

1875.
NEW ZEALAND.

RAKAIA BRIDGE COMMISSION,

(REPORT OF THE).

Presented to both Houses of the General Assembly by Command of His Excellency.

Rakaia Bridge Commission, Christchurch, 30th April, 1875.

To His Excellency the Most Noble Marquis of Normanby, Governor of New Zealand,
&c., &c., &c.

WE, the Commissioners appointed the 2nd day of February, 1875, under your Excellency's hand and the seal of this colony, to inquire into certain matters connected with the Rakaia Bridge, as set forth in the Commission, beg to report,—

That the first contract for the construction of the Rakaia Bridge received the approval of the late Mr. T. Patterson, Consulting Engineer, and Mr. G. Thornton, Provincial Engineer, and was subsequently made on the 7th October, 1869, between the Superintendent of the Province of Canterbury and Mr. William White, contractor.

The second contract, for the conversion of the bridge (during the progress of the first contract) to a combined road and railway bridge, was entered into by the Superintendent of Canterbury with Mr. William White on the 29th August, 1871. The plans were approved by the Acting Engineer-in-Chief, Mr. Blackett, and the Provincial Engineer, Mr. Thornton, on behalf of their respective Governments. Under the second contract, the first was to remain in force, and a clause was inserted providing for the General Government taking over the contract, which, however, was never acted upon. This contract in its main features provides for additional piles, railway girders, transverse joists 9 x 4 on edge, and longitudinal planking.

Mr. W. B. Bray is named as the General Government Engineer, and Mr. George Thornton (to whom the supervision of the works was intrusted) as Provincial Engineer.

The powers of the General Government Engineer were not defined, but, as it was contemplated that the General Government would repay the cost of the bridge to the Provincial Government, the Engineer of the former would have some control: he could dissent from or assent to any alterations.

Mr. Locke (since deceased) was appointed by the Superintendent of Canterbury clerk of works under the contract.

Mr. Bray retired from the service of the General Government in May, 1872, and was succeeded by Mr. T. S. Tancred. In September, 1872, Mr. Tancred suggested alterations in the design—viz., to lay 18-ft. 10 x 5 joists on their flat instead of 9 x 4 on edge, and to floor the bridge between the rails with timber four inches thick to receive asphalte as a protection to the structure against fire.

Plan No. 4, which embodies this idea, does not materially alter the original plan No. 2, for the combined bridge, but was never carried out.

It was prepared in Mr. Thornton's office by Mr. D. G. Ward, under instructions from Mr. Tancred. This plan was signed by Mr. Tancred and Mr. Thornton, and forwarded to the Engineer-in-Chief, Mr. J. Carruthers, for his approval, which was signified in due course, on the 29th October, 1872, to Mr. Tancred, by telegram; and on the 31st October the latter offers Mr. White, and he accepts, a contract to lay the permanent way.

No further instructions appear to have been forwarded by the Engineer-in-Chief in this matter, and no intimation in any form was given of the confirmation of the plan to the Provincial Engineer or the contractor, although both were aware that such a plan as No. 4 was contemplated.

Mr. Tancred left office on the 5th November, 1872, without explaining to his successor, Mr. C. Y. O'Connor, the position of the works on the bridge, or that No. 4 plan had been approved. The latter never saw the plan.

Mr. Locke, clerk of works, was invalided about this date, 4th November, 1872, and none other was appointed for four months, during which period the whole of the superstructure was completed in a mode entirely at variance with the contract designs, Mr. Thornton having been content to accept Mr. White's word as to the mode in which the bridge was to be constructed.

Plan No. 3, drawn after completion of the bridge by Mr. J. G. Warner, shows it as built, and has not received the sanction of any of the Engineers excepting as far as asphaltting is concerned. It differs radically from either No. 2 or No. 4 plan, by the omission of the joists 9 x 4 or 10 x 5, and placing all the planking transversely, and by the asphaltting of the whole of the bridge.

Mr. White says Mr. Tancred authorized this plan, but Mr. Tancred denies it, and there is no other evidence. He authorized the use of Oregon sleepers, but left office before the decking was commenced.

The intention seems to have been to use short joists and still carry out No. 4 plan.

The contracts which have been entered into are as follow :—

1. Between the Superintendent of Canterbury and Mr. White, dated 7th October, 1869.
2. Between the Superintendent of Canterbury and Mr. White, sanctioned by the General Government and dated 29th August, 1871.
3. For tarring joints, between the General Government and Mr. White, in February, 1873.
4. For asphaltting the whole bridge, between the General Government and Mr. White, in February.
5. For painting hand-railing, between the Provincial Government and Button.
6. For approaches and fencing, between the Provincial Government and Holden and others.

The mode in which the contracts have been performed is as follows :—

Plan No. 2, which was the only authorized deviation from No. 1, has never been carried out. Instead of the bridge being built with transverse joists 9 x 4 in size, and longitudinal planking 8 x 3 of totara, black pine, or sugarloaf pine, the transverse joints are all omitted. Between the rails, transverse planking, consisting mostly of 4 in. thick black pine of various widths, has been laid. Outside the rails the planking consists of 8 x 3, chiefly white pine in a very perished condition.

The whole of the planking is laid directly on the road and railway girders.

The 8 x 3 planks are not properly secured with spikes at the butts.

The supervision of the construction of the bridge was of the most careless description, and, as far as can be heard from the evidence, the cross joists, equal to 103,488 feet of timber, have been left out by the contractor without any authority whatever. The reason why it suited his purpose to do so will presently appear.

The planking for the deck of the bridge was seen by Mr. Tancred, before it was put in position, and acquiesced in by him, although he considered it "not good at all." His reason for not objecting to it is because he understood from Mr. White that he had used it in a temporary bridge with the consent of the Provincial Government.

There is, however, no evidence of this consent, and Mr. Tancred quite forgot the clause in the General Conditions of Contract regarding materials. Some of this planking had been cut for four years, and had been mostly in use as scaffolding: it is improbable therefore that it can have been in a fit condition to lay down as permanent planking.

Mr. Thornton reports to the Secretary for Public Works on 10th March, 1873, that he found the planking generally good, but we are compelled to state that the weight of evidence is directly the opposite.

The bad condition of the planking in course of being laid down was at the time the common talk of the whole country side. In specification to contract No. 2, clause "Joists and Flooring," it is ordered that "the flooring shall consist of planks 8 x 3, spaced as on drawing, $\frac{1}{4}$ in. apart. The planks to break joints so that three planks shall pass through with five feet shift of butts, as more particularly shown on drawing, &c. No planking shall be less than 10 feet in length." Mr. White in his evidence considers that, when new, white-pine planking would last for five years in the flooring of a bridge.

As a quantity of the planking was four years old, from his own showing some of it must have been nearly done for, and it is a fair inference that he could more easily get a lot of short lengths which would pass muster at the inspection than lengths the least of which was to be 10 feet. Now, the greatest length required for transverse planking between the outside of rails and outside of bridge is 6 ft. $4\frac{1}{2}$ in., and from ends of sleepers to outside of bridge only 4 ft. 5 in. He was therefore able to cut out decayed or twisted portions in his longer lengths of 8 x 3, and thus to save a great deal of total waste of planks, which, in the longitudinal planking, would have been unavoidable.

The hand-railing has not been returned round the shelter platforms, although proper shelter platforms were to be provided as directed. The lower walings and braces have been omitted on 55 bays. There is a foot-note on plan No. 2 which provides for this omission under certain circumstances, but they were to be furnished if afterwards found necessary.

It was not imperative to shift the timbers in order to tar the joints. It appears from Mr. O'Connor's evidence that Mr. White, the contractor, told him the timbers had been shifted, for which work £324 7s. is allowed, the actual cost of the tarring being £133 15s. 6d. Mr. Warner in his evidence says he would not think it necessary to require any extra labour for shifting these timbers for tarring. We have seen the timbers in question, and agree with Mr. Warner.

The asphaltting of its sort was properly done, but, as the planking which formed the formation was not secure, it could not stand the effect of traffic.

The painting of the hand-railing appears to have been properly carried out.

The same remark applies to the contract for the approaches and fencing.

The sums of money paid for the works and supervision are,—

ORIGINAL and Combined Contract with Mr. White, including the Redemption of Tolls.

	£	s.	d.
Under Contract	32,464	0	0
Tarring and shifting Timbers, as per contract	458	2	6
Approaches and Fencing " "	373	14	2
Painting Hand-railing " "	240	0	0
Contract for Asphalte	1,400	2	4
Extra Work on ditto	26	8	0
Maintenance of ditto	190	8	0
Advertising	69	8	10
Superintendent, Travelling Expenses	11	15	0
Notice Boards, and Painting	17	10	0
Clerks of Works, for Supervision, Surveyors, Labour, &c.,	945	6	9

£36,196 15 7

The payments were authorized by the Provincial Engineer, or some other duly qualified Provincial officer.

The payments were made to the different persons mentioned in the vouchers, copies of which are hereunto annexed.

As to the propriety of these payments, we report there has been great waste in addition to the contractor, Mr. White, having been materially overpaid; and in order to show this we must refer to the omissions and defects at 11th August, 1873, when Mr. Thornton certified to the completion of the bridge. At that time there were missing—Lower walings and braces for 55 bays, being 16,500 feet timber at 25s. per 100, £206 5s.; about 14,000 spikes, £70; hand-railing round shelter platforms, £20 10s.; material and labour in alteration in mode of decking, £2,303 1s. 4d.

This latter item Mr. Thornton entirely denies in his report, in fact makes a statement to support his view that the bridge, as completed on No. 3 plan, has cost the contractor 1s. 4½d. per bay more than if completed according to No. 2 plan. This comparative statement is not of much value, as it was made up from data supplied by the contractor.

We have had two other comparative statements of this work from quite independent quarters, the first being made by Mr. J. P. Maxwell, the present General Government Engineer in charge of the Christchurch District; the other by Mr. W. B. Bray, originally the District Engineer at the time the combined contract was made. Mr. Maxwell estimated a deficiency in value per span in No. 3 plan, as compared with No. 2 plan, of £7 1s. 3d., to which should be added the value of sleepers supplied by the Government at 25s. per 100 feet, the schedule price, equal to £3 15s. per span, or a total of £10 16s. 3d. per span less value in No. 3 than in No. 2.

Mr. Maxwell, however, admits that it is impossible to estimate these values quite correctly, without having been acquainted with the timber cut up. Mr. Bray estimates the value short on No. 3 plan, as compared with No. 2 plan, at £10 6s. 2d. per span. Accepting this, as there are 224 spans in the bridge, it amounts to an over-payment to the contractor of, as stated above, £2,303 1s. 4d.

The defective beams and walings will cost, according to Mr. Warner's lowest estimate, £233 11s. 10d. to replace.

The quantity of white-pine planking declared valueless is 171,360 feet, which at 25s. per 100 feet is worth £2,142, without reckoning the labour or fastenings consequent on the bad and insecurely fixed planking. The asphalte, which with maintenance cost £1,616 18s. 4d., was a total loss, as previously stated; and the sum of £324 7s. was paid for shifting timbers for tarring without sufficient reason.

In checking Mr. O'Connor's figures for tarring, Mr. Thornton has omitted to deduct the sum of £20 15s. allowed for tar for certain joints by Mr. Blackett, and included in the contract sum of £8,564; see estimate at foot of Mr. Blackett's letter of 27th February, 1871.

To sum up, there have been overpaid and wasted on the bridge the following amounts, viz.:—

	£	s.	d.
Value of Walings and Braces not put in	206	5	0
Spikes saved by Contractor for butts of planks	70	0	0
Hand-railing round shelter platforms	20	10	0
Material and Labour saved in alteration of mode of decking	2,303	1	4
Estimated cost of replacing defective Beams, &c.	233	11	10
Value paid for White-pine Planks declared worthless	2,142	0	0
Total loss of Asphalte	1,616	18	4
Unnecessary Payments for lifting timbers to tar joints	324	7	0
Tarring of certain joints, already paid for in general contract	20	15	0
	£6,937	8	6

There are no sums of money due by the General or Provincial Government to any contractors for the bridge, and none are claimed, but, as the General Government has only paid the province £31,922 2s. 6d. on account of the work, it would appear there is still due to the province a balance of £4,274 13s. 1d.

The condition of the bridge, when completed, was that, for railway purposes, with the exception of the defective beams and walings mentioned in Mr. Warner's report of the 25th May, 1874, the bridge was a strong railway bridge, but it requires re-planking to make it thoroughly fit for cart traffic.

The condition of the bridge now is much the same as at date of completion, except that the asphalte has entirely broken up.

The usual clause for deductions has not been inserted in either contract No. 1 or No. 2, and, as Mr. Bray signed plan No. 2 on behalf of the General Government, it may be presumed that he ought to have seen that the specifications were properly drawn out, and that deductions were provided for. He denies, however, that he had anything whatever to do with the specifications.

The whole conduct of the District Engineers, in connection with the Rakaia Bridge, has been of the loosest description. Mr. Tancred retires from office without taking care to leave data as to the intention of the General Government regarding deviations sanctioned. His successor (Mr. O'Connor) takes office, and is not aware on what plan the bridge is to be constructed. He consents to alterations and eventually passes the bridge (on a memorandum from Mr. George Phipps Williams) without having before him any authorized plan whatever. Mr. O'Connor is partly responsible for the waste of money paid for shifting timbers for tarring, and chiefly responsible for the failure of the asphalte. If he had examined the flooring he was about to lay the asphalte on, he ought not to have done it. But the Engineer to whom blame attaches all through is the Provincial Engineer. He was connected with the work from the commencement to the end; the Inspectors were his direct subordinates, and the contract itself points to him as the chief officer who had power to interfere with the construction of the bridge, subject to the consent of the General Government.

It is clearly shown by the evidence that it is a great mistake to construct a bridge, or any other important work, under the divided authority of two sets of engineers belonging to different Governments, unless their respective positions are most clearly laid before them and insisted on.

We attach, as per appendix, copies of the plans, evidence, and documents referred to in this report.

JOHN INGLIS.
JOSIAH BIRCH.
ANDREW DUNCAN.

Price 3d.]

By Authority: GEORGE DIDSBURY, Government Printer, Wellington.—1875.

