

faction to the eye by the play of colour on its face that it tends to dissatisfy one with a material in itself unimpeachable but relatively inferior. The girders to be used at the viaduct being of 96 feet span are of different construction to those we have already described. Instead of the two single web girders as at the Humber, here we have single tubular girders, 7'0" high and 7'0" wide, with the track on the top of it and projecting sidepaths as before, giving a full width of floor of 16'0", each girder weighing somewhere about 50 tons.

In the same style of masonry and of material from the same quarries we came, at about a mile further westward, to a 25 foot arched culvert, with a vertical height of 6'6" to springing, and containing, I was told, about 3,000 cubic yards, with an embankment over of about 194,000 yards, crossing a valley 1,500 feet wide. I observed here an excellent expedient for securing a double use to these culverts, for after allowing sufficient height for the passage of the stream, by making a set off on the face of each side wall a bearing is obtained, joisting laid and planked, and a roadway thus provided above the waterway. We subsequently visited a 15 foot arched culvert of similar character 1½ miles further westward, coming, at about 31 miles from Toronto, to what is called "the Lindsey cut," a work which has given much trouble in consequence of the character of the material—hard cemented gravel—through which it is made. Of this I have secured a specimen, and although probably most of us have encountered material somewhat approaching it in difficulty of working, few of us have been tried by a cut in it such as this, 50 feet in depth and containing 173,000 yards.

In succession to this cut and immediately beyond it we entered another 60 feet in depth, containing, we were told, about 25,000 yards, in limestone rock of excellent hydraulic quality, the cement from which, setting somewhat slowly but with great tenacity and hardness, has been generally used throughout the works.

Immediately beyond this again, after passing over the embankment filled from these cuts, we came to another (called Scots) which, containing upwards of 192,000 yards, it was a relief to find, of pure sand, although as it approached to quick, it seemed to give some indication of trouble.

Passing a 15 foot arched culvert similar to those already described, at 36½ miles, we reached the summit between Toronto and Guelph, which is 991 feet above the level of Lake Ontario. Here is a cut in indurated gravel from which some 36,000 yards have been taken.

Three miles further westward is another 25 feet arched culvert, built in limestone of highly fossilated character. The style of this masonry was even heavier than that of those previously visited, but like those, it was finished with bold self-faces and drove arrises, the arch stones being, if I remember rightly, tooled. I name this because I think this style of masonry highly applicable to works of this nature, and far superior (by reason of the play about the face, relieved as it is by the wide arrises which define the strict outline of all angles) far superior to any higher finish or tooled faces which in my judgment impart tameness when adopted in massive structures.

At 40 miles from Toronto we come to the Eramosa Valley Viaduct over the river of that name and near the Village of Rockwood. The full width of this structure is 570 feet, comprising 8 spans of 60 feet each, the full width of valley being 1200 feet, crossed at an elevation of 45 feet above water line. The stone used in this structure is obtained in the immediate vicinity; the whole district around it, on the east side of the river, presenting a bare broken face of highly fossilated lime-

stone rock, abounding, we were told, in caverns of large capacity and interesting character, well worthy of the visit, which want of time obliged us to decline. At Eramosa the style of masonry consists with that of the other structures, but the colour of the stone, which varies from grey to purple, and passes in parts into a lighter ochraceous tint gives it a distinctive and peculiar aspect as compared with the other viaducts, and one which, although preferred by some of my companions, I did not admire so much as the warm and even face of the Georgetown material.

The quantity of stone laid in the Eramosa structure, (the masonry of which is fully completed), was 5000 yards, the embankment connected with it containing 80,000, and the weight of metal in the girders being about 125 tons.

Passing on to Guelph, (where the road seems to me to have been located somewhat strangely, although doubtless with good reason, right through the heart of the town), we find the most peculiar structure on the whole line, and one indeed for which few, if any, precedents can be found. This peculiarity is due to the crossing of the Speed River at right angles on and over the line of a street which is approached at each end and on each side of the river by other streets, also at right angles. In crossing the river therefore at this point it was necessary to preserve the common road on the same site as that to be occupied by the railway and to connect that roadway at each end with the streets abutting upon it. This has been effected by the viaduct in question, which is 580 feet in length, comprising six spans of 60 and one centre span over the river of 80 feet. But instead of solid piers of the usual width, there are two rows of piers, leaving a transverse opening of 20 feet wide between them, spanned by short transverse wrought iron beams to receive the longitudinal girders or tubes in the direction of the rail and roadway, so that throughout the length of some 600 feet the railway will be above the road for which a headway of about 20 feet will be left clear of the transverse beams before mentioned; in fact, except that this work is on *terra firma* it illustrates the same conditions of use as the new Suspension Bridge at Niagara, with the carriage way immediately beneath the railroad. That any local necessity exists for retaining the road in its old position or for forcing the location of the railway to its site is not very apparent, but Municipalities are not always as considerate as they should be, and seem sometimes disposed to test their strength by the pressure of some unreasonable prejudice.

At 53½ miles from Toronto, and 6 miles beyond Guelph, we visited what is called the "Jack hill cut," in indurated clay and hard pan, of a depth of 40 feet and contents of 161,000 yards. So close and compact is this material that the sides of the gully stand for the full 40 feet at a perfectly fair and vertical face; and I traced on part of it which had been excavated from nearly 2 years since, the marks of the pick as sharp and clean as though they had been recently made rather than stood exposure through two winters.

In connection with these deep cuts, I availed myself of the opportunity for noticing the effects of the then recent heavy fall of snow in relation to the probable obstruction of traffic. The general depth of snow over the surface of the country was from two to three feet, and it drifted very considerably in places, sufficient to illustrate fully the circumstances of our average winters. I found almost universally that cuts from 5 to 15 feet were comparatively choked by drift, and that as the depth above 20 or 25 feet increased, the deposit was diminished. In the cut at Jack's hill, 40 feet in depth, although the snow was two feet deep at the summit of the sides, there was cer-