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Peat Soil Stabilization by Using Sugarcane Bagasse Ash (SCBA)

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Abstract : It is well recognized that peat can impede the proper hydration of cement because of high organic content, presence of humic acid and less solid particles. That means the large amount of cement is required in order to neutralize the acids or otherwise the process of the peat stabilization remains retarded. Nevertheless, adding a great quantity of cement into the peat is absolutely an unfriendly and uneconomical solution. Sugarcane production is world number one commodities and produced a lot of bagasse. Bagasse is burnt to generate power required for diverse activities in the factory and leave bagasse ash as a waste. Increasing concern of disposal of bagasse residual creates interest to explore the potential application of this material. The objective of this study is to develop alternative binders that are environment friendly and contribute towards sustainable management by utilizing sugarcane bagasse ash (SCBA) in the stabilization of peat soil. Alongside SCBA, Ordinary Portland Cement (OPC), calcium chloride (CaCl2) and silica sand (K7) were used as additives to stabilize the peat that sampled from Hokkaido, Japan. In obtaining the optimal mix design, specimens of stabilized peat were tested in unconfined compression. It was found that stabilized peat comprising 20% and 5% (PCB1-20 and PCB2-5) partial replacement of OPC with SCBA 1 and SCBA 2 attain the maximum unconfined compressive strength (UCS) and discovered greater than untreated soil (P) and UCS of peat-cement (PC) specimen. At the optimal mix design, the UCS of the stabilized peat specimens increased with increasing of curing time, preloading during curing, OPC dosage and K7 dosage. For PCB1-20 mixture, inclusion of a minimum OPC dosage of 300 kg/m3 and K7 dosage of 500 kg/m3 along with curing under 20kPa pressure is recommendable for the peat stabilization to be effective. However for PCB2-5 mixture, it suggested to use more OPC and K7 dosage or alternatively increase the preloading during curing to 40kPa in order to achieve minimum strength target. It can be concluded that SCBA 1 has better quality than SCBA 2 in peat stabilization especially the contribution made by its fine particle size.

Keywords : peat stabilization, sugarcane bagasse ash utilization, partial cement replacement, unconfined strength
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