the year under an expenditure of Rupees 5,074-15-1, which in addition to a previous outlay of Rs. 6,255-6-0, has made the whole cost up to the end of 1851 Rs. 11,330-5-1, leaving a balance to complete the sluices next year of Rupees 1,544-1-11. The artificial banks of the Toongaboodra interrupting the drainage of the country, these sluices were devised by Lieut. Steele to afford the water, that would otherwise rest on the land, a passage into the channel. They have in some situations answered the intended purpose, but more frequently they have been of little use, being totally inadequate to carry off the volume of the

land floods, which for several successive years have been unusually severe, and have regularly breached the embankments of the channel in numerous places.

The Toongaboodra being a channel led off from the Kistnah and supplied by that river only when its freshes have attained a certain height, considerable sums have of late years been laid out in enlarging and extending it with a view of obtaining for the reservoirs it feeds the greatest possible quantity of water within a limited time, but as no means have at the same time been provided for regulating or cutting off the supply, the results of what has been done are almost as injurious as beneficial, for the advantages of being able to begin cultivation with an early and certain command of water have been frequently neutralized by the destructive effects of floods, arising from the natural drainage of the country, but aggravated, towards the end of the season, by the Kistnah freshes pouring down the channel, and laying the whole of the lower lands of the Delta under water for such a length of time as to render their cultivation impossible. Similar are the effects, more or less, of all the open channels led from the Kistnah under the present system, and there can be no effectual remedy be provided till the erection of the Kistnah anicut shall have secured a continuous, never failing supply of water, regulated by sluices, instead of a precarious and sometimes overwhelming one; and till, in connection with that project, measures be adopted for the thorough drainage of the lower portion of the Delta.

4. Excavating a supplying channel, with branches, and constructing sluices in their banks, for the irrigation of the lands of the villages of Edoopilly, Yellatypollum, and Mutlapoody. This work having been proposed by Lieutenant Steele in 1848, it was undertaken the following year on an estimate of Rupees 2,315-14-0, of which was expended prior to 1851 Rupees 1,714-12-0, and during that year Rupees 410-6-9, leaving a balance of Rupees 190-11-3 for the completion of the improvement next year.

The result of the formation of these branches from the Vellatoor and of furnishing them with a head and distributing sluices, has been very satisfactory, the revenue derived being in Fusly 1260 Rupees 4,038-14-0, and in Fusly 1261 Rupees 4,821-3-0, making together Rupees 8,860-1-0, as the return within two years of an outlay of about Rupees 2,000 or upwards of 400 per cent. Nothing can shew more clearly the value of river irrigation and the enormous returns it is capable of yielding when properly managed.

5. Forming a new tank at Vaenaveram, and providing it with two masonry sluices and a calingulah.

This work recommended by Lieutenant Steele in 1849, was undertaken this year and completed at an outlay of Rupees 1,360-0-6 on an estimate of

Rupees 1,360. The lands to be watered are 149 acres, calculated to yield an increased revenue of Rupees 887-3-0 when converted from dry into wet cultivation, and as the ryots are more than usually anxious to make the change there is little doubt of the whole being realized.

The bank is thrown across the gorge of a slight valley and was formed in a very satisfactorily substantial manner, as were also the sluices and calingulah, as reported by Lieutenant Steele, in his diary for July 1851. At that time, although the work had been completed only a very short period, some 30 millions of Cubic yards of water were collected, cultivation with it had commenced, and the ryots were highly pleased, unfortunately however, later heavy rains breached the bank and destroyed for the time the favorable promise of the work.

6. Constructing a Talook Cutcherry at Datchapilly.

This building, one of a series on the same plan, was commenced in 1850 and completed in 1851, at a cost of Rupees 1,354-15-8 out of an estimate of Rupees 1,391-12-0. It has been built entirely of the dark red stone or slate, found so abundantly in the Datchapilly Talook, and has been floored with slabs of the same. The materials used are good, and the execution of the work under the charge of the Collector's department, assisted by occasional inspections of this, has been satisfactory.

7. Extending and repairing the Court House at Guntoor.

The addition of a room to be appropriated to the use of the Moofly Sudr Ameen, and extensive alterations and repairs, were completed this season at a cost of Rupees 1,613-5-8, being Rupees 22-4-8, in excess of the estimate the Collector's department having superintended the performance of the work under occasional inspections by Lieutenant Steele and Mr. Bance.

8. Clearing out the Pettah canal at Masulipatam.

Deposit, and earth washed into this canal having rendered it, so shallow as to be useless except for lightly laden boats during high tide, thereby causing much inconvenience and loss to the merchants of the port, who have invested considerable sums in erecting warehouses near the basin at the upper termination of the canal, the removal of the accumulation was undertaken this season under an estimate of Rupees 2,568-12-0 prepared by Lieutenant Applegath, under whose immediate supervision the work was performed at a cost of Rupees 2,473-4-0. This canal being a blind duct in which the tide rises and falls without causing any scouring current, deposit accumulates rapidly and must be removed from time to time at a considerable expense and much inconvenience to trade, till effect be given to a project of Captain Lake's, for connecting the Pettah and Chinnapooram canals by means of the navigable cut from the basin, at the head of the former, to near Goon-

diapollum, up to which place, the latter is navigable from the Kistnah. length of the cut would be about four miles, and besides turning a stream through the Pettah canal, as is so much required, it would open out many mill canal and river navigation between the town and port of Masulipatam, a great part of the richest, though at the same time least accessible portion of the district.

I have the honor to be,

Sir,

Your most obedient Servant,

CHARLES A. ORR, CAPTAIN.

Civil Engineer in charge Kistnah Division

Camp at Bezoarah,
9th September, 1853.

No. 350.

Civil Engineers Of
Godavery Division
5th October, 1853

FROM MAJOR F. C. COTTON,

Civil Engineer Godavery Division,

TO THE SECRETARY TO THE BOARD OF REVENUE,

Department of Public Works, Fort Saint George.

Sir,

In the absence of my detailed reports upon the works executed in the year 1851, I am obliged to send you a mere abstract of the operations of the year. For the same reason I am unable to give you general information as to the state of the division during that period. The following is a brief account of the work executed.

2d.—A covering of cut stone in chunam was laid over the annic across the Raullee and Vizasweram branches of the river, at a cost of about 90,000 Rupees. The length of the former of these was 940 yards; of the latter 870 yards; the breadth in either case being 40 feet, and the thickness 15 inches.

3d.—It had been estimated that this work would cost 5 Rupees a square yard, but it appears from the accounts that its actual cost was not quite 4 Rupees. The stone was quarried in the Dowlaisweram Hill, where it was roughly squared, the cutting being completed on the annicuts.

4th.—The distance the stone was carried by water was on an average four miles, steam power being used with a portion of the boats, and steam

id of sails with the remainder. The line was quarried at Cantairoo and brought also by water, a distance of six miles.

5th.—The Apron of the whole of the annicuts underwent repairs during the year at a cost of 16,442 Rupees, the rough stone being deposited at the rate of about 12 Annas a ton. It was brought by the means abovementioned, and from the same quarry on the Dowlaisweram Hill.

6th.—The next greatest work of the year was the extension of the Dowlaisweram channel, the main branch from the Dowlaisweram head sluice, flowing the course of the river bank for a distance of 18 miles, which had been begun in 1849, but had made little progress during the year 1850. On this work Rupees 31,223-7-1 were expended.

7th.—A Lock 100 feet in length and 15 feet broad, with a lift of eight feet, was commenced during this year at Kovoor, on the Thooliah bagah channel; it was, with its Calingulah of 45 feet water way, nearly completed; the cost of the two being 11,800 Rupees.

8th.—A Lock of the same plan, but allowing for a lift of ten feet, was built at Nundamoore on the Weiyairoo river. This lock contains 8,300 Cubic yards of rubble stone in chunam, and cost 11,768 Rupees.

9th.—The Nundamoore lock is placed at the lower end of a straight canal 500 yards in length, which cuts off several turns in the Weiyairoo and shortens the line of navigation four miles.

10th.—The Chettepett Calingulah was built at the same time. It has a water-way of 120 feet, and is capable of discharging all the water of the Weiyairoo, which has a clear fall over it of 10½ feet on a cut stone apron. The cost of this work was 5,872 Rupees.

11th.—The Thooliah bagah channel which had previously been opened was this year still further improved, the sum of 10,425 Rupees having been spent on it, chiefly in cutting off several abrupt bends in the line.

12th.—In 1851, the river embankments were improved in several places under the management of the Collector's Department; and the following improvements of channels were made under the head of "ordinary repairs" by the Department of the Civil Engineer.

	Expenditure.	
Clearing Samuleottah channel, Rupees	2,649	4 10
Do. Gorinkalah, do. „	1,500	0 0
Do. Burtooluharee, do. „	2,477	1 4
Repairing Cowseca, do. „	2,551	11 0

	<i>Expenditure.</i>
Clearing Dungates, channel, Rupees	1,193 12 0
Widening Apparaw, do. „	2,363 15 11
Clearing Venkiah, do. „	2,183 5 4

I have the honor to be,

Sir,

Your most obedient servant,

Rajahmundry District,
Camp Dowlaisweram }
5th October, 1853.

F. C. COTTON, Major,
Civil Engineer, Godavery Division.

REPORT OF THE CIVIL ENGINEER, 2d DIVISION UPON WORKS OF IMPROVEMENT EXECUTED DURING THE YEAR 1851 IN THE

NELLORE DISTRICT.

1. During this year the new Civil Dispensary with out-offices for the Town of Nellore was completed. It consists of two large wards, each 45 ft 24 feet long by 18 wide, with a Verandah all round eight feet wide. The Eastern end Verandah, is divided off into two small wards for particular cases and in the rear one, two bathing-rooms are partitioned off. There is also a surgery and operating room. The foundation and Basement are each three feet deep, laid in Laterite stone in chunam, and the walls are 13 feet high of brick in chunam, plastered, with a tiled roof, in which is a ridge Ventilator, which is found to add very much to the ventilation of the wards. The surgery and operating-rooms are built in a similar manner, but their roofs are terraced. The out-offices are of the usual description. The total cost was Rs. 2,722-0-0 to which Rupees 400-0-0 may be added for the assistance given by the prisoners.

2. In the Judicial Department a new Guard-room for the Jail, was erected at a cost of Rupees 671-7-0. It consists of a room 36 feet long by twelve wide with a terraced verandah nine feet wide in front. Foundation and basement of laterite stone in chunam, walls of brick in chunam 11 feet high and plastered, with a tiled roof.

3. In the Revenue Department some extensive repairs and improvements were made to the Collector's Huzoor Cutcherry, at a cost of Rs. 1,636-6-0 and for repairing the Talook Cutcheries of Woodlaghery, Toommalupod and Ravor, Rupees 449-5-1 were expended. Materials were in course of collection for new Talook Cutcheries at Enamanamallor, Chendaloor and Talamunchy, and for new salt Cutcheries at Beerungoontah and Deegoorat.

ipatom, but as these works were hardly commenced upon they will be noticed in the report for this year. The estimate cost of these new buildings Rupees 9,348-4-0.

4. In the Marine department, the foundation and block for a Light house for the Armegham Shoal were built with brick in chunam, near the fishing village of Menappollum a little to the north of Poondy. The column is to be erected this year and will be 90 feet high including basement and lock. The estimated cost of the work is Rupees 4,624-11-0 which it will not exceed. This sum is exclusive of the cost of the Lantern and Lamps, which are being made up in the Arsenal at Madras.

5. Works to the amount of Rupees 6,156-3-0 were sanctioned for the section of three bridges and six drains on the road from Nellore to Cuddapah, near the village of Danaramudgoo, and for repairing certain portions of it, but nothing with the exception of the drains had been completed up to the end of the year, though a great deal of other work was in progress.

6. No new project for the improvement of the revenue of this district was executed during the past year. Several sluices, Calingulaks, &c. were given to certain tanks but these are not works deserving particular notice. Rupees 23,490-8-8 were disbursed for ordinary repairs to tank tanks, clearing out supplying channels, &c. &c.

7. I may here observe (as I submitted no report for the year 1850,) that the result of the three projects mentioned in my report of 1845, are satisfactory. The first of these was a channel cut for the better supply of the Nellore tank. The following statement shews that the revenue derived from it, is steadily increasing.

	1255	1256	1257	1258	1259	1260	1261
Fusly.....	1845-46	1846-47	1847-48	1848-49	1849-50	1850-51	1851-52
Year.							
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Revenue.....	10,882	20,564	21,098	12,244	18,224	19,354	21,332

2dly. The benefit derived from the Kundlairoo Anicut is only now beginning to be felt. I have no doubt its revenue will not in future fall below that of the last Fusly.

Amount of Annual Revenue realized.

Revenue of the 5 years immediately preceding that in which the work was executed.						Revenue realized in the years subsequent to the construction of the work.				
Fusly.....	1253	1254	1255	1256	1257	1258	1259	1260	1261	
Year.....	1843-44	1844-45	1845-46	1846-47	1847-48	1848-49	1849-50	1850-51	1251-52	
Revenue...	4,037	4,653	3,610	6,700	4,933	4,759	4,797	4,740	6,66	

3rdly. The six villages that are now irrigated by the new cut from the Vagoor River channel, have also greatly benefited by this work. When submitting this project for sanction, I stated in my report that the average revenue derived from them was Rupees 17,589. It will be seen by the following statement that the revenue collected last Fusly $\frac{1261}{1851-52}$ was Rupee 20,988-14-11.

Fusly.....	1256	1257	1258	1259	1260	1261
Year.....	1846-47	1847-48	1848-49	1849-50	1850-51	1851-52
Revenue.....	17,164	17,631	18,122	19,038	20,024	20,988

A. DEBUTTS.

Civil Engineer, 2d Division.

Civil Engineer's Office,
10th August, 1852.

REPORT UPON THE IMPORTANT PUBLIC WORKS UNDER EXECUTION
IN THE THIRD DIVISION DURING THE YEAR, 1851.

1. In my report for the year 1850, I explained to the Board that it was impracticable to treat of the works of the two Districts comprising this Division in connection with each other, as their nearest points are separated by a broad tract of the Mysore and Southern Mahratta countries, of about 60 miles in breadth, and these points from want of proper roads are accessible to one another only during the dry season. I propose therefore to bring under review the works of each district separately except when treating of the High road now under construction from Bellary towards Dhurwar which is the only connecting link between the two districts, and which when carried onwards

to meet the Devamunny Road near Sirpy will have a great effect in improving and increasing the Cotton trade between Bellary and the Port of Coomptah in the district of Canara on the Western coast.

2. I shall therefore commence this report by noticing the works in progress in the

BELLARY DISTRICT.

3. On the 6th of May, of the year under review (1851,) a storm swept through this district nearly in the direction of N. W. to S. E., entering the District in the Kumply Talook and extending over a tract of country about 50 miles in breadth. This storm was accompanied by torrents of rain which produced a general inundation, and destroyed or otherwise injured all the communications of the country, and all the works of irrigation within its influence. So overwhelming was the effect of the inundation that several of the finest tanks in the district were completely destroyed as reservoirs. The bunds of these works that had stood the usual rains of centuries, and that might have challenged the whole of India to produce their like in strength and careful construction, were overtopped by the waters which broke through them leaving large chasms extending from 10 to 420 yards in length, and varying from 5 to 20 yards in height, besides being greatly damaged in other places. The few portions of made road that existed in the district were cut through in several places, and nearly all the drains built upon them were destroyed.

4. From the overflowing of the Rivers also the channels of irrigation on their banks suffered severely, and many of these were entirely obliterated; whilst from the same cause a great extent of land was rendered useless, the best soil having been washed away from its surface, and sand deposited in its stead. To complete the account of this calamity, I have to add that most of the houses in the villages were ruined; that whole villages where most exposed to the violence of the flood were swept away—and that many of the Ryots were ruined by the loss of their cattle and other property.

5. No time was lost in taking measures for remedying as far as possible this calamitous visitation. As a preliminary step Estimates were soon framed by this department for the repair of the damages sustained by different works amounting to about three Lacs of Rupees, exclusive of others framed by the Native Revenue Officers; and Government were pleased to order the immediate execution of all works the estimates of which did not exceed four years' revenue; but an exception was made in regard to the two following works as the estimates for their repair were so large that a reference to the Bengal

Government was considered to be necessary before the works could be sanctioned.

The first of these works is

THE DAROJEE TANK.

6. The Revenue of this Tank is Rupees 7,122-8-0 and the amount the Estimate for its repair was Rupees 38,000. The work was commenced upon the general sanction of the Madras Government, but after an expenditure of Rupees 1,397 in 1851, it was suspended to obtain the sanction of the Government of Bengal, which was not given till 17th February, of the following year (1852.) This tank sustained two large breaches one extending to 160 yards and the other 80 yards in length. The Estimate, which was drawn up with every attention to economy consistent with the efficiency and durability of the work, provides for a new Collingwall of stone masonry in the former breach and for filling up the other with earth faced with loose stone; besides the repair of a large sluice and the levelling of the Bund throughout extending upwards of two miles.

The other work above alluded to is

THE SINGANAMALLA TANK.

7. This is a splendid and most important work and its bund was in perfect order before the inundation. It is said to have effectually resisted a heavy flood in 1804, but in 1851 it suffered severely, having been breached in several places, the chasms in its embankment extending altogether to 842 yards. Its Revenue to Government exclusive of extensive Enam lands under its protection amounts to Rupees 14,262-8-0 and the Estimate for its repair was Rupees 60,500. During the year 1851, the work was commenced, and suspended after an expenditure of Rupees 4,370 for a reference to be made to Bengal which delayed further progress till the following year.

8. This work will be completed by the usual rainy season of 1854.

9. The only other important tanks which it appears necessary to notice here are the following, viz.

1st. THE ANANTAPOOR TANK.

10. The Revenue of this Tank is Rupees 13,008-5-4 and the Estimate for its repair amounts to Rupees 9,536-7-0. The work was commenced on the general sanction above mentioned and Rupees 3,530 were expended upon it during the year 1851. It will probably be completed by the 1st of January 1854.

2d. THE HUNSHY TANK.

In the Koodlighee Talook.

11. Its Revenue amounts to Rupees 3,596, and the Estimate for its repair amounts to Rupees 10,344-10-0, of which Rupees 4,507 were expended in 1851. It ought to be completed by the month of May 1854.

12. By a return forwarded by the Collector, it is shewn that the amount of the Estimates in hand for the repair of the most important Tanks and canals damaged by the flood during the year 1851, is Rupees 1,62,720, and that the amount of work done to them during the same year is Rupees 33,935, leaving a balance of Rupees 1,28,785 to complete. It is expected that most of these works will be finished by the end of 1853, but that some of the larger works will occupy part of another year or till the middle of 1854.

ROADS.

13. During the year under review, two highly important roads have been sanctioned by Government, viz.

1st. THE DHARWAR ROAD.

14. The Estimate for this road amounting to Rupees 28,744 was prepared by my predecessor Captain Dittus, on the 12th September 1849, but on the delay caused by the necessary reference to Bengal, the work was not sanctioned till the 20th October 1851. It extends from Bellary towards Dharwar, as far as Humpasagar, on the right bank of the River Toombuddra, and it is proposed to continue it across the river to its farther terminus, either by a line entering the Nizam's Territories from Humpasagar, or by crossing at Wynbully, into the southern Mahratta countries. At present, the latter, though the more circuitous route, is preferred by the merchants, to avoid the transit duties levied by the Nizam's Government. But as this portion of territory has lately been brought under the management of the British Government, it is probable that this obstacle to trade will soon be abolished.

15. From Humpasagar, its present terminus, it is also proposed to make another road to the Port of Coomptali on the western coast via Sirry, and the Devamunny Ghaut in the Canara District. This is the grand line of communication between Bellary and the western coast, and would greatly benefit the cotton trade of the district by opening up to it a communication with a shipping Port. And it is highly desirable that this line be completed as soon as possible. At present, the greater portion of the traffic from Bellary is conveyed by bullocks, but even when bandies are used such are the difficulties of the road beyond the Bellary District that cotton despatched from Humpasagar does not reach the coast, a distance of about 200 miles.

under a cost amounting to 25 per cent upon its original value. A bullock load of 45 maunds or 1,125 pounds costs at Humpasagar about 80 Rupees and it requires an expense of 20 Rupees more to convey it to Coompt. This shews at once the necessity for measures being taken to complete road to the coast, and thus to facilitate the interchange of traffic; nut, salt, cocoanuts &c. being imported from Canara in return for co, and piece goods sent from Bellary.

16. Owing to this road having been so lately sanctioned, it is difficult to institute a comparison between its present and probable future traffic. The Collector states that the present trade on this line may be calculated at 10 lacs of Rupees annually, and he expects that this will be increased one half or that it will extend to fifteen lacs annually should the communication be improved.

17. Before concluding this notice of the Dhurwar road, it is right that I should advert to the insufficiency of the original estimate, for the work prepared by Captain Ditmas, who, in forwarding it to Government, pointed out, that it contained no provision for bridging many of the large streams that cross the line. In a statement which accompanied his estimate, Captain Ditmas on a rough calculation shews the probable cost of these bridges to amount to Rupees 41,226-9-0, but judging from the experience I have had of the floods in this district, I consider that the work will not be done under a cost of between 70 and 80,000 Rupees. I have lately gone over the whole line, and taken sections of all those streams for the purpose of preparing estimates, but it has been impossible for me to give further attention to it at present from the pressure of other duties.

18. The examination I made of the road on this occasion proves that Captain Ditmas' original estimate, will be greatly exceeded in the execution of the work it provides for. This arises from the defective drainage allowed for, from the streams crossing the road having been greatly enlarged by floods, from the demand for labour being in excess of the usual supply and from the soil being harder and more difficult to excavate than was first supposed.

19. In Captain Ditmas' estimate no provision is made for sundry portions of this road extending altogether for about 16½ miles, that were constructed between the years 1844 and 1849, at an expense of about Rupees 20,000. These suffered severely during the inundation of 1851; and two estimates amounting in all to Rupees 18,288, have since been sanctioned for bringing them into an efficient state. Of this sum, Rupees 5,245, is for repairs of earth work alone, the remainder being for the construction of additional drains and the repair of those already constructed. The total amount

to be expended upon these portions of road will thus be Rupees 38,280, but Rupees 6,000 of this sum would certainly have been saved to Government, had these pieces of road been properly constructed in the first instance, the latter amount deducted from the total sanctioned expenditure will leave Rupees 32,288 or about Rupees 2,000 per mile, as the average cost for these portions. I cannot anticipate, that the work included in Captain Ditmas' estimate, will be completed at a lower average rate. The distance entered in the estimate is 48 miles exclusive of the 16½ miles above mentioned, and I do not expect that its cost will be less than Rupees 96,000, or even one lac, considering the numerous streams that cross the line. If, however, the Collector's expectation be realized, that by means of this improved road, the traffic will be increased to the amount of fifteen lacs annually, the investment of one lac in this work will prove profitable both to the Government and to the people of the country.

The second road sanctioned during the year is

THE HERRYHALL ROAD.

20. This is a continuation of the high road between Bangalore and Bellary. The portion within the Mysore Territory of about 132 miles in length, is made by the authorities of that country, and the remaining portion from the frontier to the town of Bellary forms the piece of road under report. Its length is only 13 miles, and the estimate amounting to Rupees 21,000, is dated 31st October 1851, and was sanctioned by Government on the 20th December of the same year. It provides for a substantial work to be well bridged and maintained throughout, and when completed, will form a carriage way from Madras via Bangalore to Bellary. The road, however, will not only be useful to travellers; it will also greatly promote traffic and facilitate the interchange of goods, between Mysore and Bellary, by allowing these goods to be transported upon carts instead of upon bullocks, the present mode of conveyance. No returns of traffic have been taken on this road during 1851, but its benefit to the Bellary district is beyond question.

21. The old road between Bangalore and Bellary was via Bagapully, Pairoor, and Honore. The portion of this road within the Mysore Territory has been well made, and is in excellent order, but the corresponding portion in Bellary is in a wretched state. It never was a made road, though defined by trees and aloe hedges planted along its sides, its present state does not entitle it to the name of road at all. The line however, is a most useful one and ought to be kept up for the promotion of traffic.

22. The above are the only new roads in progress in this district. But besides these, an estimate amounting to Rupees 2,031-6-7, was sanctioned by

Government on the 12th May 1851, for the construction of a bridge of 11 arches across the surplus stream of the Anantapoor tank on the Bangalore road, and subsequently a further estimate for the same work amounting to rupees 140, received sanction. The total amount sanctioned, therefore, for work is Rupees 2,171-6-7, but it had not been commenced in 1851.

23. I have also to add, that another estimate amounting to Rupees 1,850, received the sanction of the Board on the 11th September 1851, for restoring the old bridge of 3 arches across the stream above mentioned on the Bellary side of Anantapoor. This work also was not commenced in 1851.

24. During this year also a plan and estimate amounting to Rupees 35,280, were prepared at the request of the late Superintendent of roads for bridging the Pennar between Bellary and Anantapoor on the direct line to Madras. These documents were forwarded to the present Superintendent of roads, on the 2d October 1851, by whom they were submitted to Government, but sanction was refused as "Government did not contemplate the construction of so extensive a work for bridging this river" and "considered that the bridging of large rivers should be deferred till a road is formed."

25. It ought here to be mentioned, that an estimate for the whole line was under preparation at the time, when that for the bridge was submitted to Government, and that the site for the bridge was carefully selected as the best spot where this line should cross the river. This estimate amounting to Rupees 57,050-13-4 exclusive of the amount for the bridge, was submitted to Government on the following year, but sanction was refused to this also on the ground that "it would probably be the direction taken for the Railway."

26. With regard to the remark of Government, that the "bridging of large rivers, should be deferred for the formation of the roads," I beg leave to point out, that bandies can often manage to creep along the present road when it is impossible for them to cross the Pennar river. This stream when full, is so rapid, and its bed so encumbered by huge rocks, that no boat can cross it without imminent danger. Bandies are often detained on its bank for 10 days or a fortnight together, the goods being exposed to danger of utter ruin from rain. There being no village on the bank to afford shelter, the people and cattle are equally exposed to the inclemency of the weather. The Tappal also is often delayed for 4 and 5 days together on these occasions, and these detentions when added together sometimes amount to nearly two months in the year. The Assistant Collector was at one time detained on its banks for 4 days, and only succeeded in crossing at last by availing himself of some Elephants, that happened to arrive there at the time. The bridging of this serious obstacle to postal communication, and to trade, would be an immense boon to the district, irrespective of the bad state of its roads.

The next works to be noticed are the

REVENUE BUILDINGS.

27. Under this head, I find that estimates to the amount of Rupees 278, were sanctioned, and work done to the value of Rupees 4,812 during the year. Of these the principal estimate amounted to Rupees 8,004 for providing additional accommodation to the Hoosoor cutcherry at Bellary, upon it work was performed to the amount of Rupees 1,839. It is expected, that the building will be completed by the end of 1853.

28. I am not aware, whether the Government contemplated that the expenditure on the restoration of ruined and damaged irrigation works, should be included in this report, but as the district was visited by such a great scarcity in 1851, I have considered it my duty to shew here, the liberal measures by which the visitation was met by Government, whilst it appeared especially desirable, that this report should account for the employment of the department.

29. The restoration of ruined works is as necessary to the prosperity of the district as the execution of new projects, and the Engineer Department is equally amenable to Government in the performance of either of these duties. The necessity for restoring the works was urgent, and had Government not come forward promptly and liberally to give hope and encouragement to the ryots, the loss to the district would have been very great for many of those poor people, who had lost all their property by the flood, would have been compelled to abandon their villages to seek for a livelihood elsewhere, and some would have quitted the district altogether in the hope of bettering themselves in the Dharwar or Mysore countries. It is also to be observed that the loss to the district would have been in the irrigated lands which already bear such a small proportion to the land under cultivation. The extent of wet land compared with that under dry cultivation being as 1 to 11 nearly.*

30. Besides the works above noticed, no other important work has ever been executed by the British Government in this district, with the exception of the Wallabapoor Annicut, which was a reconstruction on improved principles of an old native work. The old work was constructed of heavy masses

* Note. The extent of dry land under cultivation in the year 1851-52 was 14,82,468 yielding a net Revenue of Rupees 19,31,153 or nearly 1 Rupee per acre.

The extent of wet land for the same year was 1,20,734 acres, and the net Revenue was Rs. 11,35,369 or nearly 10 Rupees an acre. This shews that the Revenue derived from wet land, is tenfold what is obtained from an equal extent of dry land, and proves the importance of extending wet cultivation merely as a branch of revenue, and taking into consideration the capital created by its more valuable produce, and the additional comfort diffused by it amongst the people.

of stone loosely put together without cement; and as these stones y to the force of the stream every year a large annual outlay was in in its repair. This attracted the notice of Government, and an estimate prepared by Captain Bell in 1845, amounting to Rupees 22,500 for construction in solid masonry of stone in chunam, which was sanctioned in 1846. The work was commenced in 1847 and finished in 1849, at an cost of Rupees 26,000, the excess above the estimate having been chiefly by the substitution of brick for stone masonry in the interior body of the work. The work was superintended by the late Captain and his successor Captain Ditmas, ably assisted by the present Major superintendent of the district, Chittumbara Moodaliar.

31. The success of this work has been complete. It has required slight repairs since its construction, and thereby the Government have about Rupees 1,000 annually, being about 4 per cent on the original. The revenue of the channel has not increased since the construction work, but it has been secured, and placed beyond the reach of accident. It is probable, that this might have totally failed on the occurrence of inundation of 1851, as the old work might then have been greatly damaged or probably ruined altogether.

32. It may not be out of place to state here, that an inscription deposited near the old work, relates that it was constructed in the 11th year of Shalivahana 1,443, corresponding with the year A. D. 151 and that the kingdom was then ruled by Krishna Rayer. Several inscriptions scattered about the country, attest that many works of benefit were constructed by this enlightened Prince, whose reign was temporary with that of our Henry 8th. The old Aqueduct from this lasted for a period of 330 years, having been constructed when such were probably unheard of in England.

(Signed) ROBERT HENDERSON,

Civil Engineer 3d Division, Kurnool Ter

21st August 1853.

NOTES ON THE CANARA WORKS DURING 1851-52 DIVISION. SUMPAGEE GHAT AND ROAD TO MANGALORE.

1. Abutment Foundations, Apron, and Pile work of the Fering Bridge completed, and Unchanuddika Bridge rebuilt by Corporal Grah. A small arch near Pootoor gave way in the monsoon—Ghaut not in such order as rest of road—(Vide Diary for 15th and 26th January 1852.)

CASSERGODE AND SOOLIAH ROAD.

2. Earthwork completed, road in full use by cattle—drains commenced, mismanaged,—Vide remarks in Diary for 16th to 18th January 1852.

MUNJERABAD GHAT AND ROAD.

3. Owing to the dangerous illness of Captain Boddam, no efficient superintendence for $\frac{1}{2}$ of the year. Consequent abuses by Maistries in charge, waste of the public money, little work being done. Lieutenant Wilkieson large in November, commenced Timber bridges over the Cubbinhaul and another large stream, the three masonry arches over which had way to monsoons before. Very unsatisfactory state of things altogether this year. Very necessary to complete the communication, by either of the Naitrawutty to the head of the navigation of the Mangalore, either at Pani-Mangalore or Bantwal. Will never be much used by till such be done.

AGDOOMBY GHAT AND ROADS.

4. From its foot to Mangalore, Oodapee, and Coondapoor—Earthwork on first mentioned line completed, and some arched masonry drains built. Extension of the 2d from Pordeor to Oodapee completed, and a large timber bridge over the Bilbyle Nullah commenced. Orders from the Revenue Board, dated August 1850, to send in plans and estimates, for bridging these lines throughout have never been complied with; owing to defective strength of Engineer Department. Mr. Kemp's sections of the rivers utterly untrustworthy. Most essential to complete these lines with bridges, the whole road from the Ghaut to Shemogah, being bridged throughout, and in the highest order.

DEVAMUNNY GHAT AND ROAD.

5. The arrangements made this season for the monsoon repairs of this were perfectly successful; the written instructions left by the Officer in charge, having been attended to, with such effect, that on his return from the Bellary District, at the end of October he found it throughout in better order than he had ever before witnessed, and offering every facility to the traffic. His orders prohibiting any Earthwork being performed while the ground was saturated with wet, appear to have been as useful as any positive instructions regarding work to be performed at intervals of fair weather: by the use of heavy rammers with which each cooly was furnished, the roadway was greatly consolidated, and its shape improved during the rains. More general adoption of this practice is recommended.

In the former part of this year, the piers and abutments of the 5 arched bridge over the Benny Nullah were constructed. The laterite stones for

this work having to be conveyed a distance of nearly 5 miles came in slowly; and having occasion to employ Dharwar Stone masons, to level rocky foundations, the Officer in charge continued employing them in laying the lower courses of the piers up to an uniform level in granite stone also in facing the upstream cutwaters throughout with granite. This, doubt, increased the expense of the structure, but it also accelerated the work as building with laterite proceeded simultaneously, as fast as the stone came in. And it has added immensely to the security of the bridge, which crosses a very considerable stream, down which, much timber is swept in monsoon floods.

In the latter part of the year, after the rains, the archwork of this bridge was commenced, and to save stones, of which a vast number would have been required for such high arches, if the ordinary native method had been followed, wooden centerings were designed and put together on the spot. The archwork progressing in the mean time, as far as it was safe to dispense with support. The works on this road were greatly obstructed by want of cart-tenders for which were made at such exorbitant rates, that the Officer in charge of the works, could not close with them for fear of swamping the Estimate and was obliged to submit to carry on the operations much slower than he could have wished, for economy's sake. In order not to be losing time, with the slackness of the Devamunny Works placed at his disposal, he assumed charge from the Collector of the newly sanctioned.

BRANCH ROAD.

6. From Kuttigaul to Meerjan, meant to connect the Devamunny and Arbyle lines below the Ghauts, a short but very difficult line of 4 miles length, the Estimate for which also included 2 bridges on that portion of the Arbyle road between Meerjan and Heeraygootty. An advance of a hundred Rupees made by the Collector, in anticipation of the expected saving allowed of the road being quickly opened out to a width of 10 or 12 feet very early in the year, so as to allow of carts making use of it to reach Gokul where an annual Jatra draws together a great concourse of people. Before the monsoon set in, the road was completed to its full width of 18 feet, at one small bridge and embanked approach to it very substantially executed. Carts were kept at work throughout the rains conveying stones from the Fort to two bridges within such reasonable distance, as to make it worth while to do so in preference to opening new quarries. The Fort stones being of large size and good quality, were especially adapted for such flat arches. They were intended, their rise being only one-fourth of their respective spans of 4 and 32 feet, the boldest yet built in Canara. Fair progress was made in the

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struction before the end of the year, great attention being paid to the maintenance, and pains taken to improve the workmanship of the Goa masons employed, some of whose headmen are very intelligent and apt at earning.

7. ARBYLE GHAT AND ROAD—from YELLAPOOR to SANECUTTA and BURN.

So early in the year was the small balance of estimate expended on this road, that it is only mentioned in this Report to allow of some notice of the enterprising zeal and attention of Lieut. Searle, of the 35th Regt. under whom the western portion of it, has been worked out. The Assistant Civil Engineer has the greatest satisfaction in reporting his opinion of this Officer's fitness for employment in the Road Department. He distinguished himself from his appointment to the Arbyle road, by his attention to the details of his work entering into the minutiae, in a manner that made his maintenance most valuable. In time, he acquired very correct ideas in the art of tracing and laying out his road, and accomplished the latter portion assisted, in a most skilful manner and at the same time with great economy, relieving the Assistant Engineer at times, in the charge of the Meerjan road, where he acquired some experience in bridge building, and altogether shewed his interest in his duties, as point him out as an Officer, whose services it would be desirable to retain in the Road Department as long as practicable.

8. Of the BRANCH ROADS auxiliary to the Arbyle Ghaut, that from Yellapoor to Hullial was opened out as a 2d class line by Lieut. Thornton, before the monsoon of this year; and, a commencement made after the rains of the Yellapoor and Kirwutty line. And on the former, as well as that from Yellapoor to Moondagode, large choultries were constructed at the half-way stages, from the proceeds of the Pagoda funds; these, it is hoped, will add greatly to the comfort and security of travellers traversing these forest tracts.

Many carts that have been used in conveying merchandize down the Devamunny ghaut, have returned to the Southern Mahratta Country, by way of the Arbyle road, since the two were connected by the Meerjan branch; they sometimes carry a little salt or timber back with them, but until the line is bridged throughout, probably most of such return handies will go back empty. The opening of the Meerjan road has likewise relieved the Dewgah Ferry of the Tuddry river, on the Devamunny line, by rendering that at Meerjan also accessible.

The District of Canara, with its Sea board of 200 miles, and north which 50 miles of Foreign Territory bar the trade of the interior, is, road district, of the highest importance. Every mile opened out in it, with effect on the inland districts of Mysore and Dharwar; indeed produce of the interior, has lately been brought down by the new communications so cheaply, as to undersell local produce in Canara. It begins not to be felt by those interested in, and acquainted with this, and the adjoining districts, that however useful, the works performed in the last 8 or 10 years have been, and creditable to the Government that has allowed their execution yet not only much more is wanting, but that the additional work must be through at a faster rate than hitherto, and much quicker than present establishments will allow. Most of the main communications have been opened as regards the roadways, but only two lines have been finished with masonry bridges. What is now required is a large increase of expenditure on roads and bridges, and on establishments for their completion and their repair completed. Unless at least Rupees 50,000 per annum are expended, for the 10 years on this object, the progress of the communications will fall far of what is desirable, and would be profitable both to Government and the dividend. Projects for carrying out the works of the district to completion under vigorous superintendence, have been already sent in by the Assistant Civil Engineer, and he thinks it most desirable, that they should be brought forward for discussion in hopes that active measures may be adopted.

GEORGE WARREN WALKER, LIUT.

1st Assistant Civil Engineer, third Division

Mangalore, 5th May 1853.

List of I.

No.	Names of Works and date of commencement.	1					Amount of sanctioned estimate.	Amount expended during the year.	Total amount expended up to the end of the year.	Balance of estimate and probable remaining cost at the end of 1851.	
		Rs.					Rs.	Rs.	Rs.	Rs.	
1	Arbyle Ghaut road traced in	1845-49	5,601	874	5,601	Rs.	5,601	874	5,601	Rs.	5,601
2	Yellapoor and Hulial road	1850	5,525	3,691	5,525	Rs.	5,525	3,691	5,525	Rs.	5,525
3	Devamunny Ghaut road traced in	1843	71,729	6,707	71,729	Rs.	61,749	6,707	61,749	Rs.	9,980
4	Meerjan road and bridges	1851	6,925	4,300	6,925	Rs.	4,300	4,300	4,300	Rs.	2,625
5	Eekunby and Sunghay road	1851	4,086	2,217	4,086	Rs.	2,217	2,217	2,217	Rs.	1,869
6	Mangalore and Agoomby Ghaut road	1848	12,700	3,086	12,700	Rs.	11,523	3,086	11,523	Rs.	1,177
7	Pendoor and Mulpay road	1851	5,987	4,150	5,987	Rs.	4,150	4,150	4,150	Rs.	1,837
8	Munzerabad Ghaut road traced in	1843	74,794	2,420	74,794	Rs.	70,341	2,420	70,341	Rs.	4,453
9	Ooperangady and Footoor road	1849	2,432	394	2,432	Rs.	2,298	394	2,298	Rs.	134
10	Feringapett bridge	1849	5,620	1,024	5,620	Rs.	2,469	1,024	2,469	Rs.	3,151
11	Cassergode and Jalsoor road	1849	9,732	603	9,732	Rs.	6,881	603	6,881	Rs.	2,851
12	Mangalore Sea Custom House and Marine Yard road ...	1850	1,869	490	1,869	Rs.	1,409	490	1,409	Rs.	460
13	Amcharadaka bridge	1849	2,024	485	2,024	Rs.	1,245	485	1,245	Rs.	779

Mangalore, }
31st August, 1854.

GEORGE WARREN WALKER, LIUT.,
Civil Engineer, 3d Division.

(Signed) F. N. MALTBY,
Collector.

Return of the Export Trade of the several Ports in Canada.

[illegible]

Years	Bekul				Oodipiy				
	Rice		Sundries value	Total value	Rice		Sundries value	Total value	
	Quantity	Value			Quantity	Value			
			Corges	M.			Rs.	Rs.	Corges	M.	Rs.	Rs.
1843-44	1,254	2½	65,924	51,785	Rs. 1,17,709	853	26½	54,614	Rs. 69,980
1844-45	890	31½	48,390	82,706	1,31,096	920	35½	54,653	68,299
1845-46	1,193	26½	67,983	59,942	1,27,925	1,216	16	86,258	1,06,561
1846-47	1,312	39½	72,229	61,272	1,33,501	1,279	27	90,995	1,04,580
1847-48	1,297	12	77,807	63,371	1,41,178	1,505	39	91,894	1,26,092
1848-49	1,128	37½	1,03,412	71,899	1,75,312	1,471	9½	90,636	1,43,532
1849-50	975	26½	60,184	72,463	1,32,647	1,094	9½	65,968	1,01,037
1850-51	1,122	9	63,073	56,949	1,20,022	1,209	5	73,072	1,03,756
1851-52	1,434	21	87,069	97,966	1,85,035	1,322	19	73,356	1,20,705
1852-53	1,240	4	55,363	55,886	1,11,199	1,391	34½	76,895	1,17,774

Return of the Export Trade—(continued.)

Years	Bareilly					Cundapore				
	Rice			Sundries value	Total value	Rice			Sundries value	Total value
	Quantity		Value			Quantity		Value		
	Corges	M.	Rs.			Corges	M.	Rs.		
1843-44	4,271	38	2,61,712	Rs. 39,073	Rs. 3,00,785	6,185	23	3,73,809	Rs. 39,322	Rs. 4,13,131
1844-45	4,687	...	2,92,635	57,912	3,50,597	6,478	24	3,98,073	59,235	4,52,314
1845-46	4,961	11½	2,77,447	57,251	3,34,698	7,326	14	5,05,551	54,616	5,59,997
1846-47	4,855	41	3,49,601	44,552	3,94,153	6,846	32½	4,63,720	35,301	4,99,021
1847-48	5,589	26	3,45,543	36,559	3,82,102	7,733	34	4,82,365	73,820	5,56,185
1848-49	5,464	1	3,31,438	51,121	3,82,569	7,098	14½	4,36,048	48,979	4,85,027
1849-50	5,019	41½	3,04,389	56,499	3,60,888	6,365	29½	3,82,820	68,730	4,51,550
1850-51	4,412	19	2,78,009	60,083	3,38,097	6,167	29	4,94,256	41,941	4,35,197
1851-52	4,974	27	2,70,505	41,111	3,22,657	5,559	32½	4,52,001	41,500	4,93,503

Years	Berkul					Honore				
	Rice			Sundries value	Total value	Rice			Sundries value	Total value
	Quantity		Value			Quantity		Value		
	Cs. M.	Rs.	...			Cs. M.	lbs.	Rs.		
1848-49	269 15	15,116	16,755	Rs. 31,871	Rs. 44,296	...	...	...	Rs. 22,958	Rs. 62,898
1844-45	298 31	18,862	25,434	44,296	44,296	...	...	...	33,747	57,150
1845-46	379 11½	25,472	22,083	47,555	47,555	...	...	...	45,130	1,06,106
1846-47	322 17½	23,784	29,658	53,442	53,442	...	...	...	50,204	90,725
1847-48	349 12	21,701	21,270	42,980	42,980	6 24	316	316	43,592	77,043
1848-49	345 32½	22,185	28,356	50,541	50,541	7 3	281	281	53,071	1,09,652
1849-50	417 30½	24,822	30,015	54,837	54,837	2 15	...	154	54,530	1,05,564
1850-51	380 13½	22,603	29,249	51,852	51,852	13 7 12	1,072	1,072	54,059	1,23,058
1851-52	476 30	25,985	35,112	61,097	61,097	83 1 18	1,813	1,813	65,260	1,07,554
1852-53	499 6	26,683	31,967	58,650	58,650	27 3 22	1,650	1,650	58,127	1,15,357

Return of the Export Trade—(continued.)

Years	Coimbatore						Ankola							
	Rice			Cotton			Sundries value	Total value	Rice		Sundries value	Total value		
	Quantity		Value	Quantity		Value			Quantity	Value				
	Cs.	M.	Rs.	Cs.	M. lbs.	Rs.							Cs.	M.	Rs.
1843-44	894	20	53,250	36,298	8	....	32,52,338	3,39,982	36,47,580	437	38	26,609	Rs. 1,681	Rs. 28,290
1844-45	1,876	1	1,17,532	15,044	4	22	22,35,202	4,44,286	27,97,020	589	28	26,243	44,519	80,562
1845-46	1,375	25	97,535	17,133	7	15	15,35,119	3,75,920	20,08,574	618	7	39,428	69,467	1,08,895
1846-47	1,468	3	99,203	1,023	13	22	91,722	2,86,908	4,77,833	549	19	33,238	60,436	93,674
1847-48	963	5	63,471	25,420	15	8	13,52,427	4,94,280	19,10,178	611	31	32,909	39,681	72,590
1848-49	862	36	67,468	10,377	8	21	4,67,342	4,76,420	10,11,230	358	27	19,089	47,675	66,764
1849-50	1,202	9	81,348	45,368	5	17	27,11,481	7,48,842	35,42,171	497	27	31,195	48,983	75,178
1850-51	1,637	31	1,02,241	38,570	17	1	28,79,795	6,56,797	36,38,833	551	15	23,984	34,365	58,349
1851-52	1,524	92	85,400	...	...	...	...	...	...	...	...	...	...	...

Return of the Export Trade—(continued.)

Years	Sedashigur						Total			
	Rice			Sundries			Rice			Remarks
	Quantity		Value	Quantity		Total value	Quantity		Total	
	Cs.	M.	Rs.	Cs.	M.	Rs.	Cs.	M.	Rs.	
1843-44	500	30	27,483	20,012	47,495	Rs. 47,495	Rs. 17,95,311	1,00,492	Rs. 32,52,338	Rs. 58,43,705
1844-45	682	16	42,254	63,790	1,06,044	20,72,928	70,135	22,35,202	22,35,202	53,85,301
1845-46	1,006	40	63,127	64,050	1,27,177	29,36,999	1,33,709	15,35,119	15,35,119	55,75,438
1846-47	954	40	57,806	33,438	91,244	24,53,193	1,63,757	91,722	91,722	34,91,564
1847-48	677	84	38,468	43,947	82,115	21,72,536	1,65,762	13,52,743	13,52,743	46,84,393
1848-49	481	26	25,501	50,076	75,578	21,77,398	1,90,950	4,67,623	4,67,623	41,07,489
1849-50	456	3	27,715	46,663	74,378	13,48,948	1,53,440	27,11,635	27,11,635	61,69,840
1850-51	681	33	37,389	56,171	93,660	17,80,114	1,92,242	28,80,867	28,80,867	63,77,110
1851-52	577	31	24,607	35,631	60,238	20,74,574	1,56,050	18,15,301	18,15,301	54,27,705
1852-53	489	31	20,812	38,127	58,989	20,67,013	2,30,728	40,95,964	40,95,964	76,38,745

Mangalore,
31st August, 1853.

GEORGE WARREN WALKER, Lieut.,
Civil Engineer, 3d Division.

F. N. MALTBY,
Collector.

REPORT ON THE WORKS EXECUTED IN THE FOURTH DIVISION, COMPRISING NORTH ARCOT AND CHINGLEPUT, DURING THE YEAR 1851.

Civil Engineer, Captain Collyer.

1st Assistant Civil Engineer, Lieutenant Dean, appointed 24th February 1851; has never joined this district.

2d Assistant Civil Engineer, Lieutenant Denison, appointed 4th August 1851.

Assistant Revenue Surveyor, Dick.

Assistant Revenue Surveyor, Ross, suspended temporarily, restored 6th March 1851—again suspended on the 27th May, and removed.

Assistant Revenue Surveyor, Bayne, appointed in April 1851, dismissed 10th May 1851, by order of Government.

Overseer Cahill, died October 1851.

Overseer Bush, appointed October 1851.

1. The sum of money actually expended during this year, amounts to Rupees 1,02,237-7-1, of which 52,811-5-0 were expended in Chingleput and 49,426-2-1 in North Arcot, as follows:—

CHINGLEPUT.				NORTH ARCOT.			
Works of irrigation	51,637	1	0	46,818	7	5	
Roads	197	6	0	292	7	0	
Public bungalows	100	10	0	377	4	3	
Cutcherrys	748	0	0	1,034	4	6	
Salt pans	128	4	0				
Judicial buildings	0	0	0	430	13	9	
Police buildings	0	0	0	251	13	2	
Hospital, public	0	0	0	161	0	0	
	52,811	5	0	49,426	2	1	

Collector's fixed Revenue Establishment	3,700	11	9	2,784	0	0
Temporary do.	543	7	4	300	0	0

2. Works to the value of Rupees 29,384-5-0 in the Chingleput district and to the value of 17,400-12-0 in North Arcot, have been examined by the Civil Engineer's Department.

In addition to the above works completed during the year, there have been sanctioned and commenced, besides, numerous small works—

The following :

IN CHINGLEPUT.

Dispensary and District Hospital	4,500	0	0
Road to Ennore	8,392	12	5
Do. from Chingleput through Conjeveram, to join the western road at Soorapen's chuttrum	6,917	13	2
Road from Conjeveram, to join the western road at Maclean's chuttrum	2,394	3	0
Repairs of road at Penagarum being part of the road from Conjeveram to Wandawash	877	10	0

IN NORTH ARCOT.

New entrance and head sluice to Mamundoor tank	3,782	9	10
Charity choultry at Sholinghur	1,097	3	8
Nagaputla tank restoration	6,066	6	10
Aukanambut do.	2,337	3	4
An annicut across the Cheyaur, with 20 miles of channel extending through a portion of Trivatoor and Wandawash talooks	31,475	15	11
Road from Vellore to join the Arcot and Chittoor road at Panautoor	9,974	2	0
For forming a new ghaut at Canembady on the road from Vellore to Arnee	1,169	4	0
For repairing a portion of the road from Arcot to Arnee	273	11	1

3. The number of works estimated for, or inspected after completion, or while in progress during 1851, by the Officers in the department, are as follows:—Captain Collyer—288.

Lieutenant Denison.—Remained in the Civil Engineer's Office a few weeks and then superintended the construction of the road from Vellore to Panautoor.

Mr. Dick.—248—and employed in taking levels for the Palaur channel.

Mr. Ross.—52.

Mr. Bush.—Joined in October, and took charge of the Cheyaur annicut.

Mr. Cahill.—For a portion of the year was sick, and for a short time superintended the construction of the Ennore road, he died in October 1851; he was a very zealous and useful servant to the Government.

4. Of these works, the one of principal importance was repairing the breach in Madranticum tank, under my own superintendence; this breach

called the little breach is 87 yards long, and was made many years ago; and the masonry wall (the whole tank is faced with stone set in mortar) with which it was faced was built upon the earth put in to fill the breach up to the level of the tank, and being false, the wall has constantly slipped and cracked, and been a source of continued anxiety—the earth put upon the bank was continually sinking down below the wall into the tank.

The mud was so soft in front of the breach, that no-one could stand upon it, and all material thrown in to make a bank, sunk; and not daring to take down the damaged wall without an embankment, (in case the water should come into the tank, which could in case of rain be by no means prevented) and there being but little water in the tank, I had it entirely emptied, and cut



a trench round in front of the breach thus,* 117 yards long and at distances of 6 to 9 yards from the bottom of the bulged out wall, 12 feet broad at bottom, and excavated to 1½ feet below the bottom of the breach where I found hard soil mixed with lime stone; in this trench I built a solid stone in mortar wall, 4 yards broad at bottom and 4½ yards high, thus bringing it two

* yards above the foundation of the present wall; this was commenced on the 6th April, and by the 2d of May this wall was completed, all the cracks in the bulged wall opened up and rebuilt with brick and the top (though I had ordered it not to be) brought up again to its original level; the beam between the two walls nearly filled with earth tamped and rough stone facing partly laid on it. When the repairs had got thus far, the tremendous rains of May 3d and 4th occurred and filled this tank in one day. I visited it in September 51, but there was then 6 feet of water over the top of the new wall; up to this time the work has remained in this unfinished state, the tank having had water in it, but it has safely stood some very severe trials, particularly in October 52 and March 53, and is still in good order—the work cost Rupees 1,878-6, the stone masonry costing under 12 Annas a cubic yard.

5. Penagarum Channel for supplying Penagarum Tanks from the Cheyaur.

The entrance to this was constantly damaged by a stream running into the river at that place, and a cut was made to turn it into the Penagarum channel lower down—not only to prevent this damage, but to secure a valuable additional supply of water; two waste weirs or calingukals were also

built, one at the spot where the stream was turned, the other just below its junction with the former channel, these works cost 1,791 Rupees.

6. Chumbrumbaicum Tank—(Golden (Bungaroo) supply Channel.

One of the supplies of this tank was a channel taken from the Cortelear river—I found it filled up to a depth of 5 feet and in this state it had been for some years, no water coming by it, except during extraordinary floods in the Cortelear. I had this opened to the lowest level of the river at an expense of Rupees 4,242-6-0, I believe this to have been very remunerative, a supply of some 5,000,000 cubic yards having gone down it, within a very short time of its completion, which would otherwise have been lost—this supply at 1,000 yards a Rupee was worth 5,000 Rupees, when an amicut is built at Coratoor and a head sluice to the Chumbrumbaicum channel at that place, and an amicut built across the Cortelear at the head of this portion of the channel; there will for the most part be a very much more copious and steady supply, not only to the Chumbrumbaicum tank and various others—but to the Cooum river at Madras.

7. Other repairs of various amounts from trifling expenditure up to sums of 1,000 and 2,000 Rupees have been made for the preservation or improvement of revenue works of various descriptions, but they require no particular notice.

NORTH ARCOT.

8. Canverypauk Tank.

This valuable tank has a bank of 3½ miles in length, and a water spread of probably 2 miles—there have been Rupees 8,04,293-14-5 of revenue derived from this tank during the twenty years ending in 1848, and during that time there have been Rupees 97,605-9-4 expended upon it, not for raising the revenue, but simply for keeping it in repair—showing a per centage of 12-2-2 on the revenue—some of these repairs were to re-construct damaged sluices, and the amount less this, shews a per centage of 7-11-8 on the revenue as the annual amount of ordinary repairs.

9. The front of the embankment of this tank is revetted throughout with a stone revetment, not set in mortar, which is from three feet six inches, to five feet higher than the highest water mark—at a slope of about 1 to 1, except in one place near the sluice called Pulla Muddogoo where it is steeper and set in mortar, this stone revetment is about 4 to 6 feet thick at bottom and 2 to 3 at top.

10. This year the earthen portion of the bank has been very materially improved, it has been raised to a height of 5 feet above the stone revetment

throughout—that being its previous height, making it thus 3 yards above high water mark.

11. The top width of the bund varied considerably, this has been reduced by making the whole of the front slope above revetment of an uniform slope, of $2\frac{1}{2}$ to 1 where the bund exceeded 4 yards, where this operation reduced the top width, the width was increased in rear to that thickness, at the extremities of the bank this height and thickness is proportionately reduced, the whole of the bank has been carefully turfed, or planted with durbah—the sum expended on this was Rupees 2,264-8-0, and has not only improved the strength of the bank, but by reducing pressure on the stone facing has tended to prevent bulging out, which it had in many places done.

12. The channel for the supply of this tank has been improved by removing obstructions of rock and hard accumulations of earth in it, at an expence of Rupees 1,542, repairs to it are still going on. This channel is from 30 to 50 yards wide and in many places faced with stone.

13. Cheroovunkee Tank and Channel

This tank supply channel head is protected by a masonry wall extending diagonally upwards, a considerable way into the Gooriattum river—it is continually being injured, and has this year been partially rebuilt on walls at a cost, together with some earth work repairs, of Rupees 1,423-6-0.

14. Tandrie Annicut repairs 1,079-2-0; this is an annicut of native construction of loose large stones built across the Culvay waste water; the repairs to this consisted of building a wing wall which it had not, and painting all the front of it with chunam and improving the apron by a rear retaining wall.

15. Oolconday Annicut, cost 1,017-8-3. Cooppodeesanthum Annicut, cost 1,183-2.—These two works as the Tandrie annicut of native construction, were constantly damaged and have been re-built with masonry, with wing walls, aprons, rear retaining walls, &c.

16. As in Chingleput there have been a great many other works executed this year, but they require no description, they are for the repair or rendering more efficient existing works.

17. The repairs to the revenue, judicial and the buildings are also of the same description.

18. In concluding this report I may state as a general rule, that the tanks in this district are in very fair order, great destruction took place from the floods of 1846-47, and the late Civil Engineer Major Henderson, took great pains in having them repaired and provided with calingulals, &c. Since

that time, a vast quantity of calingulals and stone revetments for tanks have been built, as have sluices, &c.; and though there was a very serious storm in May 1851, the damage done was not excessive, less than 30,000 Rupees sufficed to repair it.

G. C. COLLYER, CAPTAIN,

Ocherry, 13th June, 1853.

Civil Engineer, 4th Division.

REPORT ON THE PROGRESS OF PUBLIC WORKS IN THE DISTRICT OF SOUTH ARCOT, FOR THE YEAR 1851.

It is necessary to preface this report by remarking, that as I only assumed charge of the 5th Division in June 1853, any thing beyond a mere cursory statement of amounts of expenditure and of works executed cannot be offered.

1. On examining the bills and lists for the more important works under execution during the year and the amount expended during the year, 1851, I cannot discover one solitary item which can be described as an "important work." The

total sum expended during the year on all descriptions of works appears to have been Rupees 29,394-0-0 distributed as follows:—

Works of Irrigation.	Roads, Bridges, &c.	Public Bungalows.	Revenue Buildings.	Judicial Buildings.	Flag Staff, &c.	Ferries
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
26,619	2,224	54	231	193	52	21

The amount entered under the head of works of irrigation appears to have been expended exclusively in works of reparation and in the construction of sluices to tanks, clearing of channels of supply, &c. that for roads, &c. embraces only repairs to causeways over the Poneyar river and across the Mercanum backwater, while the other insignificant items speak for themselves.

A general statement of the expenditure on Public Works for ten preceding years, (already submitted with letter No. 564.)

2. The statement appended exhibits the expenditure on Public Works from the year 1843 to 1851.

3. On account of the circumstances set forth in the preamble to this report, and looking to the fact that these remarks

A general view of the present state of the division in report of Irrigation, Communications, Ports, Lists, principal wants.

are penned at the close of the year 1853, it is to be represented that the following sketch of the irrigation, communications, &c. of the province of South Arcot is to be looked upon more as a sketch of the state in which I find it at this, the period of review, than as a faithful representation of its condition at the close of the year treated of in this report: while at the same time it should be borne in mind that, having been only 5 months in the district the greater part of which period of time was engrossed by the superintendence of the repair of the damage sustained by the Vellar annicut in the great March storm, but little opportunity has been offered to me for acquiring a practical knowledge of the chief requirements of the district. At the head of the list of wants for its improvement, I should certainly place "Roads" in respect of which this province is more deficient than any in which I have ever been employed. The trade at the shipping ports languishes for want of means of communication with the interior, the produce of the agricultural districts has to look to home consumption for its almost sole vent, the important manufacture of salt in the Government factories, is impeded in its sale and the carrying trade through the country appears almost ruined, owing to the grievous absence of any one road which can be veraciously described as practicable except in the finest weather. It will however serve no good purpose to dwell upon this lamentable state of things, nor would I wish to intrude any opinion, of mine regarding the causes which have led to it, further than to protest against the popular doctrine that the blame should lie at the door of the Government. If it can be held to rest any where it certainly should be attributed to the local Officers, whether professional or revenue, who have failed to press upon the notice of Government the neglected state of the highways, and to denounce in the most emphatic manner the ruinous consequences which it was entailing upon the district.

It is more satisfactory to advert to the beneficial changes which the year 1854, will in all probability usher in, when a most valuable line of communication extending from the frontiers of Salem, to the port of Cuddalore proposed by my predecessor Captain Smythe and now sanctioned by Government will be commenced upon, and when several other important roads diverging from the interior towards the sea coast, for the repair of which estimates have been prepared, will be partially restored, and their utility in aiding in the development of the resources of this fertile district, exemplified.

Upon the subject of the irrigation of South Arcot, it would be presumptuous in me—so little acquainted with it—to hazard an opinion, but as far as opportunities of

personal observation warrant me in forming one, I should say that there remains much to be done. The waters of many minor rivers intersecting the district, embracing the Mahamutanudee in the south and the Ginjee river in the north could without doubt, by means of dams and channels, be turned to far greater account than is at present witnessed. Personal inspection of the first named stream warrants me in this assertion, and as regards the latter I am now in relation with the French authorities upon the subject of several works of irrigation which promise to be of much benefit to the mutual interests. A very general repair, after examination, of the bunds of the numerous tanks with which South Arcot is studded, the construction of sluices where none exist, and above all a thorough clearing of all channels of supply, are measures indispensably needed, but, I fear, little likely to be effectually carried out until a more adequate professional establishment is allotted for the administration of the Public Works of the two vast provinces which constitute the 5th Division.

The subject of "Ports" I approach with considerable reluctance. It has been assumed that the import and export trade of Cuddalore has fallen off of late years in consequence of the deterioration of the "harbour" (a term which should be replaced by "backwater") brought about by mis-application on the part of nature of the means at her command to keep open the bar, which after the manner of all estuaries on this coast forms across its mouth, and acting on this assumption extensive operations, involving an expenditure of 62,000 Rupees, have been proposed by the Civil Engineer of the neighbouring division, whose estimates, now sanctioned by Government, were forwarded before I assumed charge of the 5th Division. I found myself impelled to entirely dissent from the views adopted and expressed by the Civil Engineer of the 6th Division, both as regards the possibility of keeping practically navigable an artificial opening to be cut through a deep sandy coast by the combined action of two streams which are in full flood not more than two entire months of the year, and of a tidal movement not equal to 2 feet in height save at springs; and also as regards the advisability of excavating a canal at a vast expence to connect the port of Porto Novo, already boasting a trade little inferior in value to that of Cuddalore, and to which as far as I can judge, but little traffic would resort, save that of salt from the Government salt pans at Degavelly, &c. I therefore recorded in my official diary a protest against what I could not but consider, and do still consider, a profitless expenditure of public money, and I expressed a deferential opinion to the effect that the sum about to be squandered had far better be devoted to the thorough repair of the various lines of communication with the interior which converged towards

Cuddalore, and in whose state of utter inefficiency, I stated that I thought the real cause of the falling off in the trade of that port was to be found. I do not stand alone in these opinions, but they have failed to attract the attention of the Board of Revenue, and operations are now in progress in connection with the project under the superintendence of the Civil Engineer of the sixth division.

A statement* is appended shewing the returns from sea customs on imports and exports levied at the ports of Cuddalore

* Submitted already with letter, No. 554.

and Porto Novo for the last ten years. Marnum has also been entered in the Collector's report, but its returns are insignificant.

A statement is also appended shewing the nature of the employment of the several officers and subordinates constituting the department of the Civil Engineer of this division during the year 1851, and also the number of works inspected by each member together with a return of the expenditure on the maintenance of the Maramut establishment European as well as Native for the districts of South Arcot and Salem severally.

SALEM DISTRICT, 1851.

The records for 1851, do not exhibit any work of magnitude or particular interest.

The total sum expended during the year on all descriptions of works appears to have been Rupees 34,666, distributed as follows:—

Works of Irrigation.	Roads, Bridges, &c.	Public Buildings.	Revenue Buildings.	Judicial Buildings.	Total.
9,031	21,416	317	1,890	2,012	34,666

The sum of Rupees 9,031 entered as expended on works of irrigation appears to have been devoted exclusively to repairs of tank bunds, rough stone alicuts, clearing of channels, &c. &c. In the list of public buildings executed in 1851, to the amount of Rupees 3,902 the following are prominent. A civil hospital erected at Salem on an estimate of Rupees 3,052, of which however only Rupees 1,095 were expended during 51, the building having been completed in 52, and a talook cutcherry at Paramatty at a cost of Rupees 1,012.

Conspicuous above all the works executed in 1851, is the elegant bridge built over the Cauvery at Bhowany which was completed, all but the parapets, at a cost amounting in the year quoted to Rupees 19,318. This sum does not appear in the Collector's accounts for the year 1851, because it seems to have been undertaken by the Civil Engineer's department under a separate management. The bridge was raised upon the ruins of the structure which fell in 1847, and it connects the new great Trunk road, No. 5, through Salem with its prolongation on the Coimbatore side in connection with the bridge built in 1846, across the Bhowany. The Cauvery bridge is of brick, and having withstood the efforts of the heavy freshes of two successive stormy seasons it may be looked upon as permanent, and may be ranked for elegance of design and excellence of workmanship amongst the public works of India of which the Government have reason to be proud. Under the head of roads, &c. is seen a new road formed between Salem and Moganoor through the Namcul talook, a work of considerable utility, while various reparations and additions of drains and tunnels to existing roads were effected in many parts of the district by the aid of the bandy fund. The expenditure under this head including the amount devoted to the completion of the Cauvery bridge in 1851, amounts to Rupees 21,416.

I have seen so little of the Collectorate of Salem since I joined the division in June 53, that I do not feel warranted in attempting a resumé of the state of its irrigation and requirements save of the most casual kind. Except in the south western talooks which are watered by the Cauvery channels, the whole Nanjey cultivation of the district is maintained by means of tanks supplied by channels led off from streams of inferior capacity the waters of which are retained by means of dams of rough stone, carefully constructed across them. From the open nature however of these structures and the consequent severe action upon them in high freshes, it results that they are continually suffering damage, the reparation of which absorbs a large proportion of the amount of money disbursed under the head of ordinary estimates. Of the roads of this district it is unnecessary to treat, their excellence is too well known to need to be referred to, and as the collections of the bandy fund continue to be devoted with judgment to the improving of existing lines, to the shortening and straightening of several of the old ones and to the construction of covered drains and road dams to the nullahs which intersect them, the roads of Salem, already the boast of the district, will, it is to be expected, soon be brought into a state affording an example for imitation to the neighbouring provinces.

J. OUCHTERLONY,

Civil Engineer, 5th Division.

Cuddalore, 17th November, 1853.

Number.	Names of Officers.	Rank.	Salem District.												South Arcot District.												Grand total of works inspected in both districts.	
			January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.		December.	Total.
1	Capt. Smythe.	Civil Engineer.....	8	...	1	8	3	135	31	36	10	12	145	33	27	37	2	...	...	...	...	...	...	...	...	...	99	244
1	Lt. Wilkieson.	Ed Asst. do.....	...	...	...	...	22	32	27	14	...	...	97	...	...	...	...	...	...	...	...	...	...	...	...	...	...	97
1	Mr. Bayne....	Asst. Rev. Surveyor	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1	" Sheilden..	do. do.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1	" O'Hara....	do. do.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1	" Vardon....	do. do.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1	" Reid.....	Asst. Overseer....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	42
1	" Loosemore	do. do.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8			8	...	1	8	5	23	67	58	50	10	12	242	33	27	37	4	6	10	8	6	10	...	...	...	141	583

about Wilkesboro.....

[illegible]

Civilization, 1858.
7th December, 1858.

J. OUCHTERLONY,
Civil Engineer, 5th Division.

Excepting the completion of the Cauvery and Vennar regulating dam, and the commencement of the improvement of the Adappur river, no new works of importance were executed in this division in the year 1851, but the outlay on repairs and improvements was as considerable as the means of superintendence allowed. Much delay and obstruction were occasioned by the storm in May, which not only put a stop to active operations for several days, but destroyed a great number of raw bricks, and by filling the rivers with water, enhanced the difficulties of all works of excavation. The period for work is so short in the Delta, that an interruption of this nature is seriously felt, and hence I may remark on the great energy displayed in constructing and opening four bridges on the Manargooly and Negapatam road within a distance of ten miles.

Irrigation and Drainage.

Regulating Dam of the Cauvery and Vennaur Rivers.

This work was fully described in the Report for 1850. The construction of 20 arches and two sluices in the Cauvery, and 18 arches with one sluice in the Vennaur completed the undertaking in the year under report. The effect has been fully equal to the expectations of its utility.

Estimate.....	Rupees...	1,787	8	0
Expenditure.....	"	1,678	5	0

Re-constructing Peramboor Channel Head Sluice, with an Aqueduct crossing it.

Estimate.....	Rupces.....	3,915	13	0
Expenditure.....	".....	2,764	3	0

The head sluice of this channel, which irrigates about 1,000 acres of land with a revenue of 7,000 Rupees, was ruined several years ago, and was re-

built in 1851, with provision for a smaller channel to cross it, for the supply of certain lands situated between the main channel and the river Vennaur.

Reforming Catchamungalum Annicut.

Estimate.....Rupees...	1,521	9	0
Expenditure..... „	1,520	9	0

This estimate provided for repairing an old work of native construction on which depends a revenue of 60,000 Rupees, and executing certain improvements to it for the purpose of equalizing the overfall.

Repairing North Bank of Cauvery—Upper Annicut Limits.

Estimate.....Rupees...	1,364	15	0
Expenditure..... „	1,071	4	0

Works of preservation calling for no remark.

Repairing Aprons of the Upper Coleroon Annicut.

Estimate.....Rupees...	2,779	1	0
Expenditure..... „	2,695	5	0

The addition of cut stone to several parts of the apron hitherto covered with rough blocks which frequently became loosened, and thus exposed the annicut to danger, was provided for in this estimate.

Cutting bend of the Vennaur.

Estimate.....Rupees...	1,261	11	0
Expenditure..... „	1,062	5	0

A sharp bend of this river a short distance below its separation from the Cauvery, has always caused great obstruction to the current which this cut has served to remove, though the ground being rocky the main channel of the river is not altered.

MANARGOODY TALOOK.

Cutting and Embanking Corayaur River.

Estimate..... Rupees...	1,066	11	0
Expenditure..... „	1,066	11	0

A mere work of repair requiring no particular remark.

TRITERAPOONDY TALOOK.

Strengthening and raising the Corayaur Bank.

Estimate.....Rupees...	1,054	11	0
Expenditure..... „	1,054	11	0

25

An ordinary work of repair to the bank of the above named river near the head of tide water at Mooteopettah. The object was to prevent inundation and deepen the river bed, and has been attained.

Improving Adapaur River.

Estimate.....Rupees...	7,762	0	0
Expenditure..... „	2,965	14	0

This important work is designed for improving the drainage of the south eastern parts of Tanjore, by deepening, straightening and embanking the Adapaur river, the course of which runs for several miles through a morass, the work was attended with considerable difficulty and but partially carried out in the year under report.

TRITERAPOONDY AND MANARGOODY TALOOKS.

Improving Shalooovenaur River.

Estimate.....Rupees...	2,431	14	0
Expenditure..... „	2,196	11	0

An ordinary project for widening, straightening and embanking one of the branches from the river Corayaur, serving both as a draining and supplying channel.

KEEVALOOR TALOOK.

Improving Mundoooy or Taden Choultry cut.

Estimate.....Rupees...	1,406	3	0
Expenditure..... „	1,101	10	0

This cut forms the outlet to the sea for a very large body of drainage water to the south of Negapatam. It has hitherto required and received periodical clearance to keep it efficient, but its capacity is becoming enlarged, so that the necessity of this work will ere long cease.

Making a cut for the Drainage of Tereopoondy and Karapadargary.

Estimate.....Rupees...	1,875	0	0
Expenditure..... „	1,863	8	0

Intended to carry off the water accumulating on the eastern part of the Keevaloor Talook, and discharge it into the outlet noticed above at Taden choultry. The length of cutting was 5,000 yards and its breadth 10 yards.

Altering the course of the Vellayaur River.

Estimate.....Rupees...	3,771	0	0
Expenditure..... „	3,771	0	0

This work forms another part of that system of drainage improvement which has been for several years in progress in the south eastern Talooks, and consists of straightening and embanking the Vellayaur river near its outfall.

Straightening and embanking the Veerasholen and Nundulaur Rivers near Tranquebar.

Estimate Rupees.....	3,011	2	0
Expenditure in 1850 Rupees	1,846	12	0
do. in 1851 „	942	9	0
	2,789	5	0

Another work of the same character as the foregoing, and described in the report for 1850. It was completed in 1851, and has had a successful result in securing the lands from inundation.

TRANQUEBAR AND PARELLUM TALOOKS.

Improving the Cadalaly River.

Estimate..... Rupees...	3,185	0	0
Expenditure	3,185	0	0

The Cadalaly is a very important stream, watering an extensive tract of land in the Parellum and Tranquebar Talooks. Its course was obstructed by encroachments and by several old masonry works, so that it did not afford a due supply to the fields near its outfall, and this work was designed to restore the efficiency of the irrigation which has been accomplished.

SHEALLY TALOOK.

General improvement of Cauvery.

Estimate..... Rupees...	1,684	12	0
Expenditure	783	0	0

Widening, straightening and deepening the Cauvery near its outfall, were proposed and partly executed under this estimate.

PAUPANASSUM TALOOK.

Improving Vennaur.

Estimate..... Rupees...	2,069	14	0
Expenditure	1,617	0	0

A work for rectifying the course of the river which had several sharp bends endangering the banks.

ROADS AND BRIDGES.

THIVALOOR TALOOK.

Bridge of one segmental arch of 30 feet span across the Vaulay Voikal on the Tanjore and Negapatam Road.

Estimate..... Rupees...	1,915	8	0
Expenditure	1,905	7	0

This bridge was built in substitution for a dilapidated work of ancient construction.

Bridge of three segmental arches of 22 feet span across the Paundayyaur on the Road from Negapatam to Manargoody.

Estimate..... Rupees...	4,069	10	0
Expenditure	4,004	1	0

This structure designed in connection with the three following, to open the communication between Manargoody and the Eastern Coast is built on the plan common in the division, and calls for no particular description. Its construction was entirely satisfactory.

Bridge of three segmental arches of 22 feet span across the Vellayaur on the same Road.

Estimate..... Rupees...	3,876	15	0
Expenditure	4,114	14	0

Another work no further noticeable than the foregoing except in a slight excess of expenditure above the estimate arising from unforeseen difficulties in the foundations, a common and unavoidable contingency.

MANARGOODY TALOOK.

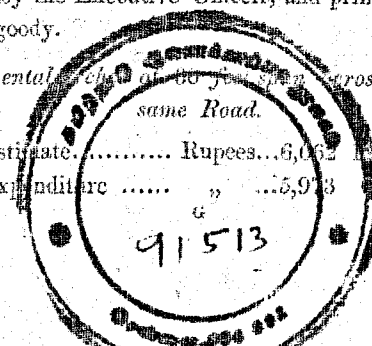
Bridge of five segmental arches of 30 feet span across the Corayaur on the same Road.

Estimate..... Rupees...	8,512	4	0
Expenditure	5,973	0	0

This work calls for no particular remark except on the energy and efficiency displayed by the Executive Officers, and principally Rungiah Naik, Tahsildar of Manargoody.

Bridge of five segmental arches of 30 feet span across the Vennaur on the same Road.

Estimate..... Rupees...	6,062	12	0
Expenditure	5,973	0	0



A similar remark applies to this work as to the foregoing and its completion has opened the communication as far as the passage of rivers affected it, between the two important towns of Trivuloor and Manargoody.

Beach Defences at Tranquebar.

Estimate.....	Rupees...	15,296	14	0
Expenditure	„	7,666	12	0

Consequent on the report of a Committee held by order of Government in 1850, to decide on the best means of protecting Tranquebar from the encroachments of the Sea, four groins were ordered to be constructed, partly of old brick blocks taken from the Citadel, and partly of stones brought from the Fort of Trichinopoly.

The works were partly executed in the year now reported on and answered their purpose, to some extent.

The stones were brought from a distance of 90 miles in basket boats by the Veerasholen river.

A new Moonsiff's Court House at Manargoody.

Estimate.....	Rupees...	1,139	12	0
Expenditure	„	1,139	12	0

A small tiled building with three rooms and a verandah. Walls of brick in chunam.

TRICHINOPOLY DISTRICT.

Irrigation and Drainage.

CONAUD TALOOK.

Stone Vauganay on the right bank of the Agunda Cauvery at Patavotallay.

Estimate....	Rupees...	2,618	14	0
Expenditure	„	2,451	2	0

A very exposed part of the dike of the Agunda Cauvery had for a long period caused a great deal of trouble and some anxiety owing to the severe attacks it received from the current in high freshes, and as the usual temporary works had failed in diverting the stream, it was thought advisable to throw out a spur or groin built of large masses of rough stone, the effect of which is to give permanent security to the embankment.

VITTICUTTY TALOOK.

Stone Vauganay on the right bank of Agunda Cauvery in the Curpatoor Limits.

Estimate.....	Rupees...	1,125	0	0
Expenditure	„	1,100	0	0

Another work of similar character to the above, constructed for the same reasons, equally beneficial in result.

LAULGOODY TALOOK.

Widening and deepening Shenyaroor Channel and adding 2 Vents to its Head Sluice.

Estimate.....	Rupees...	1,024	0	0
Expenditure	„	1,015	12	0

This channel is nearly the last source of irrigation on the left bank of the Coleroon in the Laulgoody talook and has hitherto been but scantily supplied, owing partly to the insufficient dimensions of its head sluice, and partly to the choked condition of its bed which had been much narrowed by the encroachments of parties through whose lands it flowed.

The work here noticed was merely one of improvement to afford a due share of water to the lands under the channel and it has succeeded.

Repairing the North bank of the Coleroon River.

Estimate	Rupees...	3,968	6	0
Expenditure	„	3,891	7	0

These repairs were on annual ordinary estimate and intended merely for the security of the cultivation.

Widening the Roadway and extending Piers of the Iyen voikal Head Sluice.

Estimate.....	Rupees...	1,212	15	0
Expenditure	„	1,193	14	0

The Iyen voikal one of the most important channels in the district, has its head sluice close to the upper Coleroon annient and so situated as to be much exposed to the current. The piers have been extended to allow room for a double row of shutters for closing the sluice, and the roadway was widened because the traffic across it sometimes occasioned inconvenience when opening the vents.

TORRIORE TALOOK.

Raising Calingulah and repairing sluice and bank of Mooreangahelatan Tank.

Estimate..... Rupees...1,984 7 0
Expenditure „ ...1,251 1 0

A work of mere repair calling for no particular remark.

WODIARPOLLIAM TALOOK.

Repairing bank of Vuddavaur.

Estimate..... Rupees...1,702 1 0
Expenditure „ ...1,575 4 0

The left bank of this river on the eastern borders of the district has suffered severe injury from the excessive flood in 1850, and hence a considerable sum was required for its repair in the following year.

A new Moonsiff's Court House at Manargoody.

Estimate..... Rupees...1,106 13 0
Expenditure „ ... 979 15 6

A small tiled building with three rooms and a verandah, walls of brick in chunam.

SOUTH ARCOOT DISTRICT.

Irrigation and Drainage—Manargoody Talook—Improving Vuddavaur Channel.

Estimate..... Rupees...2,417 3 0
Expenditure „ ...2,133 4 0

Numerous bends in this river had greatly weakened its right bank, and having no head sluice its supply from the Coleroon had increased so much as to require an enlargement of its bed at several points.

CHELLUMBRUM TALOOK.

Cutting through Island and projection in the Coleroon.

Estimate..... Rupees...1,176 8 0
Expenditure „ ...1,029 4 0

The object of this work was to rectify the current and clear the bed of the Coleroon which in this vicinity has for a long period been much obstructed by Islands and sand banks.

Cutting a surplus channel and constructing a Calingulah in the Ponairy River.

Estimate..... Rupees...2,460 15 0
Expenditure..... „ ...2,271 9 0

The Ponairy one of the chief draining streams of the Manargoody Talook, irrigates large tracts of land in Chellumbrum, and thus flows on a higher level than it would naturally take. Hence it was liable in floods to breach its banks, and cause great mischief, to remedy which a large Calingulah or waste dam was built, over which, any excess of water passes into the Khan Sahib's channel near the town of Chellumbrum. The work was efficiently executed.

ROADS AND BRIDGES.

CHELLUMBRUM TALOOK.

Bridge of one arch of 30 feet span across the Khan Sahib's channel between Chellumbrum and Porto Nova.

Estimate..... Rupees...1,369 8 0
Expenditure..... „ ...1,368 12 0

This work was built in substitution for one of 16 feet waterway which by the alteration of the channel had been rendered inadequate.

Bridge of three arches across the Ponairy River on the Chellumbrum and Bowangherry Road.

Estimate..... Rupees...2,639 0 0
Expenditure..... „ ...2,275 12 0

A very necessary work to open the communication between two considerable towns.

NAVIGATION WORK.

MANARGOODY TALOOK.

Deepening the Vellical Channel.

Estimate..... Rupees...1,125 0 0
Expenditure „ ... 533 0 0

This is the surplus channel from the Veeranum tank and forms part of the navigable line from Combaconum to Porto Nova, but it is liable to much obstruction from its great fall, and deposits formed in its bed after any heavy freshes. The only remedy hitherto adopted has been frequent excavation but further measures of improvement are in contemplation.

Civil Engineer's Office, 6th Division,
South Arcot District,
Shatlappe, 29th August, 1853.

E. LAWFORD,
Civil Engineer, 6th Division.

THE MOST IMPORTANT OF THE WORKS EXECUTED DURING THE YEAR
1851, IN THE COIMBATORE DISTRICT WERE

PUBLIC BUILDINGS.

Barracks at Coimbatore.

This building intended to serve as a place of Arms, Hospital and Store for a Detachment of Native Infantry, is 112 feet long by 20 broad, having a front verandah 8 feet in breadth. It has a tiled roof supported on trusses. The interior is divided by partition walls into several compartments which are used as hospital, surgery, guard room, armory, ammunition and store rooms. There are 2 small detached out houses.

The estimated cost was..... Rupees...1,879 8 0

The actual expenditure being... ..1,879 2 0

Coimbatore Civil Dispensary.

As originally designed was to have consisted of 2 large wards for males and females and 3 central apartments for receiving room, surgery, and operating room, with front and back verandahs.

An alteration has been made in building by taking a portion from each of the two large wards for the purpose of forming 4 small separate wards for patients whose cases or circumstances might render seclusion desirable. This arrangement has I am informed, added very materially to the usefulness of the building, the principal wards being still found amply sufficient in size.

A free circulation of air is maintained by ridge ventilators over each large ward and no complaint is made of rain finding its way in through them.

The building is well finished and answers fully its intended purpose, with the exception of the operating room which is found to be deficient in size, a defect that should be avoided in all future buildings of this class.

The estimate was..... Rupees...3,013 15 0

The whole of which was expended.

BRIDGES.

Sauganore Bridge.

This was built across a mountain stream intersecting the road from Coimbatore to Coonoor about 3 miles north of the former place.

The stream takes its rise in the Tadacum valley about 10 miles west of the road and though very shallow, seldom if ever exceeding $4\frac{1}{2}$ feet in depth, yet owing to its great fall, 40 feet per mile, produces the most destructive effects on the sandy and alluvial portions of soil which it traverses after descend-

ing to the plain; owing to this circumstance, it is not surprising that it should have frequently changed its course and that the difficulty of keeping it to any fixed bed is very great.

In selecting a site for the bridge the lowest of 3 channels, which had been formed at different times, appears to have been fixed upon. This, the others having been closed, was widened sufficiently, judging by sections of the bed taken higher up, to allow of an ample waterway.

The bridge consists of a timber platform supported on 5 masonry piers and covering 6-21 feet vents.

The foundations were laid 6 feet deep of brick in chunam on 1 foot of concrete, the soil on which they stand is a sandy loam. The piers were originally built 6 feet high but the whole having been placed on a low level, probably with the expectation of the stream when confined deepening its bed, which did not however take place, it was subsequently found necessary to raise the piers and platform 3 feet.

The estimated cost was..... Rupees...3,576 0 0

The actual do. „ ..2,827 0 0

Shortly after the bridge was completed a fresh occurred which rose above the roadway, slightly damaged the hand rail and parapet, and breached the road on both sides, but did no serious injury to the structure. As this accident appeared to be owing principally to deficient height and not want of breadth of waterway, the piers were, as before mentioned, raised. The position however in which the direction of the road rendered it necessary to place the bridge originally is very unfavorable, the river taking an abrupt sweep immediately above it and there is of course a risk of the stream eating away the bank and turning the flank of the work on the south side. A rough stone revetment has been formed and other precautions taken to prevent this, and although I do not consider the work to be perfectly secure, still the form of the bed has improved and there is every prospect of our being able eventually to reduce this most unruly stream to a regular course.

WORKS OF IRRIGATION.

Enlargement and Prolongation of the Pullivallungaul Channel.

This work was intended for the improvement of the first channel branching from the Aulaur, a river rising at the foot of the Annamullays and watering a considerable extent of land in the Polachec talook situated at the south west extremity of the Coimbatore district. Of the total sum of Rupees 2,176-10 expended upon it a portion only has been so during this year. The work is yet incomplete though the funds have all been swallowed up in con-

sequence of a large mass of rock having been encountered where an excavation through earth only had been anticipated. To complete the project therefore it will be necessary to apply for more ample means.

Notwithstanding however its partial failure owing to the circumstance above mentioned, the result hitherto has been very favorable, an increase of 366 Rupees of revenue having already resulted, being 17 per cent on the expenditure.

Regulating Sluice for the Veerajamungalum and Nellumboor Channels Darapoorem.

Estimate..... Rupees...926 2 0
Expenditure ... „ ...894 15 0

This work was built with the intention of preventing the frequent disputes which took place regarding the division of water between the Veerajamungalum and Nellumboor channels and this object has been effectually attained. Though undertaken without any especial view to an increase of revenue some increase was nevertheless anticipated. The increase actually obtained has been 183 Rupees but this does not appear in the accounts being absorbed in the general decrease which has occurred in the Nunjay cultivation of the village. It is probable however that the work will hereafter be found to have greatly profited the cultivation.

Construction of a Revetment on the north side of the Bowany above the Calingarayan Annicut.

Estimated cost..... Rupees...1,233 3 0
Expenditure in 1851 „ ... 527 0 0

This work was only partially executed during the year 1851, but has been completed subsequently.

The surplus water of the Bowany during high freshes is allowed to escape over a very extended natural rocky calingulah in the north bank of the river a little above the annicut. This calingulah, indispensably necessary as a safety valve, was found however owing to its unevenness and in parts too low level to cause a considerable waste of water at periods when none could be spared from the channel. The overfall moreover in many parts had so worn away the rock that breaches of a dangerous nature were likely to occur. To prevent this mischief and the escape of water during low states of the river the work now noticed was designed and the result has been most satisfactory.

The work consists of a low rough stone wall or revetment set in chunam converting the rocky and irregular channel into a calingulah with an even

crown. In parts where necessary, aprons of rough stone are provided to break the fall of the water.

The increase of revenue due to the construction of this work is stated at 356 Rupees.

Varapolliam Annicut and Channel.

Estimated cost..... Rupees...1,117 8 0
Expended in 1851..... „ ... 365 14 0

This work which is an annicut across a jungle stream and a channel leading from it for the supply of the Ookarum tank in the talook of Suttinungalum was only partially completed in 1851. The increase anticipated from it has not consequently been yet realized. Had the work however been fully completed, it is probable that the great failure of the rains in that part of the country would have cancelled its good effects for the year 1852. There is every prospect however of the estimated increase being realized hereafter.

PUBLIC ROADS.

I annex a statement of the expenditure on the most important public roads under execution in the Coimbatore district during the year 1851, and shall add a few remarks relative to them.

Road from Polachee to Paulghat.

I have not received any account of the expenditure on this road during the year under review but considerable progress was made in it. As far as the work has progressed it has been well done and the road promises to be a very good and durable one. This is mainly owing to the attention which has been paid to the drainage the neglect of which is generally too common.

The bridge estimated for, was to have been a platform one, but I have substituted for it a permanent masonry structure without any additional cost.

This road even in its unfinished state is already much used and when completed will be I think one of the most useful lines in the district. A large quantity of cotton is brought from and beyond Oodanulcottah, via Polachee to Paulghat en route to Ponany for shipment. A large estimate for the improvement of the road from the Ambravutty east of Oodanulcottah to Polachee, has subsequently received Government sanction and when this work is completed, the traffic along the whole line will be immensely facilitated and will doubtless increase largely.

TRUNK ROAD, No. 5.

From Coimbatore to Panigbait at the end of 1851, was still in a very unsatisfactory state, never having been thoroughly finished. An annual allowance of 100 Rupees for its repair has been sanctioned subsequently and it is to be hoped that with this its state will improve.

Guzelkuty Ghaut

Is practicable and barely that for cattle. The small allowance made for its repair is expended in keeping it from complete ruin, but to improve it materially, would be impracticable, and I think unnecessary, seeing that it has been nearly superseded by the

Hassanoor Ghaut.

The state of which is upon the whole as satisfactory as could be anticipated. The traffic on it is gradually though slowly increasing, and when the approaches to it from the Mysore side above (since undertaken by that State,) the bridging of some difficult nullahs in our territory above the ghaut and the construction of a bridge across the Bowany, for both of which liberal estimates have received the sanction of our Government, I anticipate a very large increase in the amount of traffic.

In anticipation of a full report which I am preparing, but which is not yet completed, of the general state of the public works, especially those of irrigation in this district, I shall offer a few remarks regarding the improvements which seem to me to be necessary to render complete and efficient existing works as well as to extend or enlarge them when desirable.

Bowany Channels.

There are 3 principal channels fed by this river and irrigating a large extent of Nunjay land, extending from Arkancottah 5 miles below Suttimungalum to a point near the junction of the Noyel and Cauvery.

The Arkancottah channel irrigates 1,682 cawnies, producing a revenue of 18,423 Rupees.

The Thuddapully 7,049 cawnies, producing 81,241 Rupees.

The Calingarayen yields a revenue of 1,00,806 Rupees, including 13,307 Enam.

An estimate of Rupees 9,997-4-0 for the extension and improvement of the Arkancottah channel has already received the sanction of Government.

It provides for the excavation of a branch channel for the prolongation of the existing one and for the construction of 121 irrigating sluices and 20 small aqueducts.

The anticipated increase of revenue is Rupees 3,000. 3

An estimate for the improvement of the Thuddapully for Rupees 25,530-15-6, has also been sanctioned.

It provides for the extension of the upper part of the existing channel for a small branch, the construction of a head sluice, irrigating sluices, and other subsidiary works.

The anticipated increase of revenue is Rupees 5,500.

A project for the improvement of the Calingaroyen channel is under consideration. It, equally with the Thuddapully requires head and irrigating sluices; under sluices for the discharge of jungle streams also seem desirable. The channel generally but especially at the lower part of its course will require to be enlarged, and its extension to the east bank of the Noyel (which river it would cross by an aqueduct,) for the irrigation of additional land in that direction, will form a part of the same project.

In addition to the benefit derived from the two last named channels as sources of irrigation, there seems no reason why they should not be eventually made useful as navigable canals. For a great part of their course they are of considerable size, and for several months in the year are abundantly supplied with water. In the improvements now contemplated, the application of them to this additional use will not be lost sight of.

The Poogaloor Neroor and Vangul channels are led directly from the Cauvery for the irrigation of the lands between the Noyel and Ambravutty in the lower part of the Caroor talook.

The first has its head above the Noyel, and its passage across that river is effected by an annicut, a head sluice being placed in the channel on the east side of the annicut to prevent the entrance of sand. The two other channels receive their supply by Corumboos carried into the Cauvery bed lower down. The whole arrangement for the irrigation under these three channels is very defective, and it would appear most desirable to improve and enlarge the head of the upper channel and make it suffice for the supply of the other two also.

There is a good deal of land irrigated by the Noyel itself especially in the neighbourhood of Coimbatore, where, besides channel irrigation, several large tanks are filled by it, owing however, to the deficient supply (except during high freshes) of water in the river and the gradual silting up of the tanks, the Nunjay cultivation which has of late been much extended, receives a very deficient supply. Under one channel alone the loss, principally due to this cause, amounts to as much as 10,000 Rupees annually. I see no effectual remedy for this but the formation of a tank on a larger scale than has hitherto been attempted in the valley where the river rises. Its capacity should be such as to

admit of its retaining the greater portion of the water which during high freshes now escapes down the river and is lost.

By taking advantage of other vallies, lying along the base of the range of hills west of Coimbatore, other large reservoirs might be similarly formed and the freshes of numerous jungle streams, which now only run to waste and in so doing cause frequently much damage might be stored up and made to serve a highly useful purpose.

There are 5 annicuts across the Auliar a river rising in the Annanullays and supplying a tract of Nunjay land in the Palachée talook. They are rudely constructed works and their improvement together with that of the channels they supply would have a most beneficial effect on the irrigation in that neighbourhood. The supply of water in this river is very constant.

The restoration of the Neringapett annicut, a ruined and long abandoned work across the Cauvery would be both practicable and highly beneficial by throwing a supply of water not only into the Andloor talook on the Coimbatore side but also into the Salem district on the opposite bank of the river.

In Collegal a large tank might be formed by throwing a dam across the valley through which the Goondul Pullem flows, and the supply of the numerous tanks fed by it, be rendered both more certain and more abundant.

The above are some of the projects which appear to me most desirable for the improvement and extension of the irrigation in the Coimbatore district, but a thoroughly careful and searching enquiry into the state of all the existing works is much needed and would doubtless shew that there are few in which some improvement is not required, either for the better and more certain supply of water to the land actually cultivated, thus obviating the necessity for remissions, or for the extension of it to lands which at present are not supplied at all.

So much has been done of late by Government for the improvement of the roads in this district and so favorable is the soil in most parts that our wants in that respect are comparatively small.

An estimate for the improvement of the road from Erode to Caroor is under preparation and will be submitted shortly.

The main line from (Trichinopoly and) Caroor to the foot of the Hills stands in need of improvement, and the bridging of the Ambravutty at Caroor is a highly necessary work which should I think be no longer deferred.

The necessity for a ghaut practicable for wheel traffic to Coonoor has been long felt, and Government have sanctioned an outlay of 4,000 Rs. for the tracing out of a line, which work is about to begin.

A bridge for the Seegoor river at the foot of that ghaut is being built, and the road between Seegoor and Tippacadoo hitherto, one of the worst in the country, is in course of improvement.

An outlay of Rupees 32,909-4-0 has been sanctioned for the improvement of the road from the Ambravutty to Palachée and Coimbatore and the work will probably be completed within the year 1854.

Government have favorably received a project for a line of road to connect the road above the Hassanoor ghaut, with the outlying talook of Collegal and when an opportunity occurs of again examining the line, an estimate will be finally forwarded for the purpose.

Many small bridges, cross roads, &c. are required in different parts of the district, but these are of minor importance and hardly requiring to be here noticed.

THE FOLLOWING ARE THE MOST IMPORTANT WORKS IN PROGRESS OR COMPLETED DURING THE YEAR 1851. IN MALABAR.

Metalling Road between Buddagherry and Mahé.

Estimate.....	Rupees...1,990 0 0
Expenditure in 1851.....	„ ...1,433 0 0

The break in the canal communication on this part of the line renders it more necessary to make the coast road as perfect as possible, and with this view the above estimate was framed. It provides for metalling the road, which, for the most part runs on loose and sandy soil.

The work as far as it has been completed is well executed, but certain improvements are necessary, especially small tunnels, which will probably be provided out of the balance of the estimate.

An estimate of Rupees 3,843-4-0, for similarly improving a different portion of the same line between Pooraparumba and Betutpoodiangandy was partially carried out in 1851, to the extent of 1,165 Rupees.

Constructing Bund and Sluice at Archancottah Coonoor.

Estimate.....	Rupees...717 14 0
Expenditure	„ ...722 11 0

This work was designed for the benefit of the cultivators and the Government, and an increase of Rupees 561-4-0 in the revenue anticipated. The work was not finally completed till December 1852, and the benefit accruing therefrom has not yet been ascertained, but will be so at the expiration of the current Fussy 1263.

Civil Hospital and Dispensary at Calicut.

The estimate for this building is Rupees 3,374-10-0, a part of which will be defrayed by local subscriptions. But little progress had been made with the work in 1851, but it has since been completed and will be more fully noticed hereafter.

Repairing the Narrayanencherra Dam at Talla Collatoor.

Estimate.....Rupees...290 3 0

Expenditure „ ...293 13 0

The restoration of this dam has led to the reclamation of land laid fallow from the encroachments of salt water. The lands reclaimed have been let out on progressive Cowles since Fusly 1260, and a revenue of 50 Rupees will accrue to the Government annually from Fusly $\frac{1266}{1855-56}$.

When submitting the estimate of this work, it was expected that in four years from Fusly $\frac{1260}{1850-51}$ the cost of the work would be repaid by the reclamation of land.

Reclamation has, as expected, already taken place, but until the completion of the Jummahbundy for the current Fusly 1263, it is difficult to say in figures what has really been done.

Clearing Jungle and forming Village at Moddalamudday on the high road from Colungode eastward.

Estimate.....Rupees...300 0 0

Expenditure..... „ ...285 9 0

The object of forming a village at Moddalamudday was to check the depredations of Mulser robbers, and to people and cultivate the wild tracts of Colungode, and this has been realized to the fullest expectation.

Mr. Robinson who brought the project forward intended houses for only some 10 to 15 families, who consented to locate themselves, but as premised by him more came, and it was found needful to build the following at Moddalamudday.

20 Houses,

17 Bazars,

1 Moossaferkana,

10 Houses and 12 Bazars

at Pathalingum Paddum, contiguous to Muddalamudday.

Road from Paulghaut to Trichoor.

An estimate of.....Rupees...1,556 9 0

(Expenditure in 1851 „ ... 817 0 0)

for the repairs and improvement of 4 miles of this road from a point $1\frac{1}{2}$ mile west of Vuddakanchairy to the Cochin boundary has been partially carried out during this year.

The parts lately raised were found when the rains set in to be heavy and boggy as might have been expected, but the soil is such as will eventually consolidate and form a good road and the work has been well and carefully done.

The expenditure has included the building of the Shengareem Condul nullah platform bridge of 2-19'-6" vents, piers 10'-9" high wings 12'-6" long, the latter dimension appearing too small. This work has been well executed, though the timber is rough in appearance and requires to be tarred or painted.

The road is one of much importance to both States, both locally and generally, some money was expended upon it by our Government previous to 1845, since which, nothing has been spent though trifling repairs have been made by the villagers.

An annual allowance should be made for its repair, the improvement of the line between Vuddakanchairy and Paulghaut, the formation of branch lines and the bridging of the Vuddakanchairy and Kunnady rivers, will all be necessary for the completion of the line. The estimates are under preparation and when completed will be forwarded.

One main obstacle on the line has already been removed by the construction of the

Alatoor Bridge.

It has 3 arches of 45 feet span and a road-way of 18 feet, between the parapets. The piers and abutments are faced with cut stone.

The work was commenced by Mr. Robinson in 1851, and has been since fully completed.

The estimated cost was.....Rupees...4,878 12 0

The actual being..... „ ...4,800 3 0

When I last examined this bridge, I found that both the wing walls on the south side had cracked at the point of junction with the abutment. This is probably owing either to unequality in the hardness of the soil, or to the wings not having had the same depth of foundation given to them as the abutments, a practice which is rather common and very objectionable. In the present case I do not think that the damage is of a serious nature.

Perlay River Bridge.

An alteration has been made in the line of the Trunk road, No. 5, between Paulghaut and Luckady, by which the passage of 2 large rivers has been avoided, the communication being completed by the bridging of the Perlay river alone.

The original design was for a bridge of 10 arches of 45 feet with 8 feet piers, the section for security having been taken at the broadest part of the reach where the river is 168 yards broad from bank to bank, when, however, the exact site was fixed upon it was found necessary to diminish the lateral water-way to suit the section at the point to be actually bridged which measured only 142 yards. The bridge was therefore reduced to one of 9 arches, but the piers being raised 2 feet the effective water-way was really increased and the bed being rocky a small additional head of water was of course immaterial. This alteration tended to reduce the cost of the bridge.

The estimated cost was.....Rupees...12,990 1 0

The actual expenditure in 1851..... „ ... 6,061 0 0

The whole structure with the exception of the parapets was completed in 1851. It is substantially and economically built and reflects much credit upon Mr. Robinson, who had the sole superintendence of the work.

The change in the line of road, for which an estimate of Rupees 13,066-10-4 has been sanctioned, was not fully carried out until 1852.

General Remarks on the State and Requirements of the Malabar District.

The works of irrigation in Malabar are few, consisting principally of dams and calingulabs placed across the outlets of the large natural lakes, and intended for the discharge of the land floods and exclusion of the tidal waters.

The damage sustained by the Yennamakle dam a large work of this description, rendered a substitute for it necessary, and a larger work to be placed in a situation where it will be more extensively useful was planned by Major Cotton, and the proposed expenditure of Rupees 36,215-14-0 has subsequently received the sanction of the Home Government.

A smaller work of the same class at Veatil has also been sanctioned and carried out, but this will be more fully noticed hereafter.

The internal communications of Malabar, though greatly improved of late years, are yet far from being what they should be.

The excellent ghaut road from Mysore by the Perambady pass to Cannanore, laid out and executed by Captain Francis, has added materially to the

prosperity of the northern part of the province and when the branch from it to Tellicherry is completed, its beneficial effects will be still more apparent.

The ghaut itself still stands in need of some further expenditure to render it perfect, and the bridging of the Irrity river is urgently required; an estimate for the former has already received the sanction of Government, and a plan for the latter is under preparation.

A liberal allowance is made for the maintenance of the Trunk road from Paulghaut to Ponany, a portion of which is annually expended in metalling and other improvements. The alteration of the line at Perlay, and the handsome bridge there built by Mr. W. R. Robinson, have added much to the public convenience on this line. An improvement of the line and a new bridge near Wotupalam have also been sanctioned, and the only material obstacle now remaining on it is the passage of the Ponany river near Tritallah: I should have proposed the bridging of this, had not the prospect of a Railroad from Paulghaut to Ponany rendered it unadvisable to go to so heavy an outlay for the completion of a line which is likely to be in a great measure superseded by the more perfect class of road.

The cheap and commodious coast road nearly completed by Mr. Conolly from Cannanore to Tritallah, provides for all that is required in that direction but still stands in need of partial improvement.

The country lying between the foot of the ghauts and the sea is still sadly deficient in good roads, and between Calicut and Paulghaut, there is no interior line of road capable of being used by wheeled conveyances.

The construction of such a road would, however, in my opinion tend so materially to improve the whole of that portion of Malabar, that after a careful examination of the country I have resolved to propose it. The survey has been made, and the estimate is being prepared.

The line which I propose will run from Calicut by Beypore, Condoty a place of much traffic, Malapoorum now a Military station, Angadipoorum and Munnar to Paulghaut.

Notwithstanding the apparent difficulties of the country, a line has been selected which offers no serious obstacle to wheels.

This line will pass through Munnar, formerly a place of some importance, and it is proposed to improve the existing or open up a new ghaut across the hills from that place to the north-west part of Coimbatore.

The communication between Paulghaut and the back-water at Trichore by Vuddakuncherry is still imperfect. Bridges are wanted across the Kunandy and Vuddakuncherry rivers, which together with the general improvement

of the road and the opening up of one or more branches will do all that is required in that direction. Estimates for this purpose have been prepared, and will be shortly submitted to Government.

Much has been done by Mr. Conolly and Major Cotton, and certainly at an unusually low figure, considering the resulting advantages, for the improvement of the canal communication in this province.

There are, however, still 3 breaks in the line of coast canal which it would be most desirable to fill up and thus complete the internal water communication from the north to the south extremity of Malabar. The 1st portion alluded to, is between Ponany and Chowghat, for which an estimate has been sanctioned by Government and the work is under execution.

The 2d is a very short break between the Tannore canal and the Venjalee Lake. An attempt to connect them was made, but failed in consequence of the occurrence of an unforeseen obstacle in the shape of a quicksand to overcome which the funds at the disposal of the Collector proved to be insufficient. Circumstances have subsequently rendered the difficulties likely to attend the completion of the project less arduous, and an estimate has been sent up to Government, which I trust will be shortly sanctioned.

The 3d and longest break occurs between a point 10 miles south of Mahé, and extends to some 3 miles north of Cannanore, a distance of about 30 miles. There are portions of this where the excavation of a canal would be a matter of no great difficulty, but in other parts the high and rocky nature of the ground would render it necessary to carry the line some way inland, and considerably increase the expense.

It is the opinion however of those who have most carefully examined the country that there exists no insuperable difficulty or any such as would necessitate an outlay greater than would be justified by the prospective advantage of supplying the only link wanting in a chain of internal water communication extending along the whole length of Malabar and communicating with the canals north and south of it.

In a country intersected as Malabar is, by numerous rivers flowing in deep and rapid streams for several months during the year, the hindrance and inconvenience caused to traffic by the want of bridges is necessarily great.

251 Ferries large and small, yielding to Government a revenue of about 34,000 Rupees but imperfectly make up for the want of these.

That it will be most desirable to bridge many of these rivers, especially those on the large roads and along the coast where they cause the greatest, most general and constant trouble, there can be no doubt, and if bridge tolls

are substituted for ferry tolls, the revenue derived from this source, which appears a very proper one, will not only be maintained, but probably largely increased.

The rivers which I think should be first bridged, are those of Beypoor and Kuddilboondy, a 3d on the road between the large towns of Tellicherry and Cannanore, and a 4th close to the French settlement of Mahé.

The improvement of the several minor ghauts leading from Malabar to the Neilgherries and Wynaud, together with the lines of road at their foot is deserving of early attention, but I am not sufficiently well acquainted with their several wants and uses to offer any opinion as to what particular measures are requisite.

Employment of Surveyors, &c.

There were 2 Surveyors and 3 Assistant Overseers attached to the division during the year 1851.

The Senior Surveyor appears to have been principally employed in plan drawing, estimating and plotting surveys. He also occasionally inspected works and surveyed.

The Junior Surveyor was for the most of his time employed in surveying, levelling and plotting surveys. He was also at times occupied in plan drawing and estimating, and was for some time laid up with fever.

The time of one Assistant Overseer was entirely devoted to duties connected with the Annamullay forests.

A second superintended the construction of bridges at Sanganore and Seegoor.

The 3d was employed principally on the Ponany groins, but also surveyed and estimated some roads. He was ill for a portion of the year.

The Assistant Civil Engineer accompanied the Civil Engineer in his Malabar tour during January and February, was laid up by an accident in March, employed inspecting and estimating for works, from April to August, and was placed in charge of the division during the remainder of the year.

S. O. E. LUDLOW,

Acting Civil Engineer, 7th Division.

Civil Engineer's Office, 7th Division, }
Suttimungalum, 17th January 1854. }

No. 2.

Statement descriptive of the Expenditure on Important Public Works, (Irrigation) and the result obtained thereby since last reported to the Board of Revenue, Department Public Works, in the District of Coimbatore.

Names of Works.	Disbursements in 1831.				Result.					Remarks.
	Ordinary.	Emergency.	Occasional.	Total.	Years.	Extent of cultivation canals.	Amount of Revenue.	Increase.		
1	2	3	4	5	6	7	8	9	10	
Prolongation of Pullevalungaul channel in Pulachy	122 1 7			122 1 7	Previous to work Early 1256—1847 Subsequent to work Early 1260—1851	275 354	1,096 2,076		982	
Repair of Nunjah Poogaloor channel in Caroor	20 13 7			20 13 7	1254—1845 1260—1851	1,110 1,113	7,440 7,561		221	
Do. of Calingaroyen suncut and channel in Erode	3,952 4 9	109 2 5		4,061 7 2	1254—1845 1260—1851	5,012 3,360	81,539 86,748		5,209	
Do. of Pillioor, Tendony, &c. tanks and Coymempully channel in Caroor	767 0 3			767 0 3	1254—1845 1260—1851	1,637 1,638	14,856 14,881		25	
Total	4,862 4 2	109 2 5		4,971 6 7					6,437	

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No. 3.

Statement showing Expenditure on Important Public Roads in 1851, in the District of Coimbatore, with the results obtained thereby so far as can be ascertained.

Name of Talooks.	Name of Road.	Disbursements.					Balance of Estimate.	Amount re-quired to complete the work.	Amount of Export, Import and Home Trade.			Probable period for completion.	Remarks.
		Up to end of 1850.	In 1851.	Total.	In 1850.	In 1851.			Comparison.				
									In-crease.	De-crease.			
1	2	3	4	5	6	7	8	9	10	11	12		
Pulla-chey...	Paughant road from Pullachey to the limits of Cochin 9 1/2 miles, as far as Munganddy											Road works in progress under orders of Lieutenant J. Michael and will be completed shortly.	
	Constructing a bridge on the said road		100	100	2,461		57,597	57,451	146		146	Bridge will be finished in December 1853.	
Coimbatore	Road (Trunk) No. 5, from Coimbatore to Wallahar, and bridge over Nurgumpully river	22,159	5,925	28,084	4	394		12,78,567	12,84,205	5,638		Completed.	
	Repair of Guzzibuty grant Mysore road	493	263	756	5	237		2,12,416	2,08,287		4,120	July 1853.	
Danan-ken Cot-tah	Construction of Hassanoor grant road—Trichinopoly &c. to Mysore	20,825	76,10	96,925	11	2,370		2,09,419	2,14,551	5,132		Completed.	
	Total	43,483	6,364	49,847	4	6,498		17,57,999	17,64,494	10,770	4,273		

No. 5.

General Statement of the Expenditure on Public Works in the District of Malabar, for 10 years, or from 1841 to 1850 inclusive.

Years.	Building and repairing Public and Revenue buildings.		Making and repairing Roads, building and repairing Bridges, Ferry Boats, &c.		Building and repairing Dams.		Building and Opening and repairing Canals.		Total.								
1841...	1,347	15	4	14,600	5	10	.....	440	2	0	16,398	7	2				
42...	10,579	7	5	34,987	5	5	56	3	3	203	1	6	45,826	1	7		
43...	6,612	10	9	24,936	15	0	161	3	3	629	5	1	32,370	2	1		
44...	9,175	1	3	12,418	7	11	31,979	5	5	490	6	11	54,063	5	6		
45...	7,252	12	2	19,797	12	0	1,420	12	6	3,494	3	6	31,965	8	2		
46...	7,501	2	5	15,605	13	5	997	14	1	852	11	1	24,957	9	0		
47...	23,522	11	6	9,750	0	2	945	2	4	112	3	4	34,330	1	4		
48...	13,674	12	10	53,156	1	10	180	5	4	21,783	4	3	88,794	8	3		
49...	17,338	14	8	13,441	7	7	9,232	11	0	1,920	0	7	41,933	1	10		
50...	10,669	12	7	16,019	2	10	697	14	7	6,033	5	11	33,420	3	11		
Total.	1,07,705	4	112	14,713	8	0	45,671	7	9	35,958	12	2	4,04,019	0	10		
														Trunk Road, No. 4, from 1848 to 1850 Rupees... 95,982		5	
														Trunk Road, No. 5, from 1848 to 1850 Rupees... 30,884		14	
														Rupees... 1,26,867		3	1

Trunk Road, No. 4, from 1848

to 1850 Rupees... 95,982 5 2

Trunk Road, No. 5, from 1848

to 1850 Rupees... 30,884 14 9

Rupees... 1,26,867 3 11

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Returns of Trade for 10 years, or from 1841 to 1851, exported from and imported into Malabar.

Years.	Fusly.	Export.	Import.
1841-42	1251	40,75,603	14,90,934
42-43	52	39,73,605	14,85,014
43-44	53	43,44,069	14,90,880
44-45	54	46,63,003	15,30,721
45-46	55	46,37,786	14,14,898
46-47	56	42,93,190	16,88,778
47-48	57	35,74,066	15,92,691
48-49	58	45,99,963	17,29,902
49-50	59	48,96,466	19,84,359
50-51	60	39,31,845	19,39,719
Total...		4,29,89,601	1,63,47,896
Average...		42,98,960	16,34,789

REPORT ON THE MORE IMPORTANT WORKS EXECUTED, OR IN
PROGRESS DURING THE YEAR 1851, IN NO. 8 DIVISION.

Madura, Tinnevely. As respects works connected with irrigation, the principal item of expenditure in the year under review was Rupees 3,792-7 for removing rock from the bed of the Mailacaul channel from the Murdoor annicut across the Tambrapoorney river in the Tinnevely district, in continuation of work executed in the year 1849 and 50 and noticed in the reports of those years. This work is still incomplete, but nevertheless the benefit accruing from it is extensively felt, the large tanks of Velloor, Thenkurray and Cadumba receiving their supply at an earlier date and with greater certainty than was the case formerly. For 12 years previous to the commencement of the above work, or from Fusly 1247 to Fusly 1258, the total amount of remissions on account of drought, and short crops under the several tanks supplied by the Mailacaul channel in the Streevigoontum talook alone was rupees 48,444 or an average of Rupees 4,037 per annum, whereas for the last 3 Fuslies the remissions have only amounted to Rupees 341, or about Rupees 280 per annum.

The total cost of the improvements up to the end of 1851 amounted to Rupees 8,005-2, and there remained a balance of Rupees 1,435-13 to be carried into effect in 1852. The length of channel cleared of rock and

widened to 14 yards in 1851 was—1 m. 5 fur. 196 yds., making a total of 7 ms. 4 fur. 197 yds. from the commencement. The works next in importance to the above are the reconstruction in part under the head of "Occasional" of the rough stone revetments to the Soondrapandiem and Kadianelloor Keelacolum tanks in the Thencausee talook, and of Sevala Keelacolum in the Streevigoontum talook of the above district. The amount of estimate, work performed, &c. were as follows :

	Amount of Est.	Work performed.	Remaining.
	Rs. A.	Rs. A.	Rs. A.
Soondrapandiem Pereacolum, ..	1,858 0	671 13	1,186 3
Kadianelloor Keelacolum.....	944 8	865 1	79 7
Sevala Keelacolum	1,898 13	713 6	1,185 7

The remaining work, it was expected, would be completed in 1852 at the estimated cost, or thereabouts. In addition to the above, there were three large tanks repaired and an annicut rebuilt in the Sunkerninarcoil talook of Tinnevely at an aggregate cost of Rupees 2,685-12, and one tank in the Streevellapoothoor talook repaired at an expense of Rupees 676-15. The return for the above outlay was as follows :

	Average of 5 years previous to repairs.	Revenue in Fusly 1262.
	Rs. A.	Rs. A.
Sunkerninarcoil Pautacolum.....	503 0	640 9
Pooliengoody Naranapairy Tank...	344 9	390 10
Poolancolum Sambencolum.....	259 14	350 15
Aureyoor Annicut.....	243 2	888 1
Moovervendan Thathencolum	248 14	324 14
Total.....	1,599 7	2,595 1
Increase.....	995 10	

Repairs to 2 other tanks were in progress on Occasional Estimates during the year under review in the Tinnevely district, viz. :

	Amount of Est.	Work performed.	Remaining.
	Rs. A.	Rs. A.	Rs. A.
Calcyogaramanelloor Peracolum.....	802 7	727 15	74 8
Streevenkatasapoorum Peracolum and its supplying channel	670 15	190 6	480 9

Under the head of "Ordinary" a very large number of works of irrigation both in Madura and Tinnevely underwent repair in 1851. Of these may be mentioned in the former district, the Avaneapoorum and Thovarimam channels from the Vigay and the large tanks of Natchecolum, Kaleppenputty, Murdoor and Butlagoondu in four different talooks. The aggregate cost of the above works amounted to Rupees 4,077-8. The head sluice of the Iyempully Rajahvaykāl was repaired and the channel itself improved at an outlay of Rupees 940-2. The principal masonry works executed in the Madura district in 1851 were repairs to the Alagoopāray Oopaurputty and Mailmungalum annicuts, in the Thenkurray talook, the first and second as "Ordinary," and the last as "Emergent." In the Tinnevely district, among the ordinary works connected with irrigation it will be sufficient to mention the following, viz :

	Amount of expenditure.		Average revenue for 5 years previous to repairs.		Revenue in Fusly 1262.	
	Rs.	A.	Rs.	A.	Rs.	A.
Poothocotay Peracolum.	1,198	9	587	13	729	6
Vedacurray do.	811	1	1,063	4	1,111	4
Amranaud do.	822	0	620	10	760	7
Thavercat channel	1,457	1	8,318	9	9,378	14
Total	4,288	11	10,590	4	11,979	15
Increase					1,389	11

Under the head of "Emergent" the Congyen channel from an annicut across the Guddananuddee was cleared of deposit and widened at a cost of Rupees 619-10, the result of which was an increase in cultivation to the extent of 75 cotays in Fusly 1262. The total expenditure for works of irrigation in Madura and Tinnevely during the year 1851 was as follows :

	Ordinary.	Emergent.	Occasional.	Total.
Madura	30,625	2,653	1,842	35,120
Tinnevely	40,664	1,803	10,006	52,473
Total in No. 8 division	71,289	4,456	11,848	87,593

In my report for 1850, I gave a statement of the cultivation and revenue for the two districts for the 20 years ending with Fusly 1259. I have since procured the returns for Fuslies 1260 and 1261 and find that the former Fusly in Madura and the latter in Tinnevely were nearly as high as the highest year on record, viz. Fusly 1257, whilst in Fusly 1261 in Madura and 1260 in Tinnevely there was a falling off in consequence of want of rain at the proper season. The returns are as follows :

	Fusly 1260.		Fusly 1261.	
	Acres.	Rupees.	Acres.	Rupees.
Madura	1,13,301	5,07,617	96,243	3,83,831
Tinnevely	1,68,791	11,44,647	1,78,972	13,08,989
Total	2,82,092	16,52,264	2,75,215	16,92,820

Notwithstanding the falling off in the above-mentioned Fuslies, the average of the five Fuslies ending Fusly 1261, as compared with the preceding 10 Fuslies shows a very considerable increase both in land and revenue.

	Acres.	Revenue.
Average from Fusly 1247 to 51	2,21,632	13,75,273
Do. from 1252 to 56	2,58,230	15,85,294
Do. from 1257 to 61	2,82,150	17,36,235

The above statement shows an increase in the last 5 years over the first 5 years of 60,518 acres and 3,60,962 Rupees in the two districts forming the 8th division. The account of expenditure for the repair and improvement of works of irrigation during the ten years ending with 1851, or Fusly 1261, given in detail below, shews a total outlay during that period of Rupees 7,58,117, while the return to Government from increase in cultivation during the same interval has been Rupees 28,54,915.

It may, I think, with truth be affirmed, that the present state of the 2 districts forming this division as regards wet cultivation (and if I mistake not it is the same with dry) is superior to anything which existed under former Government. As respects Madura and Dindigul the increase in wet cultivation is more perceptible in the western talooks, Thenkurray and Iyempully, lying at the foot of the hills, whence flow the several rivers and streams which serve to fertilize the plains. To such an extent is this the case in the Thenkurray talook, that the Collector is fearful that the eastern talooks may suffer from want of water should works of irrigation be multiplied to the westward of the Peracalai Dam on the Vigay. The waters of this river are entirely consumed in the cultivation of the land. Scarcely a drop ever finds its way into the sea, even in what may be considered favorable seasons; and in unfavorable seasons, the large Zemindaries of Shevagunga and Ramnad, but more particularly the latter, suffer for want of water. As regards Tinnevely, I need only compare the present cultivation with 7 years average at the time when the district first fell into the hands of Government to shew that there is a considerable increase there also.

	Cultivation.	Bariz.	Rate
	Acres.	Rs.	Rs.
Average for 7 years, from Fusly 1211 to 17 ...	1,30,360...	11,54,593....	8½
Do. for 5 years, from Fusly 1257 to 61 ...	1,76,177...	12,67,718....	7½
Increase.....	45,817...	1,13,125....	0
Decrease.....	0...	0....	1½

A further increase in cultivation may be obtained by making use of the surplus water of the Tambrapoorney river eastward of the Mardoor Amicul, but to carry into effect any large project of this kind an increase in the Civil Engineer's establishment is absolutely necessary. During the 12½ years I have had charge of this division, containing an area of about 15,500 square miles, I have been 7½ years without a single assistant. My time, therefore, has necessarily been occupied chiefly in looking after the ordinary duties of the division, viz. the repair and improvement of existing works. I have had little or no leisure to turn my attention to new works.

ROADS AND BRIDGES.

During the year under review the several portions of Road No. 4 from Madura to Palamcottah and Travancore, via the Arambooly lines, in the Tinnevelly district, spoken of in the report for 1850 as under repair on estimates amounting in the aggregate to Rupees 22,825-8, were completed with the exception of the gravelling over broken stone in the limits of Elloppoorney and Nully, which was carried into effect in 1852. The expenditure in 1851 on the above road, spread over a distance of 71 miles, was Rupees 6,804-4 and the total cost, including work performed in 1849 and 1850, Rupees 19,158-10, and there remained Rupees 2,342-8 to complete the work in the above mentioned limits. The improvement effected during the last few years to this important thoroughfare, though not equal in extent to what could be wished owing to the great want of coolies in Tinnevelly, is nevertheless considerable, particularly in those parts where black cotton soil occurs. About 20 miles of road North and South of Santoor still remain to be made on estimate, and bridges are required over the principal rivers and streams, estimates for which have been submitted for sanction. It has not been the practice heretofore to keep any returns of traffic on the roads in Tinnevelly or Madura, and therefore it is impossible to say what the amount of traffic along road No. 4 was before the improvements were undertaken, but it appears from a return shewing the description and extent of the traffic on this road at the present time, furnished to me by the Collector of Tinnevelly, that the total value of

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articles conveyed along it annually is Rupees 13,94,268, and that about one-third of these articles is carried to and from the neighbourhood and the remaining two-thirds from and to a distance. The principal articles are clean and seed cotton, tobacco, piece goods, jagherry, paddy, tamarind, salt-fish, and oils and dry grains of different kinds. The description of traffic will probably remain the same on the completion of the road, but its extent will no doubt be greatly augmented. The continuation of this road, on the North in the Madura District as far as the boundary with Trichinopoly, and in the South as far as Trevandrum in Travancore, is in very fair order, but requires annual outlay for repair to keep it in that state. Bridges are in course of construction at the present time across the Goondaur in Madura and the Virlooppetty river in Tinnevelly on the sanction of Government dated 1st February 1853, the estimate for the former being Rupees 8,023-8, and for the latter Rupees 8,725-1.

During the year 1851, sundry small road bridges and open drains were constructed on road No. 12 in the Tinnevelly District on an estimate of Rupees 1,096-14, sanctioned by Government on the 18th February 1851. The cost of the work performed in 1851 was Rupees 513-11-9. This road leads from Palamcottah to Trichendore, a distance of 35 miles, and is much frequented, particularly at the annual feasts at the great Pagodas of Trichendore and Alivar Tinnevelly. The principal articles of traffic are salt, jagherry and salt-fish. Two salt roads Nos. 13 and 20 fall into the above, one at Streevigoontum and the other at Coorunboor. Both these roads were likewise repaired in 1851, the former at an expense of Rupees 1,175-9-5 and the latter at Rupees 457-6. In addition to the above outlay on road No. 12 at the Government expense, it had more than an equal amount laid out upon it by private subscription and the sale proceeds of avenue cuttings, which has improved it very much. It still requires gravelling in parts where the mud lies heavy, and a paved causeway is much needed across the Cadumba tank surplus. The former it is expected will be accomplished without expense to Government, and an estimate for the latter has lately been sanctioned.

TRUNK COTTON ROAD.

The amount sanctioned for this road, including the Streevellapoothoor portion and the cross road from Coilputty to Ettiapoorum, is Rupees 1,17,378-10. During the year 1851, the length of road constructed under the superintendence of Captain Boswell, of the 27th N. I., was about seven miles, and the expenditure for the same is Rupees 12,295-8-6. In this is included the sum of Rupees 4,220-6-1 for constructing a bridge of seven arches across the Venkatasapoorum Oday on road No. 4, which was completed with the exception of the parapets and plastering. These latter were carried into

effect early in 1852. The total expenditure on this road up to the end of 1851 was Rupees 14,401-11-6, and the total length of road constructed about nine miles.

BRANCH COTTON ROAD.

An estimate of Rupees 73,304-13 was sanctioned on the 16th December 1850, for making 26½ miles of road to connect the large cotton depot of Aroopocotta in the Ramnad Zemindary of the Madura district, with the trunk road at Ettiapoorum in Tinnevelly. Of the above distance 14 miles are in Tinnevelly and 12½ miles in Ramnad; the latter being paid for by Government, and the former from the surplus pagoda funds of Tinnevelly. The Ramnad portion, estimated at Rupees 23,329-2, was commenced in June 1851, under the superintendence of Ensign Lawford of the 15th N. L. and between this and the 31st December of the same year about five miles of road were completed and about three miles partially so. The expenditure for the above period was Rupees 9,186-13-10. The method of construction is exactly similar to that adopted on the trunk cotton road, viz., a foundation of broken stones nine inches in depth laid on the black cotton soil, previously raised to the required height, and over these a coating of gravel averaging 6½ inches in thickness. The only difference is that the breadth of stone on this road is six yards, whereas on the trunk road it is seven yards.

In the Madura and Dindigul district roads Nos. 15 and 2 were under repair during the year 1851, the former on an estimate of Rupees 7,968-1, sanctioned by Government on the 16th March 1851, and the latter on an estimate of Rupees 4,664-15, sanctioned on the 21st November 1848. Road No. 15, commences at Ramiswerum and leads through Paumben and Ramnad to Madura and thence to Dindigul, a total distance of 142 miles. Of this 38½ miles are included in the above estimate. The repairs consisted of earth and gravel work and constructing sundry bridges and culverts. The cost of work executed in 1851 was Rupees 2,744. The repairs executed to Road No. 2, in 1851 were in continuation of those performed in 1849 and 1850, the total expenditure on the above estimate being Rupees 4,413-10-1. This road leads from Dindigul to Pulney and thence to Poolachy and Palghaut and is greatly frequented by cotton and salt bandies. Quantities of piece goods from Madura and Tinnevelly are carried along it to the western coast. The whole distance (36 miles) from Dindigul to Pulney has been very much improved of late years, but annual outlay is required to keep it in repair, a considerable portion of the road lying over cotton soil. It is greatly to be wished that the continuation of this road in the Coimbatore district were in good repair. There is one portion west of Oodoomullacotta, about six miles in length through black cotton soil, which may be considered impracticable for carts during wet wea-

ther. The Amravuttee river also requires bridging. At present there is neither bridge nor ferry, except one or two small basket boats the property of the inhabitants.

The principal items of expenditure in 1851 on account of public buildings in Madura and Tinnevelly were as follows.

Madura.

Expended in 1851.

Rs. A. P.

Head Assistant Collector's Cutcherry			
at Madura.....	309	11	4
Sea Custom Chowkeydar's do.			
at Keelacurray.....	1,080	2	0
Verandah to Traveller's Bungalow at			
Thoverancoorehy.....	530	12	0

Tinnevelly.

Punjamahl Talook Cutcherry,	2,869	4	0
Thencausee do.	2,625	1	0
Sautoor Chuttrum and Out houses ...	2,556	0	0
Parpanairy do. ...	1,557	6	0

Total Rupees.....11,528 4 4

In addition to the above, a place of arms, tent godown and prison room were erected at Ramnad for the use of the detachment of Native Infantry there stationed under the personal superintendence of the 1st Assistant Civil Engineer, whose time was thus employed for 6 months and 12 days. The total cost of the above military buildings was Rupees 2,371-2-3, so that the charge for superintendence amounted in this case to 78½ per cent. on the outlay. It was found impracticable to get the work done on contract and there was no assistant overseer in the division, after Serjeant Eaton left in March 1851, to superintend the work. Under these circumstances, and having been made personally responsible by the Military Board for the money advanced by the Military Paymaster, I had no other course left me but to employ my assistant, the only one in the division, on the above work.

W. H. HORSLEY, Captain,

Civil Engineer's Office, 8th Division,
Waltrap, 12th July, 1853.

Civil Engineer, 8th Division.

Statement shewing the Number of Officers, &c., employed in No. 8 Division, during the year 1851, the number of Works examined or superintended and the amount of Salary drawn by each individual.

Name of Officers, &c.	Designation.	Number of days employed in the Division.	Works examined.		Works estimated.		Amount of Salary.	Percentage on the works examined or superintended by each Officer or Surveyor.
			No.	Amount.	No.	Amount.		
Captain W. H. Horsley.....	Civil Engineer.....	842	188	73,755 4 0	81	27,236 7 0	0 840	0 13 5 51
Lieutenant P. O'Connell.....	1st Asst. do.....	365	135	35,557 1 3	63	33,403 1 0	3,495 0 0	0 9 13 24
Mr. F. Mason.....	Asst. Surveyor.....	365	233	40,880 2 11	110	20,932 0 0	2,015 15 9	4 14 11
Mr. D. McNair.....	do.....	363	258	42,405 8 9	90	17,446 7 0	1,590 12 11	3 13 84
Sergeant F. Eaton.....	Asst. Overseer.....	90	2	370 0 1	.....	.....	131 13 33	6 51
2d Corporal W. H. Bywater.....	do.....	11	1	.....	.....	.....	15 9 6	.....
Captain W. H. Boswell, 27th Regiment, N. I.....	Supl. Trunk Cotton Road.....	365	1	12,150 1 6	.....	.....	2,295 0 0	0 18 14 3
Ensign Lawford, 15th do.....	do. Branch do....	232	1	9,186 13 10	.....	.....	1,579 5 4	17 3 0

Civil Engineer's Office, 8th Division, }
Watrap, 12th July, 1853.

W. H. HORSLEY, Captain,
Civil Engineer, 8th Division.

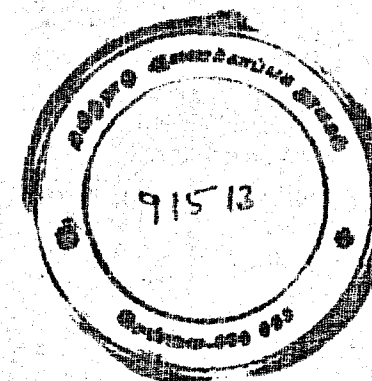
* N. B.—During the year 1851 Lieutenant O'Connell was employed 6 months and 12 days at Ramnad, Superintending the erection of Military Buildings, the cost of which amounted to Rupees 2,371-2-3 and is included in the amount of Examinations set opposite that Officer's name.

Statement shewing the amount expended on Public Works in No. 8 Division during the year 1851.

	Madura.		Tinnevely.		Total.		Remarks.
	Rs.	A. P.	Rs.	A. P.	Rs.	A. P.	
<i>Works of irrigation.</i>							
Ordinary.....	30,625	0 0	40,653	15 0	71,288	15 0	
Extraordinary	2,653	0 0	1,802	10 8	4,455	10 8	
Occasional	1,842	0 0	10,006	3 0	11,848	3 0	
<i>Works not of irrigation.</i>							
Roads and bridges.....	13,978	2 10	21,254	8 6	35,232	11 4	
Civil buildings.	2,865	7 4	10,567	8 5	13,432	15 9	
Chuttrams			5,214	15 0	5,214	15 0	
Military buildings	2,371	2 3			2,371	2 3	
Grand Total, Rs....					1,43,844	9 0	

W. H. HORSLEY, Captain,
Civil Engineer, 8th Division.

Civil Engineer's Office, 8th Divn., }
Watrap, 12th July, 1853.



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