

147. Taking the plant into consideration?—We do not take plant into consideration quite in that way. We find that a work costs us so-much a yard after paying for all plant. The estimate for this tunnel was based on the actual cost to the Department of other tunnels.

148. You do not take the plant into consideration, then, in making an estimate?—It is all taken into consideration, but our estimate is based more on actual experience than on theory. We take the actual cost of similar works elsewhere.

149. You heard Mr. McLean state that the plant which has cost them £73,000 he estimates to be worth £5,000 at the end of the job. That means that the whole cost of the plant has to be put on to the work?—Mr. McLean said that was a very conservative estimate, and I concur in that view. I have here a statement of the accounts as they stand to-day [handed in].

THURSDAY, 5TH SEPTEMBER, 1912.

CHARLES RANKEN VICKERMAN, Superintending Engineer, Public Works Department, examined.
(No. 4.)

The Hon. Mr. Fraser: It will be remembered, Mr. Chairman, that a question was asked of Mr. Blow as to what the average cost of constructing tunnels was, and he said it would be better to ask Mr. Holmes, Engineer-in-Chief. Well, Mr. Holmes is away, and Mr. Vickerman has come to give the information on behalf of the Department.

Witness: I have made out a complete list of tunnels that have been carried out, which I produce. I give the tunnels done by contract and those done by co-operative labour since the system was altered. The statement shows, among other things, what the tunnels cost per lineal yard for lining and excavating. The making of tunnels by contract was stopped about the year 1890, and since then they have been done mostly by co-operative contract. The size of the tunnels has been slightly varied, too, of late years. They were 15 ft. high and 12 ft. wide originally—up to about the time the co-operative system came in. Then the size was increased to 15 ft. 6 in. high by 12 ft. 6 in. wide—that is, at the springing of the arch. Later on again—about five years ago—the size was increased to 17 ft. 1 in. in height and 15 ft. in width. The Arthur's Pass Tunnel is not quite the same size. It is 16 ft. 9 in. high and 15 ft. wide at the centre and 14 ft. wide at the rail-level. I have diagram plans of tunnels here, so that if you like to refer to them you will see exactly what I mean.

1. *Hon. Mr. R. McKenzie.* Can you tell us any material difference that the alteration in size made?—You have a bigger area of excavation. At the Round Hill Tunnel, which was constructed on the old design and is 15 ft. by 12 ft., the excavation required was 21·4 cubic yards per yard run. In the 15 ft. 6 in. by 12 ft. 6 in. tunnels the excavation is 24·4 cubic yards per yard run. The enlarged tunnel that we are building now necessitates the excavation of 29·9 cubic yards per yard run with 12 in. lining, and 31 cubic yards with 15 in. lining.

2. It costs you on an average about 10s. a lineal foot more now, does it not, on account of the increased size?—There is 10 cubic yards per lineal yard between the Round Hill Tunnel and the type of tunnel we are building now—that is, 10 cubic yards of excavation.

3. And what is about the rate?—Anything you like.

4. What is the rate at the Arthur's Pass Tunnel?—About 17s. a cubic yard.

5. What is your ordinary rate?—It depends on the material. With northern papa it runs from 7s. to 10s. a cubic yard, according to whether there are backs in it or not. The cubic content of the Arthur's Pass Tunnel is 33·4 cubic yards per lineal yard run. I also produce, as I stated, a list of contracts that have been let at different times for the construction of tunnels, and I have given the cost per lineal yard of tunnel complete. I have shown the cost of excavating and lining separately, per lineal yard.

6. Can you tell us the total, for lining and excavating, per lineal yard, for the Arthur's Pass Tunnel?—£60 15s. per lineal yard for lining and driving.

7. Can you give us the figures for the Deborah Bay Tunnel?—It cost from £28 to £40 a lineal yard, according to the thickness of the lining. In this case it was simply a contract originally to excavate the tunnel and leave it unlined, but as a result of leaving it in that condition it began to come down in great lumps from the roof, and it cost a great deal more to line than it would have cost if it had been lined straight away.

8. *Hon. Mr. Fraser.* Can you suggest a tunnel that it would be fair to compare with the Arthur's Pass Tunnel?—We have nothing that will compare with it. The length of the Arthur's Pass Tunnel is out of all comparison with anything we have touched. Its extreme length affects the cost of the whole tunnel. The Deborah Bay Tunnel was 1,400 yards long, as against the Arthur's Pass, 9,354 yards. That shows you at once that you cannot compare the two.

9. *Hon. Mr. R. McKenzie.* Can you make a comparison in this way: in estimating the excavating and trucking at the Arthur's Pass Tunnel, would you set it down at the same, approximately, as ordinary tunnels, and then make a certain allowance on account of the length for running the stuff in and taking the spoil out?—Yes, I suppose you would, but it would be very difficult to do so.

10. Who made the estimate in this case?—Mr. Peter Hay.

11. You have the details of the estimate, of course?—We have his figures, but I do not think you can put your hand on the actual estimate. He put it down at half a million.

12. Are there not in the office any details of the estimate?—He did not detail what he allowed for the different items.