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Performance based design of sound wall foundation under freeze-thaw cycle effects

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Performance-based design of sound wall foundation under freeze-thaw cycle effects

Sound walls are designed to mitigate the impact of noise pollution in sensitive areas and buildings. At present, the design process of sound wall foundations, specifically those involving steel piles, is greatly affected by freeze-thaw cycles. These cycles induce deformations, leading to structural damage and playing a significant role in determining the stability of structures in colder regions. The number of studies that have delved into steel pile design in the context of sound wall foundations, particularly their behaviour under cumulative freeze-thaw deformations, remains limited. Current design approaches overdesign the steel piles' length or resort to concrete piles that are non-environmentally friendly. The experimental program aims to develop a performance-based design approach that yields tangible outcomes, replacing concrete piles and reducing the amount of steel used. This initiative will contribute to the construction of structures that are not only aesthetically pleasing and functional, but also energy-efficient and environmentally sustainable.