country to greatly reduce the cost of such foundations, but we will also add to the certainty of success by increased rapidity of execution. These views I have carried out in my plans of foundation for the New York tower of the proposed East River Suspension Bridge, where solid rock cannot be reached at a less depth than 110 feet. In a later part of this treatise I propose to give a full description of my plans, as adapted to our Western rivers.

The elevation presented on Plate 1, allows a clearance of 100 feet between the lower chords and low water-line. The law now pending before Congress will probably require a height of 45 feet above the highest known floods, which, on the lower Ohio vary from 45 to 75 feet above low water-mark. When the river rises only 45 feet, the height of the piers may be reduced to 90 feet. Now, supposing the rock to be at a depth of 60 feet below low water, the total height of the piers will be 150 feet. The dimensions of the masonry have been assumed accordingly. Some masonry may be saved by building the centre part hollow. A well-hole 14 × 14, and 150 feet deep, will save over 1000 C. Y.

A superstructure forming a clear opening of 500 feet, single span, would not be safe without a very effective horizontal bracing. This has been provided for by the storm-cables suspended horizontally below the floor. But it must be acknowledged that the considerable height of the arches in the centre is an objection, and it is therefore very advisable to erect a double bridge at once, which, by its greater breadth, with the assistance of storm-cables, will be amply secure against the effect of high winds. The plan on Plate 1, leaves the entire span below the lower chords clear. This, however, is not a necessary condition, and will not be demanded by the interests of navigation. By descending with the arches below the floor, we remove the top weight from the centre, and thereby vastly increase lateral stability. I therefore much prefer the plan presented on Plate 7, which will also be found more economical on account of the saving of masonry. The lateral safety of this plan for 500 feet spans and single track cannot be doubted.

The piers on Plate 1, are laid down for a double track, but the storm-cables are designed for a single track only. The lateral stability of the towers and of the ends of the trusses is much increased by heavy wire-ropes guys secured on the coping to vertical anchor-bars, which descend into the masonry about ten feet. An easy mode of inserting these bars is to leave a recess in the face front of the pier, 10 feet below the coping, say 18 inches wide and 2 to 3 feet deep. Then drill a hole through the coping and masonry below, down to that recess, drop in the anchor-bar, insert the washer, and screw on the nut. This opening may then be closed with masonry.

When comparing the details of construction of the plans before us, with those of European engineers, it will be noticed that the very small number of rivets is a striking feature of the American plans.

In Europe labor is cheap; riveting and jointing is therefore less expensive. The American engineer’s great object is economy in labor as well as material; hence rolled solid shapes are preferred to composite sections: we not only save riveting thereby, but also weight, and we gain in strength.

As a general rule, which should be observed in the construction of all the different parts, I will remark that all the rivet-holes should be drilled: no punching whatever is to be allowed. As is well known to practical men, punching injures the iron and will invariably draw or buckle the plates and bars. No matter how accurately the work may be laid out in the yard or shop, parts which have been punched will never come together and make a good fit. All joints must be planed off true to the bevel; this is particularly necessary with the channel-bars which compose the arches and chords.

I need scarcely mention that such work as is required here, must be laid out and put together in a shed under roof, so that the sun will be kept off, and all the parts will be exposed to the same degree of temperature. When handling pieces of 30 feet long and over, variations of temperature become very perceptible. The scale by which the work is laid off should form a continuous bar of iron extending over the whole length of the span, and should be at liberty to contract and expand freely. With a competent superintendent in charge, there can be no difficulty in extending the work in the shop in such a style, that when put in place on the site of the bridge, all parts will meet and fit. When treating of the scaffolding, I shall again recur to this subject. I will now enter upon the details of Construction, and treat of all parts successively as they have to be put together in the work.