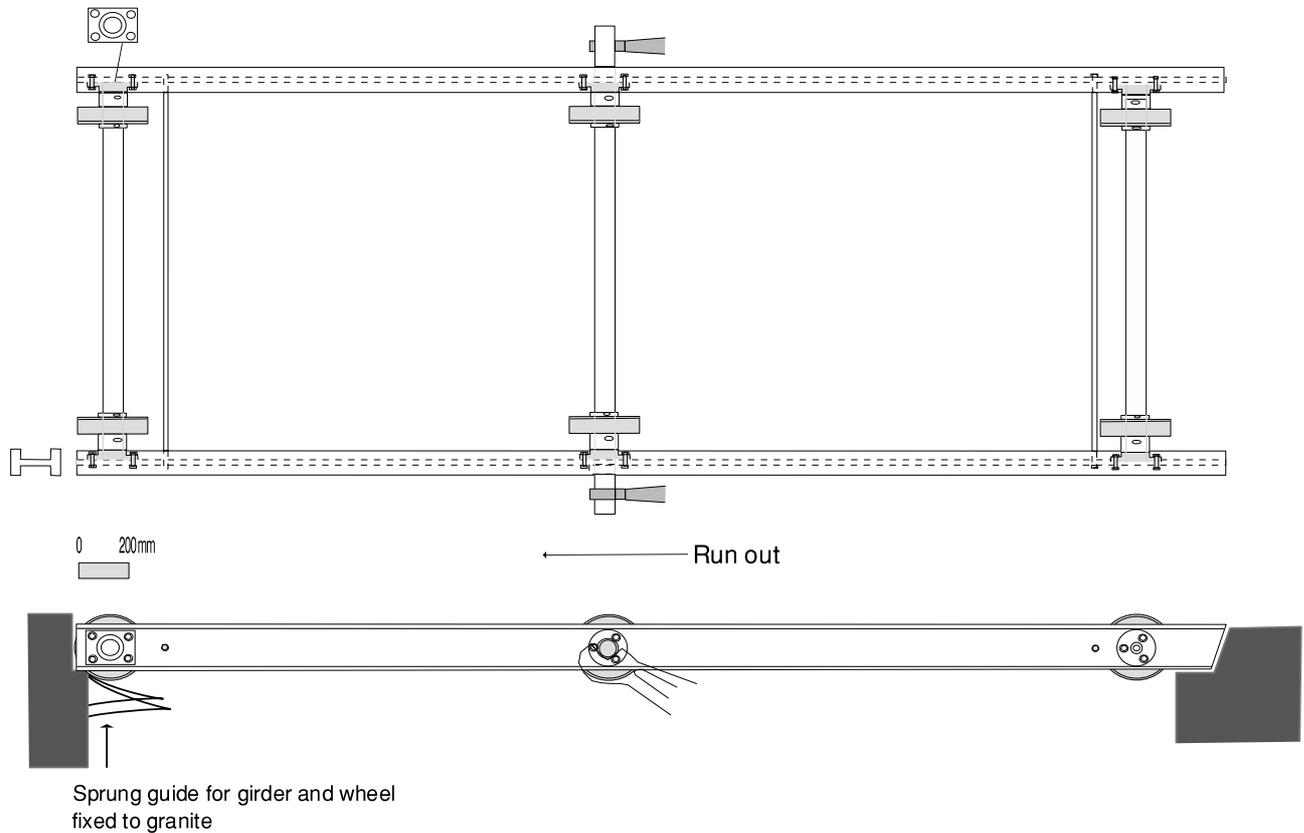


GUTHRIE'S ROLLING BRIDGE

David Moore



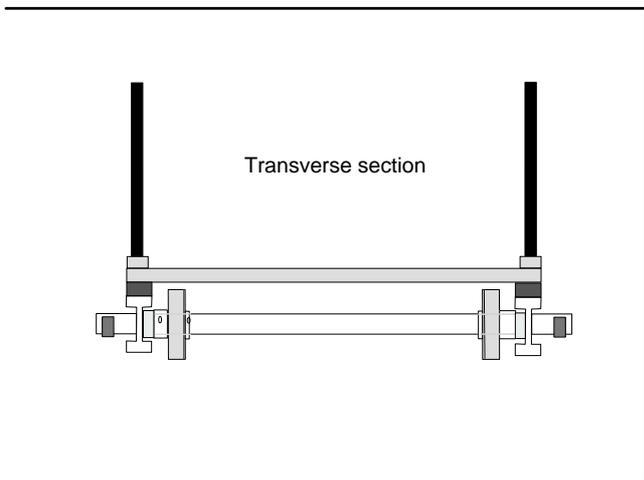
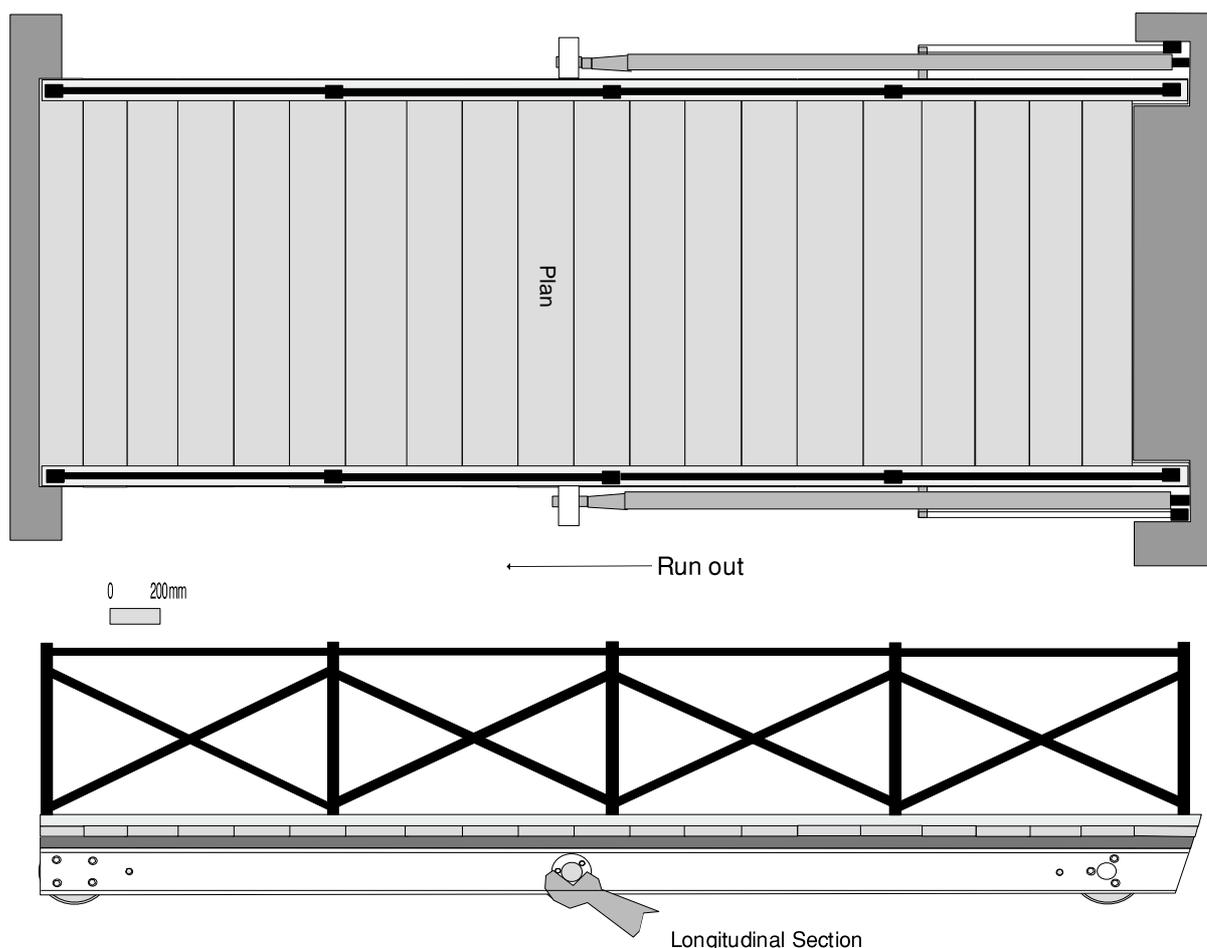
Following a visit to The Verne Citadel, Portland, by Geoffrey Salter and Peter Davies (H.C.C. Architect) it has been possible to examine the surviving pieces of a Guthrie rolling bridge. The rolling bridge consist of two I section girders, each 15ft. long. At the outer and inner ends are axles fitted into bushes bolted to the sides of the girders. Each of these axles has two wheels that are free to rotate. These are held in place by collars bolted to the axles. Forward of the centre point of the girders is a third axle. This one passes through the bushes and projects outside the girder in order for it to engage in the cups of the lifting arms of the bridge raising mechanism. Two 3/4" diameter

tie bars, one at each end, provide strength. All six wheels are flanged on their inner sides.

When the bridge is in the 'run in' position these flanges run on the iron rails along the inner sides of the trays fitted to the courtyard flagstones. This lines the bridge up accurately with the lifting mechanism and ensures that the two inner sets of wheels run down the incline of the granite sill.

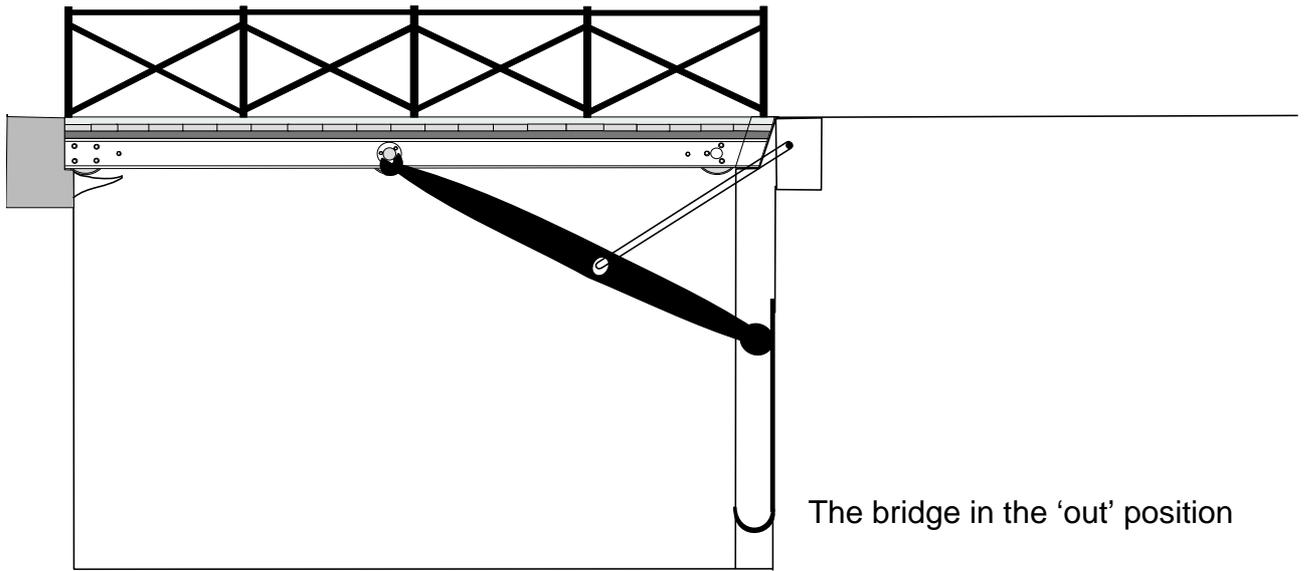
Running the bridge out

The following is at present supposition. Running the bridge out is effected by pushing it along its rails until the outer



on its inner two wheels. The middle two wheels follow along the trays. When the bridge is just less than halfway out, the ends of the centre axle then engage in the cups of the lifting arms. The middle two wheels partially descend the slopes of the granite sill. The bridge continues to move out, its outer end dipping below the horizontal, its inner wheels still running along the trays of the courtyard. The weight of the bridge, at the point where the centre of gravity of the lifting arms is beyond the pivot point of the arms and the stays, causes the bridge mechanism to descend, its wheels running up the vertical racers set into the wall of the pit. At a point where the inner wheels are at the top of the slope down the granite cill, the outer ends of the girders and the outer wheels hit curved sprung metal guides.

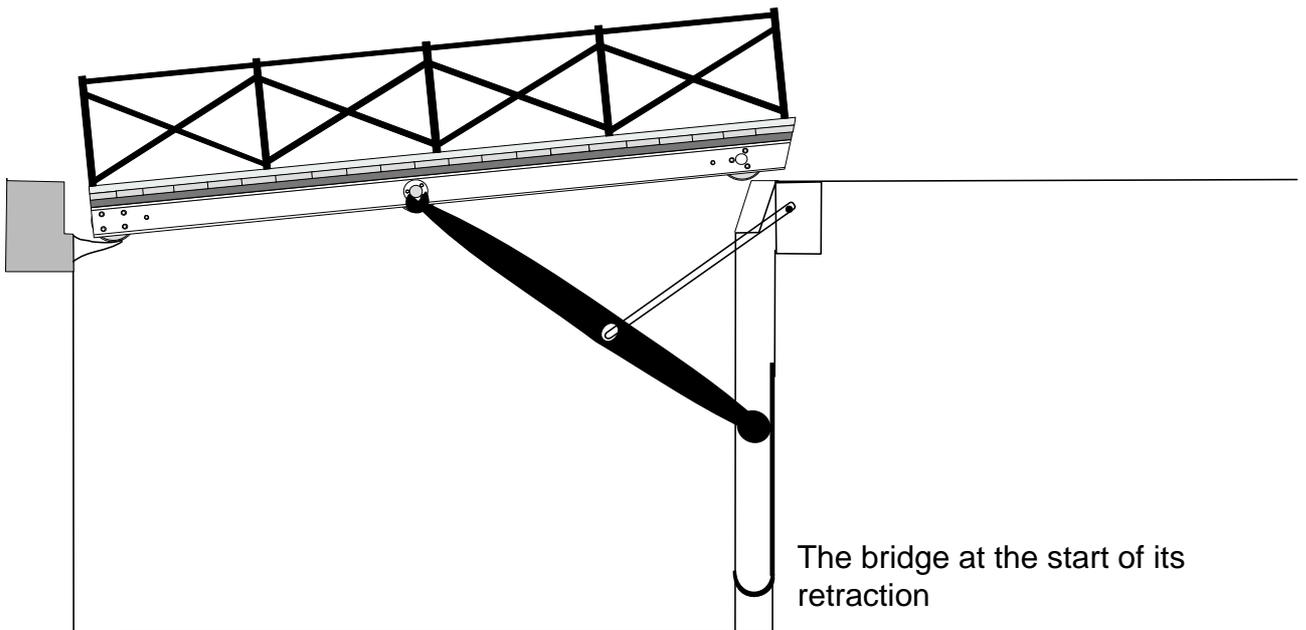
two wheels are at the edge of the granite sill. When the bridge is pushed beyond this point the two outer wheels do not descend the slopes of the granite slabs but instead the bridge remains in a horizontal position. This is due to the centre axle being offset from the centre of the girders causing the bridge to run

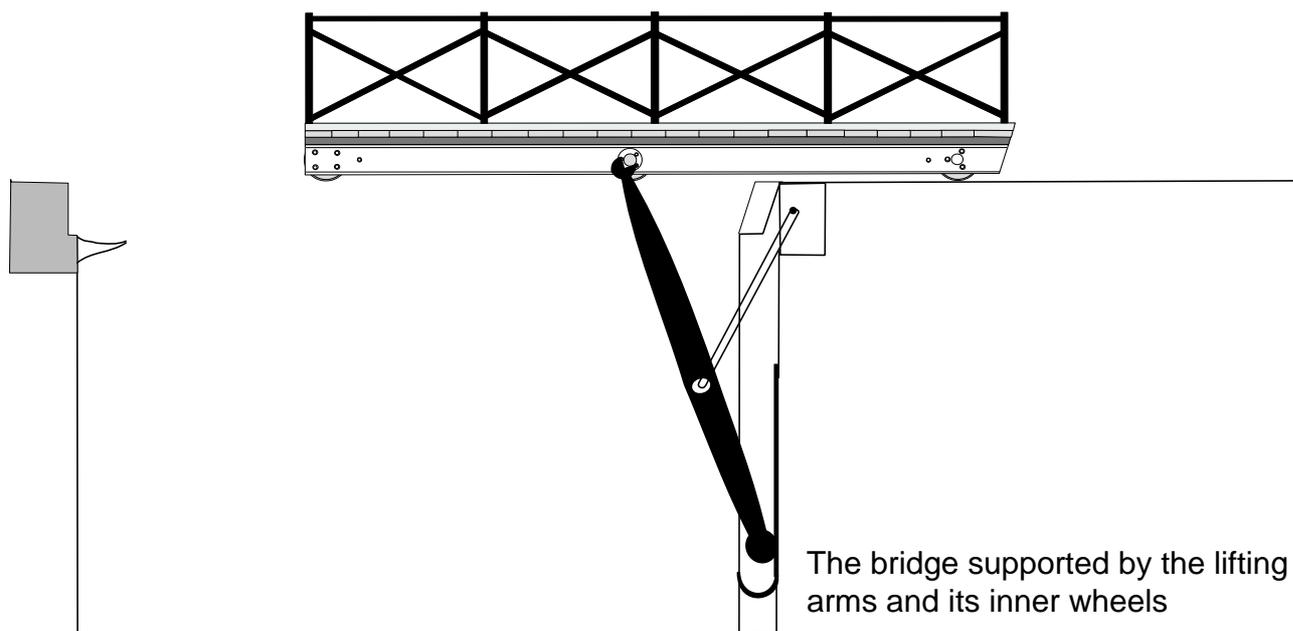


These guide the outer end of the bridge upwards so that the ends of the girders come to rest on the lip of the granite slab, the inner wheels descending the slope of the inner granite slab. The inner end of each girder is angled to form a close fit with the granite slab.

Running the bridge in

To raise the bridge an initial lift to the inner end of the bridge is required. This raises the inner wheels back up the inclines of the granite slabs. At the same time the outer ends are pulled from the lip of the granite slab, the wheels rolling down the sprung metal guides.

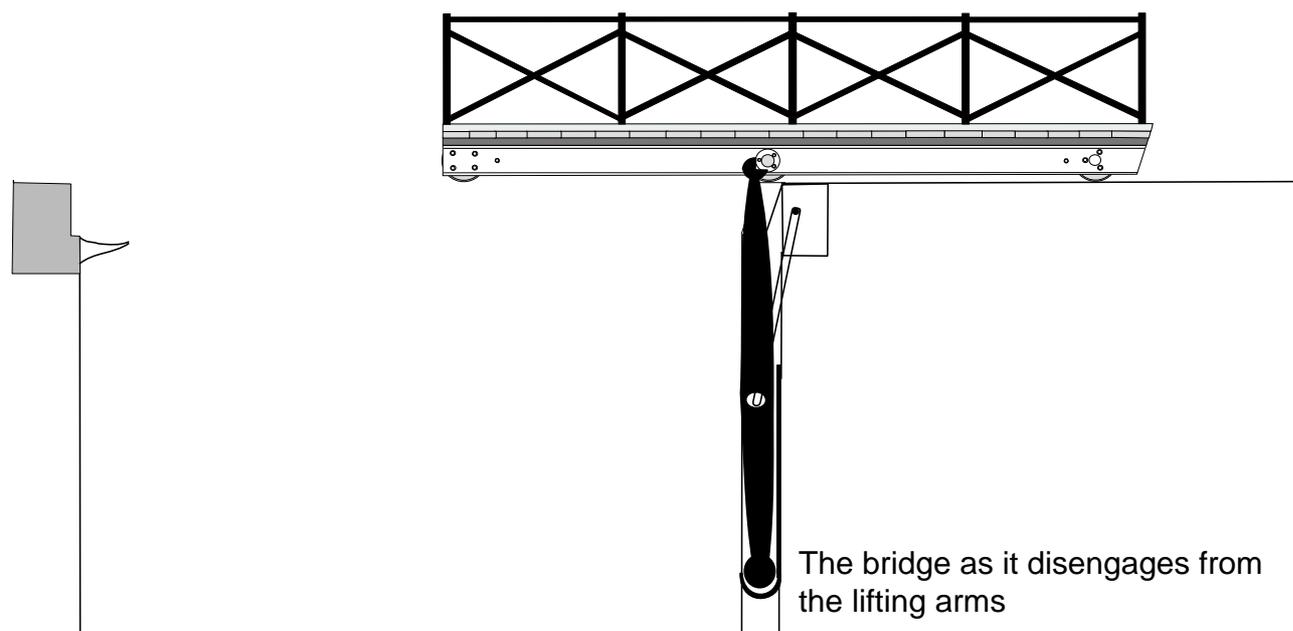


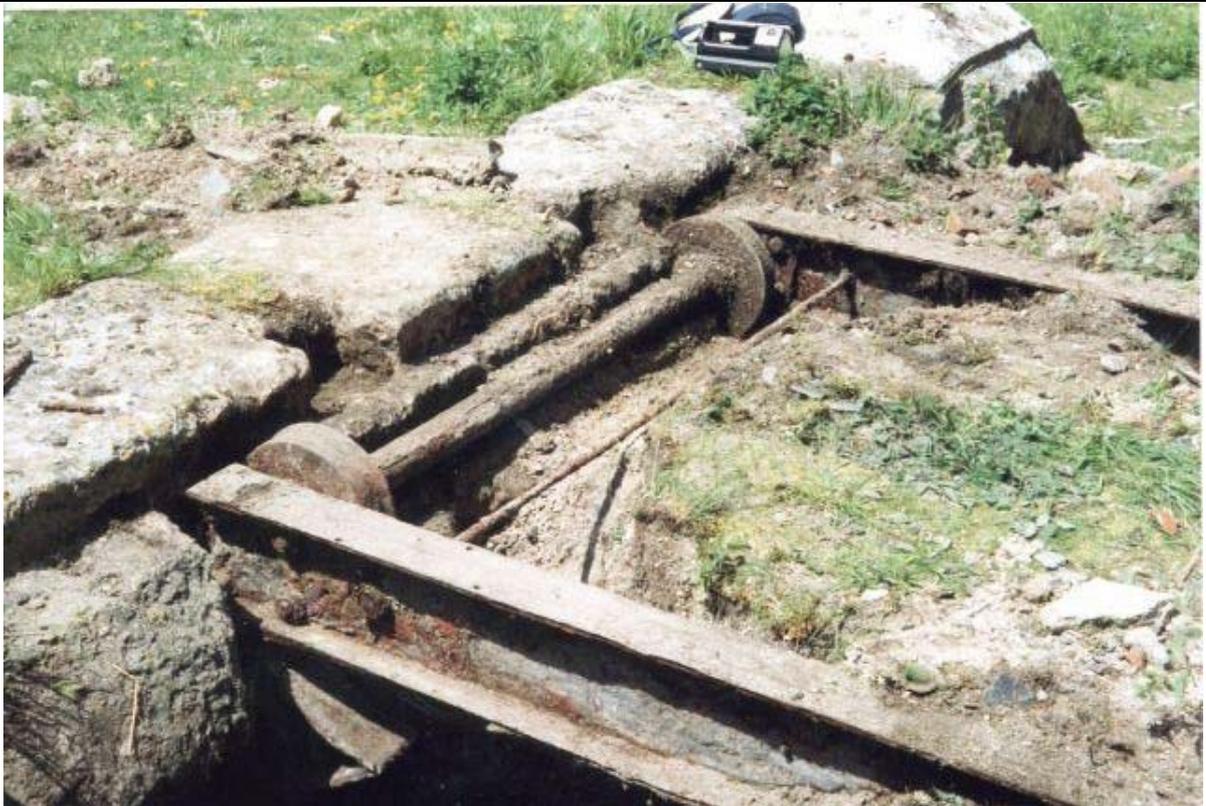
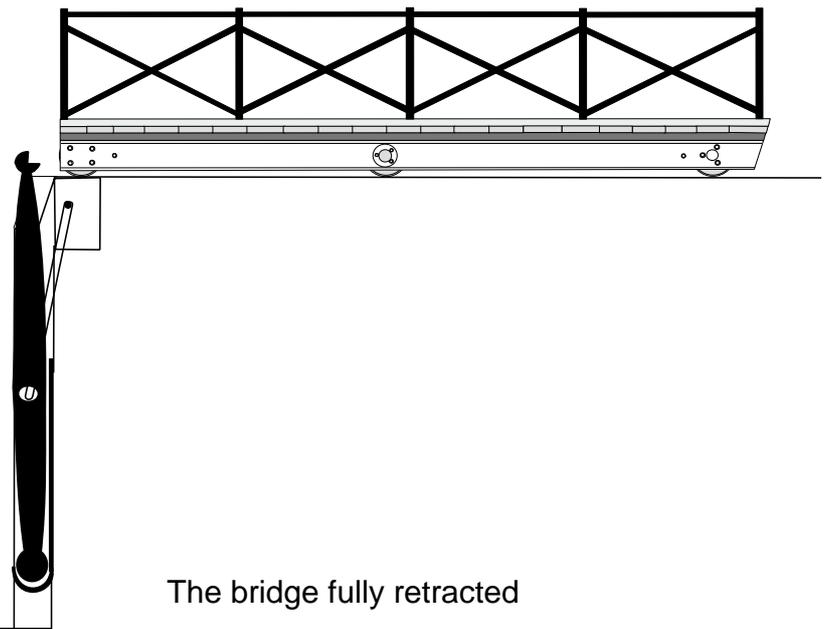


When the inner wheels are pulled up onto the metal trays the weight of the lifting arms assists the raising of the bridge to a point where the centre of gravity of the arms is over the pivot of the upper support stays. From here on the pull necessary to raise the centre wheels is negligible. Once the lifting arms are in the fully retracted position the centre wheels are on top of the

metal trays and the axles disengage from the cups. The bridge now sits on its inner two axles.

From here it is necessary to pull the bridge in until the outer two wheels arrive at the trays. The bridge is then pulled within the gates on all six wheels.





Remains of the Guthrie bridge : The Verne, Portland (Photo G. Salter)



Centre axle with wheel and top of lifting arm : The Verne (Photo G. Salter)

A Rolling bridge applicable to defensive works. Proposed by Mr. C.T. Guthrie.

18/08/70 Minute 28,287

Director of Artillery 8/8/70 forwards for record a correspondence, as follows :-
Director of Works 18/08/69 submits a claim from Mr. Guthrie for some recognition of his services on account of his invention of a rolling bridge applicable to defensive works.

Colonel Jervois states that this bridge has been adopted with success in several of the forts recently constructed.

The subject was considered at a meeting of the Ordnance Council held at War Office 9/7/69, and it was resolved to recommend the grant of 100l. to Mr. Guthrie.

The Lords of the Treasury, 138/69, sanctioned the above, on the understanding that the invention had been carried out during unofficial hours. Mr. Guthrie, 13/9/69 stated that such was the case. A sum of 100l was inserted in the Army Estimates for 1870-71 as a reward to Mr. Guthrie; sanctioned by Parliament; and claim allowed, 27/07/70

[I am grateful to Timothy Crick for supplying this excerpt from WO33/2/A]