TOPOGRAPHICAL RAILWAY TRAVERSING.

By J. A. MacDonald.

IN running a preliminary line, except in old and settled localities, it is usually necessary to traverse the lakes and other larger bodies of water contiguous to the line. On the Grand Trunk Pacific, for instance, it was necessary, in many parts of the country, to traverse the lakes and map the country, for much of the region through which the railway ran had never been mapped. On striking a large body of water, it is necessary for the surveyor to learn from topographical investigations, which side of the water or lake is most suitable for the line, and in order to determine this a traverse of the lake

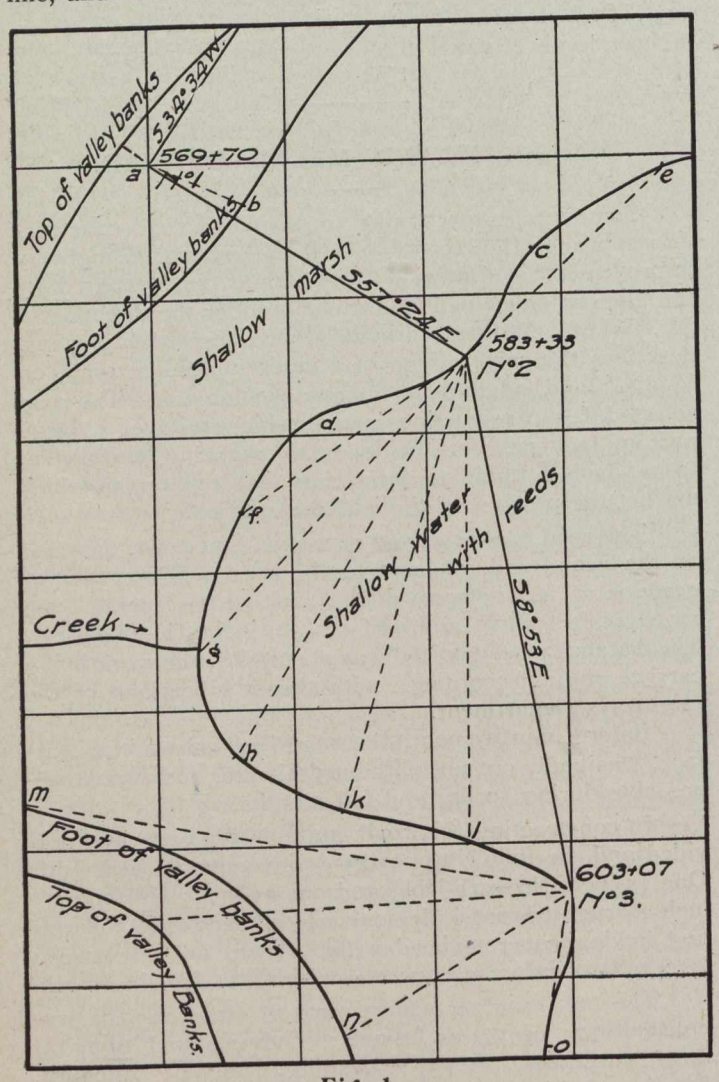

Fig. 1.

is absolutely necessary. While making this traverse, a large amount of topography can also be taken.

In these traverses the stadia is used for measuring distance, for rise and fall of the ground, and for obtaining the necessary topographical features of the country. By the use of the stadia, surveys of rivers, lakes and other bodies of water, etc., are made quickly and at a moderate cost. The stadia party consists of the surveyor, assistant, two rodmen, a couple of axemen and, where bodies of water are met with, a small boat or canoe, which may also require another man. A folding boat will be found the most convenient.

The traverse of a lake is made from one or more instrumental stations or hubs, at or near the shore, the rodmen following the bank and giving side shots at suitable distances apart. For rivers and narrow lakes there is an advantage in keeping one rodman on each side and surveying both sides at the same time. Under normal conditions the survey will be made on one side only, the front rodman travelling away from, and the rear rodman travelling towards, the surveyor. The latter having reached the surveyor, or transit man, and the former the next instrumental station, the surveyor moves his instrument to the next station while the rodmen are waiting in their places. Upon the arrival of the instrumentman or surveyor, the front rodman shows him the point of the new station, and the instrument is set up. The rear rodman places his rod upon the last station for orienting the transit, and the other can take charge of the folding boat and get a few soundings. He also gives side shots for stations at islands.

The procedure is better understood from the accompanying example: Commence the survey at a hub or instrument station, as, for example, at 569 + 70, in Fig. 1. Explain to the rodmen, if they are inexperienced, how to

Point	Distance	Bearing	Vertical Angle	Corrected Distance	Remarks
	Station 1; on 569+70. Line south 34°34′ west.				
a	1.50	307°00′	6°40′	1.52	Top of valley bank
b	3.50	115°30′	2°45′	3.53	Foot of valley bank
(2)	13.43	122°36′	5°50′	13.63	
	Station 2; marshy shore 6 chains wide. No perceptible rise. Water 5′ deep, 15 chains from shore.				
c	4.57	31°25′		4.68	
d	5.15	252°47′		5.28	
e	9.18	46°40′		9.40	
f	9.87	238°12′		10.04	
g	14.23	224°51′		14.56	Creek 10′ wide 2′ deep
h	16.41	212°38′		16.78	
k	16.75	198°09′		17.14	
l	17.10	180°53′		17.49	
(3)	19.31	171°07′		19.74	
	Station 3; sandy beach 30′ wide. Ground rising 6″ per 100′ to foot of valley banks. Water 11′ deep, 3 chains from shore.				
m	20.	2°80′		estimated	To foot of valley
n	10.	2°40′		estimated	bank
o	5.52	191°31′		5.65	
p	15.	250°00′			Distance estimated

Fig. 2.

hold the rod vertical, how to ascertain it is not hidden, and how to select a new instrument station. Arrange also a system of signals with the rodmen for directing them to stop or start again, as to indicate that the rod is hidden. Some signals can be made with the arms or a flag may be necessary at a great distance. Before the front rodman leaves the instrument, show him where the next instrumental station is to be.

For distances greater than 1,300 feet use only half the wire interval, thereby being able to read, on the ordinary 13-ft. rod, 2,600 ft.

It is seldom necessary to record vertical angles along the shore; it is frequently necessary, however, to do so in getting the topography, as the lake or river may have steep banks. Distances read with the whole interval are more accurate than with the half intervals. The length, of course, between stations (1) and (2) on the plan (Fig. 1), should be more carefully measured and read than the side shots.

The left page of the field book is for the notes (see Fig. 2) and the right page is used for the plan of the survey (Fig. 1). The stations of the traverse is designated by numbers, the side shots by letters. In the first column of the left page, enter the letter of the side shot