

IX: Deva Victrix Restored

The Application of Computer 3-D Modelling Techniques in the Reconstruction of Roman Chester

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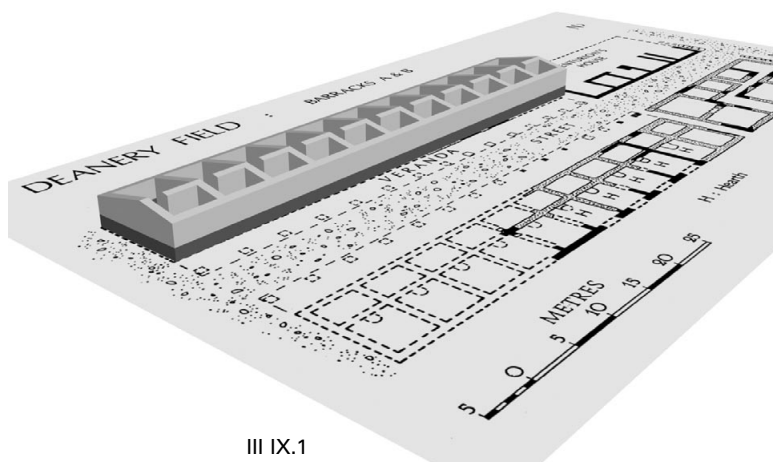
As the result of a chance meeting which took place several years ago between the authors of this paper, a conversation developed on the possibility of reconstructing all of the Roman buildings of Chester on a computer. It was agreed that Julian should start with a barrack block, on the assumption that this was the simplest and best understood of the structures which have been excavated to date. The success of these initial reconstructions persuaded us to carry on with what we have called 'The Chester Project', but now extending it to take advantage of the expertise of other specialists in the archaeology of Roman Chester, in particular Peter Carrington, David Mason and Tim Strickland.

Like many other built environments, Roman Chester saw many changes during its long history. The moment in time we have decided to represent in the Chester Project is the early third century. This may seem at first glance an unusually late date to choose for a major Roman site in Britain, but in fact it does reflect the archaeological evidence which indicates that this was the only period in its history when the fortress was fully manned and had its full complement of buildings.

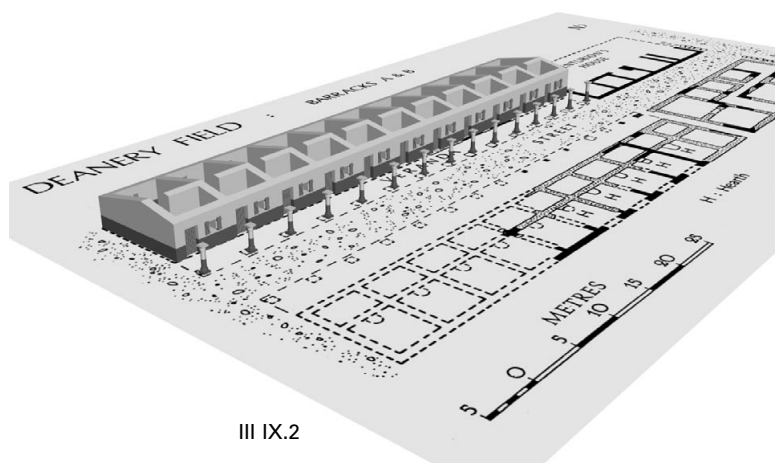
The concept behind the project is twofold: firstly, of course, our aim is to provide a public face for the work of the archaeologists, but secondly, and equally important in our view, is to identify problems of understanding which are glossed over or obscured by the conventional black-and-white archaeological plans. After all, it is quite easy to present a plausible representation of a building if you do not have to explain where the doors are, how to get to the upper storey, or what holds the roof up. Our aim has been to be as accurate as we can; having said that there are many areas of speculation when it comes to three-dimensional reconstructions, and it is our intention to offer solutions, sometimes provocative, which will stimulate other archaeologists to debate the issues which we have raised. Hopefully this will provide a consensus view.....!

Another use of computer graphics is to provide an approximate method of quantity surveying. The materials needed for the roof of a barrack block can serve as an example. By constructing one average roof tile and asking the computer to multiply it as many times

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III IX.1



III IX.2

The reconstructed barrack building demonstrates its use of archaeological data, mostly from the Deanery Field excavations carried out by Professor Robert Newstead in the 1920s and 1930s. The published plan is the base, and in the case of a relatively simple structure like this it is used directly as a template to control the computer three-dimensional modelling of the barrack.

The barrack at this simple level of detail is made of extruded planes. In the case of basic evaluations like this, it can be presumed that the barrack maintains the same profile along its length. The profile is drawn as a two-dimensional template then extruded to the length of the original barrack. There is no real-world equivalent to this process, and in a similar manner blocks representing the volume of each *contubernium* are built, then subtracted from the solid barrack object, leaving space for the walls. Smaller blocks, matching presumed dimensions of doors and windows, are again subtracted from the main barrack object. The veranda columns are also constructed first as a two-dimensional template; the profile is then spun around an axis to produce a three-dimensional image. The profile can be derived from drawings of site finds, reconstruction drawings or from photos of column bases and capitals; in the last case the drum can then be extrapolated according to the type of column required.



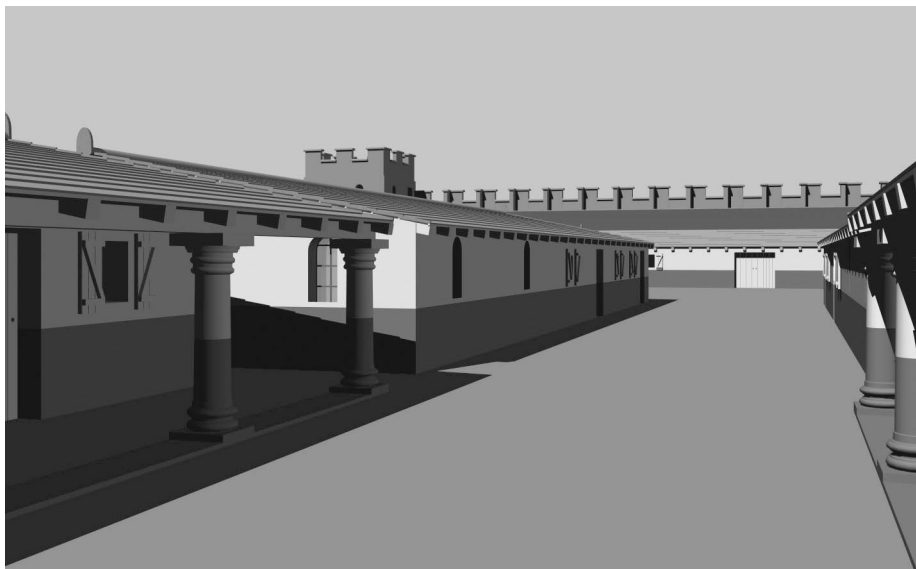
III IX.3 This overview of the north-eastern corner of the fortress is provided to show how the use of a basic level of detail can be expanded, building on the known and extrapolated plan which has been developed from archaeological research. Once we can see the three-dimensional spacing of the structures we can get a clearer perception of the ‘townscape’ of the fortress.

as necessary to cover the roof, we can get a fair idea of how many might be needed for a single barrack. Once the principle is established this can be extended to any building. Since we know the weight of a single tile we could similarly calculate a total weight for a roof.

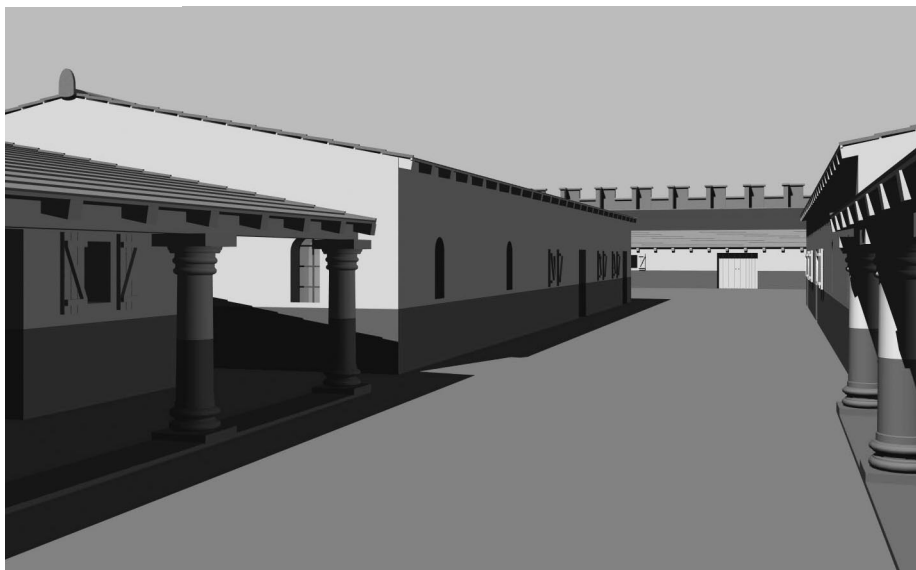
The figures we have produced for one of the Deanery Field barracks, in the north-east corner of the fortress, are:

Barrack block (<i>contubernia</i>)	3,360 <i>tegulae</i>	3,304 <i>imbrices</i>
Centurion’s quarters	1,764 <i>tegulae</i>	1,708 <i>imbrices</i>
Total	5,124 <i>tegulae</i>	5,012 <i>imbrices</i>
Total number of tiles	10,136	

There were also, of course, antefixes, but their number is unknown. We are inclined to believe that they occurred only at ridge ends, and since Chester barrack blocks were built with the centurion’s quarters as a separate unit there may have been four antefixes rather than two per block.

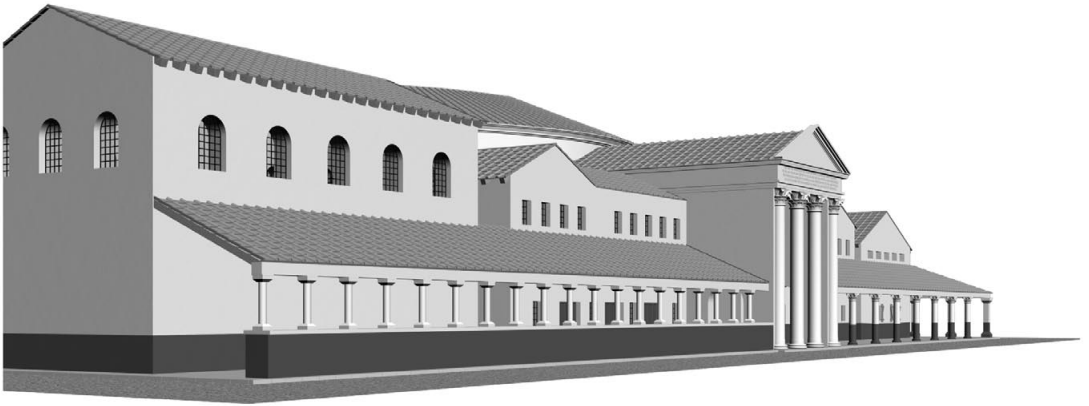


III IX.4



III IX.5

As an illustration of the sort of issue that may be thrown up by the reconstruction process, two versions of the centurion's quarters at the end of the barrack block are shown here. It is usually assumed that the roof structure for a barrack block was a single continuous surface; but at Chester we have a small alleyway between the centurions' quarters and the *contubernia*. Since we know that the difference in status between the centurion and the common soldier was considerable, is it not possible that the walls of the centurions' quarters were slightly higher to emphasise the difference? To demonstrate, we have included one image showing the regular roof level on a centurion's quarters and another version with a higher one; the archaeological evidence would support either. Computer reconstruction is a useful tool for testing such interpretations.



III IX.6 The most dramatic reconstruction so far is of the 'Elliptical Building' — an enigmatic grandiose structure at the heart of the fortress. Begun in the 70s of the first century it was abandoned before it had progressed beyond foundation level. Construction started again almost 160 years later and the building was finally completed to almost the original design, suggesting that the first-century plans must have survived in an office somewhere to resurface in the third century. The view shown here is the eastern side of the third-century building. The Elliptical Building in reality stood very close to the next building to the east, so that nobody in Roman times would have been able to stand back far enough to admire this magnificent façade.

Other calculations show that it would have been possible to assemble the complete legion in the cross hall of the *principia*, which perhaps indicates that this calculation influenced its size. The legion could also have been assembled in the courtyard outside.

The Chester Project is not formally funded and this has inevitably delayed progress; most of what has been achieved has been done in Julian's spare time. Advantage has been taken of the publication of reports on the Elliptical Building and that on the fortress bath house (both compiled by David Mason and published by Chester Archaeology) and the fortress defences (compiled by Charles LeQuesne and published by Chester Archaeology and Giffords) to add the reconstructions of these elements to the package of buildings which will ultimately be combined to make a total picture of Roman Chester.

Our ultimate aim is to create a complete virtual fortress, with the ability to 'walk' the streets and enter at least some of the buildings. The program will be accessible in the Grosvenor Museum in Chester, where a pilot version, using some basic elements from the project, is already running in the Newstead Gallery, and it should be possible to make the Chester Project available on CD for schools or the general public if there proves to be a market. Development work is also available on the web at www.chesterproject.co.uk.