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THE LAYOUT OF A SMALL RIVER CROSSING

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The completed bridge, as shown in Fig. 1, is 650 feet from ballast wall to ballast wall; five 40-foot towers being connected with six 75-foot D.P. girders; height of water-towers, 75 feet. An ideal location (Fig. 1) made it difficult to lay out, owing to the steepness of the banks and to the fact that each abutment stood on a promontory; added to which there was 300 feet of water in the middle.

The location tangent was established and chainage between hubs checked by a rough triangulation, a topographical sketch made, and conditions determined the base line as shown. (Fig. 2). Hubs were set every 10 feet and a double one at 100 feet for plumbing down; each set of 10 being levelled, the total drop in the 200 feet being about 5 feet. This base line was measured with a 100-foot band chain and the three angles were repeated four times on each quadrant. A tabulation showed any radical errors and the average for each angle was taken out to 15 seconds.

Having determined the distance between two hubs which were approximately 650 feet apart, this exact distance was staked and checked by the same method. At a later date, when the pond was dried, the distance taped was found to be .06 foot shorter than the distance triangulated, a discrepancy due to the fact that the heavy band chain could not be stretched to its proper length without supports. Six hubs were then set on banks for the line of the pedestals from each side was chained separately. The face of ballast walls and centre of pedestals was referenced at right angles by hubs set out closer than 100 yards, one in fact being one-quarter of a mile up the valley. This completed the layout.

The abutments were checked every 5 or 6 feet during erection, the carpenter being given the centre line and face of ballast wall.

The depths of the pedestals were approximately determined by soundings, and staked accordingly. After the footings were in, hubs were set on the centre and reference lines, an intersection obtained with fine fishing line, and these lines

transferred to the footing, on which the base of the foustoum was staked out. When the form was built the top was checked in the same manner. After the concrete was finished centres were marked on the pedestals from the reference points and checked with tape. On all important lines, wherever possible, foresights were set to eliminate double centering and to dispense with having to send a man around the dam to give point.

The first levels were, of course, the check levels over the section, when bench marks were set on each bank and at water level. Bench marks were then set every 12 or 13 feet

down the banks and levels taken four times. These were tabulated, showing the differences between back and foresights which was the difference in elevation between benches and established a definite relation between them independent of initial or accumulative errors, any radical difference was eliminated and a mean struck which gave the elevation for the bench marks. Afterwards, whenever levels were run, the work was checked on to the next bench

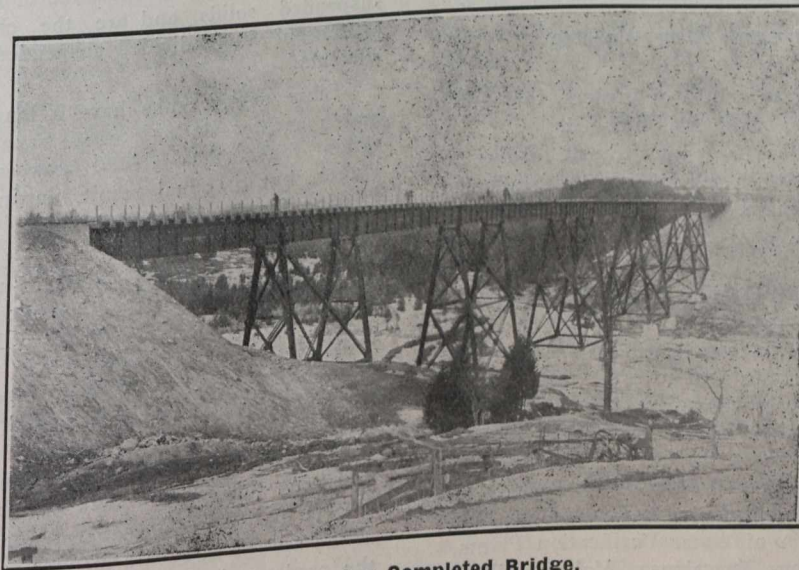


Fig. 1.—Showing Completed Bridge.

mark and the book elevations marked on the same sheet, thus obtaining an average in which final elevations were correct to within .01 foot. To set levels for the bridge seats temporary pillars were set on each side of the abutment and the height, some 30 feet, taped up, a line joining the points at the top being checked with a carpenter's level.

Elevations were, of course, given for the top of the pedestals, but owing to the shrinkage of the concrete and the varying temperaments of the men who floated the tops, the finished work varied as much as .05 high or low. The base of the columns was marked on the pedestals, and levels taken at each corner. These were tabulated in sets of four for each pier, and a mean struck which gave the least chipping, a difference of .01 in 75 feet being inappreciable. With an improvised target rod (a pencil point on a picket) the four corners of each seat were chipped to .001 foot and then