

A Review of Reconstruction Methods and Materials for Ancient Dry Stack Structures

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Abstract:

We see the results of reconstruction projects at ancient Roman and Greek archeological sites (i.e. anastylosis) around the world and can typically find their historical and archaeological information fairly easily. However, specific information on the design and construction methods used during the reconstruction is often difficult to obtain. Rather than the archaeology or art history perspective, this paper compiles published information on general structural engineering methods and materials of anastylosis from several case studies. The authors acknowledge that this is not a complete list of all anastylosis projects around the world, but it is aimed to be a summary of common methods, particularly for structural connections made in reconstruction of ancient structures made of dry stacked stone construction (i.e. without mortar). In the last couple of decades, a commonly used and researched method for anastylosis has been titanium reinforcement to join stone elements. Previous to titanium, stainless steel or iron was typically used, but these often corroded and caused damage to restored structures located in chloride rich environments. To bond titanium or reinforcement to stone, Portland cement mortar or grout is commonly used. This method has come as a response to the earlier detrimental interventions with iron or steel reinforcement and improper use of lead or Sorel cement mortar. More recently, glass fiber reinforced polymer (GFRP) rebar embedded in epoxy resin is offered as an alternative and used in a few archeological sites in Turkey because it offers a cost effective alternative to titanium. However, there is not sufficient research to justify the use of GFRP with stone, particularly with respect to the durability of both the GFRP and epoxy in hot and salt-exposed climates.

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