

estimated from the calculation for trestle-work, and I shall be obliged by your letting me have an approximate estimate of the other portions, at the very earliest practicable moment. The object of such estimate being to show the respective cost of filling in the openings in the banks, for which there is now no material, in the first place with trestle-work which will be subsequently filled in with earth and sand. And, the cost if now filled in with these materials at the contract price, the trestle-work being abandoned either altogether or as far as practicable."

I may here call your attention to the fact that, while it will be necessary in all cases to have the superstructure of the trestle-work made of the best squared timber, a considerable portion of the timber to be used in the "bents" may be round; only squared at joints, mortices, and tenons, thereby materially reducing the cost (at cost rates).

Mr. Carre promised to let me have the information asked for in these letters before this date, but as I have not yet received it, I now hand in Mr. Whitehead's letter, with such information bearing on the subject as I am in a position to give at present; I may hear from him within the next few days, and then be in a position to give you further information.

The present grades on Contract 15, in their relation to the cuts and fills, were adopted with a view to keeping down the first cost, by reducing the rock cuttings. The material taken from these to be used in the first place, where necessary, for bringing up the banks across lakes and bays to three feet above high-water level, and of such a width that, at some future date, earth embankments could be formed upon them without the toe of the latter being in the water.

In the meantime trestle-work, placed upon these rock banks, would carry the track over these uncompleted banks, and at other points where sufficient material could not be obtained to make them up.

It was decided to make the rock banks as above described, to prevent the timber work in trestles from being acted upon alternately by air and water; and of that width, in preference to narrower (only sufficient to carry the trestles) as, had this latter plan been adopted, more earth would be required to complete them subsequently; and, after completion, rock would have to be procured for rip-rap at their base, to preserve them from the action of the water.

At the time when it was determined to adopt the plan above stated, all the information which had been obtained, lead to the belief that very little material other than rock could be procured on the section. During last summer, however, the men and tools, &c., required for making examinations, being on the ground, it was ascertained that a considerable quantity of sand and clay could be obtained at some points on the line and from borrowing pits. To place this in the works, however, a very considerable length of haul will, in some instances, be necessary.

That this discovery has a most important bearing upon the method of constructing the work previously determined on, the accompanying diagrams and calculations prove, as they show that—

1. Earth embankment is cheaper than trestle-work for banks of less than 18 feet in height;

2. If a rock base of full width, for subsequent earth bank on top, is more than half the total height of the bank, a rock bank made up to grade would be less expensive;

3. A rock base on rock sides, less than 10 feet in height, will not reduce the cost of constructing an embankment;

4. Rock sides (as in Figure 1) filled in with earth to full height of embankment, is in all cases at least 33 per cent. cheaper than a full width rock base with trestle-it, and nearly 50 per cent. cheaper than this same bank with earth filling work upon it;

5. Banks between 20 and 50 feet in height, will ultimately cost from 57 to 69 per cent. more, if crossed in the first place by trestle-work and subsequently filled in with earth, than if made up with earth now.

These facts are arrived at from the following data:—