About your book « Building for Eternity »

Your book is fantastic! I enjoyed every part of it and learned a lot. Thank you very much for this enormous effort. While reading, I wrote down a few comments concerning details which I would like to share with you. Again, I insist on the fact I highly value your work, and my questions concern only say 1% of it … In any case my comments are completely open for discussion, if you wish to have such a discussion with me.

P 122 on Thapsus: Younes, 1997 PhD (see <http://www.ancientportsantiques.com/wp-content/uploads/pdf/Younes-1997.pdf> ) shows that the submerged part of this enormous breakwater might also consist of a ‘vertical breakwater’ made of concrete blocks, and that it is not a ‘rubble built’ structure. I am afraid Davidson & Yorke, 2014 base their conclusion on their 1966 survey (with unpublished details): their Fig. 4 shows a really large ‘quarried block’ that resembles a concrete block according to me. Considering the large waves that can reach this site, I believe the vertical breakwater was destroyed by 2000 years of wave action that scattered the blocks over 80 m width, making it look like a rubble mound breakwater. I beg any diver to go there and have a closer look at this marvellous breakwater!

P 178 on bonding of aggregates with mortar: I wonder how much sense [my work](http://www.ancientportsantiques.com/ancient-port-structures/reinforced-concrete/) makes in this direction of thought … I conclude: “*It seems that we may carefully validate the hypothesis that courses of bonding tiles located in the lower sections of massive structures like bulwarks and donjons increase the internal cohesion of the lower part of the structure.”*

P 179 on compressive strength: I could not get hold of Mehta, 1991: 25, but I would say that some mixing up occurred in the units as maximum impacts of breaking waves on vertical walls are in the order of hundred tons/square meter. This may depend to some extend on the duration of the measured impact and therefore on the sampling frequency of the measurement, but I would say no more than a few hundred tons/sqm. You may consider William Allsop from HR Wallingford as a serious reference: <http://eprints.hrwallingford.co.uk/449/> .

P 191 & 208 on opus reticulatum: Clearly ancient cofferdams cannot go as deep as 9 m (that is the height of the modern Panama locks with monumental steel gates!!). A few meters would really be a maximum. One method for gently sinking a prefab block including opus reticulatum would be the one I described in de Graauw, 2000:6.

P 225 on maritime trade: The idea of combining pulvis one way and grain on the way back sounds very logical as ship owners hate to sail ‘on ballast’ for economic reasons. However, I would favour a direct trip to Alexandria where pulvis would be unloaded and taken over by other ships to Caesarea. In this way the grain ships would remain concentrated on their main grain business and would not have to sail against the wind from Caesarea back to Alex. The trip of the grain ships would not be altered due to pulvis delivery at Caesarea. Pascal Arnaud, 2005:222-223 gives argumentation on the preferred ancient sailing routes (NB: he is a sailor himself). The map shown by Arnaud, 2005:56-57 shows that a direct trip from West to East was feasible from Sicily to Alex, while the way back had to go North along the Levant and then West along the southern Turkish coast until Rhodes and then through the Aegean (see also Stadiasmus). Ship owners probably tried to make two trips per year: one in May-June and one in September-October, in order to avoid the strongest ‘westerlies’ (in July-August) on their way back to Rome. This means that they had to optimise the available time and that they would not like to take a risk of getting stuck in Caesarea because of adverse winds for sailing back to Alex to load grain.

Further details:

P 35 on Procopius: I was wondering if Procopius meant the port of Constantinople or the port of Hieron/Hereum further North on the Bosphorus.

P87 on Alexandria (see also pp 212 & 219 & 222): the “ingenious but unlikely suggestion” is not mine! It is from Prada & De la Pena, 1995 (see attached doc). I confess I rather prefer Brandon’s suggestion on p 210. I was with Goddio in Alexandria in 1998 when he still believed the Antirhodos block was non-pozzolanic, and I then suggested the block would have been made on land and floated according to the sketch presented in de Graauw, 2000:6. Although I do not remember seeing such a sketch elsewhere in the literature, it must have been in use by ancient Egyptians (and others) since archaic times for transporting natural rock blocks and non-pozzolanic concrete blocks. Hence, my contribution on this topic was really modest (Goddio was more interested at that time by my work on fitting Ptolemee’s fleet into the ancient port).

Thanks a lot for magnificent positioning of 93 sites! Just a few comments:
P 124 on Bagno del Saraceno: coordinates not correct.
P 126 on Le Grottacce: coordinates not correct.
P130 on Miseno: Fig. 6.41 does not show the western pilae mentioned in the text as a N-S line.
P 133 on Naples: coordinates point to Piazza Mercato, but should perhaps point to Piazza Municipio?
P 138 on Horrea Caelia: perhaps Hergia should be Hergla; how sure is the location inside the modern port (Slim et al. 2004 give another location)?
P 138 on Neapolis: how sure is the location inside the modern port (Slim et al. 2004 give another location)?

P 141 chapter 7: you do not mention the work of [David Moore](http://www.romanconcrete.com/romanconcrete.htm) … Why not?!

P 244 App 3: how does ‘GPS reing’ correlates with Latitude/Longitude ?