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Agents,

1914
9 Sept.

Last previous Paper.
21538

Locomotives for Uganda Rly.

Fwds. copy of obsons by Messrs Rendel Palmer & Tritton as to the most suitable type of locomotive, the possibility of prompt supply, & the ability of the bridges to stand the load.

Copy of Dft. on 20651, with copy of this to the Sec. for infn with refce to 20651. D.T. at once
W. D. E.
10/9/14

Copy for R.A.S. 16 Sep. 14

C.O.
R. 11 SEP
D. 12

Next subsequent Paper.

(88,105) Wt. 31,085—13. 45,000. 12/13. A & E. W.

E.
283/4

ALL COMMUNICATIONS TO BE ADDRESSED TO THE CROWN AGENTS FOR THE COLONIES, THE ABOVE REFERENCE AND THE DATE OF THIS LETTER BEING QUOTED.

TELEGRAMS "CROWN, LONDON."
TELEPHONE 7730 VICTORIA (6 LINES.)

East

34268
Rec'd
Reg'd 10 SEP 14

WHITEHALL GARDENS,
LONDON, S.W.

9th September 1914.

Sir,

In reply to your letter No. 20651 of 16th June 1914 I have the honour to enclose for the information of the Secretary of State a copy of preliminary observations by Messrs. Rendel Palmer and Tritton as to the most suitable type of locomotive for use on the Uganda Railway, the possibility of the prompt supply of such locomotives, and the ability of the bridges to stand the load.

. 9. 14
encls.

I have the honour to be,
Sir,
Your obedient Servant,

for Crown Agents.

The Under Secretary of State,
&c., &c., &c.,
Colonial Office.

C O P Y

283/7

373

MESSRS RENDEL PALMER & TRITTON TO CROWN AGENTS

34268
REC'D
REGD 10 SEP

Dartmouth Street,
Westminster, S.W.
5th September 1914.

UGANDA RAILWAY

STRENGTH OF BRIDGES

Your letter No. 283/E/7 of 23rd June 1914

Gentlemen,

We have now made an examination of all the different types of bridges on the line, and also of the trestles of the Kikuyu and Mau Viaducts, with a view to ascertaining their capability for carrying a heavier live load than now in force. The load we have assumed consists of two 4-8-2 type locomotives, as shewn in Mr. Neville's sketch which accompanied your letter, each weighing 58½ tons (with 10 tons on each of the four driving axles) and having a tender weighing 32 tons, or 90½ tons in all for each engine and tender, followed by a train load averaging 1½ tons per foot run, but subject to the proviso that no wagon axle load shall exceed 10 tons, nor be closer to an adjacent 10 ton axle than 4' 0".

2. Under this loading we find that with some few exceptions the whole of the structures are within the limits laid down for steel bridges in this country. The points of excess are:-

(1)

(1) In some of the trestles of the Kikuyu Viaducts where some of the longitudinal diagonal ties might be stressed up to 6¾ tons per square inch by the traction or breaking effort of a passing train, instead of to 6½ tons permissible, and

(2) In various plate girders and in the cross and rail girders for the 100 ft. spans, where the bearing pressure on the rivets connecting the main angle bars to the web plates would exceed 6½ tons per square inch.

3. In no case, however, do we consider that the stresses indicated are so high as to call for any reinforcement. We think therefore that the proposed 4-8-2 locomotives (with four driving axles of 10 tons each) may be sanctioned for use over the whole line, subject to a speed restriction of 15 miles per hour over the 100 ft. spans (of which we believe there are only one or two cases on the line) and 25 miles per hour over the viaducts.

4. We are sending this portion of our report in advance because we understand that it is desirable to settle the question of the engines referred to at once. The question of the heavier (15 tons) axle loads is a greater one, and will be investigated and reported on as soon as possible.

5. We believe from recent offers we have received for locomotives that engines of the type proposed by the Locomotive Superintendent could be obtained with delivery commencing in about eight months, though of course under present conditions it is very difficult to give a reliable estimate in this respect.

(SD) RENDEL PALMER & TRITTON

COPY

UGANDA RAILWAY

Summary of Maximum Stresses produced in Bridges by two 4-8-2 type locomotives each weighing 90½ tons including tender, and train of wagons at 1½ tons per foot (with no Impact) and wind at 56 lbs. per square foot.

MAKUPA (OR "SALISBURY") BRIDGE

	tons per sq. in.
Main Girders (60 ft. span)	
Tension	5.38
Compression	4.62
Shear	2.24
Bearing (Rivets)	7.22
Cross Girders	
Tension	4.21
Compression	3.70
Shear	1.77
Bearing (Rivets)	5.12
Rail Girders	
Tension or Compression	4.83
Shear	1.51

KIKUYU VIADUCTS

40 ft. spans	
Tension	5.7

	Tons per sq.in.
Compression	5.32
Shear	2.0
Bearing (Rivets)	7.86

20 ft. Spans

Tension	3.1
Compression	2.73
Shear	1.19
Bearing (Rivets)	5.39

Trestles

Leg. Compression	5.4
Bracing (transverse)	
Tension	5.96
Compression	1.80
Bracing (longitudinal)	
Tension	6.75
Compression	0.6

MAU VIADUCTS

40 ft. Spans

Tension	4.95
Compression	4.68
Shear	2.03
Bearing (Rivets)	7.0

20 ft. Spans

Tension	3.15
Compression	2.73
Shear	1.19
Bearing (Rivets)	5.18

	Tons per sq. in.
Cross Girders (Channel Bars)	
Tension or Compression	5.8
Trestles	
Leg, Compression	5.82
Bracing (transverse)	
Tension	5.37
Compression	1.70
Bracing (longitudinal)	
Tension	5.75
Compression	0.6

	Tons per sq.in.
6 ft. Clear Span (drg. No. 92)	
Tension or Compression	2.79
Shear	1.88
10 ft. Clear Span (drg. No. 209)	
Tension or Compression	3.89
Shear	1.44
12 ft. Clear Span (drg. No. 93)	
Tension or Compression	4.14
Shear	1.30

	Tons per sq. in.
20 ft. Clear Span (Drg. No. 94)	
Tension or Compression	4.13
Shear	1.65
40 ft. Clear Span (drg.No. 95)	
Tension	5.05
Compression	4.98
Shear	1.74
Bearing (Rivets)	6.0
40 ft. Clear Span (drg. No. 743)	
Tension	4.85
Compression	4.91
Shear	1.65
Bearing (Rivets)	6.13
60 ft. Clear Span (drg. No. 231)	
Tension	5.12
Compression	4.9
Shear	1.77
Bearing (Rivets)	7.8
Bearing Girders for 40 ft. Spans (drg. No. 235)	
Tension or Compression	4.28
Shear	2.7.
Bearing Girders for 60 ft. spans (drg. No. 616)	
Tension or Compression	4.46
Shear.	3.43

100 ft. Clear Spans (drgs. Nos. 595 & 596)

	Tons per sq. in.
Main Girders	
Tension	6.5
Compression	5.61
Bearing (Rivets)	4.87
Cross Girders	
Tension	5.53
Compression	4.52
Shear	2.62
Bearing (Rivets)	9.9
Rail Girders	
Tension	3.31
Compression	2.91
Shear	1.93
Bearing (Rivets)	7.3