GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

General.
Account.

READ—the following paper :—

From the Director-General of Stores, India Office, to the Secretary to the Government of Madras, Public Works Department, dated Whitehall, S.W., 3rd August 1894, No. S. 2771.

With reference to your letter No. 262 W., dated 30th January 1894, transmitting papers regarding the unsatisfactory quality of the wire rope supplied in January 1893 for the main dam ropeway, Periyár project, I have the honour to inform you that the samples sent home have been tested, and I now forward copies of the documents noted in the margin for your information.

Letters from Bullivant and Co., dated 12th and 13th March, 19th June and 2nd July 1894.
Report by the Consulting Engineer, dated 27th July 1894.

I may observe that Messrs. Bullivant and Co. were under a misapprehension in supposing that the Consulting Engineer had already forwarded to you a copy of their letter of 12th March 1894.

ENCLOSURES.

72, MARK LANE, LONDON, E.C.,
12th March 1894.

[Indian Public Works, Periyár Project.]

Dear Sir,

We have the honour to acknowledge and thank you for your esteemed communication of the first instant containing an extract from a report from S. D. Pears, Esq., Superintendent of Works of No. I Periyár Division, to the Chief Engineer of Public Works Department, dated Periyár, 20th November 1893, No. 193 C.E., and in conjunction with this we respectfully beg to refer you to a similar report, dated 4th October 1893, No. 153 C.E.

Mr. Pears is doubtless aware that these two wire tramways (A) and (B) were designed and supplied by us and that they were designed to do a certain quantity of work.

With respect to the life of the ropes on each line, we would respectfully submit that the proper way to consider this would not be as to the actual time the ropes have lasted, but should be considered as to the quantity carried by them.

We think, with reference to report No. 153 C.E., that Mr. Pears will agree with us that it is hardly fair to consider the work done by the ropes as being what they might truly have been expected to have done if the ropes had been put to work when they first arrived. He most candidly says in the report under consideration that although the rope was supplied as long ago as 1888, it was not put to work till 1892. He does not say in what month, but at the time of his report, October, it must have been at work over 10 months, and we can quite understand that nearly any rope which had been constantly at work on a running rope system of tramway and doing the amount of work that was calculated that that tramway would do would show very considerable signs of wear and tear after being at work for 10 months.

With respect to report No. 193, we must ask a preliminary question. Mr. Pears says that when he received this rope of 5,400 feet in length that he cut it into two equal parts. We do not understand why he should do so, because it requires 5,400 feet of rope to work this tramway and that he has not materially shortened the length of the tramway is shown by the fact that the rope has to pass over 10 pulleys each 8 feet in diameter in each circuit, and this is as designed in the original tramway which took 5,400 feet of rope.

We have not yet received the specimens of rope that he refers to in his report and we shall be very glad to do so. In fact without these it is nearly impossible for us to offer any remarks on the working of the rope. We can only go back to our original point and say that the work the rope has done must be considered not by length of time it has run but by quantity it has carried.

Mr. Pears is also good enough to tell us in his report that he has considerably increased the tension, *i.e.*, reduced the sag on the ropes. This will make the wear and tear on them much more severe than if he had allowed the sag we had originally provided for.

In making these remarks we beg Mr. Pears to consider that what we are trying to arrive at is the perfecting of all parts of his gear, and any information that he may be good enough to give us will not only be of considerable interest to us but will be esteemed a great favour.

We have understood from letters we have received with respect to supplying motive power and also with respect to extension of the line that the tramways have given very considerable satisfaction, and if there is any part of the gear that we can improve, we shall only be too pleased to do so.

The amount of work done by both (A) and (B) must have been considerable, as we find in 1893 we supplied an additional number of Carrington's saddles, and in March 1893 we supplied additional numbers of carriers, wrought iron hangers and buckets. The whole of the last three items being for tramway (A), the first item being for tramway (B). It is fair to infer that as the 100 additional buckets were supplied in all probability extra work was put on the second rope.

In conclusion, we may say that the record of tests we have of materials used in the ropes referred to are all that can be desired.

To Sir A. M. Rendel, K.C.I.E.,
8, Great George Street, Westminster.

We have, &c.,

(Signed) BULLIVANT AND CO.

72, Mark Lane, London, E.C.,
13th March 1894.

No. S. 2771, 12th March.

Sir,

We have the honour to acknowledge and thank you for your esteemed communication as above. With reference to our tender of the 2nd March, we wrote to Sir A. M. Rendel, K.C.I.E., yesterday on this subject replying to Mr. Pears' memorandum as far as we could from the data furnished us.

We have no hesitation whatever in giving the assurance you ask for, viz., that if it can be shown there is anything wrong with the ropes, either as to quality or make, that we supplied under contract No. 17/2751, we will make compensation.

We pointed out in our letter to Sir Alexander yesterday that the services of a rope must not be considered by its actual life but by the quantity of work that it does.

We should therefore not be prepared to rely simply on the samples that are sent home, but should ask, before any compensation be arrived at as to the alleged failure of the rope, that we should wait the reply to our letter addressed to Sir A. M. Rendel yesterday.

We have, &c.,

(Signed) BULLIVANT AND CO.

To the Director-General of Stores.
India Office, Whitehall, S. W.

72, Mark Lane, London, E.C.,
19th June 1894.

[Indian Public Works, Periyár Project.]

Dear Sir,

In reply to your letter of yesterday and referring to your letter of the 18th April, we have to apologise that this has not been replied to before.

We need hardly assure you, however, that this is due to no discourtesy on our part, but simply to the fact that we wanted as far as possible to ascertain the actual conditions under which the rope on Tramway B has been worked.

Since the date of your letter we have had the pleasure of meeting on two or three occasions Mr. Roscoe Allan who was engaged at Periyár and who explains to us the point raised in our letter of 12th March as to why Mr. Pears should have cut the 5,400 feet of rope into two equal parts. It appears that Tramway B was divided into two parts of about equal length, and from what he tells us it seems that the work of each part was very considerably increased.

We have most carefully tested the samples of rope you were good enough to send us. These show considerable signs of wear, and to our mind the rope has been overstrained.

Attached to this letter we beg to send you a copy of the original tests of the rope under discussion before it was sent out. We also attach a copy of the results of the tests of the pieces returned.

Considering the work that the rope has had to do, we must say that we consider the tests satisfactory.

We therefore are disposed to think that the cause of failure, if any, has been due to the manner in which the rope has been worked and not to any inherent defect in the rope itself.

Mr. Pears will doubtless be replying to our letter of the 12th March, and we shall esteem it a favour if we may be honored with a copy of his reply.

We have, &c.,

(Signed) BULLIVANT AND CO.

To Sir A. M. Rendel, K.C.I.E.,
8, Great George Street, Westminster.

Tests of wire made by Mr. Goldsack on 13th January 1893.

'102

lb.	Turns 6″.	lb.	Turns 6″.	lb.	Turns 6″.
1,410	22	1,390	23	1,435	25
1,374	24	1,395	26	1,405	23
1,407	24	1,412	24	1,384	22
1,424	22	1,407	24	1,424	25
1,405	21	1,380	24	1,384	30
1,382	21	1,422	24	1,410	23
lb.	Turns 8″.	lb.	Turns 8″.	lb.	Turns 8″.
1,396	31	1,395	28	1,437	29
1,402	30	1,404	31	1,384	31
1,404	30	1,422	31	1,384	33
1,408	32	1,381	31	1,423	38
1,392	26	1,385	30	1,482	33
1,424	31	1,387	33	1,404	29

Tests of samples sent down, 2 $\frac{7}{8}$″ rope.

Strand No. 1.

			Breaking S. lb.	Turns in 6″.	
'102	...	...	1,322	13	(badly abrazed).
101	...	...	1,410	10	(„ „)
100	...	...	890		(too much worn to test).

Strand No. 2.

			Breaking S. lb.	Turns in 6″.	
'102	...	...	1,330	13	All these wires are more or less abrazed.
'102	...	...	1,360	10	
'101	...	...	1,352	14	
'101	...	...	1,328	11	
'102	...	...	1,330	12	
'102	...	...	1,290	13	

Strand No. 3.

			Breaking S. lb.	Turns in 6″.	
'102	...	...	1,300	14	All abrazed badly.
'101	...	...	1,308	12	
'102	...	...	1,421	18	
'102	...	...	1,329	10	
'103	...	...	1,408		Too abrazed to test for torsion.
'103	...	...	1,349		

Strand No. 4.

	lb.	Turns in 6″.	
'102	1,400	14	Slightly abrazed.
'101	1,328	13	
'100	1,310	16	
'101	1,424	9	Badly abrazed.
'101	1,370	10	
'101	1,435	13	Slightly abrazed.

Strand No. 5.

	lb.	Turns in 6″.	
'101	1,332	7	Badly abrazed.
'102	1,382	15	Slightly abrazed.
'101	1,321	11	
'100	1,380	8	Badly abrazed.
'101	1,467	16	Slightly abrazed.
'104	1,450	14	

Strand No. 6.

	lb.	Turns in 6″.	
'101	1,322	13	Very badly abrazed.
'102	1,370	11	
'102	1,300	7	
'099	1,369	6	
'099	1,364		Too badly abrazed to test.
'101	1,350		

72, Mark Lane, London, E.C.,
2nd July 1894.

[Indian Public Works, Periyár Project.]

Dear Sir,

In reply to your letter of the 25th ultimo, as far as we know the conditions of working of the two ropes were not the same. We think in the first case the rope was worked as a whole; in the second case it was divided into two parts. This is a question you will remember on which we asked information from Mr. Pears.

With respect to the overstrain, this may be done—

Firstly.—By increasing the number of carriers.

Secondly.—By increasing the speed of the rope.

Thirdly.—By means of tightening gear.

This latter might cause overstrain by tightening the rope during the very hot weather and leaving it subject to the effect of the cold night.

It is very difficult to give a definite answer to your letter until we receive a reply to our letter, dated 12th March, which will doubtless soon be to hand, when we shall be very pleased to go into the matter fully with the aid of the further information that Mr. Pears may give us.

To Sir A. M. Rendel, K.C.I.E.,
8, Great George Street, Westminster.

We have, &c.,
(Signed) BULLIVANT and CO.

P. S.—We will return you by messenger to-morrow the samples you refer to in your letter of the 26th ultimo.

Copy report by Consulting Engineer, dated 27th July 1894.

I enclose a letter from Messrs. Bullivant, dated the 16th ultimo, giving the results of both tensional and torsional tests made on wires taken from the samples of rope sent home. Seeing that all the wires were more or less damaged by wear, I think that these results are satisfactory and that Mr. Pears' suggestion that the failure of the ropes has been due to bad material is not borne out.

I see that in his letter No. 226 C.E. to the Chief Engineer, Mr. Pears says, "The sag with which the ropeway has hitherto been worked is less than that specified by the makers . . . But as I think the premature failure of the present rope may not improbably be partly attributable to the excess over the specified tension," &c.

The alteration of the amount of sag in the rope materially affects the initial tension upon it so that by reducing the sag Mr. Pears has put an unintended strain on the rope which may account for its failure.

I am satisfied that the frequent failure of wire ropes in India is to be attributed much more to mistaken usage than to bad workmanship.

Order—dated 28th August 1894, No. 2133 W., Public Works.

Communicated to the Superintendent of Works, Periyár Project, with reference to G.O., No. 261 W., dated 30th January 1894.

(True Extract.)

Under Secy. to Govt., P.W.D.

To the Superintendent of Works, Periyár Project.
" Chief Engineer for Irrigation.
" Superintending Engineer, V Circle.

Exd. C. A. Munisawmy.
Spare Copies

GENERAL.
ACCOUNT.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated August, 28th.

Recd. *Encl.*

G.O., 28th Aug. 1894, No. 2133 W.

AUGUST.

Periyar Project

Letter from the Director-General of Stores forwarding copies of correspondence in connection with the failure of the wire rope supplied to the —, communicated to the Superintendent of Works.

It is requested that in any further communication on this subject the under-mentioned letter and number may be quoted, and the reply addressed to

The Director General of Stores,
India Office,
Whitehall,
London, S.W.

S.2771

India Office,
Whitehall, S.W.

3rd August 1894.

Sir,

With reference to your letter No. 262 W. dated 30th January 1894, transmitting papers regarding the unsatisfactory quality of the wire rope supplied in January 1893 for the main dam ropeway, Periyar Project, I have the honour to inform you that the samples sent home have been tested, and I now forward copies of the documents noted in the margin, for your information.

Letters from Bullivant & Co. dated 12 & 13 March, 19 June and 2 July 1894.
Report by the Consulting Engineer dated 27 July 1894

I may observe that Messrs. Bullivant & Co. were under a misapprehension in supposing that the Consulting Engineer had already forwarded to you a copy of their letter of 12th March 1894.

I have the honour to be, Sir,

Your obedient Servant,

J. Tucker

Director General of Stores.

The Secretary to Government,
Public Works Department,
Madras.

Y 25606. 3 rms.—3/94. I. 189

P. W. CURRENT No. 6366

Recd 27 8 94

Received 27/8/94

Enclosures Six

Sept 12 Pwd

General account

No. 2133 W. dy 28 August 94

Communicated to the Supt: of Works, Periyar Project with reference to L.O. 261 W. dy 30 Jany 1894.

Comm 2354

Pears

DESPATCHED
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Soph. PP.
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72 Mark Lane,
London, E.C.
12th March 1894.

Sir A. M. Rendel, K.C.I.E.,
8 Great George Street, Westminster.

Dear Sir,

Indian Public Works, Periyar Project.

We have the honour to acknowledge and thank you for your esteemed communication of the 1st instant, containing an extract from a report from S. D. Pears Esq., Superintendent of Works, of No.1 Periyar Division, to the Chief Engineer of Public Works Department, dated Periyar November 20th 1893 No.193 C.E. And in conjunction with this we respectfully beg to refer you to a similar report dated October 4th 1893, No.153 C.E.

Mr. Pears is doubtless aware that these two wire tramways (A) and (B) were designed and supplied by us and that they were designed to do a certain quantity of work.

With respect to the life of the ropes on each line, we would respectfully submit that the proper way to consider this would not be as to the actual time the ropes have lasted, but should be considered as to the quantity carried by them.

We think with reference to report No.153 C.E. that Mr. Pears will agree with us that it is hardly fair to consider the work done by the ropes as being what they might truly have been expected to have done if the ropes had been put to work when they first arrived. He most candidly says in the report under consideration that although the rope was supplied as long ago as 1888 it was not put to work till 1892. He does not say in what month, but at the time of his report October it must have been at

at work over 10 months, and we can quite understand that nearly any rope which had been constantly at work on a running rope system of tramway and doing the amount of work that was calculated that that tramway would do, would show very considerable signs of wear and tear after being at work for 10 months.

With respect to report No.193, we must ask a preliminary question. Mr. Pears says that when he received this rope of 5400 feet in length, that he cut it into two equal parts. We do not understand why he should do so, because it requires 5400 feet of rope to work this tramway, and that he has not materially shortened the length of the tramway is shown by the fact that the rope has to pass over 10 pulleys each 8 ft. in diameter in each circuit, and this is as designed in the original tramway which took 5400 ft. of rope.

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The amount of work done by both (A) and (B) must have been considerable, as we find in 1893, we supplied an additional number of Carrington's saddles, and in March 1893, we supplied additional numbers of carriers, wrought iron hangers and buckets. The whole of the last three items being for tramway (A), the first item being for tramway (B). It is fair to infer that as the 100 additional buckets were supplied in all probability extra work was put on the second rope.

In conclusion we may say that the record of tests we have of materials used in the ropes referred to are all that can be desired.

We have, &c.,

(Sd) Bullivant & Co.

Print

5 SP

72 Mark Lane,

London, E.C.

13th March 1894.

The Director General of Stores,

India Office, Whitehall, S.W.

Sir,

S.2771, 12th March.

We have the honour to acknowledge and thank you for your esteemed communication as above with reference to our tender of the 2nd March, we wrote to Sir A. M. Rendel,K.C.B. yesterday on this subject, replying to Mr. Pears' memorandum as far as we could from the data furnished us.

We have no hesitation whatever in giving the assurance you ask for, viz., that if it can be shown there is anything wrong with the ropes, either as to quality or make, that we supplied under contract No.17/2751, we will make compensation.

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We should therefore not be prepared to rely simply on the samples that are sent home, but should ask before any compensation be arrived at as to the alleged failure of the rope, that we should wait the reply to our letter addressed to Sir A. M. Rendel yesterday.

We have, &c.,

(Sd) Bullivant & Co.

Paint

72 Mark Lane,

London, E. C.

19th June 1894.

Sir A. M. Rendel,

8 Great George Street, Westminster.

Dear Sir,

India Public Works, Periyar Project.

In reply to your letter of yesterday and referring to your letter of the 18th April, we have to apologise that this has not been replied to before.

We need hardly assure you, however, that this is due to no discourtesy on our part, but simply to the fact that we wanted as far as possible to ascertain the actual conditions under which the rope on Tramway B. has been worked.

Since the date of your letter, we have had the pleasure of meeting on two or three occasions Mr. Roscoe Allan, who was engaged at Periyar, and who explains to us the point raised in our letter of March 12th as to why Mr. Pears should have cut the 5400 feet of rope into two equal parts. It appears that Tramway B. was divided into two parts of about equal length, and from what he tells us it seems that the work of each part was very considerably increased.

We have most carefully tested the samples of rope you were good enough to send us. These show considerable signs of wear, and to our mind the rope has been overstrained.

Attached to this letter we beg to send you a copy of the original tests of the rope under discussion before it was sent out. We also attach a copy of the results of the

tests

tests of the pieces returned.

Considering the work that the rope has had to do, we must say that we consider the tests satisfactory.

We therefore are disposed to think that the cause of failure, if any, has been due to the manner in which the rope has been worked, and not to any inherent defect in the rope itself.

Mr. Pears will doubtless be replying to our letter of the 12th March, and we shall esteem it a favour if we may be honoured with a copy of his reply.

We have, &c.,

(Sd) Bullivant & Co.

India Office. Contract 17/275 Dec./92

Tests of Wire made by Mr. Goldsack on January 13th 1893.

'102

lbs.	Turns 6"	lbs.	Turns 6"	lbs.	Turns 6"
1410	22	1390	23	1435	25
1374	24	1395	26	1405	23
1407	24	1412	24	1384	22
1424	22	1407	24	1424	25
1405	21	1380	24	1384	30
1382	21	1422	24	1410	23

lbs.	Turns 8"	lbs.	Turns 8"	lbs.	Turns 8"
1396	31	1395	28	1437	29
1402	30	1404	31	1384	31
1404	30	1422	31	1384	33
1408	32	1381	31	1423	38
1392	26	1385	30	1432	33
1424	31	1387	33	1404	29

Tests of samples sent down, 2 7/8" rope.

Strand No.1

'102.....B.S.1322 lbs. 13 turns in 6" (badly abrazed)
'101..... " 1410 " 10 " " " "
'100..... " 890 " too much worn to test)

Strand No.2

	Breaking S.	Turns in 6"	
'102	1330 lbs.	13	)
'102	1360 "	10	)
'101	1352 "	14	)) All these wires are
'101	1328 "	11	) more or less abrazed.
'102	1330 "	12	)
'102	1290 "	13	)

Strand No.3

'102...1300 lbs. B.S. 14 turns in 6") all abrazed badly
'101...1308 " " 12 " ")
'102...1421 " " 18 " ")
'102...1329 " " 10 " ")
'103...1408) too abrazed to
'103...1349) test for torsion.

Strand No.4

'102....1400 lbs 14 turns 6") slightly abrazed
'101....1328 " 13 ")
'100....1310 " 16 " badly "
'101....1424 " 9 " " "
'101....1370 " 10 " slightly "
'101....1435 " 13 "

Tests

Tests of Sample.

Strand No.5

'101....1332 lbs	7 turns 6"		(badly abrazed)
'102....1382 "	15	"	(slightly ")
'101....1321 "	11	"	(" ")
'100..".1380 "	8	"	(badly ")
'101....1467 "	16	"	(slightly ")
'104....1450 "	14	"	(" ")

Strand No.6

'101....1322 lbs	....13 turns 6"	) Very badly abrazed
'102....1370 "	....11 "	)
'102....1300 "	.... 7 "	)
'099....1369 "	.... 6 "	)
'099....1364 "	....	(Too badly abrazed)
'101....1350	....	(to test)

Print

10.18

72 Mark Lane,

London, E.C.

2nd July 1894.

Sir A. M. Rendel,

8 Great George Street, Westminster.

Dear Sir, India Public Works, Periyar Project

In reply to your letter of the 25th ultimo as far as we know the conditions of working of the two ropes were not the same. We think in the first case the rope was worked a a whole, in the second case it was divided into two parts. This is a question you will remember on which we asked information from Mr. Pears.

With respect to the overstrain, this may be done

Firstly. By increasing the number of carriers.

Secondly. By increasing the speed of the rope.

Thirdly. By means of tightening gear.

This latter might cause overstrain by tightening the rope during the very hot weather, and leaving it subject to the effect of the cold night.

It is very difficult to give a definite answer to your letter until we receive a reply to our letter dated March 12th, which will doubtless soon be to hand, when we shall be very pleased to go into the matter fully with the aid of the further information that Mr. Pears may give us.

We have, &c.,

(Sd) Bullivant & Co.

P.S. We will return you by Messenger to-morrow, the samples you refer to in your letter of the 26th ultimo.

Ph S.3
6344/6