



Suitability of Foam Concrete and Confined Masonry for Retaining Walls Application in Seismically Active Regions: A Review

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Abstract

The self-weight of retaining wall and the supported backfill play a vital role in its stability, particularly in weak soil conditions. Further, the seismic activity and moisture content in this soil condition aggravates the instability of retaining wall leading to its failure. Hence, the self-weight and seismic resistance of retaining walls is of utmost importance along with pore water pressure dissipation. It is to be noted that any structure's seismic behaviour is primarily influenced by its mass, strength, and stiffness, as well as by all other factors that may have an impact on those characteristics. This paper presents a detailed review on the seismic performance and energy absorption characteristics of foam concrete, which contribute to the stability of retaining walls through optimization in self-weight along with pore water pressure dissipation. Later, the limitations of using foam concrete in various types of retaining walls is discussed. Though masonry retaining walls is a potential solution, reinforced concrete confining elements along with foam concrete interlocking blocks could be more effective in enhancing their ductility, integrity, stability and strength against in-plane and out-of-plane seismic excitation. Further, few researchers have shown that confinement of wall with reinforced concrete tie-columns improve lateral resistance and deformation capacity of an unreinforced masonry wall by more than 1.5 times and five times respectively. This is in addition to a six to seven times enhancement in the energy dissipation capacity. This way, the stability of retaining walls could be enhanced by the use of foam concrete, interlocking blocks and confined masonry technologies. It should be highlighted here that though the combination of these technologies has a lot of potential in the aforementioned application, very limited research exists in the literature on use of foam concrete and confined masonry for retaining wall applications. In this light, the present work also presents an in-depth review on dynamic properties of foam concrete, enumerating the seismic resistance mechanism.

Keywords: Foam concrete, Confined masonry, Interlocking blocks, Retaining wall