M.R.O. 1—10,006—28-2-50.

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(2) Date of repair _____

(3) Initials of the Referencer _____

MADRAS RECORD OFFICE

Government of Madras

Public works. DEPARTMENT

G.O. No.	3186-A	Press
~~B.P. No.~~	3186 B	~~Mis.~~
164-A		
164-B		
164-C		
Dated	10 - 11-1874	~~195~~ .

Not to be folded or roughly handled

Proceedings of the Madras Government, Public Works Department,
10th November 1874.

No. 164A. Read the following letter from Lieutenant-Colonel J. H. M. SHAW-STEWART, R.E., Consulting Engineer for Railways, to Colonel G. W. WALKER, R.E., Secretary to Government, Public Works Department, dated Madras, 29th October 1874, No. 664 :—

With reference to the Order of Government, under date the 19th October, 1874, No. 2,983, I have the honor to return the statement received from the Government of India with the particulars under Column No. 4 filled in.

2. I herewith forward a similar statement giving details of the bridges over the Paupugnee, Chittravutty, and Pennair rivers. I have asked the Agent of the South Indian Railway to furnish me with details of the Amravutty bridge and estimated details of the bridges to be built over the large rivers on the extensions, and the delay in returning the statement is due to my having awaited a reply from him. As the Government of India desire the statement to be returned forthwith, I have thought it better to leave the remaining information to be supplied subsequently.

3. I beg that I may be furnished with twelve copies of the printed statement.

Statement of Cost of some of the dimensions of the largest Bridges on Guaranteed and State Railways in India.

Name of Bridge.	1 No. of Spans.	2 Length of Bridge.	3 Depth of foundation below low-water.	4 Height from low-water level to underside girders.	5 Total Cost.	6 Cost per Lineal Foot.	Remarks.
		Feet.	Feet.	Feet.	Rs.	Rs.	
Gorai Bridge ...	7	1,295	77 to 95	.....	16,95,009	970	Actual cost for a single railway. Each pier consists of two iron cylinders. The approaches cost 3 lakhs. Deducting approaches the cost per foot is Rupees 1,077.
Approaches to ditto	12	452	25	.....			
Jumna (Allahabad).	14	3,080	40	.....	40,75,800	1,323	Ten wells in foundation of piers, which are of stone masonry, for a double way, but girders for a single way only yet laid. Common roadway between the girders and railway on top.
Soane	28	4,730	32	.....	26,10,167	551	Double sub-structure with girders for single way with second girder; the total cost is Rupees 37,67,473, or Rupees 800 per foot nearly.
Ganges (Cawnpore).	25	2,750	50 to 65	.....	19,40,000	685	Estimated cost. One well of 18 feet and one of 10 feet in pier. Railway over, roadway between the girders.
Land-spans ...	2	80					
Jumna (Agra) ...	16	2,272	70	.....	16,54,203	728	Ditto. Three wells in foundation of piers, which are of stone masonry, and carry girders for a single railway* both broad and narrow between, and a common roadway on top.
Ganges (Rajghat) ...	33	3,040	55	.....	9,68,580	317	Ditto. One well of 16 feet diameter in pier foundation. Railway on the top of the girders.
Jumna (Delhi) ...	12	2,640	7 to 39	.....	16,60,354	629	Actual cost. Ten wells in foundation of piers, which are not dressed with stone masonry. Sub-structure and girders for a single way on top with a common roadway between the girders.
,, (Saharunpoor)	24	2,640	42	.....	...	...	The contract rate was Rupees 423 per foot, but extensive additions have since become necessary, and actual cost is not known—piers are on single wells 12 feet 6 inches diameter.
Sutlej (Loodianah).	58	6,424	40 to 50	.....	...	...	
Beas ...	29	3,220	43	.....	...	...	
Ravee (Lahore) ...	33	3,217	75	.....	18,52,176	575	Estimated cost without training works for a narrow gauge railway.
Chenab ...	64	9,088	75	.....	41,75,973	459	
Jhelum	50	4,875	30	.....	14,78,077	303	Three wells in foundation of piers, which are of brick masonry.
Sutlej (Bhawulpoor)	16	4,224	100	.....	38,85,780	920	

* Both broad and narrow gauge railway between the girders and a common roadway on the top.

Statement of Cost of some of the dimensions of the largest Bridges on Guaranteed and State Railways in India.—(Concluded.)

Name of Bridge.	1 No. of Spans	2 Length of Bridge	3 Depth of foundation below low-water.	4 Height from low-water level to underside girders.	5 Total Cost.	6 Cost per Lineal foot.	Remarks.
		Feet.	Feet.	Feet.	RS.	RS.	
Goomtee (Jounpoor)	16	1,472	45 to 50	.....	9,00,000	611	Estimated cost for broad gauge. Two wells of 16 feet in pier foundation. Railway between the girders.
Ramgunga (Bareilly)	34	2,260	85	.....	10,74,000	475	Ditto. Wells of 16 feet and of 14 feet in pier foundation single cylinders. Railway on top of the girders.
Taptee ...	30	1,875	Average 14	.....	8,95,260	497	Actual cost for a double-way. Three iron-piles in each pier.
Nerbudda ...	67	4,187	,, 37	.....	46,93,490	1,167	Ditto ditto. Five ditto, with a cluster of 10 in every 6th pier.
Saburmuttee ...	18	1,125	,, 31	.....	3,89,852	360	Ditto single line.
Kistna	36	3,865	,, 15 69	.....	12,80,001	331	Ditto ditto.
Taptee	33	2,556	,, 17·30	.....	13,64,900	534	Ditto double line.
Cauvery	22	1,536	Shallow on rock.	36	4,08,752	266	Ditto single line over masonry piers built for a double line.
Toongabudra ...	58	4,060	,, ,,	37	7,55,756	186	

N.B.—With the exception of the Cauvery and Toongabudra, the cost of Engineer and General Establishment is not included in the above. If it were, the "total cost" would be increased from ⅛th to ¼th more, according to circumstances of time and place.

21st February 1874.

H. D.

MADRAS RAILWAY.
CAUVERY BRIDGE.

Statement of heights of Piers from river bed to bottom level of girder.

Pier No.	Height of Piers. FT.	IN.	Remarks.
Abutment.	16	0	West side, Beypoor.
1	17	0	
2	22	0	
3	31	0	
4	29	0	
5	32	0	
6	34	6	
7	34	0	
8	34	6	
9	33	0	
10	30	6	
11	30	6	
12	29	6	
13	30	6	
14	30	6	
15	28	0	
16	27	6	
17	31	0	
18	32	0	
19	27	0	
20	27	0	
21	19	0	
Abutment.	12	6	East side, Madras.

18*th April* 1874.

Proceedings of the Madras Government, Public Works Department,
10*th* November 1874.

MADRAS RAILWAY.
TOONGABUDRA BRIDGE.

Statement of heights of Piers from bottom of foundations to bottom of girder.

Pier No.	Heights. FEET.	Pier No.	Heights. FEET.	Pier No.	Heights. FEET.
S. Abutment	10·19	20	36·40	40	44·13
1	12 92	21	39·49	41	45 61
2	14·67	22	35·55	42	36·69
3	16·56	23	37·00	43	32·18
4	19 02	24	29·72	44	30 56
5	20·60	25	48·12	45	33·40
6	22·80	26	39·13	46	39·12
7	26·17	27	43·92	47	37·79
8	24·09	28	43·78	48	26·97
9	30·15	29	45·31	49	18·96
10	32·57	30	39·38	50	19·81
11	36·35	31	37·97	51	23·75
12	35·00	32	41·36	52	27·42
13	33·00	33	41·73	53	24·83
14	32 92	34	47·78	54	25·25
15	32·07	35	41·65	55	24 38
16	34·62	36	36·34	56	20·01
17	35·00	37	35·35	57	15·78
18	33·46	38	41·10	N. Abut.	9·41
19	33·55	39	35·93		

18*th April* 1874.

Statement called for in Consulting Engineer's letter No. 540 *of the* 12*th June* 1874.

Name of Bridge.	1 No. of Spans.	2 Length of Bridge.	3 Depth of foundation below low-water.	4 Height from low-water level to under-side girders.	5 Total Cost.	6 Cost per Lineal foot.	Remarks.
		FEET.		FEET.	RS.	RS.	
Paupugnee ...	20	1,400	Average depth of piles below river bed is 15 feet.	19½	1,62,253	116	The abutments of bridge are built of masonry for a double line and screw pile tressle piers for a single line. Each pier consists of two groups of piles, a group being formed of five piles braced and surmounted by a strong iron casting over which the openings are spanned by plate girders. The permanent-way over this bridge is laid for a single line.
Chittravutty ...	40	2,800	12 and 30 feet deep.	20	3,54,705	127	The two abutments, first ten and last ten piers, are built of masonry for a double line and founded on wells to an average depth of 12 feet below river bed. The remaining nineteen piers are of screw pile tressles similar to the Paupugnee, and carried to 30 feet below river bed. The permanent-way over this bridge is laid for a single line.
Pennair ...	24	1,680	11 and 12 feet deep.	21	1,72,525	103	The abutments and piers of this bridge are built of masonry for a double line. The foundation of abutments and six piers on each side are solid, carried down to an average depth of 12 feet below river bed, and the remaining eleven piers in the centre are founded on wells to an average depth of 11 feet below river bed. The permanent-way over this bridge is laid for a single line.

31*st July* 1874.

(Signed) T. H. GOING,
Acting Chief Engineer.
(,,) J. W. MELLIS,
for *Agent and Manager.*

Proceedings of the Madras Government, Public Works Department,
10th November 1874.

No. 164B. ORDER THEREON, 10th November 1874, No. 3,186A.

RAILWAY, No. 24A.

ORDERED that these papers be forwarded to the Government of India, with reference to letter, dated Fort William, 30th September 1874, No. 2,480-R.

(True Extract.)

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

No. 164C. (DOCKET No. 3,186B, dated 10th November 1874.)

COPY of the above forwarded to the Government of India.

(True Extract.)

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

Exd. S. T. Austin.
Spare Copies

Proceedings of the Madras Government, Public Works Department,
4th June 1874.

No. 79. Read the following letter from Major C. H. LUARD, R.E., Officiating Under Secretary to the Government of India, Public Works Department, (Railway,) to Colonel G. W. WALKER, R.E., Secretary to the Government of Madras, Public Works Department, dated Fort William, 4th May 1874, No. 939-R.:—

I AM directed to forward, herewith, three copies of a statement of cost and of some of the dimensions of the largest bridges on Guaranteed and State lines in India, and to request that any necessary corrections may be noted, and column No. 4 filled up in one of the copies, and returned to the Government of India, with an intimation of the number of copies, if any, that are required.

Statement of Cost of some of the dimensions of the largest Bridges on Guaranteed and State Railways in India.

Name of Bridge.	1 No. of Spans.	2 Length of Bridge.	3 Depth of Foundation below low-water.	4 Height from low-water level to under-side girders.	5 Total Cost.	6 Cost per Lineal Foot.	Remarks.
		Feet.	Feet.	Feet	Rs.	Rs.	
Gorai Bridge	7	1,295	77 to 95		16,95,009	970	Actual cost for a single railway. Each pier consists of two iron cylinders. The approaches cost 3 lakhs. Deducting approaches the cost per foot is Rupees 1,077.
Approaches to ditto ...	12	452	25				
Jumna (Allahabad) ...	14	3,080	40		40,75,800	1,323	Ten wells in foundation of piers, which are of stone masonry, for a double way, but girders for a single way only yet laid. Common roadway between the girders and railway on top.
Soane	28	4,730	32		26,10,167	551	Double sub-structure with girders for single way with second girder; the total cost is Rupees 37,67,473, or Rupees 800 per foot nearly.
Ganges (Cawnpoor) ...	25	2,750	50 to 65		19,40,000	685	Estimated cost. One well of 18 feet and one of 10 feet in pier. Railway over, roadway between the girders.
Land-spans	2	80					
Jumna (Agra)	16	2,272	70		16,54,203	728	Ditto. Three wells in foundation of piers, which are of stone masonry, and carry girders for a single railway* both broad and narrow between, and a common roadway on top.
Ganges (Rajghat)... ...	33	3,040	55		9,63,580	317	Ditto. One well of 16 feet diameter in pier foundation. Railway on the top of the girders.
Jumna (Delhi)	12	2,640	7 to 39		16,60,354	629	Actual cost. Ten wells in foundation of piers, which are not dressed with stone masonry. Sub-structure and girders for a single way on top with a common roadway between the girders.
,, (Saharunpoor) ...	24	2,640	42		...	...	The contract rate was Rupees 428 per foot, but extensive additions have since become necessary, and actual cost is not known—piers are on single wells 12 feet 6 inches diameter.
Sutlej (Loodianah) ...	58	6,424	40 to 50		...	...	
Beas	29	3,220	43		...	...	
Ravee (Lahore)	33	3,217	75		18,52,176	575	
Chenab	64	9,088	75		41,75,973	459	Estimated cost without training works for a narrow gauge railway. Three wells in foundation of piers, which are of brick masonry.
Jhelum	50	4,875	80		14,78,077	303	
Sutlej (Bhawulpoor) ...	16	4,224	100		38,85,780	920	
Goomtee (Jounpoor) ...	16	1,472	45 to 50		9,00,000	611	Estimated cost for broad gauge. Two wells of 16 feet in pier foundation. Railway between the girders.
Ramgunga (Bareilly) ...	34	2,260	85		10,74,000	475	Ditto. Wells of 16 feet and of 14 feet in pier foundation single cylinders. Railway on top of the girders.
Taptee	30	1,875	Average 14		8,95,260	497	Actual cost for a double-way. Three iron-piles in each pier.
Nerbudda	67	4,187	,, 37		46,93,490	1,167	Ditto ditto. Five ditto, with a cluster of 10 in every 6th pier.
Saburmuttee	18	1,125	,, 31		3,89,852	360	Ditto single line.
Kistna	36	3,865	,, 15·69		12,80,001	331	Ditto ditto.
Taptee	33	2,556	,, 17·30		13,64,900	534	Ditto double line.
Cauvery	22	1,536	Shallow on rock	36	4,08,752	266	Ditto single line over masonry piers built for a double line.
Toongabudra	58	4,060	,, ,,	37	7,55,756	186	

*Both broad and narrow gauge railway between the girders and a common roadway on the top.

N.B.—With the exception of the Cauvery and Toongabudra, the cost of Engineer and General Establishment is not included in the above. If it were, the "total cost" would be increased from ⅛th to ¼th more, according to circumstances of time and place.

21st February 1874.

H. D.

Proceedings of the Madras Government, Public Works Department, 4th June 1874.

No. 80. ORDER THEREON, 4th June 1874, No. 1,475.

RAILWAY, No. 14. COMMUNICATED to the Consulting Engineer for Railways for early attention.

(True Extract.)

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

To the Consulting Engineer for Railways.

Exd. E. C. Shunker.
Spare Copies

Madras Railway
Doonjabudra Bridge

Statement of heights of Piers from bottom of
dations to bottom of Girder.

Heights	Pier No.	Heights	Pier No.	Heights
Ft.		Ft.		Ft.
10.19	20	36.40	40	44.13
12.92	21	39.49	41	45.61
14.67	22	35.55	42	36.69
16.56	23	37.00	43	32.18
19.02	24	29.72	44	30.56
20.60	25	48.12	45	33.40
22.80	26	39.13	46	39.12
26.17	27	43.92	47	37.79
24.09	28	43.78	48	26.97
30.15	29	45.31	49	18.96
32.57	30	39.38	50	19.81
36.35	31	37.97	51	23.75
35.00	32	41.36	52	24.42
33.00	33	41.73	53	24.83
32.92	34	47.78	54	25.25
32.07	35	41.65	55	24.38
34.12	36	36.34	56	20.01
35.00	37	35.35	57	15.78
33.46	38	41.10	Nabut.	9.41
33.55	39	35.93		

April 1874.

Madras 13th April 1874.
Sir,
I have the honor to forward
herewith

Bridge Bill 1874.
No. 2
Rec'd 18th April 1874.
Ex. P.W. Madras

Madras Railway
Cauvery Bridge
Statement of heights of Piers from River Bed to bottom Level of Girder

Pier No.	Height of Piers Ft.	Ins.	Remarks.
Abut.	16.	0	West Side. Seyfoor.
1	17.	0	
2	22.	0	
3	31.	0	
4	29.	0	
5	32.	0	
6	34.	6	
7	34	0	
8	34	6	
9	33	0	
10	30	6	
11	30.	6	
12	29.	6	
13	30.	6	
14	30.	6	
15	28	0	
16	27	6	
17	31	0	
18	32	0	
19	27	0	
20	27	0	
21	19	0	
Abut.	12	6	East Side. Madras.

18th April 1874.

Statement called for in Consulting Engineers letter No 540 of the 12th June 1874.

	1	2	3	4	5	6	
Name of Bridge	No of Spans	Length of Bridge	Depth of Foundations below low water	Height from low water level to underside girders	Total Cost	Cost per Lineal Foot	Remarks
		Feet		Feet	Rupees	Rupees	
Paupegnee	20	1400	Average depth of Piles below River bed 15 feet.	19½	1,62,253	116	The Abutments of Bridge are built of masonry for a double line and Screw Pile Trestle Piers for a single line. Each Pier consists of two groups of Piles, a group being formed of 5 Piles braced and surmounted by a strong Iron Casting over which the openings are spanned by Plate Girders. The Permanent Way over this Bridge is laid for a single line.
Chittravutty	40	2800	12 and 30 feet deep	20	3,64,705	127	The two Abutments, first ten and last ten Piers are built of masonry for a double line and founded on Wells to an average depth of 12 feet below River bed The remaining nineteen Piers are of Screw Pile Trestles similar to the Paupegnee and carried to 30 feet below River bed. The Permanent Way over this Bridge is laid for a single line.
Pennar	24	1680	11 and 12 feet deep	21	1,72,525	103	The Abutments and Piers of this Bridge are built of masonry for a double line. The foundation of Abutments and six Piers on each side are solid carried down to an average depth of 12 feet below River bed and the remaining eleven Piers in the centre are founded on Wells to an average depth of 11 feet below River bed. The Permanent Way over this Bridge is laid for a single line.

Chief Engineers Office
31st July 1874.

F. W. Mellis
for the Agent & Manager

S. H. Guise
Actg Chief Engineer

Pennar rivers. ... have asked

the

Railway Department. CONSULTING ENGINEER'S OFFICE.

No. 669

From

LIEUT.-COLONEL J. H. M. SHAW STEWART, R.E.,

Consulting Engineer for Railways,

To

COLONEL G. W. WALKER, R.E.,

Secretary to Government,

Public Works Department.

Fort Saint George.

Sir,

With reference to the Order of Government under date the 19th October, 1894, No. 2983, I have the honour to return the statement received from the Government of India with the particulars under column No. 4 filled in.

2. I herewith forward a similar statement giving details of the bridges over the Paujeyaru, Chittravutty, and Pennair rivers. I have asked the

Rd. 8 Nov. 94.
Rd. Do. Nov. 94.
Ans. 13 Nov. 94.

the Agent of the South Indian Railway to furnish me with details of the Amravetty bridges, and estimated details of the bridges to be built over the large rivers on the Extensions; and the delay in returning the statement is due to my having awaited a reply from him. As the Government of India desire the statement to be returned forthwith, I have thought it better to leave the remaining information to be supplied subsequently.

3. I beg that I may be furnished with twelve copies of the printed statement.

I have the honour to be
Sir
Your most obedient servant

Madras
29th October
1874
Ex Duty.

Mauritius (Bt. Lt. Col.)
Com. Engineer for Ry Dr.

P. W. 1874 Dept.
Prov. Govt.
No. 6787

RAILWAY DEPARTMENT.

From
The Consulting Engineer
for Railways,

To
The Secretary to Government,
P. W. Department,
Fort Saint George.

Dated 29 October 1874.
Recd. 30

No. 664

Enclosures 4

Returns Contract
received with Pro.
No. 2477. Filled in
with the necessary
particulars regarding
the Retaining Walls &
Loose Ballast

Colonel Chas. Pasley R.E.
Chief Engineer & Secretary to Government
Public Works Department
Fort St. George

Sir,

I have the honor to forward herewith for the information of Government a Return of Contracts entered into by the Executive Engineer Cuddalore Division during the month of September 1874.

2. The Contract for the Bridge over the Gadilam at Tirupapuliyur was entered into with Mr. Thomas Ashton on the 31st August 1874 for the sum of Rupees 1,64,000 and the work is to be completed in 30 months from the date of commencement.

3. The Contract for the Bridge over the Paravanar at Cuddalore was entered into with Mr. Thomas Ashton on the 31st August 1874 for the sum of Rupees 1,64,000 and the work is to be completed in 30 months from the date of commencement.

I have the honor to be
Sir
Your most obedient servant
[illegible]
Executive Engineer

To
The Consulting Engineer
for Railways
Madras

Forwarded for information.
[illegible]
Secretary to Government

Public Works.
Dept. of Civil Buildings.
6787