(1) பக்கங்களின் எண்ணிக்கை 76

(2) புதுக்கித் திருப்பிய நாள் 9/89

(3) ஆதாரங்குறிப்பவர் சுருக்கொப்பம்

தமிழ்நாடு ஆவணக் காப்பகம்.

தமிழ்நாடு அரசு

94

P. W. D துறை

அரசாணை எண்.	அச்சகம்
மு. கோப்புத் தாள் எண். 2290	பலவகை

நாள் : 21 8 1889

கவோ கண்டபடி கையாளவோ கூடாது

38 sheets

கா-I—18,006—15-6-87.

GOVERNMENT OF MADRAS.

2299

PUBLIC WORKS DEPARTMENT.

General.
Establishment.

READ—the following papers:—

G.O., dated 10th December 1883, No. 1014 I., Public Works.
G.O., dated 14th March 1884, No. 691 W., Public Works.

From Lieutenant-Colonel H. M. VIBART, R.E., Officiating Superintending Engineer, III Circle, to the Chief Engineer for Irrigation, dated Bellary, 19th February 1884, No. 3122:—

With reference to your memorandum, No. 2-III., dated 15th February 1884, I have the honor to report that the investigation of the Sugglair project* will be completed by the 25th instant, and that the survey, &c., of Pedda Puspulla† irrigation channel is expected to be completed by 15th March next. The cost of establishment, including the Executive Engineer, his two surveyors and office establishment, will be about Rs. 700 for half-a-month.

* No. 16 in the list III printed with G.O., No. 465 of 13th June 1882.

† No. 19 in do. do. do.

2. I beg to recommend that, as soon as the Pedda Puspulla irrigation channel survey is completed, the surveyors now attached to the C. Project division should be employed in carrying out the levels in connection with the Bellary water-supply project.

3. This project is clearly a very important one, and if carried out this cantonment would be fully supplied with water throughout the year, whereas now during the months of April and May the reserved supply runs very short, and that from the large well is reduced to the lowest limit.

From Colonel J. BEATTY, R.E., Superintending Engineer, IV Circle, to the Chief Engineer for Irrigation, dated Coimbatore, 21st February 1884, No. 21 E.I.

I have the honor to forward, herewith, copy of a letter from the Executive Engineer, B. Project division, giving the information asked for in your memorandum, No. 3-IV, of 15th instant.

2. I have received the preliminary report on the Krishnagiri project, which I shall forward for your information in a few days.

3. It will be seen that the Krishnagiri, Bhaváni, Calingaroyen (instead of Pugalúr) extension and the Gudamalai projects will remain incomplete at the end of this month, and that the cost of establishment, exclusive of Captain Romilly's pay and allowances, for next year will be Rs. 15,600.

ENCLOSURE.

From Captain F. J. ROMILLY, R.E., Executive Engineer, B. Project Division, to the Superintending Engineer, IV Circle, dated Coimbatore, 19th February 1884, No. 27 S.

I have the honor to reply to your endorsement, No. 17 B.P., dated 18th instant, on letter, No. 3-IV., dated 15th idem, from the Chief Engineer for Irrigation. The present is the state of the project investigation in my division.

Marandahully and Vannar Projects.—Reports complete and submitted.

Krishnagiri.—Reservoir basin contoured and 10 miles of trial channel lines run. Preliminary report submitted with estimate for completely exposing the rock over the dam site proposed. If the report is considered favorable there will be at least six months' work for the

survey parties in contouring the area to be irrigated, some 50,000 acres, and laying out the proper line for the distributaries

Bhaváni Reservoir Scheme.—The contouring of the reservoir basin is complete, and I shall very shortly have data on which to draw up a preliminary report upon the scheme. An examination of the contoured plan shows that a third site promises to be a favorable one as compared with the two already proposed, and if figures support this idea, an examination of this site will be necessary.

If the preliminary report places the scheme in a favorable light and the complete working out of the project is decided on, the surveys of the area to be irrigated and the tracing of the distributaries will occupy the present establishment quite twelve months.

Pugalúr and Calingaroyen Channels.—The former project, it is presumed, need not be investigated further. For the Calingaroyen, nearly all the levels are taken in connection with the existing channel. About three months' work would suffice to complete investigations in connection with the present channel. If the extension is decided on, about six months more would suffice to complete the necessary levels and sections.

The Gudamalai project has not been touched.

If the present establishment is sanctioned for the next official year, I am of opinion that one of the three incomplete projects could be completed and sent in; one very nearly so, and both the remainder so far advanced that the additional time necessary to complete them could be definitely fixed for the succeeding official year.

The establishment and cost required will therefore be for 1884-85 :—

Permanent Establishment.

		Rs.
1 Writer		
1 Do.		32
1 Messenger		15
2 Lascars at Rs. 6 each		7
1 Draughtsman		12
1 Do.		60
1 Do.		40
Contingencies		35
		49
	Total ...	250

Temporary Establishment.

1 Assistant Engineer	
Travelling allowance for Assistant Engineer	300
1 Overseer	100
1 Surveyor	60
2 Surveyors at Rs. 100 each	250
20 Lascars	200
Contingencies	120
	20
Total ...	1,050
Total for one month ...	1,300
Total for twelve months ...	15,600

No. 68 I.

Note by the Acting Chief Engineer for Irrigation.

B. Project Division.—The Marandahully and Vannár projects have lately been submitted by this division, also a preliminary report of the Krishnagiri.

The other projects now on hand are—

The Bhaváni Reservoir.

The Calingaroyen Channel.

The first of these is a large undertaking. It is a project for the formation of a very extensive reservoir on the Bhaváni, near Satyamangalam, which will act as a flood regulator or rather moderator to the Cauvery, and also irrigate a considerable tract of country. Its thorough investigation will take a long time; probably, if no other work was done, it would employ the existing establishment to the end of the year.

The second is a scheme for extending the Calingaroyen channel which is to take the plan of the Pugalúr channel improvement. The Calingaroyen channel commands

the land irrigated by the Pugalúr channel and is capable of being extended across the Nóyel river to irrigate fresh land. It will probably take some months to complete and submit.

If the preliminary report on the Krishnagiri reservoir shows that there is sufficiency of water, and a probability of the work doing more than pay interest on the capital outlay, there will be some months' more work to be done.

2. *C Project Division.*—This division was intended to work in the Ceded Districts where more is required in famine preventive work than in other districts. The Hindupur and Roddem projects have been worked out and remain in this office; they do not promise well, and it is hoped some of the other small projects may be better worth carrying out.

The two projects now under investigation are—

The Sugglair Project.

The Pedda Puspulla Channel.

These will, it is anticipated, be completed shortly. It is then proposed to investigate the Bellary water-supply project, towards which it is understood that a good deal of work has been already done. This will certainly occupy the division for a considerable time, and if it should be completed before the end of the year, there are still many projects on the list which was forwarded to the Government of India which it is very desirable should be fully worked out, and which if they do not give promise of being remunerative may be retained as famine relief works.

3. It will thus be seen that there is ample work for both Project divisions for the ensuing year, and there are other works, which it was intended the divisions lately abolished should take up, which it is very desirable should be investigated. Foremost among these is the Lower Coleroon irrigation in which is included the embanking of the Coleroon from the lower anicut to the sea. So much trouble has arisen from the embankments on either side of the river being worked out in separate divisions, that work in the lower portion of the river has been suspended until an establishment is available to work out the scheme.

4. The cost of the B. Project division, including Executive Engineer's pay and travelling allowance, amounts to Rs. 24,000 per annum. The C. Project division is not at present so strong, but will be brought up to the same strength and the cost of both the divisions will therefore be Rs. 48,000.

CHEPÁK, (Signed) J. O. HASTED, Colonel, R.E.,
25th March 1884. Acting Chief Engineer for Irrigation.

To the Acting Joint Secretary to Government,
Public Works Department, Irrigation Branch.

ORDER—dated 4th April 1884, No. 924 W., Public Works.

The Government approve of the employment of the Project divisions as suggested by the Chief Engineer for Irrigation, and the cost of these divisions during the official year 1884-85 will accordingly be met from Provincial funds.

(True Extract.)

(Signed) J. SHAW-STEWART, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintending Engineer, I Circle.
" " " III Circle.
" " " IV Circle.
" Chief Engineer for Irrigation.
" Examiner, Public Works Accounts.
" Revenue Department.

Exd. E. Fernandez.
Spare Copies

GENERAL.
ESTABLISHMENT.

Govt. of {1884} Madras.

PUBLIC WORKS.

Dated April, 4th.

Recd.

Encl.

G.O., 4th April 1884, No. 924 W.

APRIL.

Project Divisions

Approving of the employment of the — during 1884-85 as suggested by the Chief Engineer for Irrigation, the cost of the divisions being met from Provincial funds.

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GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

READ—the following papers:—

From Major G. F. L. MARSHALL, R.E., Under Secretary to the Government of India, Public Works Department (Civil Works—Irrigation), to the Secretary to the Government of Madras, Public Works Department, dated Simla, 30th June 1885, No. 139 I.

In forwarding the accompanying copy of a despatch, No. 20, Public Works, dated 7th May 1885, and of its enclosures, noted in the margin, on the subject of the establishment of irrigation works on the Tungabhadra river, I am directed to request that the Government of India may, with the permission of His Excellency the Governor, be furnished with any papers which may be available regarding the reservoir near Hospet, together with a report on the two petitions of the inhabitants of Bellary.

Copy of a letter, dated 1st April 1885, from Sir George Balfour.
Two petitions from the inhabitants of Bellary (in original).
Return of these is requested.

Note by the Chief Engineer for Irrigation.

No. 168 I.

Appended to this note is a brief account of the steps that have been taken to work out a large project for the irrigation of the Bellary district, and for the water-supply of the town and cantonments of Bellary, from which it will be evident that the Madras Government has for many years past endeavoured to work out a satisfactory scheme for the improvement of the district, but hitherto has been unable to recommend any such scheme for sanction on account of the enormous cost of the works, the small returns to be expected, and the impossibility of securing a continuous supply of water without the construction of a large reservoir, which could only be made wholly or partly in foreign territory.

2. The Upper and Lower Bellary projects, which are shown on the accompanying map, were worked out in detail by the officers of the Madras Irrigation and Canal Company, it having been originally intended that these projects should form part of the vast scheme of irrigation and navigation undertaken by the company from which such magnificent results were anticipated. For various reasons which are referred to in the accompanying history, but principally because the guaranteed capital of the company was limited to one million, the irrigation works were commenced near Kurnool much lower down the river, a step almost fatal to any scheme for the extensive irrigation of Bellary, as it created a prior right to the water, a right which, however,

3

could only be satisfied after the Kistna delta irrigation, far lower down on the Kistna river, had been supplied; in fact the Government having allowed for the irrigation of 415,000 acres in the Kistna delta and 196,227 acres in the Kurnool district, it was only during the season of freshes, or from June to November, that any water at all would be available for Bellary, and even during this time, if the supply in the river should be low in consequence of a season of drought, the Bellary irrigation must suffer.

3. It will thus be evident that any project for the extensive irrigation of Bellary must include reservoirs, which may be of two classes—(1) those constructed on the river itself or on its tributaries, to store flood water which could be released to augment the supply in the river as the floods subside; (2) those constructed in the district to be irrigated, which could be filled by channels from the river during floods, and used for irrigation when the supply in the river is insufficient. Consequently the officers of the company who investigated the projects examined the country for sites suitable for reservoirs, and surveyed those which appeared promising. These proposed reservoirs are shown in the sketch-map, and it is sufficient to state here that all those in class 1, with one exception, are situated in foreign territory, where, if other obvious objections could be overcome, the cost of buying up the land and villages submerged would be so great as to be almost prohibitive. The exception is a reservoir on the Tungabhadra, proposed by Major-General (then Captain) Fischer, R.E., to which reference is made in the petition presented to Parliament. This reservoir would be partly in British and partly in Hyderabad territory, and would submerge the irrigation—about 530 acres—under the Vallavapur anicut, for which heavy compensation would have to be paid. Captain Fischer roughly estimated its cost at 30 lakhs; but Colonel Mullins, the Chief Engineer for Irrigation, who examined * the proposals, considered that the estimate was far too low. Until detailed estimates are worked out, it is impossible to say what a reservoir, of efficient storage capacity (which it is believed could be constructed at this place), would cost; but considering the rise in rates of late years, and judging by experience of estimates which have been framed for other large reservoirs, it is not unreasonable to anticipate that the cost would be 60 lakhs.

* See paragraph 17 of History of project.

4. As regards the line which a channel from the river, whether a reservoir is constructed or no, should take, there seems to be little doubt. The ground has been thoroughly examined by the company's officers, as well as by competent officers of Government, and a comparison between the high-level and low-level lines shown on the sketch-map has been made, resulting in favor of the former. Any channel to irrigate extensively the open country between Bellary and the river has to be brought through the low hills and rocky ground near the river, and herein lies the great difficulty and the principal expense of the undertaking. The high-level channel would have heavy rock-cutting, and must also be carried by a tunnel through a ridge of hills immediately above the Darojee tank; had the ground been open from the river, the work would have been simple and might have been executed, as many of the district officers have recommended, by famine labor; but in reality the only portion of the work suitable for unskilled labor is that part of the channel lying between Darojee tank and Bellary, and it would manifestly be unwise to execute a channel here leaving it to be filled in again by the action of rain and wind, and the passage of cattle, when even if the project were sanctioned by the Secretary of State and funds were forthcoming, years must elapse before the channel to the Darojee tank could be excavated and water supplied.

5. From what has been said, the difficulties in the way of any extensive irrigation scheme for Bellary will be apparent; but the statements which have been submitted with the estimates and which promise fair results do not exhibit objections to the undertaking, which have been duly considered by the Government. It has been stated that the soil—black cotton—is not well suited for irrigation, and that the experience on the Kurnool canal shows that the ryots will not readily take water for irrigation; the petitioners state that the land is well suited for irrigation, as may be seen by the old irrigation tanks throughout the district, and that irrigation is wanted. Doubtless they are right to some extent; the land may be irrigated and will yield

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good crops, and there being ordinarily much less rain in Bellary than in Kurnool, the want of water to raise any crop is felt; but experience goes to show that flooding black-cotton soil for the first line brings salts to the surface which prevent the growth of a good crop, and it is only by several successive floodings that these salts are washed out; then there will be good crops, but meanwhile the Government and cultivators have little or no return for their outlay; and it is assumed that 150,000 acres will be taken up for cultivation within a short period; but in this thinly populated district where are the cultivators to come from, and how are the ryots, by petitioners' admission the poorest of the poor, to find the money necessary to lay out the fields for wet cultivation and wait two or three years for a fair crop? Under the Kurnool canal this difficulty is only now being met to some extent by giving out the land in blocks of 50 acres free of assessment for five years and at half rates for the next five years, and labor for cultivation is being imported by wealthy people who have taken up blocks. These considerations have induced the Government to believe that irrigation cannot be expected to spread as rapidly as was originally anticipated, and that if the project was carried out, the vast amount of capital that would have been expended must be unproductive or produce unappreciable returns for many years. It will be allowed by every one that the expenditure of $1\frac{1}{4}$ to $1\frac{1}{2}$ millions, even though spread over twenty years, under these circumstances, must be a matter of grave import.

6. Any project for extensive irrigation in Bellary has thus appeared impracticable to Government, and here it must be noticed that the comparison instituted by the petitioners between the Godávari and Bellary districts is altogether delusive. In the one case we have a river of vast magnitude flowing waste to the sea, commanding a large deltaic tract of soil admirably suited for wet cultivation and where wet cultivation had to some extent been practised for years; in the other a river of considerable magnitude it is true, but with existing claims on its supply lower down, flowing in a depression through vast black-cotton plains, where a scanty and poverty-stricken population raises a poor crop of dry grain only when there is a favorable rainfall. It is beyond all doubt that a network of channels, with a plentiful supply of water, over the Bellary district would change the circumstances of the country and prove of immeasurable benefit; but Bellary would move with much slower steps than the Godávari has done, and it would have from the commencement to bear the burden of a capital debt which is enormous compared with that the Godávari began with.

7. In speaking of the past, the expressed views of Government have been stated; but in making proposals for the future, the undersigned, who has given considerable attention to the subject, is solely responsible. A special project division has now been working for some months in the Bellary district, with a view to determine whether any modification of the projects which have been already suggested can be made, which would prove feasible. Two conclusions have been arrived at—(1) That no scheme for extensive irrigation is practicable without the construction of a reservoir; and (2) that any scheme for moderate irrigation should be independent, as far as the channel below the Darojee tank is concerned, of the water-supply of Bellary town and cantonments. It would seem then that the best thing to be done would be to excavate a channel from the Vallavapur anicut to the Darojee tank on much the same line, but on a much smaller scale than the originally proposed channel, by means of which the Darojee tank, a reservoir of considerable capacity, could always be kept full, and from the tank to lead a high level channel in the direction of Bellary, but which would not pass within some miles of the town and would be considerably below it, commanding an extent of several thousand acres towards the river. While the extent of irrigation is insignificant, the Darojee tank would suffice to keep up a supply while the river is low during the irrigation season, and if irrigation extends, as it would seem that the petitioners anticipate, the question of a reservoir could then be separately considered.

8. In a paper of this nature, it is unnecessary to enter into details or to give reasons for the conclusions which have been arrived at; so far as the work of investigation has already gone, it appears probable that such a project as that sketched above may be worked out with an estimated cost of below 50 lakhs, which would prove a valuable protective work, though in all probability it would not be a productive work,

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There is already a strip of land bordering on the river irrigated by old native channels supplied by rough dams across the river, amounting to about 11,469 acres, and in this neighbourhood the means of extending irrigation would probably be readily availed of.

9. The supply of Bellary town and cantonments could be taken from the Darojee tank, a distance of about 18 miles; but the water would have to be raised some few feet to enable it to run either in an open channel or pipes to the town. A rough estimate of the cost can easily be framed, and it would then rest with Government and the corporate bodies interested to decide whether the scheme should be carried out. It is of course dependent on the irrigation project, as the Darojee tank must be supplied before water will be available.

OOTACAMUND,
17th September 1885.

(Signed) J. O. HASTED, Col., R.E.,
Chief Engineer for Irrigation.

To the Joint Secretary to Government,
Public Works Department, Irrigation Branch.

HISTORY OF THE PROPOSED BELLARY PROJECTS.

The several projects connected with the irrigation of the Bellary district and for supplying the town with drinking water from the Tungabhadra, a river rising in the western ghâts with a drainage area of 20,682 square miles, though included in the original scheme of the Madras Canal Company, appear first to have been taken up by the officers of Government in the year 1854, and investigations were conducted under the orders of Colonel A. T. Cotton and the immediate directions of Captain Fischer during the years 1857-58 and 1859.

The papers connected with these investigations appear to have been lost shortly after they were completed and cannot now be found. However, from Captain Fischer's memorandum, printed with G.O., No. 2773, dated 24th September 1863, the original proposal appears to have been the excavation of a canal for irrigation only from Vallavapur on the Tungabhadra *viâ* Hospet, through the Mallápuram pass across the Darojee tank surplus, then towards Bellary, commanding a large plain to the north of that town, thence eastwards, and finally ending in the Hagari. It was calculated by Captain Fischer that from 6 to 700,000 acres were available for irrigation in the Bellary district.

2. At the end of 1859, after the formation of the Madras Canal Company, their Consulting Engineer, Colonel Hugh Cotton, submitted a report * on the projects included in the general scheme of the company, among which the irrigation of the Bellary district found an important place. So far as relates to this district, the proposed projects were a reservoir at Mari with an earthen bund 210 feet high to cost, with distributaries, &c., Rs. 22,60,000; the Upper Bellary project to cost Rs. 41,52,500; and the Lower Bellary project to cost Rs. 28,89,500.

* Printed with G.O., No. 716, dated 4th April 1860.

The Mari reservoir, with an embankment over 200 feet in height and a water-spread of 50 square miles, would contain 4,600 millions of cublic yards of water which, with occasional replenishment from the river and allowing for evaporation, would make 5,600 millions of cubic yards available for irrigation and navigation. The reservoir, besides supplying the deficiency of the river during the five dry months of the year, was to irrigate 50,000 acres in Mysore and 350,000 in Bellary by means of navigable canals.

The Upper and Lower Bellary projects were to consist of a canal taken off the Tungabhadra above the Vallavapur anicut, which was to be rebuilt; it was to be carried to the hills near Bijanaggar, thence through the Mallápuram pass, by the Darojee tank through the military cantonment of Bellary to the Hagari, crossing which it was to be united with the main channel from the Mari reservoir, and so united was to proceed as an irrigation and navigable canal to the Tungabhadra below the confluence of the Hagari.

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The Upper Bellary project was to irrigate 300,000 acres, the Lower also 300,000 acres, or a total in the three projects of one million of acres. The total estimate was thus Rs. 93,02,000, and a return of 30 per cent. was anticipated.

It may be noted that the Upper and Lower projects included two minor storage works to contain 300 millions cubic yards of water each. Captain Rundall, the Consulting Engineer of the company, reported favorably on the proposals of the Chief Engineer of the company, and the Government concurred in the views expressed by Captain Rundall and approved the scheme as laid down, reserving their decision, however, as to whether the Mari tank should be included in the works or not.

Letters printed in—
G.O., No. 962, dated 9th May 1860.
„ „ 1290, „ 4th June „
„ „ 1368, „ 28th „ „
„ „ 1423, „ 4th July „

3. In the letters printed with the marginally-noted Government orders, Colonel Lawford, at that time Deputy Chief Engineer of the Central Circle, strongly opposed the whole scheme. The objections raised by him were—

(1.) The capabilities of the Mari tank had been greatly overestimated, as regards both its capacity and its source of supply.
(2.) A question on the sufficiency of water in the Tungabhadra to irrigate the quantity of land set down.
(3.) A total disbelief in the possibility of a Hindri reservoir.
(4.) The population, without immigration, was quite insufficient to work the land to be irrigated.
(5.) A prediction that, even if irrigation were successfully carried out, malaria would be generated and the Bellary and Kurnool districts rendered more unhealthy than ever.

To these strictures both Captain Rundall and Colonel Cotton replied at length, reiterating their previous views.

4. The Secretary of State having declined, in his despatch, No. 41, dated 29th June 1860, to allow an increase on the one million guaranteed capital of the Madras Canal Company, a revised scheme was submitted by the Consulting Engineer of the company. In this scheme the works in the Bellary district were omitted, as also the proposed storage works.

G.O., No. 2397, dated 20th November 1860.

The Government in their order disapproved of the omission of the Bellary part of the original project, and pointed out that, without storage works, the canals of the company could not be supplied with water during the dry months from December to June. They therefore deputed Major Orr to report on the several points raised by them. In his report, dealing for the most part with the Kurnool canal and Nellore works, it is shown that the Bellary projects could not form part of the scheme as the million already guaranteed would be insufficient to complete the line from Kurnool to Nellore. Besides this, he was of opinion that not more than 500 millions cubic yards of water could be reckoned upon as an average supply from the proposed Mari reservoir, and even if it were otherwise, the waste of water by irrigation and by absorption and evaporation would be so excessive as to make it more than doubtful whether the remote position of the reservoir was well suited to supply a canal below Kurnool.

G.O., No. 93, dated 14th January 1866.

5. Nothing further appears to have been done in regard to the Bellary projects during 1861 and 1862, but in August 1863 the subject was again brought forward by the Collector and the District Engineer, Bellary, and orders were given for preliminary surveys and investigations on the part of Government, it being then understood that the proposed works did not come within the terms of the company's contract. With the sanction of the Government of India a sum of Rs. 4,420 was placed at the disposal of the then

See letter printed with G.O., No. 2773, dated 24th September 1863.

Letters to Government of India, No. 2924, of 7th October 1863.
G.O., No. 3240, of 7th November 1863.

5

Superintending Engineer, 3rd division, for carrying out the investigations under the immediate superintendence of Mr. Supervisor Porter. Some misapprehension appears to have arisen on the part of this officer as to the selection of the proper line for the canal, whether the offtake was to be from Siruguppah or from Vallavapur in the Tungabhadra. Accordingly, a reference was made to Government, who decided that, as the surveys and levels already taken showed that almost insuperable physical difficulties existed on the line originally proposed (the upper), the line from Siruguppah should be chosen, although the town of Bellary would not be commanded.

G.O., No. 3621, dated 8th December 1863.
" " 226, " 21st January 1864.

6. In consequence of a despatch from the Secretary of State, who was of opinion that the Bellary projects, as forming a part of the original Tungabhadra scheme, were included in the contract made with the Madras Canal Company, the surveys and investigations were taken over by the officers of the company.

Printed with G.O., No. 1947, dated 5th July 1864.

7. In March 1865 the Consulting Engineer of the company (Captain Mullins) reported to Government the progress made by the company's officers in the investigations, and from the data then available, estimated the cost of the proposed canal on the high level at Rs. 75,06,000.

With G.O., No. 1085, of 24th April 1865.

8. In August 1866 (a famine year) Captain Fischer and the Collector of the district again urged on Government the necessity for undertaking works for the irrigation of the Bellary district. The Collector (Mr. Wedderburn) was of opinion that, unless early measures for the promotion of this scheme (the Tungabhadra canal) were taken, continuously recurring bad seasons would have a most detrimental effect on the district; but that by an expenditure of one million sterling (as estimated by Mr. Gordon, the company's engineer), the greater part of the district would be protected against famine. The Government in their order stated that they were well aware that the only certain and effectual means of supplying the means of irrigation to the plains of Bellary was the construction of a sufficiently capacious canal from the Tungabhadra at or near Vallavapur, and that the then (1866) state of Bellary showed that no more time should be lost in calling on the company to begin that part of their enterprise.

G.O., No. 2606, of 20th August 1866.

9. In September 1866 the Collector of Bellary proposed, through the Board of Revenue, to commence the canal with famine labor; starting from the town of Bellary, the work to be supervised by an officer of the company, and the money expended to be repaid by the company. The Government in their order negatived the proposal, as they considered that the necessary arrangements could not be made in time.

G.O., No. 2879, dated 10th September 1866.

10. Early in 1867 the Consulting Engineer of the company submitted Mr. Gordon's report, with a review of his own on what was now called the High Level Upper and Lower Bellary projects.

See with G.O., No. 518, dated 21st Feb. 1867.

The project was divided into two parts—the "Upper" and "Lower" Bellary projects high level.

The canal was to be taken from above the existing anicut at Vallavapur in the Tungabhadra, and the head sluice was designed to discharge (eventually) 500,000 cubic yards an hour, with an average depth of 10 feet in the canal to irrigate 150,000 acres.

The total estimated cost, including storage works, was for this part of the project—a distance of about 67 miles to the town of Bellary—Rs. 1,43,88,000, thus detailed in paragraph 101 of the report under notice.

				RS.
Anicut and head works			...	2,00,000
1st section, main canal, 7 miles			...	9,68,100
2nd	do.	10 "	...	8,91,520
3rd	do.	9 "	...	15,94,400
4th	do.	9 "	...	23,46,570
5th	do.	15 "	...	10,19,000
6th	do.	16¾ "	...	5,26,660
Storage of 1,620 millions of cubic yards			...	21,60,000
Distribution of 150,000 acres			...	9,00,000
Preliminary surveys			...	1,20,000
Plant and office stores			...	5,35,000
Buildings including huts			...	1,75,000
Management—Home and Indian			...	29,51,750
		Total	...	1,43,88,000

For the "Lower project," which had not been worked out in detail, Rs. 1,25,00,000 were set down as follows:—

	RS.
Increasing the capacity of the canal above Bellary ...	25,00,000
Canal, Bellary to Hagari ...	12,00,000
Weir across Hagari ...	2,50,000
Canal, Hagari to Hindri water-shed ...	36,25,000
Main irrigation canals ...	3,00,000
25 per cent. for establishments, storage works ...	25,00,000
Total ...	1,25,00,000

The proposed canal was for irrigation only.

The considerations favoring the adoption of the high level in preference to the low level, the cheaper project of the two, were two—first, the advantages which a good supply of good water to the town and cantonment of Bellary would secure, and second, the provision for a possible future line of navigation between Bellary and Kurnool in connection with the Kurnool canal.

The estimated gross return on the project was given as 13·38 per cent., or a net return after deducting charges for maintenance and supervision of 10·88 per cent., based on the supposition of a water-rate of 8·8 per acre on 150,000 acres 1st crop, and a water-rate of 6·8 on 100,000 acres 2nd crop. The Government in their order directed the report to be communicated to the Revenue Department, with a view to ascertain the water-rate which could be imposed on the land.

11. The Revenue Board were of opinion that the rates taken by Captain Mullins were too high and would absorb more than half the net produce of the land. Looking at the circumstances of Bellary, they were not prepared to object to the Kurnool rates of Rs. 6 per acre for 1st crops and Rs. 12 for two crops being levied; but they would be averse to charging a higher rate except on the very fullest evidence as to the capacity of the land to bear it. The Board were strongly in favor of the project, and considered that it was not a question of the comparative profits or advantages of a rainfed or river-irrigated cultivation, but of a certain against an uncertain supply of a necessary of life which would have saved a large amount of loss and suffering had it been available during the past year (1866); and independently of this, the indirect returns to Government would be very considerable from such a large addition to the wealth of the district and the land-tax, exclusive of water-rate, would be largely augmented.

G.O., R.D., No. 2047, dated 2nd Sept. 1867, with P.W.D., No. 2750, of 6th Sept. 1867.

12. From the papers quoted in the margin, it would appear that at one time there was some intention of forming a new contract with the Madras Canal Company for the execution of the "Upper Bellary project," as the one million already guaranteed, though having reference to the whole of the Tungabhadra projects, was proving insufficient for the Kurnool section.

G.O., No. 3124, of 9th October 1867.
G.O., R.D., No. 2343, of 5th October 1867.

13. The investigations of the officers of the company were still continued during 1868 and 1869, and in a report of the Consulting Engineer it was shown that a low-level line (called "Upper and Lower Bellary projects low level"), taken from Hussur, 9 miles below Vallavapur, was practicable and would probably be much cheaper than the high-level line already partly investigated. The Government in their order observe that the low-level line held out the prospect that the serious difficulties and deep cutting that appeared inseparable from the offtake at Vallavapur might be avoided, and they awaited with interest the completion of these investigations. In his despatch the Secretary of State for India was inclined to think that the low-level scheme was preferable to the high-level on account of expense, and also that irrigation was the urgent want of the district and not navigation, as the means of communication would probably be sufficiently provided for by a system of roads acting as feeders to the railway. He trusted, therefore, that there would be no delay in completing a well-digested scheme for an irrigation canal from Hussur. A further report of the investigation carried out to the end of September by the company's engineer was received by Government and recorded.

With G.O., No. 956, dated 22nd March 1869.

With G.O., No. 3771, dated 29th Nov. 1869.

G.O., No. 3744, of 24th November 1869.

14. In January 1870 the Consulting Engineer, Mr. Gordon, forwarded a separate report on the "Upper and Lower Bellary projects low level." This project is for irrigation only, and consists of a main canal with the necessary head and subsidiary works, and of reservoirs to hold 2,320 millions cubic yards of water. The canal starts from the existing anicut at Hussur on the Tungabhadra, and terminates near the Chinna Hagari; its total length is 83 miles. The main canal is designed to carry 425,000 cubic yards an hour at its head, and on the data of 2 cubic yards per hour per acre would irrigate 212,500 acres or half the area commanded.

Letter No. 120, dated 11th January 1870.

As some doubts had been expressed as to the sufficiency of the water available to supply the Bellary canal as well as the Kurnool canal and the Kistna works, the question is fully entered into and it is (attempted to be) shown that the supply of water is superabundant from June to November to allow of irrigating the 1st crops directly and the 2nd crops from reservoirs for the remaining months of the year. The estimated cost was Rs. 1,65,24,640, made up thus:

	Rs.
Excavating main canal and all masonry works	89,41,240
Distribution to 212,500 acres at 3 rupees per acre	6,37,500
Storage of 2,320 millions cubic yards of water	31,00,000
Plant and machinery	5,50,000
Buildings	1,75,000
Surveys	2,25,000
Management	28,95,900
Total ...	1,65,24,640

The returns in the expenditure are estimated as follows:—

	Rs.
212,500 acres at 6 rupees	12,75,000
Second crops at two-thirds the above	85,00,000
	21,25,000
Deduct 2 per cent. for management ...	3,31,000
Net revenue ...	17,94,000

or 10·8 per cent.; while for one crop only, and leaving out the cost of storage works, 7·8 per cent.

No orders appeared to have been passed by Government on this report, and the projects from this time were laid aside till very recently when fresh investigations were ordered.

The two projects as investigated are compared in the following statement:—

—	Cost. With Storage.	Cost. Without Storage.	Area of irrigation.	Net return. With Storage.	Net return. Without Storage.
	Rs.	Rs.	Acres.		
High-level project from Vallavapur	1,43,88,000	1,16,70,500	150,000	8·42	5·71
Low-level project from Hussur	1,65,24,640	1,28,00,000	212,500	10·80	7·8

It should be noticed that, in calculating the returns of the two projects, different data were used, as follows:—

	High-level.	Low-level.
Water-rate, 1st crops	8½	6
Do. 2nd „	6½	6
Maintenance per cent. on construction	2½	2

The ordinary rate in the deltas of the Godávari, Kistna and Tanjore is Rs. 4 per acre, and it is most improbable that any higher rate could be imposed in Bellary with any chance of success.

The reasons that led to the abandonment of the projects as worked out were—

(1.) As the one million sterling guaranteed to the Madras Canal Company had proved insufficient for the Kurnool canal section, the necessity for another guaranteed loan if the company were to execute the required works.

(2.) The enormous expense and, with the experience obtained in the Kurnool canal, the doubt whether there would be any adequate direct returns.

(3.) The insufficiency without storage of the water-supply for more than six months from June to December.

(4.) The projected reservoirs were for the most part in foreign territory, and the consequent difficulty of obtaining the land required under anything like suitable terms.

(5.) The great physical difficulties presented, whichever of the two projects might be chosen.

(6.) Want of experience in the construction of large reservoirs.

(7.) The unsuitability of the work for the employment of famine labor.

If it had not been for this, it is more than probable that the work would have been put in hand in either the famine of 1866 or of 1877.

15. In July 1873 the President of the Municipal Commission of Bellary specially reported on the necessity of supplying water to the town and its cantonment by a channel from the Tungabhadra.

This report was reviewed at some length by the Chief Engineer for Irrigation, and his opinion, "that the prospect of a supply of water being brought to or near the town is so remote as to make it desirable that other sources of supply should be made the most of and improved as far as may be possible," was concurred in by the Government.

G.O., No. 2549, dated 18th October 1873.

16. In June 1875 the Government, in reviewing Colonel Rundall's report on the progress and prospects of irrigation in India, in view to the prevention or mitigation of future famines, remark, with reference to the Tungabhadra project: "That this project is one of such considerable importance in connection with the protection of the part of the Bellary district affected by it from famine, that, if it should appear that it can be carried out without any serious loss, an effort should be made to prevent its being postponed indefinitely." They therefore referred the estimates to the Revenue Department with a view to a comprehensive report being drawn up of the financial aspect of the project in all its bearings. This report appears never to have been made, probably on account of the refusal of the Government at the end of 1876 to commence the work by famine labor as proposed by Mr. Thornhill.

17. Colonel Fischer, R.E., having expressed his wish to explain his views as to an alternative Tungabhadra project, had an interview in June 1877 with Colonel Mullins, who recorded an office memorandum on the subject.

Colonel Fischer's proposals were—

(1.) A reservoir on the Tungabhadra, a little below Hoscotta. Estimated cost 30 lakhs.

(2.) A canal by the Mallápuram and Devalapur passes into the Darojee tank basin. This canal to carry water for 900,000 acres. Estimated cost 50 lakhs.

He estimated the whole expense of the project at 150 lakhs.

Colonel Mullins was of opinion that there was ample evidence to show that the area specified could not be irrigated for anything like the sum named, and that experience on the Kurnool canal showed that a water-rate of Rs. 5 per acre would not be gladly paid as supposed by Colonel Fischer.

Colonel Mullins takes the probable cost of the proposed works at 450 lakhs at the least, and eventually perhaps after many years an average water-rate of Rs. 3-8-0 might be obtained.

The financial results would then be—

Exclusive of interest charges, 900,000 acres at Rs. 3-8-0 =		31·50
Maintenance, 2½ per cent.	11·25	
Revenue collection	1·575	12·825
		18·675

or a net return of 4·15 per cent.

He considered that 45 years would be about as short a time as would suffice to complete the scheme, and that the interest charges would be a very formidable item; and that, unless the Government were prepared to lay out 3 to 5 millions sterling and would be content with a net return of, say, 3 per cent., it was useless investigating the proposed preject.

This project is the one referred to by General Sir A. Cotton in the evidence before the Select Committee on East India (Public Works, see page 250 of Cotton's Public Works in India), and is also the subject of the petition presented to the House of Commons by certain inhabitants of Bellary and sent to this Government for report.

Letter from the Government of India, No. 139 I., dated 30th June 1885.

18. In 1876 Mr. Thornhill, on special duty in connection with the famine of that year, suggested the construction of the high-level channel by famine labor. In consequence apparently of Colonel Mullins having expressed the opinion that both the schemes, the high level and low level, were very unpromising, whether cost, results of outlay, or probability of successful irrigation were considered, the proposal was negatived.

See G.O., No. 210, of 28th December 1876.

19. In 1884 sanction was accorded to the employment of the C. Project division to investigate the possibility of constructing a canal on the high level on a considerably smaller scale than already estimated for, and the investigations are still in progress.

G.O., No. 924 W., of 4th April 1884.

20. In January 1885, when famine was again threatening, the proposal to employ famine labor on the upper high level project was again brought forward, but was negatived by the Government on account of the unsuitability of the work for famine labor, of its great cost, and of the improbability of its ever proving remunerative.

G.O., No. 29, of 10th January 1885.
" " 108, of 26th " "
" " 125, of 30th " "

OOTACAMUND,
17th September 1885.

(Signed) J. O. HASTED, Col., R.E.,
Chief Engineer for Irrigation.

ORDER—dated 13th November 1885, No. 955 I., Public Works.

The Government will await the submission of the estimate referred to in the above note.

2. Ordered that a copy of these proceedings be forwarded to the Government of India, with reference to their letter No. 139 I., dated 30th June 1885.

(Here enter No. 956 I., dated 13th November 1885.)

(True Extract.)

(Signed) H. L. PRENDERGAST, Colonel, R.E.,
Ag. Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Superintending Engineer, III Circle.
" Chief Engineer for Irrigation.
" Revenue Department.

ENDORSEMENT—dated 13th November 1885, No. 956 I., Public Works.

Forwarded.

(Signed) H. L. PRENDERGAST, Colonel, R.E.,
Ag. Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

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Exd. J. Henricus.
Spare Copies

6

IRRIGATION.

Govt. of {1885} Madras.

PUBLIC WORKS.

Dated November, 13th.

Recd.

Encl.

G.O., 13th Nov. 1885, No. 956 I.

NOVEMBER.

Tungabhadra River, Bellary District

Forwarding copy of proceedings on papers on the subject of the establishment of irrigation works on the —.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

READ—the following letter from Major G. F. L. MARSHALL, R.E., Under Secretary to the Government of India, Public Works Department (Civil Works—Irrigation), to the Secretary to the Government of Madras, Public Works Department, dated Fort William, 31st December 1885, No. 328 I. :—

In reply to your endorsement, No. 956 I., dated 13th November 1885, on the subject of the establishment of irrigation works on the Tungabhadra river, I am directed to request that the estimate referred to in paragraph 1 of the Madras Government order may, in due time, be submitted to the Government of India for information, and, if necessary, for orders.

ORDER—dated 6th January 1886, No. 10 I., Public Works.

Communicated to the officers concerned for information and guidance.

(True Extract.)

(Signed) J. O. HASTED, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Superintending Engineer, III Circle.
" Chief Engineer for Irrigation.
" Revenue Department.

Exd. E. Fernandez.
Spare Copies

IRRIGATION.

Govt. of {1886} Madras.

PUBLIC WORKS.

Dated January, 6th.

Recd.

Encl.

G.O., 6th January 1886, No. 10 I.

JANUARY.

Tungabhadra Project, Bellary District

Letter from the Government of India requesting that the estimate for the —, may be submitted when prepared, communicated to the officers concerned.

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GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

READ—the following paper :—

No. 62 I.

Note by the Chief Engineer for Irrigation.

In letter No. 328 I., dated 31st December 1885, from the Government of India printed in G.O., No. 10 I., dated 6th January 1886, it was requested that the estimate, when completed, for the channel from the Valavapur anicut on the Tungabhadra river in Bellary district to the Daroje tank and from that tank to near the town of Bellary, might be submitted to the Government of India for information and, if necessary, for orders.

As so long a time has elapsed since the preparation of this estimate was ordered in G.O., No. 924 W., dated 4th April 1884, it is as well to place before Government what has been done with regard to this important project.

2. Owing to want of establishment the commencement of the investigation of this project was not begun until September 1884, when Mr. Norfor was posted to C. Project division and directed to work out the project under Colonel Vibart, the Superintending Engineer of the III Circle.

3. In March 1885 a preliminary report was forwarded to the Chief Engineer for Irrigation, who, in his memorandum, No. III/7 B.L., dated 24th April 1885, pointed that it was very doubtful whether the supply proposed to be taken from the Tungabhadra was available; that it was not advisable to raise the level of Daroje tank; that this tank and others, if possible, should be utilised for storage; and that it was objectionable to have the supply to the irrigation and to Bellary dependent on a channel 59 miles in length being kept fully supplied (without any storage) from the Tungabhadra river, it having been placed on record by Colonel Mullins and others that it was very doubtful whether the Tungabhadra could be relied upon except during freshes to give a constant supply to more than a small area of cultivation.

4. In November 1885 Mr. Norfor went on furlough, but before leaving he sent to the Superintending Engineer the project nearly completed, as far as I can judge drawn up in accordance with his preliminary proposals and with little or no attention paid to the orders of the Chief Engineer for Irrigation. Mr. Burlton took charge of the project on Mr. Norfor's departure in November 1885, and in August 1886 Colonel Vibart forwarded plans and estimates for the complete project with his letter, No. 1045, dated 20th August 1886.

5. The project as forwarded consists of the following :—

1*st*.—A channel from the Valavapur anicut to Daroje tank, about 36 miles in length, estimated at Rs. 42,38,100.

10

2nd.—A channel for irrigation from Daroje tank, about 7 miles in length, ending in a tank holding 108 millions cubic feet of water. This channel is taken off at the full supply level of Daroje tank, so this tank cannot be used for storage. Estimated at Rs. 5,05,600.

3rd.—A high level channel from Daroje tank to a supply channel from Alipur tank near Bellary. This channel is taken through iron pipes and masonry conduits and is more than 15 miles in length. The water from Daroje tank is to be pumped by steam power to a height of nearly 50 feet. The total estimated cost with engines, &c., is Rs. 7,08,718.

6. By means of the irrigation channels 50,000 acres of additional irrigation is anticipated by Colonel Vibart, who states, in paragraphs 48, 49 and 50 of his letter forwarding the estimates, that the "water-supply will suffice," that "about 750 cubic feet per second" (the quantity required for the cultivation) "will I think be readily available without injury to vested interests for seven months from July to January." Again "in 1884, when only 6 inches of rain fell in Bellary district, there was a fine supply of water in the river."

7. I regret to say that these statements are not borne out by the water returns of Valavapur anicut, and no allowance whatever is made for the extensive irrigation in Bellary district from the river below the Valavapur anicut; and I further regret that this officer did not go more fully into the question of the water-supply available before allowing the project to be prepared in its present form with little or no provision for storage and forwarded it in an incomplete state with no recorded opinions of the Revenue authorities or provision for branch channels, &c., and without attending to the orders given by the Chief Engineer for Irrigation, Colonel Hasted, in his memorandum, No. III/7 B.L., dated 24th April 188 . Had he done this, he would have seen that the water returns fully showed that the opinions of former officers (who have reported on the extension of the Tungabhadra irrigation in Bellary district) were correct as regards the necessity of storage, and that his proposals if carried out would end in failure, as the water returns from 1884-85 and part of 1886 show that the seven months' constant supply anticipated by Colonel Vibart is not available in the river even if taken to the detriment of the existing cultivation.

8. I regret that I am unable to recommend the estimates submitted for sanction, but I consider the information collected would enable a good selected officer with a proper establishment to prepare a project for the irrigation of the 50,000 acres proposed in three or four months and that the total cost of the project will not far exceed that of the one now forwarded. The irrigation project would probably cost 50 lakhs of rupees and give a return of 2 lakhs, and as a work that would enrich a poor tract of country and prevent famine, I would urge that it should be investigated as soon as possible, so that, should at any time funds be available, it may be put in hand without delay.

9. With regard to the quantity of water available in the river and the amount of storage that would be required to cultivate the 50,000 acres proposed, we have the following information.

The Valavapur anicut is about 1,015 feet in length; it is situated across the south branch of the Tungabhadra river. There is another anicut across the north branch called the Koregal anicut, 1,085 feet in length; this belongs to the Nizam's Government, and has been raised 1·8 feet above the Valavapur anicut crest.

Below this there are seven anicuts in Bellary district irrigating about 14,500 acres with a revenue of more than Rs. 1,18,000. An ample supply must be allowed to pass over Valavapur anicut for this irrigation.

At 3 cubic yards per hour per acre or 44·4 acres for each cubic foot per second (the ordinary theoretical supply for this kind of cultivation) it will require 330 cubic feet per second.

Taking into consideration the nature of the anicuts and channels and the long established rights of the cultivators, I consider we ought, when available, to allow not less than double this amount, or, say, 700 cubic feet per second for the cultivation under these seven anicuts.

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10. Below these we have the Kurnool canal taken off at Sunkesala; it is difficult to make any approximation of the quantity of water required for this or for the Kistna irrigation. The catchment basin above the Kistna anicut is about 97,000 square miles, that above the Sunkesala anicut 25,000 square miles, and that above the Valavapur anicut 11,300 square miles.

In statements A and B abstracts of the water returns at Valavapur and Sunkesala anicuts are given. Owing to the great additional catchment basin of the lower anicut we are not able to learn much by comparing them, but it will be seen that the supply at Sunkesala anicut is good for four months, namely, 1st July to 31st October, but is short in November and December. With half a foot on crest the discharge over Valavapur anicut is probably about 500 cubic feet per second. With one foot 2,000 cubic feet, and with $1\frac{1}{2}$ feet it will be at least 4,000 cubic feet per second.

11. I consider we may accept that with $1\frac{1}{2}$ feet of water passing over the crest of Valavapur anicut we may safely take off the 820 cubic feet per second we require for the old and proposed new cultivation to be irrigated by the project, and when the water exceeds this height we may take off as much again if required for storage.

We have, I regret, water returns for four years only, 1884 to 1887, but a reference to statement A shows we can calculate on the $1\frac{1}{2}$ on the anicut crest for the months of August, September and October and for three years in four during July and the greater part of November and a portion of June, therefore in ordinary years assisted by, say, fifteen days' storage we may give a full supply to the cultivation proposed for more than five months which should be ample for the cultivation.

12. The project for the channel, &c., from the Valavapur anicut to the Daroje tank as drawn up by Mr. Norfor (it is based on the project made by Mr. Gordon of the Irrigation Company many years ago) may be generally accepted, but considerable modification will be necessary, as there are many omissions in the estimates, &c. The channel should be made to carry 9 feet depth in place of 8 feet, so that when available water for storage may be passed down in addition to the regular supply required. Daroje tank should be utilised as a reservoir. Its contents from its full supply level to a depth of 7 feet is estimated at 675 millions of cubic feet, and this would be 17 days' supply for the 30,000 acres proposed to be irrigated below this tank.

This extensive storage can be obtained at little or no extra cost and should most certainly be utilised.

The channel from this tank should be taken off at a lower level than proposed by Mr. Burlton, and, judging from the report, this channel, say 7 feet below the level proposed, will command the 30,000 acres of land to be irrigated. I regret that Mr. Burlton's plans being prepared on a single line of contour levels give no information on this point, but there is no reason to doubt but that there is ample land available or to suppose there is any advantage in the channel being taken on the high level proposed and the cost of it on the lower level should be the same. Mr. Burlton proposes a small tank (holding 108 millions of cubic feet or less than 3 days' supply for 30,000 acres), at the end of the channel with 17 days' supply in Daroje tank; this small storage is not necessary, and unless storage can be obtained at a small cost in or near the channel it need not be provided for.

13. Mr. Burlton's proposals for piping masonry conduit, &c., to carry the water from Daroje tank to near Bellary will require considerable modifications, and it is thought that 3,600,000 gallons per day or at the rate of 60 gallons per head for a population of 60,000 (present population being 53,460) is excessive. This portion of the project should wait until the irrigation project is completed.

OOTACAMUND,
6th April 1888.

(Signed) H. R. MEAD, Colonel, R.E.,
Chief Engineer for Irrigation.

To the Joint Secretary to Government,
Public Works Department, Irrigation Branch.

11

A.—ABSTRACT Water of Returns of the Tungabhadra river at Valavapur Anicut showing the number of days water was at or over the following heights on the crest. Total length of the two anicuts 2,100 feet (Valavapur 1,015 feet and Koregal 1,085 feet in length).

Years.	1 JANUARY. Number of days water was at or over				2 FEBRUARY. Number of days water was at or over				3 MARCH. Number of days water was at or over				4 APRIL. Number of days water was at or over				5 MAY. Number of days water was at or over				6 JUNE. Number of days water was at or over			
	½	1½	2½	3½	½	1½	2½	3½	½	1½	2½	3½	½	1½	2½	3½	½	1½	2½	3½	½	1½	2½	3½
1884																								
1885													No returns.											
1886	28	..	..	..	28	..	..	..	31	..	..	..	30	..	..	..	22	4	..	..	30	17	6	..
1887	31	..	..	..	26	..	..	..	31	..	..	..	1	..	..	..	24	8	..	..	30	26	15	7
1888	31	..	..	..	28	..	..	..	31	..	..	..	28	..	..	..	31	2	..	..	30	20	18	8
1889	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1890	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Years.	7 JULY. Number of days water was at or over				8 AUGUST. Number of days water was at or over				9 SEPTEMBER. Number of days water was at or over				10 OCTOBER. Number of days water was at or over				11 NOVEMBER. Number of days water was at or over				12 DECEMBER. Number of days water was at or over				
	½	1½	2½	3½	½	1½	2½	3½	½	1½	2½	3½	½	1½	2½	3½	½	1½	2½	3½	½	1½	2½	3½	
1884	31	27	20	11	31	31	31	18	30	30	24	10	31	31	13	4	30	11	..	..	31	..	..	..	These figure show feet on guage.
1885	14	3	..	..	31	31	31	20	30	30	20	1	31	31	27	13	30	20	1	..	31	3	..	..	
1886	31	31	27	18	31	31	31	24	30	30	28	14	31	31	22	1	30	28	9	4	31	2	..	..	
1887	31	31	26	25	31	31	30	13	30	30	23	7	31	31	17	10	30	30	15	5	31	16	..	..	
1888	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
1889	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
1890	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	

(Signed) H. R. MEAD, Colonel, R.E.,
Chief Engineer for Irrigation.

B.—ABSTRACT of Water Returns of the Tungabhadra River at Sunkesala Anicut showing the number of days water was at or over the following heights on the crest. Length of anicut 4,500 feet.

Years.	1 JANUARY. Number of days water was at or over				2 FEBRUARY. Number of days water was at or over				3 MARCH. Number of days water was at or over				4 APRIL. Number of days water was at or over				5 MAY. Number of days water was at or over				6 JUNE. Number of days water was at or over			
	½	1½	2½	3½	½	1½	2½	3½	½	1½	2½	3½	½	1½	2½	3½	½	1½	2½	3½	½	1½	2½	3½
1872													No returns.											
1873	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	5	..	..	..	11	2	..	..
1874	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	18	5	..	..	28	14	7	..
1875	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6	2	..	..
1876	..	..	..	..	..	..	..	..	4	..	..	..	..	..	..	..	..	..	..	..	5	..	..	..
1877	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	10	..	..	..	21	10	4	..
1878	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	4	..	..	..
1879	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9	4	3	..	30	4	..	..
1880	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15	1	..	..
1881	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	..	..	..	2	..	..	..
1882	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	21	12	8	4
1883	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6	..	..	..	13	..	..	..
1884	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1885	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	22	4	..	..
1886	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11	..	..	..
1887	The lowering of the anicut crest to 3 feet was completed in April 1887 (*vide* letter, No. 33, dated 7th April 1887).																							
Average 1872 to 1886 ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..	..	..	12	3	1	..
1887	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16	..	..	..	16	12	6	..
1888	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1889	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1890	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1891	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Abstract of Water Returns of the Tungabhadra River at Sunkesala Anicut showing the number of days water was at or over the following heights on the crest. Length of Anicut 4,500 feet—*cont.*

Years.	7 July. Number of days water was at or over				8 August. Number of days water was at or over				9 September. Number of days water was at or over				10 October. Number of days water was at or over				11 November. Number of days water was at or over				12 December. Number of days water was at or over				
	½	1½	2½	3½	½	1½	2½	3½	½	1½	2½	3½	½	1½	2½	3½	½	1½	2½	3½	½	1½	2½	3½	These figures show feet on guage.
1872	30	25	19	11	31	28	1	..	30	17	6	..	31	16	7	2	10	..	..	..	11	..	..	..	
1873	31	22	16	2	31	14	4	3	30	22	..	..	31	17	1	..	11	..	..	..	..	..	..	..	
1874	31	24	19	12	31	21	11	6	30	29	20	9	31	25	17	11	30	3	..	..	25	..	..	..	
1875	31	25	16	6	31	23	5	..	30	15	..	..	27	2	1	..	11	..	..	..	..	..	..	..	
1876	28	21	15	5	31	7	3	1	30	7	1	..	7	..	..	..	..	..	..	..	..	..	..	..	
1877	31	7	1	..	31	20	2	..	30	20	6	1	31	22	15	6	30	8	6	2	18	..	..	..	
1878	27	13	2	..	31	20	12	5	30	25	8	3	31	17	6	3	30	7	4	..	5	..	..	..	
1879	31	21	14	2	31	30	18	..	30	10	3	..	31	2	..	..	19	..	..	..	..	..	..	..	
1880	31	22	9	3	31	12	3	..	30	3	2	2	31	12	5	..	28	6	2	..	15	..	..	..	
1881	22	11	4	..	31	15	9	3	30	6	1	1	29	7	3	..	24	..	..	..	2	..	..	..	
1882	31	23	19	16	17	8	1	..	8	2	2	..	3	..	..	..	..	..	..	..	..	..	..	..	
1883	31	28	20	14	31	22	9	2	30	20	14	7	31	22	4	2	30	9	2	..	31	..	..	..	
1884	28	11	3	..	31	17	11	7	30	11	5	2	31	7	2	..	26	..	..	..	..	..	..	..	
1885	31	22	10	1	31	24	10	7	30	9	2	..	16	11	8	7	..	..	..	..	..	..	..	..	
1886	16	13	5	..	26	8	2	..	14	3	..	..	9	4	4	..	4	..	..	..	..	..	..	..	
1887	The lowering of the anicut crest to 3 feet was completed in April 1887 (*vide* letter, No. 33, dated 7th April 1887).																								
Average 1872 to 1886.	22	19	11	5	29	18	7	2	27	13	4	2	24	9	5	2	17	2	1	..	7	..	..	..	
1887	31	25	19	8	31	19	2	1	30	18	9	4	31	10	5	1	30	6	2	..	31	..	..	..	
1888	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
1889	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
1890	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
1891	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	

(Signed) H. R. MEAD, Colonel, R.E.,
Chief Engineer for Irrigation.

Order—dated 14th April 1888, No. 239 I., Public Works.

His Excellency the Governor in Council regrets to learn that the project, as sent in by Colonel Vibart, for the proposed channel from the Valavapur anicut for the irrigation of a large tract of land in Bellary district and for the supply of the town of Bellary is so unsatisfactory and that a great deal of work will have to be done over again.

2. Colonel Vibart, the Superintending Engineer, appears to have paid but little attention to the orders passed by the Chief Engineer for Irrigation in 1885 and not to have seen that they were carried out by the Executive Engineers in charge. The estimates have also been submitted in a very incomplete state and with little or no examination.

3. The project is not one that will give a large direct return, but it will enrich a very poor tract of country, and it is important that it should be prepared and sanctioned so that it may be put in hand whenever funds may become available; but at present no officer can be made available for this work, but it must not be lost sight of, and as soon as establishment is available the necessary plans and estimates should be prepared.

(True Extract.)

(Signed) H. R. MEAD, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
" Superintending Engineer, III Circle.
" " V "
" Revenue Department.

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Exd. J. Moses.
Spare Copies

CHIEF ENGINEER
No. 3152
28 APR. 88
FOR IRRIGATION.

IRRIGATION.

Govt. of {1888} Madras.

PUBLIC WORKS.

Dated April, 14th.

Read.

Encl.

G.O., 14th Apr. 1888, No. 239 I.

APRIL.

Tungabhadra Project, Bellary District

Orders on note by the Chief Engineer for Irrigation regarding work done in connection with the proposed channel from the Valavapur anicut for the irrigation of a large tract of land in the Bellary district and for the supply of the town.

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GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation

Read—the following papers :—

From Colonel H. M. VIBART, R.E., Superintending Engineer, V Circle, to the Secretary to Government, Public Works Department, dated Bangalore, 18th June 1888, No. 1114.

With reference to G.O. No. 239 I., of 14th April last, and in continuation of my letter No. 504, of 7th May 1888, to the Chief Engineer for Irrigation, I have the honor to forward the following remarks with the view of showing that the censure conveyed in the Government Order is unmerited, that the remarks of the Chief Engineer for Irrigation, in his memorandum on which the Government Order is founded, are unjustifiable, and that the statements which led him to condemn my scheme in such an unreserved way are incorrect and apt to mislead the Government.

2. In his Note Colonel Mead states that little or no attention was paid to the orders of the Chief Engineer for Irrigation, that I did not go fully into the question of the water-supply available, and that I did not, in point of fact, take any trouble with the project.

3. Now, first with regard to what Colonel Mead calls the "orders" of the Chief Engineer for Irrigation, I have the Chief Engineer's memorandum before me, and it contains no absolute orders, having been apparently written to give me assistance by making suggestions as to the course to be pursued. It seemed to me that the water in the river available during the season was quite sufficient to irrigate 50,000 acres without any storage, and I consider the statistics we now have fully bear me out in my opinion. When Colonel Hasted wrote his memorandum, No. III/7 B.L., Mr. Norfor had been engaged on the project for nearly eight months, and had, to a very great extent, completed the project previously intended; and as he had still a certain amount to do to complete the upper project as far as Darogee tank, and had practically finished the project from Darogee tank to Bellary, he asked permission (as he then was shortly going home) to complete the upper project and to let his successor attend to the revised project below Darogee tank. This I allowed him to do, and he sent in the project from Vullabapur to Darogee as well as the one from Darogee to Bellary, which was disapproved of by Colonel Hasted.

4. Mr. Burlton succeeded Mr. Norfor, and got up the project for the channel from Darogee tank for irrigation as well as the project for supplying water to Bellary for domestic purposes. The proposal to raise Darogee tank weir between 3 and 4 feet was abandoned, and the level of the channel to supply irrigation between Darogee and the river was lowered to more than 7 feet below crest of weir of tank. Colonel Hasted only "thought that extension of irrigation must principally be looked for under Darogee tank by taking advantage of freshes so as to fill the tank three or four times during the season."

He gave no absolute orders on the subject, and I having come to the conclusion that there was sufficient water in the river to irrigate 50,000 acres direct, without storage, and that the channel from the river must be as economical as possible arranged to have the channel carry only sufficient for 50,000 acres.

5. It is quite true that Colonel Mullins considered it very doubtful whether the Tungabhadra could be relied on to give a constant supply except to a small area of cultivation. His opinion his doubtless entitled to respect, but it would appear from

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the tenor of his remarks that he had not founded his opinion on statistics regarding the actual discharge of the river at Vullabapur. Early in 1884 I endeavoured in vain to get any recorded register of river discharge at Vullabapur. I am glad to be able (for the sake of the district of Bellary) to say that I by no means agree with Colonel Mullins. I had a better opportunity of judging than he had, for before I sent up the project, we had the water registers for two years.

6. I will now proceed to the matter of water-supply available, and I feel sure that an unbiased mind will readily believe that there is sufficient water in the river to supply 50,000 acres in Bellary without any resort to storage.

7. Colonel Mead takes exception to my statement that "the water-supply will suffice" and "that about 750 cubic feet will, I think, be readily available without injury to vested interests from July to January," and that "in 1884, when only 6″ of rain fell in Bellary, there was a fine supply of water in the river," and observes that these statements are not borne out by the water returns of Vullabapur anicut, &c.

8. Now I went into the water-supply question as far as I was able. Previous to my arrival in the district there were no statistics regarding the river-supply available, and it was I who started the register in June 1884 (three or four months after I took over charge).

9. Now, as regards the months of August, September and October, there is no difference of opinion between Colonel Mead and myself regarding the sufficiency of the water, so I will pass on to the other months.

10. First as to July (I am now dealing with records of four years).

In 1884, for 26 days, the level was up to and above $1\frac{1}{2}$ feet;
" 1886 there was never less than $2\frac{1}{4}$ feet;
" 1887 never less than 2 feet.

In 1885 the record is less favourable, but even then for the last ten days of the month there was 1 foot, and for the last few days $1\frac{1}{2}$ feet, and the cultivation even in that year could have been commenced about the middle of July,* as the tank would be full; for during the month of June there was never less than 1 foot in the river, and on 17 days it was up to and over $1\frac{1}{2}$. Now with reference to November (out of 120 days, taking the four years) the water was never below 9 inches, and that on only four days; while on only 15 days was it below $1\frac{1}{2}$ feet.

In December again it was never below 9″;
It was over 1 foot for 99 days out of 124;
for 66 " it was over $1\frac{1}{4}$″;
and for 34 " over $1\frac{1}{2}$.

* The river was so extraordinarily low in the beginning of July that it must be considered an exceedingly exceptional occurrence. On the 17th July it was 2 feet below the crest of anicut, and during the four years, from July 1884 to March 1888, it was never so low as this, even in the hot weather. We have records for 45 months and during all that time the water level was only below crest of anicut on 61 days; 45 of these during the hot weather, and 16 in July 1885. Hence it is extremely unlikely such a low level will be reached again in July for many a long year.—H. M. V.

11. I will show later on that when 6 inches is flowing over the anicut, there is amply sufficient for the supply of 50,000 acres.

12. To support my assertion that in 1884 there was a fine supply in the river, I must again refer to the registers:

In July I find that for 11 days there was $3\frac{1}{2}$ feet or over;
20 " $2\frac{1}{2}$ "
and that for only four days was it less than $1\frac{1}{2}$ "
In August there was never less than 3 feet;
while for half the month it rose to 4 " and over;
and during one-third of the month, it rose to 6 "
for eight days it was over $7\frac{1}{2}$
and it rose even higher than this to 9, 10, and even $12\frac{1}{2}$ feet.

In September there was never less than $2\frac{1}{2}$ feet;
for 24 days it was over 3 "
for 10 days over 4 "
and it rose on several days to 6 feet and on one day to $9\frac{1}{2}$ feet.
In October there was never less than 2 feet;
for 10 days it was over $3\frac{1}{2}$ "
and for a week it was $4\frac{1}{2}$, $5\frac{1}{2}$ and $6\frac{1}{2}$ "
In November it was only less than 1 foot on 4 days;
and for 10 days it was over $1\frac{1}{2}$ feet.
In December it was never less than 9 inches;
and for 10 days over 1 foot.

Now considering that practically in 1884 there was no rain in Bellary (for 6 inches can be considered only as a mere trifle), I think the water* in the river may be decidedly taken as a "fine supply."

* It would have sufficed to irrigate the *whole* district of Bellary.—H.M.V.

13. As I have before observed, I cannot agree with the opinion of former officers regarding the necessity of storing water for the reduced area to be supplied, and I do not believe that the water returns in any way support their opinions.

14. If my proposals are carried out, I feel sure they will not result in failure, and I think before the Government have finished perusal of this letter, they will be far more disposed to agree with me than with Colonel Mead.

15. He complains that I forwarded no recorded opinion of the Revenue authorities. Now I by no means lost sight of this point as will be shown by the correspondence with the Collector, which I beg to enclose. I certainly did not suppose for a moment that the estimates, &c., sent in by me would be passed on to Government without some discussion between the Chief Engineer for Irrigation and myself.

I sent up the project just before I went on privilege leave in August 1886, and the correspondence with the Collector was still incomplete. I returned from privilege leave in November, but I heard nothing further officially from the Chief Engineer for Irrigation about the plans, &c., till a short time ago, when Colonel Mead wrote his memorandum. Twenty months had elapsed from the time I sent in the project. In the ordinary course the papers would have been sent back to the Superintending Engineer for such explanations as he might have to offer, and he would have been asked to supply any omissions and to correct any errors which might have been found.

16. About a year before Colonel Mead wrote his memorandum, I had been transferred to the V Circle, and this obvious course was not taken. Colonel Mead asked me about the project in November last, and I wrote him the enclosed note on the subject; but until I saw his memorandum in print, I had no idea that he was about to write so unfavourably regarding me, and I cannot think it was right of him to write so strongly without giving me an opportunity of replying officially to his strictures.

17. I must now enter on the subject of the quantity of water in the river in greater detail. The Vullabapur anicut is 1,015 feet long, and is separated from the Koragul anicut (1,085 feet) by an island. The latter belongs to the Nizam's Government, and has, during the last few years, been raised 1·8 feet about the level of the Vullabapur anicut. I think it is a pity that this was allowed; if raising was necessary at all, it would have been better to raise both anicuts, say, 9 inches. This would have had much the same result in raising the river level when the water was low, and during floods each branch would have discharged its proportionate quantity; but now the floods will be raised 1 foot, and our branch will be called upon to discharge more than its fair share.

18. The irrigation in the Bellary District from the river channels amount to 14,500 acres. Between 1,300 and 1,400 of this is supplied by the Buswanna channel, which takes off above the Vullabapur anicut, so below the anicut water is only required for 13,000 acres.

19. It has always been considered that 2 cubic yards per hour per acre will suffice for rice cultivation, and that 1 cubic foot a second will irrigate 66·6 acres, and this quantity has been allowed for in the project.

20. Colonel Mead says the quantity required is 3 cubic yards per hour. This latter quantity being allowed about 300 cubic feet a second would be required below the anicut.

Colonel Mead considers that this should be doubled. I myself think this quite unnecessary if proper steps are taken to prevent waste in the river channels; but even if the very large quantity of 700 cubic feet a second is to be allowed for 14,500 acres, I can still show that there is ample besides for 50,000 acres at 2 cubic yards per hour per acre.

21. Colonel Mead states that the discharge over the anicut is—

	Cubic feet a second.
With ½ foot on crest probably about	500
„ 1 „ „ „	2,000
„ 1½ feet „ „	4,000

Now I calculate the discharge to be very much higher than this.

22. Merely taking the discharge over a weir, ignoring the velocity of approach (which, although, of course, small when river is low) must be appreciable in a river which has a fall of 7 or 8 feet a mile.

I find the discharge to be—

	Cubic feet a second.
With ½ foot	1,280
„ 1 „	3,620
„ 1½ feet	6,650

In addition to his we have available the discharge of the two channels (one on each side of the river).

I find that when there is—

	Cubic feet.
½ foot on anicut, the Buswanna channel will discharge about ...	500
1 „ „ „ „ ...	660
1½ feet „ „ „ „ ...	760

This will make the total discharge available amount to 1,780, 4,280 and 7,410, respectively, without including the channel on the Nizam's side, which probably takes off two-thirds as much as the Buswanna. I do not know accurately the amount of irrigation under the Nizam's channel, but I think it may safely be assumed that it does not exceed 3,000 acres.

The channel is only I believe 12 miles in length, and the strip of ground watered between the channel and the river has not I take it more than an average width of one-third of a mile. It seems clear then that 300 cubic feet a second cannot be required for this area, and that even allowing the high rate mentioned by Colonel Mead (about 1 cubic foot for 21 acres) only 150 cubic feet a second would be necessary, and the balance of 150 cubic feet a second will return again into the river below the anicut,* so that actually the amount available for our river cultivation and the proposed new area will be at—

½ foot on crest	1,780 + 150 = 1,930
1 „ „	4,280 + 250 = 4,530
1½ feet „	7,410 + 350 = 7,760

* I may also remark that there are two under-sluices in the Koragul anicut, and that a great deal of leakage passes through these sluices. Even in the driest weather there is a good deal of leakage. This water would also be available for the lower irrigation.—H.M.V.

2220

Now taking 700 as that required for the present river cultivation* on our side (I consider 350 should suffice), we have 1,230 cubic feet a second to indent upon for our supply, which is fully 500 cubic feet more than we require, and this when there is merely 6 inches on the Vullabapur anicut. I am quite sure that the abstraction of 750 cubic feet from the river, under these circumstances, will not in any way prejudice the river cultivation in our district of Bellary, and will hardly affect the level of water over anicut, as even now 800 cubic feet are drawn off the river † by the Buswanna and Koragul channels when there is 6 inches on anicut.

* Only 13,675 acres would require water below Vullabapur anicut as the Buswanna irrigation will be provided for by the Vullabapur channel. Hence at Colonel Mead's rate only 616 cubic feet per second will be required below the anicut, while nearly 1,000 would pass over anicut, and would be available besides surplus water from Koragul channel and anicut.—H.M.V.

† Under the altered circumstances, we should not require to draw off more than about 1,100 cubic feet; only 300 more than at present, and this would only lower the water 1 inch.—H.M.V.

As for the Kurnool works, it is to be remembered that Sunkesala is 132 miles from Vullabapur, and that this 750 cubic feet in passing for so many miles over a wide sandy bed would probably disappear and be swallowed up by evaporation and absorption before it could reach Sunkesala; but even if it is assumed that this 750 cubic feet a second does reach Sunkesala, it would have but a trifling effect in raising the water there, as the anicut is 4,500 feet long and with a depth of 6 inches. 5,660 cubic feet per second are discharged, and an additional discharge of 750 cubic feet would only raise the water about half an inch. As for the Kistna I am at a loss to understand how anybody can believe that the abstraction of 750 cubic feet a second from an affluent of the Kistna, nearly 400 miles above Bezváda, can possibly affect its irrigation, especially when we consider that the Kistna has 86,000 square miles of catchment, quite independent of that of the river above Vullabapur.

23. I enclose Collector's estimate of returns. I have corrected this estimate as regards acreage.

The Collector was under the impression that the extent of land to be supplied included the present cultivation, whereas it really was in addition to that already watered. From this it will be seen that the returns will amount to Rs. 2,02,000 on a total expenditure of 47 lakhs, which is nearly 4⅓ per cent.

The Collector considers that this result will not be reached till 15 years after completion of project.

24. The final letter of the correspondence with the Collector was written by me the day before I left for England on privilege leave. After my return I heard nothing further regarding the project, and the subject was put on one side for the time, as there were, of course, many other subjects to be considered, and in less than six months after my return I was transferred to Madras.

25. With reference to the provision of branch distributing channels. There was, indeed, no time for working these out in detail; moreover, it would have been superfluous to do this until the general scheme was adopted by the Government.

By a reference to the general abstract of cost, it will be found that no less than Rs. 1,50,000 were allowed for distributaries (50,000 acres at Rs. 3 an acre) besides Rs. 12,000 for sluices.

26. Colonel Mead proposes to get enough water for storage by making the channel sufficient to carry an extra depth of 1 foot, and states that this storage can be obtained "at little or no extra cost."

There is no question of the water being available, but I do not see how this extra water can be passed down the channel "at little or no cost." I think the cost will be considerable, as all the surplus works will have to be raised, and the expensive walling, which is required in 18th, 21st and 26th miles, will require strengthening and raising. The banks of the tanks through which the channel passes will also have to be raised, and other works, such as bridges and aqueducts, will probably have to be improved. If it is proposed to go to the extra cost of making the channel carry a foot

or so more water, then it seems to me that it would be better to raise the weir of Darogee tank some 3 or 4 feet and restore the Cheetah tank (a little distance above Darogee tank) rather than lower the level of the Darogee-Sidamanhalli channel.*

* It might also be feasible, as suggested by the Collector, to construct a small reservoir near Cumnapore—H.M.V.

27. The land commanded by this channel probably amounts to 96,000 acres; now about one-third of this will be commanded by the channel near Dewalipur, so that 64,000 will be available from which the ryots can select land to be watered by Darogee-Sidamanhalli channel.

A considerable amount of this land will be required for villages, dry cultivation, grazing lands, channels, roads, &c., and some of the land may prove unsuitable for wet cultivation. If the channel is taken off 7 feet lower than is proposed, the cultivators will be greatly restricted in their choice.

28. To show that this is not an imaginary objection, I beg to insert an extract of a letter from the Collector of Bellary bearing on this point: "In black soil the people best acquainted with its properties, those who live on and by it do not cultivate the whole area which seems available. The fine reservoir at Kanekal waters a tract of black aluminous soil, and the farmers have sufficient stock and labor, but they do not keep in cultivation quite two-thirds of the ayacut (1,400 out of 2,100), this was observed just as much before the famine as in these latter years." "On the other hand, the fact that the work is stated by you to command 64,000 acres will make it possible to select the 30,000 acres most suitable for irrigation in the tract, and justifies our assuming that the whole area for which we could supply water eventually would be brought under cultivation."

29. Mr. George Gordon, Member of the Institution of Civil Engineers, was of much the same opinion as will be seen from an extract of a paper read by him before the Institute of Civil Engineers in 1872. He says: "It is desirable that a main canal should command a much greater area of arable land than the water it carries can irrigate constantly; some land may not be suitable for irrigation at all, and in no case could all the land be converted from dry to wet cultivation under many years, as three times the population would be required to cultivate it."

30. In the last paragraph of Colonel Mead's memorandum, he states that Mr. Burlton allowed 60 gallons per head for the water-supply to Bellary.

This is not the case; he only allowed 36 gallons a head for 100,000 people. In my letter, forwarding the project, I pointed out that the population of Bellary was not much more than 50,000, but that if this project was carried out, Bellary would increase considerably in importance and extent. I added, however, that if it was considered necessary only to provide for 50,000 people, the cost of the project would be reduced in works alone by a sum of about Rs. 1,10,000. The total cost, including per-centages, would be diminished by nearly Rs. 1,50,000, and thus the expense of supplying 36 gallons a head to 50,000 people would be about 5,87,000 in place of 7,37,000 rupees.

Thirty-six gallons a head per diem is a very liberal allowance, but it is to be recollected that Bellary is an especially dry place where evaporation is very excessive, and the want of water very great, especially during the hot months when the river (and consequently the Darogee tank) would be at its lowest.

The water will have to be stored in the fort ditch, and here evaporation must be especially great owing to the proximity of the bare granite rock of the fort.

31. I have always taken the greatest interest in the project, and was, I think, the first to suggest a modified scheme on a comparatively small scale. I endeavoured to frame a scheme which would be as inexpensive as possible, and with this view reduced the main canal to the least possible. Hence it was not practicable to allow anything for the passage of storage water.

I urged the Chief Engineer for Irrigation to visit Bellary with reference to the irrigation from the Tungabhadra, and I accompanied him to Vullabapur, Darogee, &c., with reference to the project. All the time I was in Bellary I used my best

endeavours to improve the Tungabhadra river channels, and did all possible to get the management * of these channels into the hands of the Public Works Department, with the view of checking the great waste of water which takes place, and also for the purpose of regulating the distribution and demarcating the channels with the object of putting a stop to encroachments which have been very extensive and extremely detrimental to the interests of the ryots and Government alike.

* Précis of correspondence on this subject is enclosed for reference.

32. I endeavoured, as far as I could, to carry out the suggestions of the Chief Engineer for Irrigation, and the only reasons I could possibly have in deviating from them was to ensure the economy of the scheme, which I consider most essential to the well-being of the district. I do not, of course, deny that if the scheme was to be more extensive, allowance for storage would be a *sine qua non*.

33. I think it will be seen from this letter that there is very much to be said in favor of the scheme sent in, and although it may contain errors, and is not as complete in details as might be desired, I would ask whether any scheme of this extensive nature is free from defects, until it has been subjected to some discussion.

34. In conclusion, I have the honor to request that this letter may be placed before the Government to show them that I interested myself warmly in the project, and that I have not laid myself open to the censure conveyed in the orders under remark. My action throughout has, I beg leave to assert, been *bonâ fide*, and in the true interests of Government.

35. This letter has been delayed a good deal by the necessity of obtaining a large number of papers from the III Circle.

No. 354 D.

Referred to the Chief Engineer for Irrigation for remarks.

Ootacamund, 22nd June 1888. (Signed) J. O. HASTED, Colonel, R.E., Secretary to Govt., P.W.D.

From Colonel H. M. VIBART, R.E., Superintending Engineer, V Circle, to the Secretary to Government, Public Works Department, dated Bangalore, 4th July 1888, No. 1445.

I beg to point out that in the latter part of para. 10 of my letter of 18th June 1888, regarding the Tungabhadra project a slight error has been made. It should read thus: "Now with reference to November (out of 120 days taking the four years) the water was never below 9 inches, and on only four days below 1 foot, while on only thirty-one days was it below $1\frac{1}{2}$ feet."

No. 70 E.W.

Note by the Chief Engineer for Irrigation.

Reference—Endorsement from the Secretary to Government, Public Works Department, No. 354 D, dated 22nd June 1888.

In his letter No. 1114, dated 18th June, Colonel Vibart complains that he has not been fairly treated by me in my Note No. 62 I., forwarding to Government the estimate for the Tungabhadra project in Bellary District (*see* G.O. No. 239 I., dated 14th April 1888).

The following are the principal points brought forward by Colonel Vibart:—

(1) That Colonel Hasted's Memorandum No. III/7-B.L. of 24th April 1885, was not orders but only suggestions; therefore he was perfectly justified in carrying out his own views (*see* paras. 2, 3, and 4).

(2) That he did not suppose the estimates, &c., would be forwarded to Government without some discussion between the Chief Engineer and himself (para. 15).
(3) That he was asked by me about the project and wrote a demi-official letter on certain points explaining them (*see* para. 16).
(4) That he was in correspondence with the Revenue authorities with regard to the returns, but that when he forwarded the estimates this was not completed (paras. 23 and 24).
(5) That there is a money provision for the branch channels (para. 25).
(6) That the water-supply in the river is ample without any storage (paras. 5 to 14 and 17 to 22).
(7) That the cost of passing an extra foot in depth down the channel for storage would be very great (para. 26).
(8) That the level at which the Sidamanhalli channel is proposed to be taken off, namely present level of Darogee tank F.S.L., ought on no account to be lowered (and that if storage is required Darogee tank F.S.L. should be raised), because if the channel is taken off 7 feet lower sufficient land will not be commanded (para. 27).
(9) That he (Colonel Vibart) has always taken the greatest interest in the project, and that he proposed to take measures to check the great waste of water in the Tungabhadra channel, &c., (para. 31).

With regard to No. 1, I can only refer to the memorandum in question, and I consider Colonel Vibart was not justified in forwarding the project as he did in 1886, taking no notice of the fact that no provision for storage had been made, and only giving his opinion that the supply was ample. The date of the memorandum is 24th April 1885; there was ample time for Colonel Vibart, if he did not agree with Colonel Hasted, to have given his opinion regarding the question of storage and to have asked for orders.

2. As so long a time had elapsed since the plans and estimates have been put in hand, I considered it right to place before Government the information regarding the project that had been collected.

As Colonel Vibart had left the Circle, and as owing to reductions in establishment, it was hopeless to expect that anything towards making the project complete could be done; it was useless, therefore, referring officially to him regarding his proposals which he had forwarded, and given his opinion that the work should be carried out without delay. *See* para. 52 of his letter No. 1045, dated 20th August 1886, forwarding the project.

3. When I found that Colonel Hasted's orders or suggestions had had no attention paid to them, I sent for Colonel Vibart and asked him to explain how this was, and I also pointed out several serious omissions in the project; he asked to be allowed to take away the papers and consult Mr. Burlton, who was then at the Mount; this he did, and the result was his demi-official letter, a copy of which he gives. I do not consider it is any explanation at all; it only says that storage was thought unnecessary, but recommends, if storage is thought necessary, that as at first proposed by him that the F.S.L. of Darogee tank should be raised. This is against Colonel Hasted's ideas, and I for one can see no reason for it.

4. When I looked through the project, I had of course only the papers, &c., that Colonel Vibart sent with it; the fact of their being letters between him and the Collector of Bellary does not in any way show that my statement, that the project was sent in without any recorded opinions of the Revenue authorities, is incorrect. I have to point out even the correspondence now forwarded is hardly sufficient to base a large project on, and certainly on his return from leave, or when I asked him about the point last November, he might have referred to this correspondence.

5. There certainly is money provision for distribution channels and head sluices, but in the project there are no levels or surveys to show generally where these distributaries are to run or where the land to be irrigated is situated. The project simply consists of a main channel to and from the Darogee tank.

6. With regard to water-supply, this is a question about which there must be different opinions. Colonel Vibart ought, I consider, in forwarding the project to have gone fully into the question, and not, as in his report forwarding the project, contented himself in only saying the quantity required would be available for seven months.

It is too late for him now to go into elaborate calculations; this ought to have been done before he had the project prepared without any storage and when he received Colonel Hasted's orders or suggestions to furnish storage.

I consider that Colonel Vibart's figures of quantities are much higher than they should be; at the same time, I am quite willing to allow that my figures are perhaps too low; this I did intentionally, as I consider it right in a project of this sort to be on the safe side. We have only four years' records to go on, and this is but a short period on which to base a project.

Colonel Vibart has taken a coefficient of ·67, and allowed for the water in the anicut crest to have a clear fall.

I consider this as more than it should be for a depth of half a foot and a foot going over an anicut. Of course, the coefficient depends entirely on where the gauge is and the nature of the crest of the anicut.

I took a coefficient of $\frac{5}{8}$ and for half foot overflow took about half the theoretical quantity for a clear fall, for 1 foot and $1\frac{1}{2}$ feet I took about $\frac{2}{3}$; these are I consider low but safe quantities to work on.

With regard to supply required for the cultivation 2 cubic yards per hour per acre with good regulation is, I believe, ample even in Bellary District, but with bad or rather no regulation 3 cubic yards is not an extravagant allowance.

Again, judging from the records (*see* Mr. Garrett's report forwarded by Colonel Vibart), I do not consider the 700 cubic feet per 1 inch allowed by me as too much. Colonel Vibart states in para. 20 he thinks this unnecessary if proper steps are taken to prevent waste in the river channels.

I am not aware that in Bellary or in other places we are likely to be able to do this; at any rate, we have to accept the fact of waste.

Opinions do and must differ as regards the supply available in rivers; but judging from the serious over-estimates of supply available that have been made in many places, I prefer my figures to those of Colonel Vibart's, as they have been taken on the safe side. Colonel Vibart's are, in my opinion, much too high; he had, when forwarding the project, only two years' returns; we now have four years nearly.

7. Colonel Vibart in his remarks forgets that he has allowed M.S.L. to be $1\frac{1}{2}$ feet above F.S.L., therefore there will be no necessity to raise the banks or expensive walling, &c., in order to pass down an extra foot of water.

8. With regard to this point, I regret that there is no information whatever given in the papers, surveys, &c., that have been forwarded, and I cannot therefore accept Colonel Vibart's assertion that taking the channel from Darogee tank on a line 7 feet lower than proposed would reduce the area of the land commanded dangerously.

In the plans, &c., forwarded, the only information given is the level of the land through which it is proposed to take the channel, and there is nothing to show the area of land commanded. In Colonel Vibart's letter now forwarded, he states that 96,000 acres probably are commanded by the channel, out of this he proposes to irrigate 50,000; this to me in a country like Bellary (not taking into consideration the facts brought to notice in para. 28 of his letter) is a very large proportion, and for this extent of cultivation, I consider a much larger proportion of land should be commanded. I suppose this area of 96,000 is gross area, and not selected blocks of land. Without definite information it is useless attempting to argue on this point, and this information has not been given.

9. I have no doubt but that Colonel Vibart has taken great interest in the project, and has proposed to check the great waste of water that occurs in the Tungabhadra channel, but this has nothing to do with the points in question.

In conclusion, I consider that Colonel Vibart, after being in charge of the preparation of the project, and being given an officer and a special establishment to work it out from September 1884 to, I believe, August 1886, forwarded the project in a very incomplete state, and also did not attend to the orders or suggestions given

to him by the Chief Engineer for Irrigation, Colonel Hasted. Nor did he refer to that officer for further instructions as he should have done when he considered those orders could be with advantage modified.

When this and other (real or apparent) omissions were pointed out to him, he did not give a satisfactory explanation, and he has, therefore, no right to complain that he was not referred to before I placed before Government the present unsatisfactory state of the project.

With regard to the supply available, I consider that for the cultivation of the 50,000 acres proposed, storage is necessary and advisable, and I further believe, after considering Colonel Vibart's letter, that it is doubtful whether the land commanded by the channel is sufficient for the irrigation of 50,000 acres. This point will have to be carefully considered when the project is taken up again.

3rd July 1888. (Signed) H. R. MEAD, Colonel, R.E.,
Chief Engineer for Irrigation.

To the Secretary to Government, Public Works Department.

Order—dated 21st July 1888, No. 2235 W., Public Works.

In his letter No. 1114, dated 18th June, now submitted, Colonel Vibart appeals against the censure conveyed in G.O. No. 239 I., dated 14th April 1888.

2. Colonel Vibart, in August 1886, submitted plans and estimates for the Tungabhadra channel project, which the Chief Engineer for Irrigation forwarded to Government with a Note containing some severe strictures on the way in which the estimates were prepared. The Government, accepting the views of their professional adviser, expressed their regret that the project had been sent up in an unsatisfactory state, and remarked that Colonel Vibart appeared to have paid but little attention to the orders of the Chief Engineer for Irrigation, and had submitted the estimates in a very incomplete state and with little or no examination.

3. Colonel Vibart now explains that the so-called orders by the Chief Engineer for Irrigation were considered by him as suggestions for his guidance, and, at very considerable length, gives his reasons for having submitted the project as he did, and explains the deep interest he took in the project, and the care and attention he devoted to the subject.

4. The Chief Engineer for Irrigation does not accept these explanations, and demurs to Colonel Vibart's views on many points.

5. The Government accept the views of the Chief Engineer for Irrigation on the professional questions involved and must decline to enter into any discussion on this part of the subject. Colonel Vibart's view that the Chief Engineer's memorandum of April 1885 should be regarded as containing suggestions rather than orders may perhaps be admitted, but, even when it is taken in that light, the point which it puts forward as of primary importance, viz., the sufficiency of the supply in the river, demanded much fuller treatment than it received in two short sentences of his 50th paragraph. The elaborate calculations now submitted may be of some value when the project is revised, but they ought to have been furnished before. While they accept Colonel Vibart's assurance that he took the greatest interest in the project, the Government cannot entirely relieve him from the imputation of having sent it up in an incomplete form and without sufficient detail. If he did not intend his report to be regarded as a complete project, he should have submitted the estimates as approximate merely, and requiring further orders before they could be laid before Government.

(True Extract.)

(Signed) J. O. HASTED, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintending Engineer, V Circle.
„ Chief Engineer for Irrigation.

Exd. F. R. Bantleman.

Spare Copies

General Estabt

~~IRRIGATION.~~

Govt. of {1888} Madras.

PUBLIC WORKS.

CHIEF ENGINEER
No. 1579 W
15 AUG. 88
FOR IRRIGATION.

Dated July, 21*st*.

Recd.

Encl.

G.O., 21st July 1888, No. 2235 W.

JULY.

Tungabhadra Project, Bellary District

Orders on an appeal from Colonel Vibart, R.E., against the censure conveyed in G.O. No. 239 I., dated 14th April 1888, for work done by him in connection with the proposed channel from the Vallabapur anicut, for the irrigation of a large tract of land in the Bellary District and for the supply of the town.

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GOVERNMENT OF MADRAS.

REVENUE DEPARTMENT.

READ—the following Proceedings of the Board of Revenue (Revenue Settlement, Land Records and Agriculture), dated 13th July 1888, No. 316 :—

W. WILSON, ESQ., M.A., C.S.

Read—again the following Proceedings of the Board of Revenue (Revenue Settlement, Land Records and Agriculture), dated 19th April 1888, Mis. No. 813 :—

Read—the following letter from H. ST. A. GOODRICH, Esq., Collector of Bellary, to the Secretary to the Commissioner of Revenue Settlement and Director of the Department of Land Records and Agriculture, dated 4th April 1888, Reference on G. and B. No. 232—1888 :—

Adverting to Board's Proceedings, No. 27, dated 24th January 1888, I have the honor to forward herewith a list of civil agency works which are suitable for famine relief in this district.

2. These works have been selected from the lists sent up to Board in 1884 with Mr. Galton's letter, No. 3560, dated 29th December 1884, printed in G.O., No. 29, Revenue, dated 10th January 1885. As reported in paragraph 4 of the above letter, they were drawn up by Mr. Sewell in September 1884, when he was in charge of the district and when famine was apprehended. In paragraph 2 of G.O., No. 231, Revenue, dated 21st February 1885, the Government have generally approved of these works, and permitted the Collector, under certain conditions, to put them in hand when the time arrived, explaining to Government the necessity for so doing.

3. In accordance with the direction contained in G.O., No. 125, Revenue, dated 30th January 1885, steps were taken for the preparation and submission of plans and estimates to Government for the works included in the aforesaid lists, and the result is that I have now on hand 11 *sanctioned* estimates for repairs to irrigation works and 7 for the making of roads—works which can at once be undertaken when the necessity arises.

The aggregate estimated cost of the former is Rs. 31,631 and of the latter Rs. 97,685. The number and date of the orders sanctioning the estimates for irrigation works are noted against each sanctioned work in the accompanying list.

4. With reference to paragraph 2 of the Proceedings under reply, I have to state that I have called for reports from my Divisional officers, and the result thereof will be communicated to the Board in due course.

5. The population of the district, excluding that of Sandúr State, is 726,275 according to the census of 1881, and the number of persons for whom labor will have to be provided is 36,313, which is 5 per cent. of the district population.

Assuming that we have to provide employment for this number daily throughout a year, the aggregate number of laborers for whom relief will be required would be 13,254,245. At the rate of $1\frac{1}{2}$ anna on an average per diem for each cooly, a sum of Rs. 12,42,585 will be required for affording relief to 5 per cent. of the population of the district for a year.

RD

6. The President of the District Board and the Chairmen of the Bellary and Adóni Municipalities have furnished lists proposed for famine relief in obedience to the orders of Government passed in G.O., No. 12 L., dated 5th January 1888. The cost of these works will have to be taken into account in considering the adequacy of the programme for the district. The marginally-noted * figures represent the estimated cost of the works proposed for famine relief by each department.

	RS.		
* By Revenue Department.	31,631	as per sanctioned estimates.	
	1,38,605	for works whose estimates have not been prepared.	
By Forest Department.	20,400	do.	do.
By Bellary Municipality.	72,000	do.	do.
By Adóni Municipality.	40,000	do.	do.
By the District Board.	1,03,990	do.	do.
Total ...	4,06,626		

7. The works now returned by the several departments will give, I think, ample employment for famine laborers at the outset when the necessity for famine relief arises.

Besides these, there are other minor † works proposed by the District Board for relief of the agricultural population in the vicinity of their villages, such as improvements to village-sites and of water-supply, but they have not been included in the list of works now sent up to Government by the District Board.

† *Vide* lists of Local Fund works sent up to Board with this office letter, No. 3560, dated 29th December 1884.

ENCLOSURE No. 1.

LIST of Civil Agency works proposed to be executed for famine relief in the district of Bellary.

Nature of the work.	Estimated cost of the work.	Remarks.
Irrigation works.		
Bellary taluk—		
1. Raising and revetting the bund of the Malapur tank.	2,005	G.O., No. 2149, dated 28th April 1885, communicated with Board's Proceedings, Mis. No. 4113, dated 6th May 1885.
2. Repairing the bund of Havinahal tank ...	1,135	G.O., No. 2765, dated 1st June 1885, communicated with Board's Proceedings, No. 5371, dated 9th June 1885.
3 Do. of Kudatini tank	2,357	
4. Do. of Gundiganur tank ...	5,620	G.O., No. 2755, dated 1st January 1885, communicated with Board's Proceedings, No. 5458, dated 11th June 1885.
5. Do. supply channel and strengthening the bund of the Kurugode tank.	2,000	
Removing prickly-pear from the banks of the Hagri channels at Asundi, Chaganur, Moka, Rupanagudi and Tolamamidi.	275	
	13,392	
Alúr taluk—		
Repairing the bund of the Bilehal tank	1,990	G.O., No. 3081, dated 15th June 1885, communicated with Board's Proceedings, Mis. No. 5793, dated 22nd June 1885.
Do. do. Nittravatti tank ...	1,530	G.O., No. 3056, dated 15th June 1885, communicated with Board's Proceedings, Mis. No. 5807, dated 22nd June 1885.
Putting in order the Semmatagiri ruined tank ...	3,000	
Do. do. Chikka Hyati tank ...	2,000	
Improving the bund of the Hirelyati tank ...	500	
Do. do. of the tanks at Niraniki ...	1,000	
	10,020	

List of Civil Agency works proposed to be executed for famine relief, &c.—*cont.*

Nature of the work.	Estimated cost of the work.	Remarks.
Irrigation works—cont.	RS.	
Adóni taluk—		
Repairing the bund of the Halhani tank ...	1,454	G.O., No. 582 I., dated 6th July 1885, communicated with Board's Proceedings, Mis. No. 6670, dated 22nd July 1885.
Restoring the tank at Mandigiri	3,420	G.O., No. 1220, dated 3rd November 1885, communicated with Board's Proceedings, Mis. No. 10408, dated 20th November 1885.
Raising the bund of the Yenigabala tank ...	1,500	
Restoring the breached bund of Balasaladoddy tank.	4,000	
Gravelling the bund of the Chinna Tumbalam tank.	1,000	
Improving the channel irrigating the villages of Malapulli, Sawlihalli and Sunkeswari.	2,000	
	13,374	
Ráyadrug taluk—		
Repairing the bund of the Kottapalli tank at Rangasamudram.	1,330	G.O., No. 3939, dated 1st August 1885, communicated with Board's Proceedings, Mis. No. 7233, dated 7th August 1885.
Repairing the bund of the Kottapalli tank at Kanekal.	410	G.O., No. 818 I., dated 22nd September 1885, communicated with Board's Proceedings, Mis. No. 9476, dated 20th October 1885.
Repairing the tank bund of Deepala Nagammacheruvu.	500	
Repairing the Chickanna Vadercheruvu at Kanekal.	9,230	
Repairing the supply channel of the tank at Sethur.	500	
	11,970	
Hospet taluk—		
Restoring the bund of the tank at Arlehalli ...	10,380	G.O., No. 4632, dated 1st September 1885, communicated with Board's Proceedings, No. 3635, dated 18th September 1885.
Repairing the supply channel of the tank at Dhanayakanakera.	1,000	
Repairing the tank at Devalapura	2,000	
Do. at Katakasooranahalli ...	1,000	
Do. at Papinayakanahalli ...	500	
Repairing the supply channel of the tank at Byalacoondi.	1,500	
Raising the bund of the tank at Anapiniakata ...	1,500	
Do. do. at Vaddigeri ...	1,000	
Repairing the tank at Malpanagudi	500	
Do. tanks at Vantigoda, Timmalapur and Basapur.	1,500	
Removing silt from Somapa tank at Kampli ...	3,000	
Constructing a channel from Belagodahul channel to Arlehalli tank.	2,000	
Removing silt from the channels of the Daroji tank.	1,000	
Repairing the supply channel of the tank at Kanivi Timmapuram.	6,000	
Repairing the ruined tank at Chennapuram ...	16,000	
Constructing a dam to the Kaniga Vanka near Ingaligi.	5,000	

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List of Civil Agency works proposed to be executed for famine relief, &c.—*cont.*

Nature of the work.	Estimated cost of the work.	Remarks.
Irrigation works—cont.	RS.	
Hospet taluk—*cont.*		
Constructing a dam to the channel of the Avinamadugu tank near Antapur and Avinamadugu.	3,000	
Repairing the dam of Kaniga Vanka near the village of Hasahalli.	1,000	
	57,880	
Hadagalli taluk—		
Completing the tank at Devagondanhalli	20,000	
Do. cunta near Giriapuram at Kattebennur.	500	
Completing the famine tank at Magalam	15,000	
Do. do. at Timmalapur ...	3,000	
Do. do. at Kalasapuram ...	2,000	
Repairing hondam at Holalu	1,500	
Do. tank at Varakanahalli	500	
	2,000	
	44,500	
Harpanahalli taluk—		
Repairing the supply channel of the large tank at Harpanahalli.	5,000	
Repairing the tank at Jiganikatti	1,000	
Constructing the supply channel to the tank at Madlagiri and raising the bund of the old tank at Madlagiri.	1,500	
Repairing the tank at Nichapuram	100	
Do. the new tank at Siraganahalli	200	
	7,800	
Kúdligi taluk—		
Repairing the calingulah and sluice of the tank at Gundinahalli.	400	
Repairing the calingulah of the tank at Iyagala Mallapuram.	480	
Constructing a dam to the supply channel of the tank at Sasalavada.	470	
Constructing a wall along the irrigation channel of the tank at Ramadurgam.	150	
Repairing the supply channel of the tank at Kottur.	2,000	
Do. the calingulah of the tank at Kottur ...	1,500	
Closing the breach and completing the tank at Rampuram.	4,000	
Constructing a dam across the surplus channel of Kottur tank.	300	
Cutting a new irrigation channel from the Kottur tank through the market bazaar at Kottur.	2,000	
	11,300	
Total ...	1,70,236	
Sanctioned works ...	31,631	
Balance for which estimates have not been prepared.	1,38,605	

ENCLOSURE No. 2.

LIST of Forest Department works proposed to be executed as Famine relief works.

Nature of the work.	Estimated cost of the work.	Remarks.
Bellary, Hospet and Ráyadrug taluks.	RS.	
Building a dry masonry wall around the Tornagal, Bellary and Mincheri hill blocks of the proposed Bellary reserve, an estimated length of 60 miles. The wall to be 4 feet high and 2 feet thick spread over the following villages :—		
Bellary taluk— Halcoondi, Mincheri, Sunjiverainikota, Bomahanhal, Budihal, Woblapur, Siddapur, Mulpanagudi, Honnahalli, Hirdall, Bellagal, Kudatini, Timlapur. Hospet taluk— Tumti, Gungalapur, Anantapur, Tornagal, Daroji. Ráyadrug taluk— Nemcul.	5,400	
Kúdligi taluk— Building a dry masonry wall around the Sunkadakal reserve in the villages of Sunkadakal, Nimbalgeri, Bhiraviswaradurgam, Chidlurgumhalli, Nunjapur, Agrahar, Ganasagar, Choudapur, Nagalapur.	2,250	
Do. do. Sherbi in villages Sherbi, Devalapur, Kandakal, Gungammanahulli, Gajapuram.	1,080	
Do. do. Gollalinganahulli in villages Gollahalli and Mothalagunta.	720	
Do. do. Tummarguddi in villages Tummarguddi Sannasehalli, Ankammanahalu.	720	
Do. do. Shivpur in villages Hospet, Untigalu Gunjapur (Lambadies) 10 men. Hadagali, Anacul, Wobalapur, 10 men. Kúdligi, Dusenapur, Shivpur, Holekunta, 30 men.	1,800	
Do. do. Sandúr reserve (Bandri and Somalapur block) in villages Bandri and Somalapur.	900	
Hospet taluk— Building a dry masonry wall around the Sandúr reserve in villages Gunga, Nagalapur, Goonda Vyasanakerri, Danapuram, 'Gowripur, Kalhalli, Rajapuram, Jambanathhalli, Papinaikanhulli, Suglagi, Wudhalli Joga, Tungadahalli Oblagudi, Rajapuram.	3,600	
Constructing a forest well near Joga	150	
Hadagalli and Harpanahalli taluks— Building a dry masonry wall around the Harada and Sogay reserves in the villages of Hadagalli taluk, Harkanhall, Harada Polikunta, Coorvutty, Sogay, Adavi-Mullanakerru and Cumbrapully. In the villages of Harpanahalli taluk, Gurboji, Coonchoor, Asenahalu, Kolhalu, Humpanur Oolehalla, Hoolikatta, Nakle Basapur, Kolhalli, Coorlipalli, Kanavihalli.	3,780	

NOTE.—These works the District Forest-officer proposes to conduct as village works under the superintendence of maistries who would be under the orders of the Forest Department, but paid out of famine funds when forest guards are not present or available for the superintendence.

The works above enumerated are not urgent ; their execution is merely suggested to provide employment for men and women who would otherwise be on village relief, and on the express understanding that no portion of the cost shall be debited to head "Forests" either at once or afterwards when the famine accounts come under classification and audit.

Resolution—dated 19th April 1888, Mis. No. 813.

The Board observe that the total estimated cost of the works proposed by the Collector is Rs. 1,90,636, of which Rs. 1,70,236 represent the cost of repairs to irrigation works and the balance that of certain forest works. The District Board and the two municipalities in the district have furnished lists of works costing Rs. 2,15,990. The total estimated cost of all "Civil agency works" is therefore Rs. 4,06,626. The population of the district being 726,275, it would cost about Rs. 12,42,585 to provide employment to 5 per cent. of the population for twelve months. The Collector is requested to report whether he cannot recommend any more works for famine relief.

(True Copies and Extract.)

(Signed) P. RAJARATNA MUDALIAR,
Secretary.

To the Collector of Bellary.

Read—the following letter from H. ST. A. GOODRICH, Esq., Collector of Bellary, to the Secretary to the Commissioner of Revenue Settlement and Director of the Department of Land Records and Agriculture, dated 25th June 1888, Reference on G. & B. No. 750-1356 :—

In pursuance of the instruction conveyed in Resolution, Mis. No. 813, dated 19th April 1888, I have the honor to report that I am able to recommend the following additions to the list of works for famine relief, should such be needed :—

(1) The gravelling of 702 miles of road estimated to cost Rs. 1,95,939 for collection of the material on the road-side (enclosure A).

(2) The collection of metal at the road-side upon the roads in the accompanying list (enclosure B). The cost of this is estimated at Rs. 1,000 per mile or Rs. 3,50,000.

(3) The collection of stone for the piers and abutments of ten large bridges at Rs. 12,000 and twenty-two small bridges at Rs. 4,000. Total cost Rs. 2,08,000 for quarrying and stacking the stone at bridge sites (enclosure C).

2. All these works might, in my opinion, have precedence of earth-work for extensions to the railway system ; of these, extensions due north and south from Bellary to the limits of the district promise best.

ENCLOSURE A.

Name of road.	Miles.	Quantity of gravel required.	Amount.
			RS
Road from Savinhully *viâ* Hampasagar, Gowripur and Hospet to Bellary	56	1,774,080	17,740
Road from Duggavatti *viâ* Harpanahalli to Gowripur ...	57	1,805,760	18,057
Do. Mysore frontier near Ráyadrug to Koodair *viâ* Bellagooppa	35	1,108,800	11,088
Road from junction of Koodair road near Ráyadrug towards Kalyándrug to boundary of Ráyadrug taluk ...	14	443,520	4,435
Road from Madavaram *viâ* Adóni to Aspari	39	1,235,520	12,355
Do. Bellary *viâ* Bomenhal to Kalyándrug frontier.	23	607,200	6,072
Do. do. *viâ* Moka to Kurnool frontier ...	24	633,600	6,336
Do. 8th milestone of Bellary-Herihal road to Ráyadrug	25	660,000	6,600
Road from Bellary to Roopengoody	12	316,800	3,168
Do. Adóni to Siruguppa	25	660,000	6,600

2290

ENCLOSURE A—*cont.*

Name of road.	Miles.	Quantity of gravel required.	Amount.
			RS.
Road from Ráyadrug to Kanakal	18	475,200	4,752
Do. do. to Yeridikera	15	396,000	3,960
Do. Kudutany to Kampli	20	528,000	5,280
Adóni to Alúr	14	369,600	3,696
Do. to Nagaldinny	20	528,000	5,280
Guntakal to Alúr	16	422,400	4,224
Halvi-Kósgi road	15	396,000	3,960
Main road to Kowtalum	8	211,200	2,112
Alúr to Moodengeri	6	158,400	1,584
Kúdligi to Samalapur	12	316,800	3,168
Gowripur to Kúdligi	24	633,600	6,336
Harpanahalli to Hampasagar	28	739,200	7,392
Oojiny to Savinhally	38	1,003,200	10,032
Hospet to Kampli	19	501,600	5,016
Mylar to Huvinahadgalli	19	501,600	5,016
Hospet to Hosoor	4	105,600	1,056
Marryanahully to Bellahoonsy	7	184,800	1,848
Hadagalli to Magalam	7	184,800	1,848
Kúdligi to Oojiny	14	369,600	3,696
Tornagal to Yettenhully	7	184,800	1,848
Hospet to Kulhully	6	158,400	1,584
Devalapur to Kamalápuram	12	316,800	3,168
Kamalápuram to Hampi	3	79,200	792
Hadagalli to Moondrighee	7	184,800	1,848
Buddrasetty Bunda to Hampi	2	52,800	528
Kampli to Moodlapoor	2	52,800	528
Kúdligi to Goodacotta	20	528,000	5,280
Do. *viâ* Kootoor to Harpanahalli	29	765,600	7,656
Total ...	...	...	1,95,939

ENCLOSURE B.

		MILES.
1.	Road from Bellary to Savenahulli	70
2.	Do. do. Aspari	40
3.	Do. do. Ráyadrug	32
4.	Do. do. Siruguppa	35
5.	Do. do. Kalyándrug	31
6.	Do. Adóni to Nagaldinni	30
7.	Do. do. to Siruguppa	25
8.	Do. Kudatani to Kampli	20
9.	Do. Hospet to do.	20
10.	Do. Adóni to Alúr	17
11.	Do. Alúr to Guntakal	15
12.	Do. Bellary to Mysore frontier	15
	Total ...	350

ENCLOSURE C.

Large bridges.

1	Near Madhavaram	Adóni taluk.
1	Do. Southekudlier	Alúr ,,
1	Do. Badanhal	Ráyadrug.
1	Do. Ittigi (Kampli)	Hospet taluk.
1	Do. Kottiar	Kúdligi ,,
1	Do. Gowripur	Hospet ,,
1	Do. Yettinahatti	Sandúr.
3	Over the Chinnahagari.	
10		

23

Small bridges.

1	Near Naranapuram	Adóni taluk.
1	Do. Halvi	Adóni.
1	Do. Nandavaram	Do.
1	Do. Halharavi	Do.
3	Between Bellary and Siruguppa.	
3	Do. Alúr and Chippagiri.	
1	Do. Moka and Halparavi.	
2	On the Háyadrug road.	
1	Near Kampli	Hospet taluk.
1	Do. Samalapur	Kúdligi ,,
2	Do. Hampasagar	Hadagalli ,,
1	Do. Bennikal	Do.
1	Do. Hirehadagali	Do.
1	Between Bagali and Masalvada	Harpanahalli taluk.
1	Near Hampapatnam	Hadagalli ,,
1	Do. Timmalapur	Hospet ,,
22		

Resolution—dated 13th July 1888, No. 316.

Submitted to Government with reference to G.O., dated 29th November 1887, No. 1109.

2. The several civil agency works mentioned in the two letters of the Collector are estimated to cost about Rs. 11,60,565. The amount required to give relief to 5 per cent. of the population is Rs. 12,42,585, but the Board believe that the works given in the Collector's lists are sufficient for all practical purposes.

(True Copies and Extract.)

(Signed) P. RAJARATNA MUDALIAR,
Secretary.

To the Secretary to Government, Revenue Department.
„ Collector of Bellary.

ORDER—dated 10th November 1888, No. 779, Revenue.

Miscellaneous.

The works proposed by the Collector are :—

	Cost. Rs.
(1) Irrigation works	1,70,236
(2) Forest works	20,400
(3) Municipal and District Board works	9,69,929

The Collector also mentions extensions of the present railway system due north and south, but these do not commend themselves to Government. It is difficult to find any civil agency works in the Bellary district which will prove really useful, and little can be done beyond providing a test of the necessity for relief. The majority of the works specified above fall under the third head and the lists have not yet been examined in the Local and Municipal Department.

2. In the lists received from the Public Works Department, Irrigation and Railway Branches, there is only one * work entered against the Bellary district. It is estimated that this project will give employment to 25,000 laborers for two years, but it is added that considerable revision is necessary and that investigations have been stopped until an officer can be made available. His Excellency the Governor in Council considers it desirable that this revision should be proceeded with as soon as possible and the necessary steps will be taken in the Public Works Department.

* Name of work.	Amount of Estimate. Earth-work.	Other works.	Total.	Number of coolies that can be employed.	Probable time required to complete.
	Rs.	Rs.	Rs.		Months.
Tungabhadra channel—					
Upper section	29,15,103	1,92,159	31,07,262	25,000	24
Lower do.	59,850	4,99,515	5,59,365		

REMARKS.—This project is to take off a channel from the river at Vallabapur to Darojee tank to irrigate 50,000 acres and to supply the town of Bellary with fresh water. Requires considerable revision. Further investigation stopped until an officer can be made available.

(True Extract.)

(Signed) C. A. GALTON,
Ag. Secretary to Government.

To the Commissioner of Revenue Settlement, Land Records and Agriculture.
„ the Public Works Department, Railway Branch.
„ the Local and Municipal Department.
„ the Public Works Department, Irrigation Branch.
„ the Commissioners of Land Revenue.

Exd. P. L. Pereira.

150 Copies.

C No. 12258.

File connected with Famine Relief Works was put up with C-No. 12191 and sent to L Office yesterday D.P.

24-11-88

2290

Gobt. of {1888} Madras.

REVENUE.

Issued

Read.

Encl.

G.O., 10th November 1888, No. 779.

NOVEMBER.

25

14

Famine Relief Works in Bellary.

Passing orders on Board's Proceedings submitting list of proposed —.

1888.

2290

P. W. DEPARTMENT.

Current No. 12651

From

E. I.

Enclos.—

No. 268

Dated 5 Dec. 1888

Received 8 — Dec —

Subject.

Tungabhadra Channel Project

stating that nothing can be done unless some officer is available for the revision referred to in last clause of P. W. S. No. 779 Rev. dated 10-11-88

Disposal.

No. 4951C Dated 10th Dec. 1888

J.

I

Actg 11.12.

We have no officer available at present to investigate & complete this project but I hope we may have one available in 2 or 3 months.

With the Consent of H. Ex. the

C. No. 12256

Rev. S. O. 779 dated 10-11-88

Passing orders on Board's Pros: submitting list of proposed Famine Relief Works in Bellary.

12

26

the matter may lie over but it is considered that the project should if possible be completed by next July.

(Sd) H. R. M.

8/12/88

D 10/12

2290

2290

26

26

No. 218 C.

Government of Madras.

PUBLIC WORKS DEPARTMENT.

Madras, 6th May 1889.

Notifications.

~~OFFICE NOTE.~~

~~From~~

2290

2290

To C.

For publication.

Transfers.

The following transfers are ordered at the public expense.

Mr. W. Hughes (A.M.I.C.E.), Executive Engineer 1st Grade from charge of the VI Circle to the Madura Division for charge of the Division.

He joins on relief by Lieut. Col. A. C. Smith R.E.

Mr. A. S. Russell, Executive Engineer 3rd Grade from the Madura Division to the III Circle for special duty on the investigations of the Tungabhadra project.

He joins on relief by Mr. Hughes.

27

27

MCR
6.5.89

Dir.

7 MAY 1889
ENCLOSURES
W. ACCOUNTS.

2290 In Orders

2290

On the arrival of Col. Vibart from Gooty about the 10th May, Mr Hughes now in temporary charge of the VI Circle will resume charge of his old Division, the Madura one. Mr Russell's services will then be available and it is proposed that he be posted to the III Circle for the investigation of the Toongabhadra project which has been lying over unattended to for some time for want of an efficient officer.

28

[illegible]
24.4.89

[illegible]
25/4/89

Let this order go out accordingly, on the relief of Mr Russell by Mr Hughes —

[illegible]
29.4.

I have no objection to the proposal. Mr Russell I suppose is not wanted anywhere else.

[illegible]
28

[illegible]
2/5/89

No. 22166

Notification

The following transfers are ordered at the public Expense:—

Mr. W. Hughes. A. M. I. C. E. Executive Engineer 1st Grade from Charge of the VI Circle to the Madura division for Charge of the division. To join on relief by Lt. Col: A. C. Smith. R.E.

Mr. A. S. Russell Executive Engineer 3rd Grade from the Madura division to the III Circle for special duty on the investigation of the Tungabhadra project — To join on relief by Mr Hughes —

6.5.89

29.4.89

T. I. for [illegible] of [illegible] initials

Ayl. 73/4. Hm 2574.

No. 4951 C d/ 10-12-88
" 2399 " 14-4-88
" 2235 W " 21-7-88
" 2399 " 14-4-88

The Hon Mr. J. St. H. Gar[illegible] CSI

H.E. the Governor

No. 2218 C d/

E 83.615

76/15

P.W.D. 73/4 Ann. THS. 30/4

3.v.89

C. No 6124

2290

The order sanctioning the Establishment has gone to Madras – but I think that only one Clerk and 2 messengers were sanctioned –

2290

R.S.
6.vi.89

There [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

I cannot recommend this for sanction – E.I. informs me that 1 Clerk & 1 Draftsman were sanctioned for Mr Russell's office, & with a large office for S.E. & another for E.E. at Bellary it seems strange that accommodation cannot be provided for these two extra men. The S.E. must make the best arrangements he can.

[illegible]
8.7.89

533

No. 755

Superintending Engineer's Office,
3RD CIRCLE,
Bellary 19th June 1889.

FROM, Col H. Smalley R.E.
SUPERINTENDING ENGINEER,
IIIRD CIRCLE.

To, THE Chief Engineer
P. W. Deptt
Madras

Sir,

I have the honor to request that sanction may be accorded to Executive Engineer Mr. Russell accommodating his office in his own house under para 831 of the P. W. Code and to draw an office rent of Rs 25 a month which is less than half the rent paid for the building.

Enclosures.

2. Suitable accommodation is not available for the establishment in the P. W. Offices at Bellary.

I have the honor to be
Sir
Your most obedt Servant
H Smalley Col R.E.
Supdg Engineer
3rd Circle

31

Memo No 2218C d/6.5.89. Fo. Hno 239 d/14-4.88
" " 4951C d/10-12.88.
Got " 2235 d/21-7-88.

No. 2898C d/ 21st June 1889

To
C

For favor of report.
WWB
21.6.89

D.W.

No. 928 d/ 2nd July 1889

To W.

Mr.A.S.Russell Executive Engineer 3rd.Grade has been posted for special duty on the investigation of the Toongabhadra Project. Code para 831 with reference to which office rent is recommended applies only to accommodation required for a divisional office and it seems doubtful whether the office of Mr.Russell on special duty can be considered an Executive Engineer's office.

2. As however Government has the power of creating a temporary division it has also the power of sanctioning the office rent recommended by the Supg.Engineer 3rd.Circle.

2/7

What is the strength of his Est.? R... 5.7.89

C.
1 ... 7.
2/7

0/4/7.

O.G. 7/4 ... 30/4.

From,
P.W.C. No: 6124 ~~5602~~
The Superintending Engineer,
(4) IIIrd Circle,
Bellary.

To,
The Chief Engineer
P. W. Dept
Madras

Dated 19th
Received ~~2~~ 3.7.89 } June 1889

Enclosures.

No. 755

Subject.

Requesting sanction for the Exec Engineer Mr Russell to locate his office in his house and charge Rs 25 a month as an office rent for the portion of the building occupied.

Hm
B

~~The admission of office rent at Rs 25 per mensem, to Mr Russell, Ex. Engr on special duty, is sanctioned.~~
WWB
4.7.89

S.S. III

P. W. Department
Ootacamund July 1889

2290 2298

From the Suptg Engineer III Circle No 755 d/19th June/89
From the Examiner P. W. Accounts No 928 d/2nd July/89

The Chief Engineer is not prepared to recommend the proposed charge for sanction until satisfied that Mr Russell's small establishment a Clerk and a Draughtsman cannot be accommodated in the existing Public Works office at Bellary.

(Signed) R.R.G.W.B.
Mr

32

32

The Suptg Engr III Circle despd 10/7/89.

Nº 2218 Cal. 6. 5. 89.
4951 C " 10. 12. 88
2393 " 14. 4. 88
2235 W " 21. 7. 88

Copy of letter Nº 59 dt 19th July 1889 from
from A. S. Russell Capte Executive Engineer
on special duty Tungabadra Project to the
Superintending Engineer 3d Circle 2270

2270

Sir acknowledging the receipt of your endorsement No 1064, dated 15th Instant, on Memo No 504 D dated 10th Idem from the Chief Engineer, I have the honor to say, that as pointed out in my letter No 57 of yesterdays date, an Establishment of one clerk and one Draughtsman, is quite insufficient. In addition to myself, 2 clerks, 2 Draughtsmen and, at times, 2 Surveyors, will have to work in Office. The rooms that I myself and the Draughtsmen have to work in, must necessarily be of considerable size, in order to accommodate large drawing tables, which are indispensable, as surveys, longitudinal and cross sections, village maps and other large scale maps &c. have to be spread out and compared at the same time, and such work cannot be attempted

33

33

(7)

in a confined space. The clerks' room in addition to two printing tables, must be large enough to contain 6 Record boxes and a Cash chest. I have devoted three rooms in my house, one of which is a very large one for my Office. The total superficial area of these rooms is 1520 square feet, and I cannot do with much less. As you are aware, it is impossible that such an extent of accommodation, or anything like it, can be given me in the Public Works Offices, Bellary. The only accommodation available is two small, badly shaped, and ill-lighted rooms covering a superficial area of 530 feet. Neither of them is suited for a room for drawing to be done. If the doors and Windows are thrown wide open to obtain sufficient light, the wind makes drawing an impossibility.

2. I therefore have the honor to request you will be good enough to inform the Chief Engineer that my Office cannot be accommodated in the existing Public Works Offices at this station.

3297

D/o 1296.

(Copy)

Forwarded to the Chief Engineer.

In the circumstances represented by the Executive Engineer on special duty, recommendation is again respectfully made that he be allowed Rs 25 a month for the appropriation of part of his own house as his Office.

A Smalley Lt Col RE

Superintg: Engineer 3rd Circle

3 August 1889.

To

The Chief Engineer

P.W.D. Department

Madras

3rd

From P.W. No. 7216

The Superintg Engineer
3d Circle

(1)

To
The Chief Engineer
P.W. Department
Madras

504D

Dated 3
Recd 5 } August 1889

No 1206

Forwarding copy of letter no. 59 dt 19 July 1889 from Mr Russell Aitken, Engineer on special duty Tungabadra Project, explaining the circumstances under which his Office cannot be accommodated in the existing P.W. Offices at Bellary

Sow

For orders.

7-VIII-89

0/518

Ordinary Deputy S.E. III

Your No 1206 dt. 3 inst. Where was C Project Office Establishment 29D located – Are not those offices still available?

7.8.89 Russell

Desp'd 7.VIII

2290

P. W. Department

No 640 Dated 7th August 1889

Telegram. Ordinary State.

To The Supty Engineer

Your No. 1206 dated 3rd instant + Where was C Project office Establishment located × Are not those offices still available ×

(Signed) R.K.E. Drake Brockman
Lt Col R.E.
W

Supt. 7.VIII.89

508

2296

No. 504 D af. 10.7.89
2216 C " 6.5.89
4951 C " 10.12.88
2893 " 12.11.88
2235 W " 21.7.88

No. 640 D af. 7th Aug. 1889

Q.W. 37/8.

No. 1329

Superintending Engineer's Office,
3rd Circle,
Bellary 10th August 1889.

From, Col. H. Smalley R.E.
SUPERINTENDING ENGINEER,
IIIrd CIRCLE.

To,
THE Chief Engineer
P.W. Department
Ootacamund

Sir,

2272

Enclosures.

x Ordinary? 7th inst.

not in file put up.

2296 Referring to your Deferred Telegram dated 6th Instant, I have the honor to report that Mr. Norfor drew Office rent under G.O. No. 223 W dt. 28th January 1885; subsequently his Establishment was for a time located in the Superintending Engineers Office, a rented building since given up; and lastly in the Old Division Office now occupied as Cantonment Overseer's Office which is ill adapted for the drawing &c required in reinvestigating the Toongabadra Project.

I have the honor to be
Sir
Your most Obedient Servant
H. Smalley
Col R.E.
Superintg Engineer 3d Circle

37

37

From, SWC No. 7693

The Superintending Engineer,
IIIrd Circle,
Bellary.

To,

The Chief Engineer
P. W. Depart.
Ootacamund

Dated 10th } Aug. 1889.
Received 13 }

Enclosures.

No. 1329.

SECRETARY TO GOVERNMENT
13.8.89
P.W. DEPARTMENT MADRAS.

Subject.

Office accommodation for the late C. Project Division Office

No. 2290 W. d/ 21st August 1889

Reporting on the—

PUBLIC WORKS DEPARTMENT

2290

2290

PROCEEDINGS OF THE MADRAS GOVERNMENT.

UNDER date the 21st Aug.

READ the following

From the Supg. Engineer III Circle H.E. no 755 d/ 19 June 1889
" the Examiner P.W.A. H.E. no: 928 d/ 2 July 1889
" the Supg. Engineer III Circle H.E. no: 1206 d/ 3rd Aug. 1889
" —— do —— do H.E. no: 1329 d/ 10th Aug 1889

The admission of office rent at the rate of Rs 2[illegible] per mensem to Mr Russell Executive Engineer on special duty Bellary, is sanctioned pending personal enquiry by the Chief Engineer for Irrigation, who it is expected will visit the District shortly.

Sect. stamp

Russell
14.8.89

[illegible] 15/8/89

[illegible] 17/8

To

The Supg Engr III Circle
" Exr P.W.A.
" Chief Engr for Irrign.
(I for favor of counter initials)

£0 5 15/8..

£ 5-1.10 4h 1r10 5 23/8-