The process of building the Colosseum: the site, materials, and construction techniques

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The construction of the Flavian Amphitheare under the emperor Vespasian was a massive undertaking on a difficult site, and many of the choices made by the builders were no doubt conditioned by the environmental and architectural challenges. In the past two decades, much work has been published by various groups who are studying the Colosseum and its surroundings. C. Panella's excavations around the Meta Sudans have clarified the environmental setting in the area before the Colosseum was built. Geological cores have revealed much about its substrata and hydrology. H. Beste has published a study of the *hypogea*, and various excavations sponsored by the Soprintendenza Archeologica di Roma have further clarified the construction of the building's foundations. My article in *JRA* 1998 on the reconstruction of the superstructure after the fire of A.D. 217 permits a more precise definition of which parts of the building belong to the Flavian phase. The intention here is to review recent work that relates to the construction of the building, integrating my own observations on the constructional details of the superstructure in order to create an overview of the issues confronted by the builders and the factors that governed their decisions. As I have dealt elsewhere with the evidence for different work-groups at the Colosseum,[1] I will focus largely on the builders' choice of materials and evidence for the construction techniques employed.

The environmental context

As Martial implies (*de Spect.* 2), Vespasian built his amphitheater on the site of Nero's Domus Aurea as a way of returning to the people the land taken for the private domain of that megalomaniac emperor. It was built in the area where Nero had created an artificial lake, and excavations and geological cores have revealed the complex nature of this building site. Once believed to have been built upon continuous tuff bedrock,[2] the Colosseum is now known to straddle sedimentary bedrock and unconsolidated alluvial sediments filling the Fosso Labicano, a tributary leading to the Tiber (fig. 1). On the north, the Colosseum rests on Middle Pleistocene (one million years old) sedimentary bedrock; on the south, it sits on unconsolidated muds, sands, and gravels of the Holocene (10,000 years ago). A drop in sea-level some 15,000 years ago caused intensive erosion that carved a valley into the Middle Pleistocene bedrock. When sea-level rose again during the Holocene, sedimentary deposits then filled the valley. These more recent deposits are far less compact and more saturated with water than the Pleistocene bedrock.[3]

The nature of the deposits in the Fosso Labicano has affected the flow of groundwater beneath the Colosseum. The Holocene deposits in particular contain suspended aquifers formed above impermeable layers of clay. That the Romans drained the groundwater in this area as early as the 6th c. B.C. is shown by the remains of a drain (*c.*11 m asl) near the Arch of Constantine.[4] The present water-table lies at *c.*12-14 m asl,[5] which is somewhat higher than the concrete foundations, which were laid at 8.0-9.0 m asl. Recent excavations have shown that there was a rise in the water-table during the active life of the amphitheater, requiring that

1 See Lancaster in Rea *et al.* 2002, 361-74.

2 Cozzo 1928, 205-6.

3 Funiciello *et al.* 1995, 927-37; Funiciello *et al.* 2002, 161-67. Analyses have shown that the seismic waves from earthquakes are amplified in the poorly-consolidated Holocene deposits, on which the Colosseum's S side rests. This may, in part, explain why the S side has undergone more extensive damage and spoliation than the N side.

4 Panella 2001, 51; Rea 2001, fig. 1; Narducci 1889, 59-64, fig. 13.

5 Funiciello *et al.* 1995, 933-35.