Govt. of {1883} Madras.

MARINE.

Issued

Recd. *Encl.*

G.O., 2nd October 1883, No. 484.

No. 2929 W.A. 16th Oct/83

OCTOBER.

Survey of Vizagapatam anchorage.

Informing the Collector of Vizagapatam that the — commences on the 17th October, and requesting the Master Attendant, Madras, to report if any steamer can be placed at the disposal of the Survey Department, and to instruct the local port officer, by telegram, to give every possible assistance to the officer in charge of the survey.

With order

No. 2929 W.A. 16th Oct/83.

Communicated
to the S.E. First Circle
A. C.B.
e.s.

S.E. First Circle

GOVERNMENT OF MADRAS.

FINANCIAL DEPARTMENT.

8th December 1881, No. 2399.

Municipal—Taxation.

Read the following paper :—

From A. MACKENZIE, Esq., C.S., Officiating Secretary to the Government of India, Home Department (Municipalities), to the Chief Secretary to Government, dated Simla, 18th November 1881, *No.* 5—164-73 [*Current No.* 3259].

Referring to the correspondence ending with your telegram of the 25th July 1881, I am directed to forward, for the information of His Excellency the Governor in Council, copy* of an order issued under the provisions of Section 3 of Act XI of 1881 (The Municipal Taxation Act), prohibiting the levy of certain Municipal taxes from Military Officers and men of the classes therein described.

* No. 162, dated 18th November 1881.

2. The Governor-General in Council does not propose to issue any general order under Clause (*b*) of Section 3 of the Act regarding the exemption of Government property from Municipal taxation; but His Excellency in Council will be prepared to take action under that clause if any case of inordinate assessment of Government property is brought to notice for which redress cannot be obtained under the ordinary Municipal Law.

3. I am to take this opportunity of forwarding a revised order,† issued under Section 24 of Act III of 1880 (The Cantonments Act), in which the description of persons to be exempted in cantonments from certain Municipal taxes has been made to correspond with that adopted in the order under the Municipal Taxation Act, 1881. This order supersedes that circulated with the communication from this department, No. 1—38-47, dated the 24th April 1880.

† No. 163, dated 18th November 1881.

ENCLOSURE No. 1.

Extract from the Proceedings of the Government of India in the Home Department (Municipalities),—under date Simla, the 18th November 1881, No. 162.

Read—

Section 3 of Act XI of 1881 (The Municipal Taxation Act, 1881).

ORDER.

In exercise of the powers conferred by Section 3 of Act XI of 1881 (The Municipal Taxation Act, 1881), the Governor-General in Council is pleased to prohibit the levy by any Municipal Committee upon the persons described below of taxes of the following kinds :—

Persons exempted.

All persons exclusively in military employ, or belonging to any department directly attached to the Army or to the Public Works Department, Military Branch, being persons subject to the Army Discipline and Regulation Act, 1879, or the Indian Articles of War, and compelled by the exigencies of military duty to reside within the limits of a Municipality.

Taxes from the operation of which exemption is granted.

(1) Municipal taxes on salaries.
(2) Municipal taxes on professions, trades, callings, offices, or appointments.
(3) Municipal taxes on horses, mules, or ponies kept for military duty.
(4) Municipal tolls leviable on any ferry or road in respect of animals or vehicles kept or used for military duty.

ENCLOSURE No. 2.

Extract from the Proceedings of the Government of India in the Home Department (Municipalities),—under date Simla, the 18th November 1881, No. 163.

Read—

Section 24 of Act III of 1880 (The Cantonments Act, 1880).

ORDER.

In exercise of the power conferred by Section 24 of Act III of 1880 (The Cantonments Act, 1880), the Governor-General in Council is pleased to declare that, in any Cantonment situated in British India which may have been, or may in future be, brought under the operation of a Municipal Act, the following classes of persons shall, when on duty in such cantonment, be exempted from the operation of taxes of the following kinds :—

Persons exempted.

All persons exclusively in military employ or belonging to any department directly attached to the Army or to the Public Works Department, Military Branch, being persons subject to the Army Discipline and Regulation Act, 1879, or the Indian Articles of War.

Taxes from the operation of which exemption is granted.

(1) Municipal taxes on salaries.
(2) Municipal taxes on professions, trades, callings, offices, or appointments.
(3) Municipal taxes on horses, mules, or ponies kept for military duty.
(4) Municipal tolls leviable on any ferry or road in respect of animals or vehicles kept or used for military duty.

2. In further exercise of the power conferred by the same section, the Governor-General in Council is pleased to prohibit the levy, in any cantonment in British India, of any Municipal tax whatsoever on public property, animals, or vehicles.

3. In this order the expressions "Municipal tax," "Municipal taxes," and "Municipal tolls," include any tax or toll imposed by virtue of the provisions of a Municipal Act under the operation of which any cantonment may have been, or may in future be, brought.

ORDER THEREON, 8th December 1881, No. 2399.

Communicated to the Military and Public Works Departments and to the Presidents of all Municipalities.

2. The effect of these orders will be that compensation for the exemption from Municipal taxes of persons and their property, other than chargers, can in all cases be claimed by the Municipality concerned under Act XI of 1881, but that no compensation can be claimed in respect of Government buildings or property situated in cantonments and exempted only under the Cantonments Act, III of 1880. Government buildings, whether Civil or Military, situated outside cantonment limits are not exempted from Municipal taxation.

(True Extract.)

R. DAVIDSON,
Chief Secretary,

To the Military Department.
„ the Public Works Department.
„ all Presidents of Municipal Commissions.

Exd. J. Wright and T. O'Connor.

11/3/86

Govt. of [1881] Madras.

FINANCIAL.

To

THE MILITARY DEPARTMENT,

&c., &c., &c.

Dated December, 8th.

Issued

Read. Encl.

G.O., 8th December 1881, No. 2399.

DECEMBER.

Municipal—Taxation.—Communicating letter from Government of India forwarding copy of an order issued prohibiting the levy of certain Municipal taxes from certain classes of Military officers and men.

GOVERNMENT OF MADRAS.

FINANCIAL DEPARTMENT.

READ—the following paper :—

From F. N. THOROWGOOD, Esq., M. Inst. C.E., Superintendent, Madras Harbour Works, to the Secretary to Government, Public Works Department, dated Madras, 31st August 1883, No. 21 W.

I have the honor to place before Government for orders the following points in connection with the taking up of land and property to the north of this harbour, which considerably affect the value of the land and property in question.

2. I have already addressed Government on April 24th, 1883, No. 7 W., and received orders (G.O., 1312 W-*a*, May 5th, 1883,) on the general subject of the municipal taxes on property thus taken up, but on the present occasion I must venture to be so troublesome as to present some details as to the amount claimed by the municipality, the method by which the property is acquired, and the discrepancy between the rent we receive and the tax we are asked to pay.

3. I submit, herewith, a schedule A made up to June 30th of this year, in which are shown twenty-nine different properties (although thirty-one items appear). In the first column is shown the survey number of the property, in the second the number of the municipal bills is shown, and in the third the date on which the property was handed over to me by the Deputy Collector. The fourth column does not bear upon the present case, but the fifth is important as showing what the Deputy Collector tells me is the rental value. The sixth column shows the actual rent that can be collected, the seventh the value that the municipality place upon the rent, and the eighth gives the actual sum claimed as tax.

4. Up to the present date I have only received bills for the taxes on these twenty-nine items, but I may state that up to June 30th there had been handed over from the Deputy Collector 805 items of property, and up to the present date the number has nearly approached 1,000. I do not mean to say that taxes will be called for on all these items, but upon many there is no doubt that taxes will be levied.

5. The land and property to be acquired is continually being taken up in driblets, so to speak, by the Deputy Collector, and in column No. 2 of the schedule it will be seen that the dates are very irregular, and the intervals variable even in these twenty-nine items out of the 1,000 (approximately) already acquired.

6. On May 17th, 1883, a letter was forwarded from this office to the Vice-President of the Municipality objecting to the amount of taxation on some items shown in the municipal bills (column 2), viz., Nos. 2672, 2677, 2678, 2679, 2680, 2682, 2739, 2723, and against No. 2678 a note was annexed "house destroyed." It will be observed the Deputy Collector's valution was Rs. 48 as an annual rent, while the annual tax claimed was Rs. 91-8-0. On the other numbers referred to in this office letter of May 17th, 1883 (notably No. 2672, where a tax of Rs. 137-4-0 is demanded on a rent of

Rs. 180), there will be observed to be an excessive taxation. A second letter from this office was forwarded on May 18th (more bills for taxes in the mean time having been received), in which the Vice-President was asked to state on what principle he levied his taxes.

7. On June 7th the Vice-President despatches a reply to both letters in which he writes as follows:—"The valuations are those standing in the books of this office for years past as representing the gross annual rent at which the premises to which they respectively relate might reasonably be expected to let, and that in the absence of any appeal against such valuations within the time fixed, viz., November 18th last, they are final for the current year."

8. Now, out of the twenty-nine properties shown in the schedule (A), seventeen were handed over after November 18th, 1882, an appeal therefore was impossible. On the other hand, on account of the note "house destroyed," already referred to in this office letter of May 17th, 1883, to the Vice-President regarding bill No. 2678, it will be subsequently found that a reduction of taxation was made from Rs. 91-8-0 to Rs. 7-5-2 although no appeal whatever was lodged.

9. Further correspondence and discussions followed until, on June 16th, 1883, I addressed the following letter to Mr. Arundel, the President of the Municipal Commission:—

"To A. T. ARUNDEL, Esq., President, Madras Municipal Commission, dated Madras, 16th June 1883, No. 130 M.

"I have the honor to place before you for consideration, as concisely as I can, the following case which has arisen in consequence of Government having purchased land to the north of the Madras harbour where the sea threatens to encroach.

"2. The Vice-President of the Municipal Commission has sent in bills for house, water, and lighting taxes for numerous houses and huts which have been taken up by the Collector of Madras on account of the Madras Harbour Works.

"3. The rates and taxes appear to me to be ridiculously high, and in a letter of May 17th, 1883, No. 73 M., Mr. Beardmore, Assistant Superintendent of these works, wrote to the Vice-President, drawing attention to this fact.

"4. When the Collector hands property over to my charge he tells me what he considers to be the proper rent of the house or land. This I accept, and it is this rent which is attached to the properties in question. There is no bargaining or disputing, but the value, as calculated from the rent fixed by the Deputy Collector's office at the time of taking over the property, is accepted.

"5. But when I come to look at the taxes on these properties, I find such an anomaly as this (see bill No. 2678 for instance):—A garden, for which Rs. 48 per annum is paid as rent, is taxed for the *half-year* at Rs. 45-12-0, or at Rs. 91-8-0 for the year. Again (see bill 2672), a house and garden, the rent of which is Rs. 180 per annum, is taxed at Rs. 137-4-0 per annum, and many similar cases occur.

"6. On the general question as to whether Government property should pay municipal taxes, I have been told by Government that taxes may be claimed on these properties.

"7. Mr. Beardmore, on May 18th, 1883, wrote again to the Vice-President (letter No. 74 M), asking how the amounts of the rates and taxes were arrived at. This was replied to on June 7th, and I learn from the reply (letter from Vice-President P. Ramasawmy Chetty, No. 743,) that the taxes are based on 'valuations shown in this (*i.e.*, Municipal office) office books for *years past* as representing the gross annual rent,' not that has been paid, but 'at which the premises might be reasonably expected to let;' and further, notwithstanding that the transfer of the properties was a matter daily going on in driblets through the Collector's office, that as I have not appealed against the rates by the 18th November last, the rates are final for the current year!

"8. With regard to the date of the 18th November last, a very large portion of the property was not purchased by Government until after that date, so an appeal from me then was impossible.

"9. With regard to the *amount* of the rates, I appeal to you as to whether it is any way right that 'what was reasonably supposed to have been the value of this property years ago,' should *now*, after roads, houses, temples, and villages have been destroyed by the sea, be taken as value on which Government should be taxed. I think there can be no doubt as to your reply.

"I have, &c.,
"(Signed) F. N. THOROWGOOD,
"Supt., Madras Harbour Works."

10. It will be observed that in paragraph 5 of this letter I again draw attention to the high taxation in bill No. 2678, as no notice of the reduction of the assessment in

that case was received until July 6th. To this letter Mr. Arundel replied as follows on July 31st, 1883:—

"To F. N. THOROWGOOD, Esq., Superintendent, Madras Harbour Works, dated Madras, 31st July 1883, R. No. 893.

"In reply to your letter, No. 130 M, dated 16th June, I have the honor to inform you that the annual value of houses, buildings, and lands upon which the municipal house, water, and lighting taxes are calculated, is fixed in the manner provided in sections 119 *et seq.* of the Municipal Act V of 1878.

"2. In accordance with the provisions of the law, public notice was given that appeals against the valuation and assessment for 1883 must be filed in the municipal office on or before the 18th November 1882.

"3. In cases where no appeal was preferred, the valuation and assessment stand good for the year in question, viz., 1883, and no further appeal can be preferred except for the following year 1884.

"4. Any purchase by you of lands or buildings from Government or from private parties was made subject to all their legal liabilities as above explained.

"5. The case of the destruction or demolition of taxable property is provided for by section 135 of the Act, which lays down that the owner is liable for payment of tax on such property until he has given notice of its destruction.

"6. With regard to bill No. 2678, referred to in paragraph 5 of your letter, it appears that the house therein taxed was reported by Mr. Beardmore in his letter No. 73 M, dated 17th May, to have been destroyed by the sea, the valuation was accordingly reduced to Rs. 48, and this fact was communicated to Mr. Beardmore in the Vice-President's letter No. 811, dated 6th instant.

"7. Referring to bill No. 2672, also mentioned in paragraph 5 of your letter, I find that the premises are used as a market for which license has been taken out by Mr. Beardmore, and the valuation of the premises has for some time stood at Rs. 900 per annum without appeal by the former proprietor.

"8. From what I have above explained, it will appear that no regular appeal can be made by you against the valuation and assessment of property for the current calendar year, but that a remission of tax will be made on account of any property destroyed by the sea, from the date such destruction may be reported by you to this office.

"I have, &c.,
"(Signed) A. T. ARUNDEL,
"President, Municipal Commission, Madras."

11. With regard to paragraph 7 of this letter and bill No. 2672, all I can state is that it is impossible to get Rs. 900 per annum for this property now, and that no offer of more than Rs. 180 (the Deputy Collector's figure) has been received. It was acquired in December 1882, and therefore an appeal in November of that year was impossible.

12. To sum up the matter, it will be seen in the schedule that the total value of rents collected on these twenty-nine properties (column 6) is Rs. 2,208-12-0, and on this a tax is levied of (column 8) Rs. 570-3-8, which is nearly 25 per cent. on the rental.

13. I submit (1) that under the circumstances this tax is excessive, (2) that by reason of the sudden and unavoidably irregular way in which the land is continually being handed over to me, I was debarred from appealing, and (3) that most of the property in this schedule was acquired *after* November 18th, 1882, which rendered any appeal before that date clearly impossible.

14. In conclusion, I wish to draw special attention to the fact that I have only touched upon twenty-nine cases of taxation, but that there are many more pending. That the taking up of the land and paying compensation to owners turns out to be a very unsatisfactery proceeding, inasmuch as it is with the greatest difficulty that rent can be collected from most of the tenants, and if pressure be brought to bear upon them they leave their houses, which remain empty; and consequently that to pay taxes at the rates now claimed by the municipality will render less valuable property which is already deteriorating and almost daily being washed away. I therefore would ask whether it would not be possible to make special the taxation of the land acquired for the Harbour Works under G.O., No. 601 W., dated 8th March 1882, and order that taxes be paid only upon the rent as valued by the Deputy Collector at the time of handing over the property to the Harbour Works.

ENCLOSURE.

A.—*Rávápuram and Casemode Properties.*

LIST of Properties taxed by Municipality for first half-year of 1883, showing Annual Valuation, Proposed Tax, &c.

Survey Number.	Municipal Bill Number.	Date when taken possession of by Madras Harbour Works.	Purchase-money by Madras Harbour Works, including compensation for compulsory purchase.	Annual rent as advised to be collected by Deputy Collector's Inspectors.	Rent actually collected per annum.	Annual Municipal Valuation.	Proposed Annual Municipal Tax.	Remarks.
			Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	
2761	2682	2nd March 1883 ..	5,980 0 0	336 0 0	288 0 0	420 0 0	64 0 10	Shop at Rs. 4 is unlet; only Rs. 288 is collected per annum.
2763-64	2680	14th October 1882 ..	8,280 0 0		360 0 0	420 0 0	64 0 10	Let to Mr. Charles Underdown.
2765	2679	20th ,, ..	10,384 8 0	..	480 0 0	720 0 0	109 12 10	Let to Mr. John McLeece.
2766	2678	29th September 1882 ..	10,383 6 2	48 0 0	48 0 0	* 600 0 0	* 91 8 0	VanDerwarf's garden. Let to Periathumby.
						† 48 0 0	† 7 5 2	These sums have since been reduced by Municipality.
2767	2677	25th October ,, ..	10,005 0 0	..	444 0 0	744 0 0	113 7 4	House let to Miss E. S. Gordon, garden to Pommappa Naiken.
2768	2676	29th November ,, ..	862 8 0	24 0 0	24 0 0	24 0 0	3 10 6	Let to Ahmad Sahib since December 1882.
2775	2755	20th October ,, ..	287 8 0	24 0 0	18 0 0	21 0 0	2 1 8	Let to Khadir Sahib. Three rooms only, a fourth is broken down.
2778	2756	3rd November ,, ..	287 8 0	18 0 0	9 0 0	14 0 0	1 6 4	Let to Abdul Khafur Sahib; two rooms only since November 1882.
2782	2675	19th December ,, ..	1,150 0 0	54 0 0	36 0 0	48 0 0	7 5 2	A portion only let to Mathar Sahib since January 1883.
2784	2673	15th ,, ..	4,882 12 0	6 0 0	6 0 0	14 0 0	1 6 4	Let to Mathar Sahib since 15th December 1882.
2785	2757	15th ,, ..	1,150 0 0	30 0 0	17 4 0	30 0 0	4 9 2	Let to Batcha Meah since 15th December 1882; one room destroyed, another unoccupied.
2788	2672	14th ,, ..	2,415 0 0	180 0 0	180 0 0	900 0 0	137 4 0	Let as a market to Chinnaunnoonattan. Besides tax, Rs. 50 is paid for a yearly license.
2789								
2792	2745	25th October ,, ..	368 0 0	13 8 0	12 6 0	14 0 0	1 6 4	Let to Sultan Sahib since November 1882; one room unoccupied since April 1883.
2793	2745	25th ,, ..	172 8 0	12 0 0	9 8 0			
2796	2754	11th November ,, ..	402 8 0	18 0 0	12 0 0	14 0 0	1 6 4	Let to Sillar Sahib since November 1882. Rent has been reduced from Rs. 1-8-0 to one rupee.
2798	2796	3rd ,, ..	805 0 0	36 0 0	..	14 0 0	2 2 2	Unoccupied.
2800	2753	3rd ,, ..	230 0 0	15 0 0	3 12 0	18 0 0	1 12 10	Let to Navajee Meah. Unoccupied since 1st May 1883.
2801	2751	7th April 1883 ..	299 0 0	9 0 0	0 10 0			Let to Chaboo Meah. Unoccupied since 1st April 1883.
2946	2750	19th December 1882 ..	2,415 0 0	60 0 0	38 0 0	24 0 0	3 10 6	Let to Mathar Sahib. Four rooms, two rooms unoccupied.
2952	2748	30th November ,, ..	218 8 0	12 0 0	9 0 0	18 0 0	1 12 10	Let to Muhammad Sahib. Unoccupied for three months.
2967	2744	26th October ,, ..	197 12 10	9 0 0	..	18 0 0	1 12 10	Unoccupied.
	2735	30th ,, ..	391 0 0	12 0 0	9 0 0	14 0 0	1 6 4	Let to Shaikh Daud. Rent has been reduced to twelve annas.
2958	2737	14th December ,, ..	402 8 0	9 0 0	12 0 0	21 0 0	2 1 8	Let to Muhammad Mercayer. Two rooms three months unoccupied. Two rooms still unoccupied.
2959	2736	27th October ,, ..	287 8 0	13 8 0	12 0 0	15 0 0	1 8 0	Let to Abdul Sahib since November 1882.
2972	2743	4th December ,, ..	345 0 0	12 0 0	12 0 0	14 0 0	1 6 4	Let to Muhi-ud-din Khadir since 5th December 1882.
2975	2738	18th November ,, ..	230 0 0	9 0 0	9 0 0	14 0 0	1 6 4	Let to Husain Sahib since 5th December 1882.
2976								
2981	2739	8th December ,, ..	747 8 0	12 0 0	12 0 0	24 0 0	3 10 6	Let to Muhammad Muhi-ud-din.
2978	2742	14th ,, ..	1,092 8 0	36 0 0	3 0 0	24 0 0	3 10 6	Let to Muhi-ud-din Khazim for one month.
2982	2740	22nd November ,, ..	230 0 0	12 0 0	12 0 0	14 0 0	1 6 4	Let to Muhammad Sahib since December 1882.
2984	2741	16th ,, ..	253 0 0	13 8 0	12 0 0	14 0 0	1 6 4	Let to Muhammad Sahib since December 1882.
3059	2723	21st March 1883 ..	13,690 7 5	6 0 0	120 4 0	144 0 0	21 15 4	House unlet. Portion of land was let for storing timber from 21st March 1883. It is now being washed away.
		Total ..	78,845 14 5		2,208 12 0	3,821 0 0	570 3 8	

* These figures denote the assessment as first fixed.

† These figures are used in making the totals.

No. 1702 C.

Referred, with a copy of G.O., No. 1312 W., dated 5th May 1883, to the Financial Department for consideration and orders.

(By Order.)

(Signed) C. BOWEN, Major, R.E.,
Under Secy. to Govt., P.W.D.

CHEPAUK,
12*th September* 1883.

Read—the following G.O., dated 5th May 1883, No. 1312 W., Public Works:—

Read—the following letter from the Superintendent, Madras Harbour Works, No. 7 W., dated 24th April 1883:—

I have the honor to ask for instructions on the following point connected with the purchase by Government of the land and houses to the north of this harbour at the places where the sea has encroached or threatens to encroach.

2. The purchase of the land is made by the Deputy Collector, but the rents are collected by this office. On the monthly value of these rents the Madras Municipality send in house and land tax bills to this office.

3. I wish to know if I am right in paying these taxes, now that the land so taxed is Government property.

Order—dated 5th May 1883, No. 1312 W., Public Works.

The property in question is not exempt from municipal taxation under G.O., No. 3188 W., dated 24th December 1881.

(True Extract.)

(Signed) C. BOWEN, Major, R.E.,
Under Secy. to Govt., P.W.D.

ORDER—dated 26th September 1883, No. 2166, Financial.

The taxes should be paid for the current year, and the Superintendent of Harbour Works directed in the Public Works Department to prefer appeals without delay in regard to next year's taxation.

2. Mr. Thorowgood should also be directed to consult with the Deputy Collector as to whether the amount of tax due for next year might not be taken into consideration in settling the amount of compensation to be given.

(True Extract.)

for Acting Chief Secretary.

To the Public Works Department.

Exd. T. O'Connor.

11/3/26 Ru

No. 2930 W a/16th Oct/83

B

Communicated to the Supt M. H. Works

Communicated to the Supt M. H. Works

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Supt M. H. Works

Supt M. H. Works

Exr. P. W. A.

Exr. P. W. A.

J.C

P.W. No. 8822

Govt. of {1883} Madras.

FINANCIAL.

8 S. C

Issued

Recd. 11/10/83 *Encl.*

G.O., 26th September 1883, No. 2166.

No. 2930 W a/16th Oct/83.
6 S. C

SEPTEMBER.

Municipal Taxation.

Informing the Public Works Department, with reference to letter from the Superintendent of Harbour Works complaining of the excessive taxation of the land and houses purchased by Government to the north of the harbour where the sea has encroached or threatens to encroach, that the taxes should be paid for the current year, but that appeals should be preferred without delay in regard to next year's taxation.

2 Copies sent to reg.

With Order

With order

Entd in Receipt Regr

2nd October 1883, No. 484, Marine.

GOVERNMENT OF MADRAS.

MARINE DEPARTMENT.

Read—the following paper:—

From the Director of the Indian Marine, to the Acting Chief Secretary to Government, dated Bombay, 26th September 1883, No. 4989 (Surveys).

In continuation of my letter, No. 2763, "Surveys," dated 3rd July 1883, I have the honor to beg that you will inform the Government of Madras that it has been arranged for the survey of the Vizagapatam anchorage to be commenced on the 17th of October next by No. 2 boat party under Mr. Philip Falle of the Indian Marine Survey Department.

2. On the completion of this survey, it is proposed to fix the position of the Sacramento shoal referred to in paragraph 3 of letter, No. 7061, of 19th July 1883, from the Port Officer at Madras to the Chief Secretary to Government; but to carry out this work a small steamer will be necessary, and I therefore beg that I may be informed whether the Government of Madras will be able to place such a steamer at Mr. Falle's disposal.

3. Commander Dawson also proposes to undertake the survey of Calingapatam after the completion of the surveys mentioned in the previous paragraphs.

4. In conclusion, I have the honor to request that the local port authorities may be directed to afford the officer in charge of No. 2 boat party every possible assistance in carrying out the duty entrusted to him.

Order—dated 2nd October 1883, No. 484, Marine.

The following telegram will be sent to the Collector of Vizagapatam:—

"Your 979, August tenth. Survey Vizagapatam anchorage commences 17th instant under Mr. Falle."

2. The Master Attendant will instruct the local port officer, by telegram, to give every possible assistance to the officer in charge of the survey.

3. With reference to paragraph 2 of the Director's letter, Captain Taylor will report if any steamer can be placed at the disposal of the Survey department.

(True Extract.)

E. F. WEBSTER,
Acting Chief Secretary.

To the Collector of Vizagapatam.
„ Collector of Ganjam.
„ Collector of Godávari, with copy of G.O., No. 393, dated 27th July 1883.
„ Master Attendant, Madras.
„ Public Works Department.

Exd. J. W. Fischer.

No. 2929 way. 16th Oct/83

Communicated

to the S. E. First Circle

Sd/ C.B.
i.s.

S.E. First Circle

Govt. of {1883} Madras.

MARINE.

Issued

Recd. Encl.

G.O., 2nd October 1883, No. 484.

No. 2929 way. 16th Oct/83

OCTOBER.

Survey of Vizagapatam anchorage.

Informing the Collector of Vizagapatam that the — commences on the 17th October, and requesting the Master Attendant, Madras, to report if any steamer can be placed at the disposal of the Survey Department, and to instruct the local port officer, by telegram, to give every possible assistance to the officer in charge of the survey.

WORKS SECRE[TARIAT]

with order

GOVERNMENT OF MADRAS.

MARINE DEPARTMENT.

Read—the following paper:—

From the Director of the Indian Marine, to the Acting Chief Secretary to Government, dated Bombay, 26th September 1883, No. 4989 (Surveys).

In continuation of my letter, No. 2763, "Surveys," dated 3rd July 1883, I have the honor to beg that you will inform the Government of Madras that it has been arranged for the survey of the Vizagapatam anchorage to be commenced on the 17th of October next by No. 2 boat party under Mr. Philip Falle of the Indian Marine Survey Department.

2. On the completion of this survey, it is proposed to fix the position of the Sacramento shoal referred to in paragraph 3 of letter, No. 7061, of 19th July 1883, from the Port Officer at Madras to the Chief Secretary to Government; but to carry out this work a small steamer will be necessary, and I therefore beg that I may be informed whether the Government of Madras will be able to place such a steamer at Mr. Falle's disposal.

3. Commander Dawson also proposes to undertake the survey of Calingapatam after the completion of the surveys mentioned in the previous paragraphs.

4. In conclusion, I have the honor to request that the local port authorities may be directed to afford the officer in charge of No. 2 boat party every possible assistance in carrying out the duty entrusted to him.

Order—dated 2nd October 1883, No. 484, Marine.

The following telegram will be sent to the Collector of Vizagapatam:—

"Your 979, August tenth. Survey Vizagapatam anchorage commences 17th instant under Mr. Falle."

2. The Master Attendant will instruct the local port officer, by telegram, to give every possible assistance to the officer in charge of the survey.

3. With reference to paragraph 2 of the Director's letter, Captain Taylor will report if any steamer can be placed at the disposal of the Survey department.

(True Extract.)

E. F. WEBSTER,
Acting Chief Secretary.

To the Collector of Vizagapatam.
,, Collector of Ganjam.
,, Collector of Godávari, with copy of G.O., No. 393, dated 27th July 1883.
,, Master Attendant, Madras.
,, Public Works Department.

Exd. J. W. Fischer.

10-2-92

No 2929 Wd/ 16th October/83

Communicated to the Supdg: Engineer I circle.

Sd/ C.B.

S. E. 1st Circle

PWD

Govt. of {1883} Madras.

MARINE.

Issued

Recd. *Encl.*

G.O., 2nd October 1883, No. 484.

B

No 2929 Wd/ 16th Octr/83

OCTOBER.

Survey of Vizagapatam anchorage.

Informing the Collector of Vizagapatam that the — commences on the 17th October, and requesting the Master Attendant, Madras, to report if any steamer can be placed at the disposal of the Survey Department, and to instruct the local port officer, by telegram, to give every possible assistance to the officer in charge of the survey.

25TH AUGUST 1883, No. $\frac{913\ R.,}{A}$ PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read the following paper :—

From A. CREGEEN, Esq., Engineer-in-Chief, Vizagapatam State Railway, to the Joint Secretary to Government, Public Works Department, Railway Branch, dated Waltair, 7th August 1883, No. 499.

In reply to Government, Madras, G.O., No. 409 R., dated 5th May 1883, and previous correspondence, I have the honor to forward the plans and estimates of the proposed Railway from the littoral of Vizagapatam to Raipur in the Central Provinces, together with a report on the season's operations.

2. The estimates are prepared for a line on the 5 feet 6 inches and the metre gauges; and the leading dimensions in force for State Railways are adhered to.

ENCLOSURE.

Preliminary observations and references to work done previous to season of 1882-83.

At the close of the year 1880, which marks the first practical outcome of the deliberations of the Government of Madras in connection with proposals for connecting the East Coast with the Central Provinces by means of a State Railway, His Highness the Maharajah of Vizianagrum expressed his willingness to guarantee to the extent of one lakh of rupees, the expense of surveying a line from Vizagapatam, or Bimlipatam to Raigarh in Jeypore. This offer was not, however, accepted by the Government of India, who decided to make the surveys take a wider scope, so that any project for connecting the East Coast with the interior might become incorporated with the system of communication now under final survey, and construction in the Central Provinces.

2. In September 1881 the Madras Government deputed Mr. Nordmann, Executive Engineer of the Madras Public Works Department, to make a reconnoissance of the country between Vizagapatam and Raipur in the Central Provinces. This officer left Vizagapatam on the 2nd November 1881, and, after collecting much valuable information in connection with the country, completed his reconnoissance on the 18th April 1882 by stating that two routes commended themselves to him as being equally eligible—

(i.) A route east of the Noagarh hills, passing near Párvatipúr, Ambadola, Asargar, Kariar, Nara, and Arang to Raipur.

(ii.) A route west of the Noagarh hills, passing near Sálúr, Merialpad, Narangpur, Amorkot, and Dhamtari to Raipur.

3. On the eastern route the highest elevation of the country crossed by the proposed railway is 1394·88 feet above mean sea level; while on the western route the highest point would be the Korapat plateau, 2,900 feet above mean sea level. Other considerations affecting the question, it was finally decided by the Government of India to accept the eastern route *viâ* Párvatipur and Ambadola.

Work done during season of 1882-83.

4. In October 1882, on my return from furlough, I was ordered to Madras to take charge of the necessary surveys of the country, and to locate the line between Vizagapatam and Párvatipur, a length of 86 miles. I arrived at Vizagapatam on 21st November 1882, but as it took some time to assemble the staff, who were mostly under orders from other Railways, on the completion of work then drawing to a close, and bad weather setting in on the coast on the breaking up of the north-east monsoon, it was not until the middle of December that a start could be made with the field-work.

5. It was arranged that, if staff in addition to that required for the Vizagapatam-Párvatipur Section could be spared, a preliminary survey should be made as far northward as the lateness of the season would permit. Mr. H. B. Parry, Executive Engineer, Mr. Chiodetti, Assistant Engineer, and an Overseer, joined on the 2nd January 1883, and were at once sent forward to work out a line north of Párvatipur. This part of the country enjoys an unenviable notoriety for unhealthiness; and I regret to say that the past season was in no way favorable to the staff employed. Work was commenced on the 16th January 1883, but on the 3rd March it was abruptly brought to a close, and the staff reluctantly forced to return to Waltair in ill health, after completing a rough survey with levels of 57½ miles of country. These levels, though of the highest importance to the consideration of the future extension of the line next season, fall short of what I had hoped to accomplish; for, while the ascent from the south of the highest saddle in the range of hills on the eastern route at mile 136½ can now be arranged for, there remains the descent on the north side of Ambadola, of which nothing is known beyond such general information as I was able to collect on my examination of the country.

6. The result of the season's work may be briefly stated as follows:—

(*a*). 86 miles of line from Vizagapatam to Párvatipur located, levelled, and surveyed, for which complete estimates of cost of lines on the broad and metre gauges are prepared;

(*b*). 57½ miles of line roughly surveyed and levelled, for which sections are submitted; and

(*c*). the preparation and submission of estimates for the whole line on both gauges based on Mr. Nordmann's reconnoissance, and the 143½ miles surveyed this season.

Description of the country and alignment of the section from Vizagapatam to Párvatipur.

7. The large tract of country between the sea-board in the vicinity of Vizagapatam and the Central Provinces is broken by a range of lofty hills, which, rising near Madras, stretches northwards along the Coromandel Coast until it merges into the high lands of Orissa. Some of these hills attain to an elevation of 5,000 feet above the sea, and are of igneous formation; while the valleys are more or less broad, and some of them of considerable length. In some cases the valleys terminate in undulating table lands, and in others, in bold and precipitous hill sides and escarpments, which impose proportionately impracticable difficulties to the construction of a railway across the range. The distance across the Eastern Ghâts on the route traversed by the present season's survey is about 120 miles, and this fairly represents the breadth of the range along the Coromandel Coast measured at right angles to its longitudinal axis. In the neighbourhood of Vizagapatam spurs run out irregularly from the main range, and seldom attain to a greater elevation than 800 or 900 feet above the sea. They are not infrequently precipitous, but are seldom sufficiently extensive to enable advantage to be taken of them in the alignment of a railway with moderately easy curves and gradients. This is more particularly noticeable immediately to the north-east of Vizagapatam, and between it and Bimlipatam, distant about 18 miles, where the hills are more or less detached, or separated from each other by abrupt saddles, or low connecting ridges. On the whole, this portion of the district is very rugged and broken, and offers difficulties of an exceptional nature to the construction of a railway through it.

8. The difficulties in the way of locating a direct line *viâ* Bimlipatam to Vizianagrum made it necessary to arrange for a line by way of Samachellum, a shrine much frequented by pilgrims, and lying about 6 miles in a direct course north-west of Vizagapatam and 10 miles by railway. Here the line enters a confined valley between moderately lofty hills connected by a ridge, the crossing of which at an elevation of 295 feet F.L. above M.S.L. necessitates a heavy bank for 3 miles and 500 feet on a gradient of 1 in 100, together with about 30 chains of cutting at the summit, making in all 4 miles of heavy bank and cutting from miles 8 to 12. The line then enters the Gambheram valley, over the first 4 miles of which, *i.e.*, from miles 12 to 16, the soil is light and much cut up by surface water. In mile 20 the Gambheram stream is crossed by five spans of 40 feet, with a heavy bank approach on the north side for about three-quarters of a mile. The site selected for the bridge is not a very good one, but as the course of this stream makes an acute angle with the line, and the line is hemmed in by hills, nothing better could be obtained. After crossing a small ridge in mile 22 at an elevation of 152·81 above M.S.L., the line descends through Yanigulupalium to the Chittavalsa valley at mile 25, across which there is a heavy bank approach to the Chittavalsa bridge in mile 27, the whole of this low ground being flooded, as will be seen by reference to the section, during periods of abnormally heavy rain.

9. The site selected for the bridge across this river, which consists of six spans of 100 feet each, was decided upon after a thorough examination of the river itself, and the country on either side of it. Northwards the line passes through an undulating country into Vizianagrum, which is reached in the mile 37 at an elevation of 186·00 above M.S.L. Immediately after leaving the Vizianagrum station at mile 37¼, the line ascends by heavy bank on a gradient of 1 in 100 for about 2½ miles to cross a low spur running from east to west in mile 40, the top of the ridge being 347·18 above M.S.L., and which cannot be cleared without a cutting of 24·18 feet at the highest point. This piece of line is very heavy, to avoid which an alternative line was laid out and levelled from mile 39 to mile 43, which resulted, as might be expected, in less work, but with an addition to the length of the line of 39·60 chains. At Ambativalsa the spurs running out

from the main range of hills become more detached, and from this, northward to Párvatipur, the whole district may be described as an undulating tract covered with tanks and cultivation. At Gajipatinagram in mile 50 another large stream is met with, which is crossed by twelve spans of 40 feet; then, 3 miles further on, the line attains to an elevation of 303·00 above M.S.L.—a little to the west of the Maripelli hill, and after crossing the drainage met with in the 55th mile, the undulations in the surface of the country become less marked, and there are fewer well-defined water-courses as far as the river at the village of Pentah in mile 67; the whole of the drainage west of the line, as well as the rainfall of the immediate neighbourhood, being impounded for irrigational purposes. Three miles further on is the town of Bobbili with 15,000 souls; on leaving which, the line traverses a similar description of country, meets another large stream at Sitanagram in mile 77, and finally enters Párvatipur in mile 86, where it is proposed to provide accommodation of a temporary nature for the large traffic which the railway will tap at this point.

10. The first 43 miles of the proposed line out of Vizagapatam are bounded by hills which render the selection of the route obligatory; while the location of the remaining 43 miles is determined by the selection of suitable sites for the bridges over the large streams, and by the desire to interfere as little as possible with the storage water. It was not found possible to avoid passing through several tanks, some of which will be troublesome to deal with, and all imposing extra cost in the construction of the line.

The alignment to be followed from Párvatipur to the Madras frontier.

11. Three miles beyond Párvatipur, in the mile 89, the proposed line leaves the open country at the foot of the hills and enters the Nagavalli valley at the village of Artam. This valley is adhered to, all the way to Satikona in mile 137—the summit level of the line in the Eastern Ghât at an elevation of 1394·88 above sea level, where the line crosses the water-shed of the Nagavalli in a narrow gap about 400 feet wide and enters the Bongsdara valley. Keeping to the foot of the Niamgiri hills (5,000 feet above the sea) as far as the Khond village of Tikripara, in mile 147, the proposed line will pass from the main range and undulate through broken ground as far as Ambadola at an elevation of about 1,200 feet above M.S.L., and distant from Vizagapatam about 163 miles. Three miles beyond Ambadola the descent on the northern face will begin and terminate somewhere in the open country about the village of Dengen, in the Sindul valley, on the frontier between Madras Presidency and the Central Provinces, about 170 miles north of Vizagapatam. Owing to the lateness of the season, I was unable to examine more of the country northward, while the sudden collapse of the survey party, when the levels had reached mile 143¾, put an unexpected end to the season's field-work, without enabling me to determine the gradients for the descent on the northern slope of the range.

Result of an inspection of the Tirmui Pass at the head of the Singapur Valley.

12. As a route from Raiagadda in mile 114, by way Singapur and the Tirmui pass into the Bongsdara valley by Lonjigarh, was considered to have some points in its favor, I took the opportunity, when at Ambadola, of visiting this pass, distant about 18 miles S.W., passing through some very heavy jungle and forests on the way. This I believe is the only alternative route that can be suggested between Raiagadda and Ambadola, the latter being an obligatory point in any scheme of railway communication for crossing the main range east of the Noagarh hills. I found this route, however, to be impracticable even with gradients of 1 in 50; and calculated that the pass could not be reached without introducing 1·50 miles of 1 in 60 and 5·75 miles of 1 in 40 gradients, two continuous miles of which would require a tunnel on a gradient of 1 in 40 on the northern face of the range.

The route selected the only practicable one across the Eastern Ghât.

13. From all that I have seen of this country up to 170 miles north of Vizagapatam, I am satisfied that the route followed by the proposed railway across the Eastern Ghâts is the only practicable way of getting a line into the Central Provinces; and though, perhaps, the result of our survey work this season has made the crossing of the range from the south side a heavier line in both work and gradients than was at first expected, I am of opinion that, with the exception of the Raiagadda river crossing, not much reduction of work or improvement of gradients can be effected on the permanent location of this portion of the line next season.

Broken country between Párvatipur and the summit level of the proposed line.

14. Between Párvatipur, in mile 86, and Satikona, the summit level of the ascent of the ghâts in mile 136½, the country throughout the greater portion of this length is very broken. Following the Nagavalli river, as the line does for most of the way, the cross drainage from the hills east and west of the line has to find its way into the river over a plain of from 1 to 3 miles wide, with a very varying declivity and composed entirely of light soil. For a distance of 17 miles between Párvatipur and Raiagadda, as well as for a considerable distance northwards, the action of the water on this light soil has produced a succession of large deep nullahs running more or less parallel with each other; and

where two or more of these have united, considerable areas have been scoured out, and the valley now consists of a net work of ravines overgrown with jungle and forest.

15. Perhaps the finest example of this excavation of the valley by the action of surface water is to be found at Raiagadda in mile 114, where the river, emerging from the hills between two small spurs of rocks forming a gorge for the passage of the water, enters a large deep ravine, more than half a mile wide and 160 feet deep, the sides of which, to its junction with the Nagavalli, are all cut up, similar to the portion shown upon the section in mile 114 between chainage 138 and 148. Below the site shown upon the section in mile 114, *i.e.*, to the eastward, there is no other point at which the ravine could be crossed, unless by a viaduct considerably larger than that shown upon the section, and at an enormous outlay.

The Raiagadda river and crossing.

16. The site shown upon the section is not meant to do more than illustrate the difficulty experienced in finding a practicable way of crossing this river. There is no rock to be found to the eastward of the line laid out this season, while for a quarter of a mile or more to the westward up the stream, the direction of the river is very tortuous with high precipitous sides; and though, perhaps, two or three large spans on lofty piers might carry the line over, the depth of cutting on the Raiagadda side would make it prohibitory, if it did not necessitate a tunnel under the town.

17. After a week spent in examining this river as far as the dense jungle would permit, I am in hopes that next year I shall be able to work out a line by leaving the valley and running along the hill side on the right bank of the river up to a point perhaps a mile or more above the town, where there is a good site for a bridge, perhaps on the skew, of, say, three or four spans of 100 feet. This detour will probably add a mile or more to the length of the line; will necessitate the introduction of curves of perhaps 600 feet radius (attended with easy gradients); and will involve some heavy cutting and retaining walls, but will probably be cheaper than the present crossing by 10 or 15 lakhs. Nothing more than this preliminary examination could be done this year, as absolute data for determining the gradients to the summit at Satikona were held to be of the first importance with the small establishment at my disposal for the work.

Improvement in the crossing of the Raiagadda river practicable next season.

18. Between mile 122 and 136½, the summit level, there are 6 miles 290 feet of gradients, embracing 1 in 50, 1 in 60, 1 in 70, and 1 in 80; these gradients are with the loads moving towards the coast., that is to say, all trains from the Central Provinces to the coast will descend these gradients, and up-country borne traffic will ascend them. From miles 122 to 128 the stiffest gradient is 1 in 70, but from this to the top of the incline there is steady up-hill work, consisting of gradients from 1 in 100 to 1 in 50, broken only by short lengths of level introduced to ease the engines.

Heavy gradients on the south side of the range.

19. No improvement in the gradients, due to the present alignment between the 128th mile and the top of the pass, can be expected next season, for as the line approaches the head of the valley it is hemmed in by hills through which there is no opening, and no alternative. But seeing how desirable it is that the objectionable gradients of 1 in 70 in miles 123 and 125 should, if possible, be improved next season, efforts will be made to get a gradient of 1 in 100, if such is practicable even at an additional outlay. If the gradient in mile 123 can be improved, that in mile 125, I think, can either be altered to 1 in 100, or a slight deviation made to reduce the ascent. But I am not by any means certain that the broken nature of the country which would have to be traversed in the vicinity of mile 123 by a line with easier gradients than 1 in 70 would not add considerably more to the cost of the line than the heavy cutting which would be necessary for a gradient of 1 in 100 on the present line. This improvement would localize the heavy gradients into the 8½ miles between the 128 and 136½ miles, and as it would, I presume, be necessary to work the through traffic with extra engine-power, a running shed for four engines would be necessary at Santi Bannigaon in mile 128, the only favorable place for a station at the foot of the incline.

Efforts to be made to improve cuttings in miles 123 and 125, but no improvement expected between mile 128 and the summit level.

20. It will be seen, on reference to the sections, that the principal bridges on the portion of the line north of Párvatipur are all high, and far in excess of what the drainage of the country requires. One of the most striking characteristics of the district is that, although the hills run almost parallel with the line, and are more or less close to it, there are no indications of rock in any of the rivers except the Narainpatnam in mile 92 and the Raiagadda river in mile 114. The beds of all the other rivers and nullahs are of sand, except those of the latter, which happen to occur in places where the line strikes the toe of the hills. I consider, however, that rock will be met with at, or under, a depth of 20 feet below the bed in all the large streams crossed by the line, and on this basis the estimate has been framed.

Rock expected in the founds of all bridges.

21. From Párvatipur, mile 86, to Satikona, mile 137, the cuttings, though moderately heavy, will, with the exception of that which would be caused by substituting a gradient of 1 in 100 for 1 in 70 in mile 123, as well as those perhaps near the summit, be of light soil, and there is of course ample material for the banks, but even between the 128th mile and the top of the pass the large streams crossed seldom show anything but steep banks of light soil. Beyond Satikona the country is very broken; the line keeps nearer to the hill side, and though in some places stones and boulders crop out, I think rock may be expected in all cuttings.

Light soil expected in cuttings south of the summit and rock generally in cuttings on the north side.

22. Between Ambadola and the foot of the hills on the north side it is supposed by Mr. Nordmann that a gradient of 1 in 100 can be worked out without much difficulty; but I am not altogether prepared to accept this view of the country. My impression is, that the line will pass through a very broken and wild tract, much cut up into deep ravines with rocky beds, and that a line with a gradient of 1 in 100 will only be obtained at the expense of heavy work. At the same time I think it would be worth while, in order to secure this gradient on the north side, to incur additional outlay, and so confine the heavy gradients to the south side of the main range of hills.

Gradient of 1 in 100 to be worked out on north of range next season.

23. From what has been stated in a previous portion of this report, as regards the present line being the only practicable route from the Madras Coast to the Central Province frontier, and from a careful study of all the observations made by Mr. Nordmann in his reconnoissance to Raipur, I agree with him generally that the line northward from the frontier of these two provinces should be taken by way of Asurgor and Bogor, Kariar, Kamuna, Torbor, Jalbal, Nara, Sharmal, and Arang to Raipur.

Route to be followed from Madras frontier to Raipur.

24. After crossing the Tel Nadi in mile 195 near Bogor, about half a mile below its junction with the Undur river, the line must deflect westward to avoid the high and broken country lying to the northward of this river. It does not appear practicable to obtain a crossing of the Tel Nadi by a more direct course, since a large tributary of this river, as well as the heavy drainage from the northern slope of the Eastern Ghâts, would have to be encountered in addition to the broken country intervening. Following the course of the Undur river, from the 197 to 221 mile, the proposed line would cross a tributary of this stream, immediately above its junction with the Undur, and then, flanking the hills by Tokla, pass through an opening about 2 miles wide into Kariar (803 above M.S.L.) in mile 229.

25. Beyond Kariar the line would still skirt the high land to the north, and follow the left or east bank of Undur river, which here runs southward, draining the eastern slopes of the Noagarh hills, which lie in parallel ridges almost due north and south, and distant from the line from 3 to 4 miles. At Lamipani in the 240th mile the Undur river, which is here much contracted in breadth and capacity, passes to the westward, and the line would continue a northerly course up the east bank of the Chamsona Nadi (a tributary of the Undur) between two ranges of hills of from 2,000 to 3,000 feet elevation, crossing the drainage from the western hills at right angles, and passing the village of Kamuna (857 above M.S.L.). Onwards the line would pass through Tobor (949 above M.S.L.), and heading the water-shed of the Chamsona Nadi at Sialjori (1047 above M.S.L.), would descend to the village of Jalbal in mile 275 (967 above M.S.L.). It would then make for the Jonk river, about 600 feet wide, crossing it a mile or so north of Nara in mile 282, where it would enter the Raipur Zemindari; thence passing by Sharmal would strike the Mahanadi river at Arang (942 feet above M.S.L.) in mile 320, about a mile and-a-half south of the Raipur and Sambalpur road, and unite with the Bengal-Nagpur Railway at Raipur (962 feet above M.S.L.).

26. By a reference to the plan on Sheet No. 1, First Division, the position of the town of Vizagapatam and the inner harbour will be readily understood. This harbour is situated at the mouth of the Vizagapatam river, and has an area of over 60 acres with an average depth of 9 feet of water measured above mean low water. In it lie all the small craft or cargo boats, by means of which the trade of the port is carried on; while at the entrance is the bar over which, at low tide, there is a depth of 2 feet of water, the tidal difference of level being from 3½ to 4½ feet.

The position of the inner harbour and the swamp at Vizagapatam, the site selected for the workshops, &c., and proposals for facilitating an interchange of sea and land borne traffic.

27. To the west of the town is what is called the swamp, a large tract of low land having an area of about 7 square miles, 5 square miles of which were formerly submerged by ordinary tides. Of this latter area, endeavours are being made by Dr. Tissot, the Roman Catholic Bishop, to reclaim 2¾ square miles under certain rights which have apparently been conceded to him. The average surface level of this land at the present time is 3 feet above mean low water of spring-tides, of which it is supposed that 15 inches are due to accumulations of silt deposited during the 14 years in which the process of reclamation has been going on. This would make the

original average surface of the ground prior to 1869 about 1·75 feet above low water of spring-tides.

28. During the cyclone which occurred in 1876, this land was covered by a flood which attained a height of 10·95 feet above low water of spring-tides, or about 6½ feet higher than any previously known flood ; and during the time that it lasted, it is believed that 9 out of the 15 inches of silt were deposited by it. Since then it would appear from the observations, and trial-pits made by the Executive Engineer, Public Works Department, at Vizagapatam, that the annual deposit of silt has sensibly decreased, especially during the past four years, and it may perhaps be doubted whether, under existing conditions, the reclamation will ever be satisfactorily accomplished. No doubt the healthiness of the town would be much improved if the level of this land could be sufficiently raised to fit it for cultivation ; but in its present state it is almost valueless and totally unfitted for such railway purposes as sites for workshops, sheds, &c.

Workshops, Sheds, &c.

29. The liability of the ground in the vicinity of Vizagapatam to periodical inundations necessitates, I think, the selection of a site for the Vizagapatam station in the second mile as indicated on Sheets Nos. 1 and 2, First Division. Here I propose to lay out the workshops, the staff quarters, goods yards, and other station requirements. Opposite mile 0, in front of the backwater shown on Sheet No. 1, I would erect a small station sufficient only to serve the passenger traffic of the town, and, if approved, would extend a siding as shown by the dotted red line into the inner harbour. This line would be used entirely for the transhipment of goods from rail to ship, and *vice versâ*, and in anticipation of its being considered an integral part of the proposed railway, I have included the cost of it in the accompanying estimates.

30. The question of improving the inner and outer harbour has occupied the attention of the Government of Madras for some years past, and several authorities have been from time to time deputed to visit the port, and submit proposals in connection therewith. These proposals have been carefully reviewed by Major-General Sankey, C.B., R.E., Chief Engineer and Secretary to Government, Madras, Public Works Department, in G.O., 13th August 1880, No. 1939 W., in which he states "that it will be impossible, with the expenditure of any reasonable sum of money, to create either an inner or an outer harbour at Vizagapatam for the use of vessels of large draft ; but as there would appear to be some probability of means being found for improving the depth of water on the bar at the mouth of the river in the interests of cargo boats and other vessels of light draft, the requisite investigations with this object will be continued by the Public Works Department."

31. Whether the want of an outer harbour at Vizagapatam is ever likely to be seriously felt, it would be premature to say ; but should the future trade of the port render the construction of a harbour imperative, independent of considerations of cost, no doubt its construction would be secured. It is, however, far more probable that some less costly and more readily executed expedient will be resorted to, to meet the large development of trade which may naturally be expected to follow the opening of a railway connecting the Eastern Coast with the Central Provinces. The question, however, is not one to which I have given any special consideration, or in any way made it the subject of study, since I possess no records, maps, or plans, or any official information bearing upon it beyond the Government Order already quoted. It is not my intention, therefore, to do more than indicate in a general way the direction in which railway interests may be advanced by the ready transhipment of goods in the port. This, I think, would best be secured either by the construction of one or more open jetties of iron piles run out from the shore, under the protection of the Dolphin Hill, and so forming one or more wharves for the transhipment of goods, or by deepening the entrance to the inner harbour across the bar by dredging. To this latter some difficulties appear to be anticipated from the fact that the water on the bar at high tide is too low to allow the dredges to cross it, but this, I think, is not a serious objection, as I would prefer to dredge the bar from the outer side, and, by constructing the portion of the railway through the town, shown on the plan by a dotted line, would utilize the dredged material in the banks, and in the reclamation of a portion of the backwater opposite the Vizagapatam passenger station. I think the value of the experiment would be more readily ascertained by dredging from the outer side ; and although perhaps the surf would not be much diminished by the dredging, the value of having a channel, if only of sufficient depth of water to enable the small craft to put to sea at all times of the tide, would far outweigh all considerations of cost, even though this latter involved the permanent upkeep of the dredging operations. If the dredging operations proved successful, the whole of this inner harbour, with its splendid accommodation for small craft, would be put into direct connection with the railway, and all transhipments would be effected at any season of the year in smooth water, and much more systematically than could be expected from one or more jetties run out from the shore. Having so much area available in the inner harbour for small craft, I think it would be sacrificing large interests, not to make the experiment of dredging a deeper entrance channel.

32. If one or more jetties of iron piles were run out from the Vizagapatam shore, they would have to be sufficiently long, say 1,500 or 1,600 feet, so as to clear the high surf ; while if the jetties were taken from a point on the Dolphin Hill and run out in a north-easterly direction,

the same length would probably be required, in addition to which there would be an iron pile bridge across the mouth of the harbour about 1,400 feet long. This latter would be the most costly of the methods for facilitating the transhipment of produce.

33. If a deep-water channel were secured to the inner harbour, it is possible that larger cargo boats and even the employment of steam tugs might hereafter supplant some of the smaller craft, whose size and capacity appear to be determined by the depth of water at low tide now found upon the bar. I am not aware of any cause likely to militate against the success of the experiment of dredging a deep-water channel, say of 6 feet or more at low tide ; and as it is generally felt that, if only a sufficient depth of water can be secured, both large and small sized cargo boats would ride the surf securely, there is here, at all events, the means of affording relief to a considerable expansion of traffic without incurring a large expenditure, or even such an expenditure as would commit Government to the adoption of any future scheme of improvement.

34. The cargo boats in use at this port are small and generally of light construction, capable of carrying about 2 or 2¼ tons under favorable circumstances. They are generally manned by from 12 to 16 hands, and although they are easily handled, I am inclined to think them unsuited to the transport of heavy railway material. If it be decided, therefore, to put the dredging experiment in hand without loss of time, the use of heavier cargo boats, such as are to be found at Cocanada, for the landing of railway material might perhaps be introduced with advantage. The machinery for the workshops, if it be decided to build them at this end, as well as some 40,000 tons of iron work, would be delivered at Vizagapatam, so that there would probably be plenty of work for 10 or 12 large cargo boats, and a small but powerful tug. To meet this expenditure I have provided in the estimate one lakh of rupees.

Unsuitability of Bimlipatam for a terminal station.

35. I have already referred to the physical difficulties to be encountered between Vizagapatam and Bimlipatam which make it undesirable to connect this latter town by direct communication with the Central Provinces ; and as Vizagapatam has already been accepted by the Government of India as the coastal terminus of the railway, there is no need of more than a passing reference to any claims which Bimlipatam may appear to possess from its geographical position. When it is borne in mind that Bimlipatam is nothing more than an open roadstead, where vessels are exposed without shelter of any kind to the full effects of the winds prevailing in the Bay of Bengal, I think it will be conceded that the protection which Vizagagatam affords marks the superiority of the latter port as the coastal terminus of the railway. It is, however, claimed for Bimlipatam that the anchorage for vessels is better than at Vizagapatam, and that vessels are better able to slip their cables and put to sea in case of necessity. With these exceptions, I am unable to call to mind any other advantage that Bimlipatam can offer as a coastal terminus to serve the joint interests of the railway and vessels frequenting the place ; and as there are no local circumstances, that could be taken advantage of, to facilitate the transhipment of goods, very costly arrangements would be necessary to effect the transfer of the traffic in open sea. The site for a terminal station from a railway point of view would be vastly more inconvenient than that met with at Vizagapatam, and although perhaps the advantages to be obtained from the possession of the inner harbour may be liable to be over-rated, its existence is, at all events, of unquestionable importance to the port of Vizagapatam and the railway. Viewing the question from the joint interests concerned, my opinion is that Vizagapatam possesses natural advantages which establish its superiority and fix its position as the most suitable port on the Vizagapatam sea-board for the coastal terminus of the proposed railway.

Salt branch to Kharassa.

36. In connection with the works at the Vizagapatam end of the line, it will be necessary hereafter to co-operate with the Salt Department to promote as much as possible facilities for distributing by rail the salt manufactured at Kharassa. The proposals which are now under consideration in that department are not sufficiently matured to enable me to specify the extent to which the railway should be prepared to incur expenditure ; but I have provided to the extent of one mile of railway being required, the cost of which is shown in the abstracts of the several sub-heads of the estimate.

The estimates.

37. The length of the line from Vizagapatam to Raipur, including the portion shown by a dotted line to the inner harbour, as well as the Raiagadda diversion to be taken in hand next season, will be 350 miles, and the length of the two divisions staked out to Pârvatipur is shown on the section as 86½, to which also must be added one mile for the inner harbour extension. This length I propose to divide into two divisions of 44 and 43½ miles of each, each division having one Executive and three Assistant Engineers. Estimates have been prepared both for a broad and a metre gauge railway, from the abstracts of which it will be seen that the estimated cost of the

broad-gauge line is	Rs.	91,023	} per mile.
and of the metre-gauge line	„	73,823	
the difference per mile being	„	17,200	

These estimates are based upon the result of the season's work in connection with the location of the Vizagapatam-Párvatipur Section, and the preliminary work carried on as far as the 144th mile from the coast. I will now endeavour to give such information in connection with each of the main heads of the estimate as will, I hope, explain any exceptional features that may be traced in them.

38. I. PRELIMINARY EXPENSES.—Under this head, provision is made for staking out the whole line, and the cost provides for all charges connected with the previous reconnoissance and the past season's operations.

39. II. LAND.—His Highness the Maharajah of Vizianagrum has, with characteristic liberality, granted free of cost all lands required for railway purposes in his territory; and as there is much jungle or waste land in the district north of Párvatipur, the rate provided will probably appear sufficient. It should, however, be noted that the cost of land required for railway purposes in cultivated areas in this part of the Presidency appears to me excessively high, much higher than prevails in other parts of the country where I have been engaged on similar undertakings.

40. III. CONSTRUCTION OF LINE.—From the small station in the town of Vizagapatam to Párvatipur there are 25·475 miles of gradient varying from 1 in 100 to something under 1 in 150; 18·409 miles of gradient varying from 1 in 150 to 1 in 300; 15·852 miles of gradient above 1 in 300; and 26·761 miles of level. In the 57 miles north of Párvatipur there are ·587 miles of gradient of 1 in 50; 5·468 miles of gradient varying from 1 in 50 to 1 in 80; 14·129 miles of gradient varying from 1 in 80 to 1 in 100; 3·901 miles of gradient varying from 1 in 100 to 1 in 150; 15·928 miles of gradient varying from 1 in 150 to 300; 8·5 miles of gradient above 1 in 300; and 8·7 miles of level.

Earthwork, Curves, Gradients, &c.

41. Of curves between Vizagapatam and Párvatipur there are 12·184 miles above 1,000 feet radius, and 74·314 miles of straight lines. In the 57 miles north of Párvatipur, *i.e.*, between Párvatipur and the summit of the crossing of the eastern range, there are 9·28 miles of curves, above 1,000 feet radius, and 47·9 miles of straight lines. As regards gradients, therefore, the line may be classed amongst those possessing the special feature of steep inclines.

42. In a previous part of this report I have already referred to the stiff gradients which mark the ascent of the eastern range from the south side, and having expressed my opinion that no improvement in the contour of the section can be obtained by any deviation from the existing line; there will not probably appear much objection to the adoption of gradients of 1 in 100 in the lowlands between the hills and the coast, more especially as the employment of easier gradients would add considerably to the earthwork which in the present line is much in excess of that prevailing in ordinary parts of the country. On the other hand, I am not prepared to advocate the employment of stiffer gradients than 1 in 100 in the lowlands, as I think these should be resorted to only when the impracticability of employing a gradient of 1 in 100 can be clearly shown to be necessary.

43. Of the gradients of 1 in 100, that shown upon Sheets 3 and 4, first division section, is perhaps the most conspicuous, the ascent being almost continuous for nearly 4·25 miles, broken only by a length of fifteen chains for a station on a curve of 2° deflection, introduced to meet the wants of the passengers who will periodically visit the sacred hill, Samachellum. In the 38th mile on Sheet No. 4, another very stiff gradient extending to the 40th mile will be found. Both of these cuttings involve fairly heavy work; the former having a heavy bank for the greater portion of the length, as well as a considerable cutting of about thirty chains long with a maximum depth of 16 feet in hard soil mixed with boulders, while in the latter the cutting is about twenty-five chains long with a maximum depth of 24 feet of probably rock as before stated. An alternative line was run in order to avoid this last mentioned cutting; but as the extra length of line involved is over $\frac{3}{4}$ of a mile, not much saving was likely to follow its adoption, more particularly as the objectionable feature of 1 in 100 gradient was not much improved by it.

44. As might be expected, the earthwork of this side of the ghâts is heavy, and so far as I can see on the northern side of the range, as far perhaps as the Jonk River in mile 282, there will be little change.

45. If the earthwork on a line is heavy, it follows that the masonry in minor and major bridges must be much affected by it. The location of this line involves high banks, because the drainage from the hills, crossing the low country between the foot of the ghâts and the seaboard, strikes the line almost at right angles; while north of Párvatipur the whole of the drainage from the hill-sides crosses the line by a series of deep and irregular channels. And not only is it imperative to cross the minor drainage, but it happens, as in the case of the Nágávalli Valley, that the arterial drainage flowing from north to south has also to be crossed and recrossed by the line in its ascent of the Eastern Ghât. In the lowlands, it will be seen by referring to the general map on the one mile to the inch scale, from Vizagapatam to Párvatipur, that the country north of Vizianagrum is a net-work of tanks, many of which are of considerable depth and area. It was scarcely hoped that in locating the line interference with these large stores of water could

Major and Minor Bridges.

be altogether avoided, though endeavours were made to get the most direct alignment with the least interference with the property of the people. The extent, however, to which the tanks are affected in the first division, is thirty-four, and in the second division fifty-three, making in all a total of eighty-seven or at the rate of one tank per mile between Vizagapatam and Párvatipur. These tanks, even if some of them are abolished, impose upon the line the necessity of passing the drainage on to some other area that may be selected for storage ground, and special provision has been made in the way of large openings in order to meet the necessity of passing any sudden collection of water that the bursting of a tank-bund may occasion.

46. The average rate per mile metre gauge for minor bridges is Rs. 14,481 and for the broad gauge, Rs. 16,361 per mile. All minor bridges have been designed with a length of abutment of 16 feet on the metre gauge, and of 20 feet on the broad gauge line, and the thickness of the abutments at the top is for 6, 12, and 20 feet, 3 feet, 3 feet 3 inches, and 3 feet 9 inches, respectively, for both gauges. The thickness of the masonry on an average is about one-third of the height, and the types are designed with the view of providing sufficient masonry for an average depth of foundations of about 8 feet below the soil.

47. Under the sub-head of large bridges the rate for metre gauge is Rs. 18,750, and for broad gauge, Rs. 23,291 per mile. It would serve no useful purpose to refer in detail to each one of these, many of them consisting of single spans of 40-feet girders. But in the first division are the Gimbharam Bridge in mile 20, and the Chittavalsa Bridge in mile 27, the former consisting of 5 spans of 40 feet, and the latter 6 spans of 100 feet; and it may be remarked that the following points have been observed in calculating the cost. Major bridges are designed on the metre gauge with a length of abutment of 16 feet, and a length of body of pier of 14 feet. In major bridges consisting of 20 feet spans, the thickness of abutments is 3 feet 9 inches at the top, and of the piers 3 feet 6 inches. In spans of 40 feet, the thickness of abutments and piers is 4 feet 6 inches, and of 100-feet spans the thickness of abutments is 9 feet, and of the piers 8 feet. For the broad gauge line, the length of abutments is 20 feet, and of piers 16 feet generally.

48. I believe that, from the general indications that prevail, rock will be met with at a depth varying to 20 feet below the bed of the rivers which will enable the whole of the masonry of the piers to be founded solid. The flood lines recorded on the Chittavalsa and the Gimbharam bridges in the first divisions are of floods which I believe occurred during the cyclone of 1876, when this particular part of the Vizagapatam District was exposed to an exceptional rainfall. At that time a large portion of the lower part of the town of Vizagapatam along the proposed site of the station was submerged.

49. Throughout the entire length of the line from Vizagapatam to Raipur there are only two bridges of an exceptionally heavy character (I am now omitting altogether from consideration the Raiagadda Bridge with its 8 spans of 150, and 1 span of 350 feet at an elevation of 120 feet above the stream, because, as I have already explained, this portion of the line must be modified and improved next year). These are the bridges over the Tel Nadi and the Maha Nadi rivers; the former will probably be 1,500 feet long, and perhaps 35 feet high to rail level; and the latter about half a mile long and probably the same height. The estimate provides in the case of the metre gauge for an expenditure of 15 lakhs for these two bridges; while in the case of the broad gauge this has been raised proportionately to the sum of rupees 17 lakhs.

50. Full particulars of the bridges in the first and second divisions will be found in Form D appended, but I might here mention that the drainage area of the Pentah River, in the second division, is 274·24 square miles for which 6 spans of 100 feet are provided; while for the Sitanagaram Bridge, with a drainage area of 408·32 miles, only 5 spans of 100 feet are provided. The reason of this is, that in the former case, the breadth of the river necessitates the introduction of an extra span in order to keep the approaches out of the influence of even ordinary floods.

51. There are no special features to be recorded in connection with the construction of the bridges on the length for which type designs have been prepared. The whole of these are in accordance with examples already built on State Railways, and carried out under my direction in other parts of India.

52. The waterway provided in the first and second divisions amounts to 862 square feet per mile. North of Párvatipur, more especially between Raiagadda and the summit level of the line, the large bridges are not designed in connection with waterways rendered necessary by the drainage areas. They partake more of the character of viaducts, since their heights are not determined by flood-levels; but in most cases by the gradients of the line.

53. It is proposed to give 235 level crossings to the whole line; of which 58 will be provided on the length from Vizagapatam to Párvatipur. Gates will be provided to the level crossings at stations, but at all unimportant places posts and chains will amply suffice.

Level Crossings.

54. No provision is made in the estimate for fencing the line. This is in accordance with the orders of the Government of In[illegible], No. 1780 R., dated 30 April 1879, to the [illegible]ector

Fencing.

of State Railways, Western System. In the estimates provision is made for an earthen fence and ditch around certain stations, and wire fencing as far as the distant signals, but at all unimportant places live fencing will probably suffice.

55. IV. BALLAST AND PERMANENT-WAY.—The quantity of ballast provided for the metre gauge per foot lineal is 8·5 cubic feet, and for the broad gauge 15·46 cubic feet. This reduced will agree with the standard dimensions printed as enclosure to Public Works Department Circular No. 23 of 1881, where 6 and 8 inches, respectively, are fixed as the depths below the sleepers for the two gauges. Broken stone will be used as ballast, unless the use of steel sleepers may make it desirable to use sand in preference. The mean lead is about one mile and the rate adopted 4 rupees per hundred cubic feet.

Ballast.

56. In the estimates, I have provided for the laying of 200 miles of the line from the Vizagapatam end, and 150 from the Raipur end. Appended to this report will be found the necessary estimates of a mile of permanent-way for the two gauges. The section of rail adopted for the metre gauge is 41½, and for the broad gauge, 62 lb., the material being steel. Wooden sleepers have been estimated for, but I am inclined to recommend that a trial be made with some steel sleepers, in the lowlands on the Vizagapatam side, provided that half of the fastenings be attached to the sleepers, and keys supplied for the rest. I am afraid that creosoted pine sleepers, if used, would not long escape destruction by white-ants which are a greater pest in this part of India than in any other part in which I have been employed. Hereafter all sleepers would be renewed by supplies from the local forests, the harder woods of which, I believe, are almost proof against the ravages of these and other destructive insects. At present the high cost of wooden sleepers locally supplied would be prohibitive of their use.

Permanent-way.

57. V. STATIONS AND BUILDINGS.—Exclusive of Raipur, there will be 46 stations on the line; of these, 7 will be in the first division; 7 in the second division; and 32 between Párvatipur and Raipur; giving an average distance of about 7⅛ miles from station to station.

Stations and Staff Quarters.

58. The class of buildings proposed will be found amongst the tracings of bridges and buildings of each division. They are all designed to be built as permanent structures; but it is not proposed to provide, in the first instance, more than is absolutely necessary to meet the requirements of traffic; all superfluous accommodation being withheld until rendered absolutely necessary. The waiting-sheds proposed will not be put up at unimportant stations but only at such stations as will unquestionably require them. Goods-sheds will, where necessary, be constructed of rails and galvanized sheets such as are daily finding more favor at stations where there is a large traffic in country produce. They possess the merit of being easily removed if necessary or of being indefinitely extended. The station buildings will consist at all small stations of one room, with back and front verandah, and lamp room. There will be a set of quarters provided for the station-master and for menials, also quarters for Police. At Vizianagrum and Vizagapatam, second class stations will be provided, and I propose to add a room for the use of His Highness the Maharajah. At Raipur it is not proposed to provide any staff quarters, as probably the working of this line will be incorporated with that of the Bengal-Nagpore Railway. At the Vizagapatam end, provision is made for twenty-four drivers and guards together with the necessary running rooms and quarters for Locomotive and other foremen. Latrines are not provided at all stations, but can be added as they become necessary hereafter. Provision for temporary quarters for the staff during construction is made in the estimate.

59. Under workshops and store buildings, provision to the extent of Rs. 2,82,713 for the metre gauge is made, and for the broad gauge, Rs. 3,04,028. The large plot of land colored red on the plan, Sheet No. 2, of the first division, shows the site selected for the workshops.

Workshops, &c.

60. Under station machinery will be found provision for engine-sheds on the metre gauge to the extent of Rs. 2,21,447 and for the broad gauge, Rs. 2,78,800. And here it may be as well to remark that, viewing as far as possible the conditions under which this line will be constructed, and hereafter worked, I am of opinion that the whole run through should be divided into three stages of, say, under 120 miles for the engines. I do not think this length of run will be inconvenient, and if not, it will lead to economical working of the traffic. Moreover, to adopt Párvatipur, 86 miles, as a running-shed station will of necessity place one more engine-station on the line, will necessitate extra quarters for the staff commensurate with the engine accommodation to be provided, and will expose more Europeans to risks of ill-health in the working of the line. This latter evil will be aggravated if it is decided to work the traffic over the heavy inclines by additional engine power, for which provision is made in the estimate to the extent of accommodation for four engines. At Vizagapatam, provision is made for twelve engines, as also for eight at Raiagadda and Kariar.

Station Machinery; and distance apart of Engine-sheds.

61. It is not intended to provide watering arrangements at all the small stations. Generally speaking, it may be said that water will be arranged for at stations about 12 or 13 miles apart. Other items of station machinery will be found in the estimates, and need no remark from me.

62. VI. PLANT.—Under this head, provision is made for engineering, workshops, locomotive, carriage and waggon, and stations and offices to the extent of Rs 8,51,861 for the metre, and Rs. 8,67,726 for the broad gauge.

63. VIII. ROLLING STOCK.—No provision is made in the estimate, and it will, I think, be necessary to run up temporary shops at Vizagapatam, in the first instance, for the erection and fitting of engines and rolling stock, and a staff will be required to work this branch of construction, which I presume will be chargeable to the manufacture account of rolling stock. I have therefore not included this outlay in my estimate of establishment for construction. If it is decided to put in hand the construction of this line during the next working season, it will be very necessary to arrange for a supply of wheels, axles, and under-frames of waggons, &c., to come out along with some engines and workshop machines amongst the first consignments to the line; so that ballast waggons may be ready to lead out permanent-way when the time comes.

64. IX. ESTABLISHMENT.—The estimate of this is calculated on the assumption, that the line might be constructed in three years and that in accordance with this a corresponding number of divisions will be worked. The particulars will be found in Form M, but I may here state that the cost amounts to Rs. 5,048 per mile. In connection with establishment, I may remark that provision is made in the estimate for the appointment of a Deputy Examiner, and his office to be located at the headquarters of the line. It might be thought perhaps a more economical arrangement if the accounts of this line were audited by the Examiner in Madras; but I am very much opposed to this arrangement, and have no hesitation in expressing a decided opinion that it would be contrary to the best interest of the railway, and would be highly inconvenient to the officers concerned. When the distance which separates Madras from Waltair, and the necessary slow postal arrangements in force in this part of the Presidency, are taken into account, I can only assert that in the manipulation of a large business such as a railway with complicated transactions, the delays which would occur by cross references, extending over a long period of time, could not be otherwise than detrimental to the interest of the State.

65. The *Specification* to be used on this railway will be the same as that adopted on the Western Rajputana and other State Railways.

Specification.

66. There are no quarries adjacent to the line, but stone will probably be obtained within a lead of 8 miles from the work. Of kunkur, there is an abundance scattered about the lowlands, but no information could be obtained of its existence in the hills. When the line is well advanced, timber will become available from the forests about Bisemkattak; until then, lime and timber will have to be arranged for in the lowlands.

Building Materials.

67. Labor will be imported into the hill tracts, but no attempt will be made to work this section until the line has been sufficiently advanced from both ends.

Labor.

68. Appended will be found the following papers:—

Appendices.

1—Abstract Estimate of the cost of each head of account;
2—Abstract Estimate of the cost of the whole line showing Indian and English expenditure;
3—Statement of comparative cost of metre and broad gauge lines;
4—Forms 130 A to 130 J;
5—Sections of the line, and the necessary type drawings;
6—Index Plans and Sections of line from Vizagapatam to Párvatipur, and
7—Map of country on four miles to one inch.

In Memorandum No. 1 accompanying Public Works Department Resolution, No. 641-68 S. R., dated 31st March 1874, paragraph 16, other returns are required; these relate to lists of articles required from England which will be prepared when it is known what modifications of the proposals now submitted may be contemplated by Government.

69. Having remarked upon the estimates, it now only remains for me to add that, whatever view may be taken of them, it could hardly be expected that a line across the Eastern Ghâts would be free of those items which go to swell the cost of railway construction. That the gradients have proved more severe than was at first expected is unfortunate, but I feel that when the nature of the works to be carried out, and the country traversed by the proposed line are fairly understood, the mileage rate will not be considered high.

70. As a trade route, the proposed line will be of the highest importance to this portion of the Madras Presidency; and considering the proximity of the seaboard to the wheat producing areas of the Central Provinces, the port of Vizagapatam is, I think, destined to play an important part in the future wheat export trade of India. At the same time, the proposed Railway will bring within the reach of civilisation large tracts of the country now almost inaccessible from

this side; will open out large forests and make them available for the steadily increasing wants of the country; will prove of paramount importance to this portion of the Presidency by affording a ready means of mitigating the effects of that dire calamity, famine, should it ever unhappily occur; and will go far to improve the material prosperity of the half-wild tribes inhabiting these outlying districts.

71. To His Highness the Maharajah of Vizianagrum, who takes so keen an interest in all that pertains to the construction of the proposed Railway, my best thanks are due for the assistance which he has so readily and generously afforded not only to myself, but to the several officers whose duties have brought them into his territory, and I hope that the construction of an important link in the Railway communications of the country will bring about the results he so much desires, and which assuredly follow the introduction of Railway enterprise throughout the world.

72. The project which I have now the honor to submit will I hope receive the full support of the Madras Government, and though the prosecution of the work, carried on, as much of it will be, through a wild and inhospitable tract, will necessarily be attended with some difficulties, in the conditions which surround the collection and importation of workmen in unhealthy districts, the accomplishment of the object will be secured at a moderate outlay.

73. In conclusion, I would only add that Messrs. Taylor and Stone were the two Executive Engineers engaged in the location of the line, and the preparation of the estimates south of Pârvatipur. With them were associated Messrs. Gordon, Baker, Michell, Haig and Shaw. North of Pârvatipur the late Mr. H. B. Parry located the line, with whom was associated Mr. Chiodetti. These officers have shown much zeal and energy in the performance of their respective duties; and I have much pleasure in commending their services to the Madras Government.

(Signed) A. CREGEEN, M.I.C.E.,
Engineer-in-Chief, Vizagapatam State Railway.

VIZAGAPATAM-RAIPUR STATE RAILWAY.

BROAD GAUGE.

General Abstract of Estimates.

Main and Sub-heads of Accounts.	First Division.				Second Division.				Parvatipur to Raipur				Grand Total.			
	* English Expenditure.	Indian Expenditure.	Total.	Cost per Mile.	* English Expenditure.	Indian Expenditure.	Total.	Cost per Mile.	* English Expenditure.	Indian Expenditure.	Total.	Cost per Mile.	* English Expenditure.	Indian Expenditure.	Total.	Cost per Mile.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
I. Preliminary Expenses—																
Survey	..	43,000	43,000	1,000	..	43,500	43,500	1,000	..	2,63,500	2,63,500	1,000	..	3,50,000	3,50,000	1,000
Plant																
Establishment																
II. Land—																
Land (including Compensation for Wells, Tanks, &c.)	..	21,500	21,500	500	..	21,750	21,750	500	..	1,31,750	1,31,750	500	..	1,75,000	1,75,000	500
III. Construction of Line—																
Earthwork	..	4,00,888	4,00,888	9,323	..	3,42,820	3,42,820	7,881	..	26,06,315	26,06,315	9,891	..	33,50,023	33,50,023	9,571
Large Bridges	1,04,186	5,12,964	6,17,150	14,352	1,53,917	8,04,815	9,58,732	22,040	8,22,031	57,54,219	65,76,250	24,957	10,80,134	70,71,998	81,52,132	23,291
Minor Bridges	20,222	5,20,960	5,41,182	12,586	27,067	7,00,095	7,27,162	16,700	1,47,937	43,10,188	44,58,125	16,919	1,95,226	55,31,243	57,26,469	16,361
Level Crossings	..	16,000	16,000	372	..	14,500	14,500	333	..	90,000	90,000	341	..	1,20,500	1,20,500	344
Fencing	14,202	4,733	18,935	440	8,138	2,712	10,850	249	47,775	15,925	63,700	242	70,115	23,370	93,485	267
IV. Ballast and Permanent-way—																
Ballast	..	1,71,766	1,71,766	3,995	..	1,58,184	1,58,184	3,636	..	9,51,140	9,51,140	3,610	..	12,81,090	12,81,090	3,660
Permanent-way	6,62,309	2,31,067	8,93,376	20,776	6,32,969	2,39,527	8,72,496	20,057	39,07,544	23,14,211	62,21,755	23,612	52,02,822	27,84,804	79,87,626	22,822
V. Stations and Buildings—																
Stations and Offices ..	..	65,883	65,883	1,532	..	42,505	42,505	977	..	1,35,879	1,35,879	516	..	2,44,267	2,44,267	698
Workshops and Store Buildings	..	3,04,028	3,04,028	7,070	..	..	..	..	..	..	..	..	..	3,04,028	3,04,028	869
Staff Quarters, permanent..	..	1,96,098	1,96,098	4,560	..	15,456	15,456	355	..	1,91,562	1,91,562	727	..	4,03,116	4,03,116	1,152
Do. temporary ..	..	10,934	10,934	254	..	11,061	11,061	254	..	67,005	67,005	254	..	89,000	89,000	254
Station Machinery ..	51,802	1,52,695	2,04,497	4,756	15,192	62,877	78,069	1,795	1,29,299	5,07,505	6,36,804	2,417	2,23,173	7,23,877	9,47,050	2,706
VI. Plant—																
Engineering and Station and Office Furniture, &c. ..	2,66,964	2,26,804	4,93,768	11,483	10,000	90,117	1,00,117	2,302	41,000	2,32,841	2,73,841	1,039	3,17,964	5,49,762	8,67,726	2,479
VIII. Rolling Stock	..	..	..	..	..	..	No provision made.		..	..	..	..	..	..	..	..
IX. Establishment	..	..	..	5,049	..	..	..	5,049	..	..	..	5,049	..	17,67,120	17,67,120	5,049
Grand Total..	11,19,685	28,79,320	39,99,005	98,048	8,47,283	25,49,919	33,97,202	83,128	50,95,586	1,75,72,040	2,26,67,626	99,074	70,89,434	247,15,989	318,58,632	91,023

* The value of the Rupee is taken at 2 Shillings.

(Signed) A. CREGEEN, M.I.C.E.,
Engineer-in-Chief, Vizagapatam State Railway.

VIZAGAPATAM-RAIPUR STATE RAILWAY.

METRE GAUGE.

General Abstract of Estimates.

Main and Sub-heads of Accounts.	FIRST DIVISION, 43 MILES.				SECOND DIVISION, 43·5 MILES.				PARVATIPUR TO RAIPUR, 263·5 MILES.				GRAND TOTAL, 350 MILES.			
	* English Expenditure.	Indian Expenditure.	Total.	Cost per Mile.	* English Expenditure.	Indian Expenditure.	Total.	Cost per Mile.	* English Expenditure.	Indian Expenditure.	Total.	Cost per Mile.	* English Expenditure.	Indian Expenditure.	Total.	Cost per Mile.
	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
I. Preliminary Expenses—																
Survey	..	43,000	43,000	1,000	..	43,500	43,500	1,000	..	2,63,500	2,63,500	1,000	..	3,50,000	3,50,000	1,000
Plant																
Establishment																
II. Land—																
Land (including Compensation for Wells, Tanks, &c.) ..	..	21,500	21,500	500	..	21,750	21,750	500	..	1,31,750	1,31,750	500	..	1,75,000	1,75,000	500
III. Construction of Line—																
Earthwork	..	3,63,914	3,63,914	8,463	..	3,09,282	3,09,282	7,110	..	23,76,837	23,76,837	9,020	..	30,50,033	30,50,033	8,714
Large Bridges	63,362	4,55,288	5,18,650	12,062	94,068	6,89,076	7,83,144	18,003	6,57,625	46,03,375	52,61,000	19,966	8,15,055	57,47,739	65,62,794	18,750
Minor Bridges	15,451	4,81,882	4,97,333	11,566	20,282	5,85,805	6,06,087	13,933	1,31,500	38,33,500	39,65,000	15,047	1,63,533	49,04,887	50,68,420	14,481
Level Crossings	..	16,000	16,000	372	..	14,500	14,500	333	..	90,000	90,000	342	..	1,20,500	1,20,500	344
Fencing	14,202	4,733	18,935	440	8,138	2,712	10,850	249	47,775	15,925	63,700	242	70,115	23,370	93,485	267
IV. Ballast and Permanent-way—																
Ballast	..	97,874	97,874	2,276	..	88,044	88,044	2,024	..	5,33,439	5,33,439	2,024	..	7,19,357	7,19,357	2,055
Permanent-way	4,38,372	1,52,608	5,90,980	13,744	4,18,889	1,57,982	5,76,871	13,261	25,85,981	14,93,861	40,79,842	15,483	34,43,242	18,04,451	52,47,693	14,993
V. Stations and Buildings—																
Stations and Offices ..	..	65,883	65,883	1,532	..	42,505	42,505	977	..	1,35,879	1,35,879	516	..	2,44,267	2,44,267	698
Workshops and Store Buildings	..	2,82,713	2,82,713	6,575	..	..	..	..	..	..	..	..	..	2,82,713	2,82,713	808
Staff Quarters, permanent ..	..	1,96,098	1,96,098	4,560	..	15,456	15,456	355	..	1,91,562	1,91,562	727	..	4,03,116	4,03,116	1,152
Do. temporary ..	..	10,934	10,934	254	..	11,061	11,061	254	..	67,005	67,005	254	..	89,000	89,000	254
Station Machinery	41,228	1,27,532	1,68,760	3,925	13,806	56,762	70,568	1,622	1,10,062	4,41,211	5,51,273	2,093	1,87,596	6,26,105	8,13,701	2,325
VI. Plant—																
Engineering and Station and Office Furniture, &c. ..	2,57,108	2,22,827	4,79,935	11,161	10,000	90,117	1,00,117	2,302	40,000	2,31,809	2,71,809	1,032	3,07,108	5,44,753	8,51,861	2,434
VIII. Rolling Stock	..	..	..	..	..	..	..	..	No provision made.				..	..	..	..
IX. Establishment	..	..	..	5,048	..	..	..	5,048	..	..	..	5,048	..	17,67,120	17,67,120	5,048
Grand Total ..	8,29,723	25,42,786	33,72,509	83,478	5,65,183	21,28,552	26,93,735	66,971	35,72,943	1,44,09,653	1,79,82,596	73,294	49,86,649	2,08,52,411	2,58,39,060	73,823

* The value of the Rupee is taken at 2 shillings.

(Signed) A. CREGEEN, M.I.C.E.,
Engineer-in-Chief, Vizagapatam State Railway.

VIZAGAPATAM-RAIPUR STATE RAILWAY.

COMPARATIVE Statement showing differences between the Metre and Broad Gauge Estimates.

Main and Sub-heads of Accounts.	METRE GUAGE.		BROAD GAUGE.		DIFFERENCE.			
					More		Less	
	Estimated Amount.	Cost per Mile.	Estimated Amount.	Cost per Mile.	On Total Cost.	On Cost per Mile.	On Total Cost.	On Cost per Mile.
	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
I. Preliminary Expenses	3,50,000	1,000	3,50,000	1,000	...	...	...	...
II. Land	1,75,000	500	1,75,000	500	...	...	...	...
III. Construction of Line—								
Earthwork	30,50,033	8,714	33,50,023	9,571	2,99,990	857	...	...
Bridgework	...		..	...	..	...	...	...
Large Bridges	65,62,794	18,750	81,52,132	23,291	15,89,338	4,541	...	...
Minor Bridges	50,68,420	14,481	57,26,469	16,361	6,58,049	1,880	...	...
Level Crossings	1,20,500	344	1,20,500	344	...	...	...	...
Fencing	93,485	267	93,485	267	...	...	...	...
IV. Ballast and Permanent-way—								
Ballast	7,19,357	2,055	12,81,090	3,660	5,61,733	1,605	...	...
Permanent-way	52,47,693	14,993	79,87,626	22,822	27,39,933	7,829	...	...
V. Stations and Buildings—								
Stations and Offices	2,44,267	698	2,44,267	698	...	...	...	...
Workshops and Store Buildings ...	2,82,713	808	3,04,028	869	21,315	61	...	...
Staff Quarters, permanent	4,03,116	1,152	4,03,116	1,152	...	...	...	...
Do. temporary	89,000	254	89,000	254	...	...	...	...
Station Machinery	8,13,701	2,325	9,47,050	2,706	1,33,349	381	...	...
VI. Plant	8,51,861	2,434	8,67,726	2,479	15,865	45	...	...
IX. Establishment	17,67,120	5,048	17,67,120	5,049	..	...	...	...
Grand Total ..	2,58,39,060	73,823	3,18,58,632	91,023	60,19,572	17,200	...	...

(Signed) A. CREGEEN, M.I.C.E.,
Engineer-in-Chief, Vizagapatam State Railway.

ORDER—dated 25th August 1883, No. 913 R., A Public Works.

His Excellency the Governor in Council has perused with great interest Mr. Cregeen's report on the work done during the past season, which work may be summed as follows :—

(1.) Working survey of 86 miles between Vizagapatam and Párvatipur, with complete alternative estimates of cost, for that section, of lines on the broad gauge and the metre gauge, respectively.

(2.) Rough survey of 57 miles northwards from Párvatipur, with approximate alternative estimates of cost for the two gauges.

(3.) Approximate alternative estimates of cost, for the two gauges, for the remainder of the line to Raipur.

2. The detailed estimates for a broad-gauge line for the section from Vizagapatam to Párvatipur amount to Rs. 73,96,207, being at the rate of Rs. 86,003 per mile ; while for a metre-gauge line the estimates amount to Rs. 60,66,244, being at the rate of Rs. 70,538 per mile. Both estimates being exclusive of the cost of rolling stock.

3. For the remainder of the line, from Párvatipur to Raipur, the approximate estimates for the broad gauge amount to Rs. 2,26,67,626, being at the rate of Rs. 99,074 per mile ; and for the metre gauge to Rs. 1,79,82,596, being at the rate of Rs. 73,294 per mile. These approximate estimates being also exclusive of the cost of rolling stock.

4. Taking all circumstances into consideration, the Government are inclined to the opinion that the location of line proposed by Mr. Cregeen for the section between Vizagapatam and Párvatipur is the best that could have been made. Within the town of Vizagapatam, the proposed alignment may perhaps require some alteration. With respect to the section north of Párvatipur, which was roughly surveyed during last season, the Government trust that, as anticipated by Mr. Cregeen in paragraphs 17 and 19 of his report, it will be found possible during next season to improve the crossing of the Raiagadda river, and to ease the gradients in miles 123 and 125 so as to confine between miles 128 and 136½ all gradients steeper than 1 in 100.

5. The remarks made by Mr. Cregeen, in paragraph 35 of his report, confirm the Government in the opinion at which they had previously arrived as to the superiority of Vizagapatam over Bimlipatam as the terminus of the proposed railway.

6. With respect to the question of gauge, His Excellency the Governor in Council does not consider it necessary to offer any remarks further than to state that, in his opinion, whatever gauge may be finally determined on for the line from Nagpur to Sitarampur should also be adopted for the line from Vizagapatam to Raipur.

7. His Excellency the Governor in Council observes with pleasure the evidence of wise liberality on the part of His Highness the Maharajah of Vizianagrum, in offering free of cost all lands required for railway purposes within his territory ; and he trusts that the example will be followed by the other large proprietors through whose estates the line passes.

8. The suggestion made by Mr. Cregeen, in paragraph 64 of his report, for the location of a Deputy Examiner at the head-quarters of the line, meets with the approval of Government.

9. In conclusion, His Excellency the Governor in Council desires to record his appreciation of the excellent service which has been performed during the past season by Mr. Cregeen and the staff under his orders, in the face of many and serious difficulties due to climate and other causes.

10. The following letter will be addressed to the Government of India :—

(Here enter No. 913 R., B dated 25th August 1883.)

(True Extract.)

(Signed) J. SHAW-STEWART, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

To the Superintending Engineer, Vizagapatam-Raipur State Railway.
" Consulting Engineer for Railways.
" Examiner, Public Works Accounts.
" Revenue Department.
" Political Dept.

Exd. E. Fernandez.

Spare Copies

RAILWAY.

Govt. of {1883} Madras.

PUBLIC WORKS.

Dated August, 25th.

Recd. *Encl.*

G.O., 25th Aug. 1883, No. 913 R./A

AUGUST.

Vizagapatam-Raipur State Railway Survey

Passing orders on Mr. Cregeen's report on the past season's work in connection with the —.

2nd October 1883, No. 484, Marine.

GOVERNMENT OF MADRAS.

MARINE DEPARTMENT.

Read—the following paper :—

From the Director of the Indian Marine, to the Acting Chief Secretary to Government, dated Bombay, 26th September 1883, No. 4989 (Surveys).

In continuation of my letter, No. 2763, "Surveys," dated 3rd July 1883, I have the honor to beg that you will inform the Government of Madras that it has been arranged for the survey of the Vizagapatam anchorage to be commenced on the 17th of October next by No. 2 boat party under Mr. Philip Falle of the Indian Marine Survey Department.

2. On the completion of this survey, it is proposed to fix the position of the Sacramento shoal referred to in paragraph 3 of letter, No. 7061, of 19th July 1883, from the Port Officer at Madras to the Chief Secretary to Government; but to carry out this work a small steamer will be necessary, and I therefore beg that I may be informed whether the Government of Madras will be able to place such a steamer at Mr. Falle's disposal.

3. Commander Dawson also proposes to undertake the survey of Calingapatam after the completion of the surveys mentioned in the previous paragraphs.

4. In conclusion, I have the honor to request that the local port authorities may be directed to afford the officer in charge of No. 2 boat party every possible assistance in carrying out the duty entrusted to him.

Order—dated 2nd October 1883, No. 484, Marine.

The following telegram will be sent to the Collector of Vizagapatam :—

"Your 979, August tenth. Survey Vizagapatam anchorage commences 17th instant under Mr. Falle."

2. The Master Attendant will instruct the local port officer, by telegram, to give every possible assistance to the officer in charge of the survey.

3. With reference to paragraph 2 of the Director's letter, Captain Taylor will report if any steamer can be placed at the disposal of the Survey department.

(True Extract.)

C. Unwin Major RE
Under Secy PWD
for Acting Chief Secretary.

To the Collector of Vizagapatam.
" Collector of Ganjam.
" Collector of Godávari, with copy of G.O., No. 393, dated 27th July 1883.
" Master Attendant, Madras.
" Public Works Department.

Exd. J. W. Fischer.

B 2192 — 9. 8. 83
A 9/13 R 25. 8. 83
— 2579 — 14. 9. 83

No. 2929 Mar/16th Oct/83

B

Communicated
Communicated
to the Supdg Surgn
to the Supdg Surgn
First Circle
First Circle

C.J.
9/10

Govt. of {1883} Madras.

MARINE.

Issued

Recd. 8/10/83 Encl.

G.O., 2nd October 1883, No. 484.

B No. 2929 Mar/16th Oct/83

OCTOBER.

Survey of Vizagapatam anchorage.

Informing the Collector of Vizagapatam that the — commences on the 17th October, and requesting the Master Attendant, Madras, to report if any steamer can be placed at the disposal of the Survey Department, and to instruct the local port officer, by telegram, to give every possible assistance to the officer in charge of the survey.

7/10

S. E. First Circle

with order

GOVERNMENT OF MADRAS.

MARINE DEPARTMENT.

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(True Extract.)

E. F. WEBSTER,
Acting Chief Secretary.

To the Collector of Vizagapatam.
" Collector of Ganjam.
" Collector of Godávari, with copy of G.O., No. 393, dated 27th July 1883.
" Master Attendant, Madras.
" Public Works Department.

Exd. J. W. Fischer.

Govt. of {1883} Madras.

MARINE.

Issued

Recd. Encl.

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