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The Volunteer Review,

AND

MILITARY AND NAVAL GAZETTE.

"Unbribed, unbought, our swords we draw,
To guard the Monarch, fence the Law."

OTTAWA, MONDAY, APRIL 15, 1872.

LIEUT-COLONEL WAINEWRIGHT GRIFFITHS, at present on a tour through British Columbia, has kindly consented to act as the Agent for the VOLUNTEER REVIEW in that Province.

IT is essentially necessary that Military Bridges should have sufficient strength and stability as to permit the passage of the troops with all their material, and in case of an advance in the immediate presence of an enemy sufficiently durable as well as commodious to permit the retreat of routed troops.

For this purpose the bridge heads should be strongly fortified and attention paid to the capabilities of positions on either bank of the river for enfilading or flanking the structure.

A prudent officer will not commit his troops without such precautions and he will also be thoroughly informed by His Chief Engineer Officer of the strength of the structure on which the lives of his troops and the safety of the material of the army must depend.

As a very simple formula will determine all those conditions every officer should be acquainted therewith, the transverse strength or actual bearing capacity which each square inch of various materials will sustain has been accurately determined by experiment; for example: one inch bar of white pine one foot long supported at both ends will carry 219 lbs. and spruce 190 lbs., there are at once two elements to determine the strength of any structure in which either bear a principal part.

The rule then is to multiply the square of the depth in inches by the breadth, divide the product by the distance between the points of support, the quotient multiplied by either of the above figures will give the weight which the beam will bear.

A *balk* ten inches deep five inches wide and eighteen feet between the points of support is designed for the bay of a pontoon bridge twelve feet wide; what weight will it carry safely, timber, white pine, and what should the depth of the *chesses* be.

$\frac{10^2 \times 5 \times 219}{18} = 6{\cdot}066$ lbs. four balks in the bay would leave the points of support for *chesses* three feet seven inches apart, the length being twelve feet, width one foot.

$3{\cdot}7 = 13 \times 12 = \frac{[illegible]}{516} = 11{\cdot}75 \,.\, 3{\cdot}42$ inches or say 3 inch plank, the full strength of such a bridge would be for four balks 24,264 lbs. of this quantity, its own weight would be balks 830 lbs., chesses 1,890, total 2,790 lbs., the net bearing strength will be 21,474 lbs.

As routed infantry could not bring a greater weight than 15,000 lbs. on this bridge its stability would be sufficient for all practical purposes.

The rules can be applied to finding the dimensions of all the parts of the structure, having ascertained the weight of the bay and of the loads to pass over it and decided the distance between its points of support which should not extend eighteen feet, the load to be sustained by the batteaux or pontoon can be easily determined, taking water at 62½ lbs. per cubic foot, the capacity can be decided on as well as the shape of the vessel.

In the case under consideration 388 26 feet of water will be equal to the weight of the bridge a batteaux or scow 20 cubic feet in length, eight feet wide, and two feet six inches immersed, will displace 400 cubic feet of water.

A vessel of that dimension would weigh with thwarts, knees, and all other timbers, sheeted with inch pine about 1,500 lbs., and would displace 24 cubic feet of water or an additional immersion of one inch and three fourths, so that with a depth of forty inches, she would be at least ten inches above water.

Four good men with the material at hand would build a vessel of the dimensions described in two days, she would carry thirty to forty soldiers and bear a good deal of rough usage, but would be most available on a river with a small current.

The operations of mooring pontoons or batteaux is often very difficult if the bottom is gravelly and the current strong, ordinary anchors will not hold, a sheer line is the alternative, and the difficulty in the case is to get it across the river; the best plan would be to procure a cable twice the width of the stream, fasten a buoy to the centre, coil the ends in two row boats, send them out to the middle of the stream at a point higher up than where the bridge is to cross, the buoy is then thrown over board and both boats row for opposite shores as hard as possible.

If the operation is well executed they will reach the points at which the ends are to be fastened before the buoy and slack of the cable drifts into line, or a third boat may be used to retard the descent of the bight of the cable.

The batteaux should be fastened to the sheer line in such a manner that they will form a perfectly straight line for the bridge, if the shore fastenings are not sufficiently elevated and the cable lays in the water the batteaux nearest the centre will be fastened end on, the others with such length of head line as will enable the alignment to be kept.

The same rule holds good in anchoring sufficient length of line must be given to enable the straight line to be maintained, and to provide against the consequence of a rise in the stream.

If the bridge is to remain any time in position it may be necessary to place a boom above it for the purpose of preserving it from floating wood or any drift that would have the effect of injuring the structure, a raft of trees with the branches cut off is more likely to break up a bridge than almost any other description of drift which could be sent against it; in the present advanced state of science floating torpedoes will have to be guarded against.

It will be necessary to have one bay near the centre that can be easily opened, to allow the passage of floating masses when they become too great for the boom.

The construction of this efficient defence is a common affair in Canada, it is simply strong pieces of light timber joined at the ends by skein chains through holes cut in them and stretched across the river, not necessarily in a straight line. When the batteaux are attached to a sheer line, they must be anchored by the stern, and when anchored the same rule holds good, as it preserves the vessel in position.

If possible a second bridge should be constructed, either in the immediate neighborhood or at such point as may be most convenient.

It will not be necessary to provide a very extensive bridge train for the Canadian Army, necessary tools will enable our soldiers to procure whatever may be required, and in any army which we might bring into the field a Canadian axe would be a tool quite familiar to nine-tenths of the rank and file and singularly efficient for all purposes.

Without proper means of crossing all