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Civil Engineering, Federal University of Rio Grande do Sul, Porto Alegre 90Â 035-190, Brazil Civil and Environmental Engineering, University of Passo Fundo, Passo Fundo 99Â 052-900, Brazil Faculty of Engineering, University of Minho, 4800-058 GuimarÃÂ£es, Portugal Department of Engineering, University of TrÃ¡s-os-Montes e Alto Douro, 5000-801 Vila Real, Portugal Author to whom correspondence should be addressed. Academic Editors: LuÃs Filipe Almeida Bernardo and Sergio Manuel Rodrigues Lopes Appl. Sci. 2021, 11 (23), 11Â 286; Received: 15 October 2021 / Revised: 18 November 2021 / Accepted: 23 November 2021 / Published: 29 November 2021 of alkali-activated cements (CAA), which are very effective in the use of industrial by-products as raw materials, which also contribute to reduce the volume of waste landfilled. Several studies aimed at the development of AACs from silicon and calcium-containing waste for the chemical stabilization of soils have shown their excellent performance in terms of durability and mechanical performance. However, most of these studies are limited to a laboratory characterization, ignoring the influence and viability of the on-site construction process and, also important, of the on-site curing conditions. In this work, the application of a CCA based on lime carbide and glass residues to stabilize the fine sand that acts as a surface base was investigated. The evaluation was based on the unconfined compressive strength (UCS) and the initial cutting modulus (G0) of the material developed, and the field results were compared with the preparations in the laboratory, up to 120 days of curing. Field tests were also carried out on field layers (with diameters of 450 and 900 mm and thickness of 300 mm) after different curing times. For reference purposes, the precursors mentioned were: With a solution of sodium hydroxide or hydrated with water (given the reactivity of the lime). The results showed that AAC-based mixtures developed greater strength and rigidity at a more rapid pace than water-based mixtures. The samples cured under controlled laboratory conditions showed better results than the samples collected in the field. The inclusion of the stabilized layers clearly increased the cargo capacity of the natural soil, while the different diameters produced different failure mechanisms, similar to those found in the stabilization of the Portland cement. A recurring problem that is in the works of engineering are the bad geomechanical properties and, above all, the low strength and stiffness of soils, which are responsible for the structural problems associated with the installation of surface foundations or layers of pavement , for example, often univable. In northern and southern America, the main parameter that regulates the pavement applications is the resistance to non-confined compression (which), which must be> 1.2 MPa for the Subbase layers and 2.1 MPa For base layers [1]. The minimum values required for what are 1.7, 4.5 and 4.7 MPa in the subbassical and basic layers of pavements constructed in Australia, India and Korea, respectively [2]. In Brazil, the standards establish minimum values than 1.2 and 2.1 MPa for the material to be applied in the subbalastic and base layers, respectively [3]. A solution widely used to the problem of soils with low Charging capacity is the modification of the original geological properties of the existing soil by creating what can be considered a new material. This is achieved by adding a cement agent, generally Portland cement [4,5,6,7,8,9,10,11]. However, ordinary Portland cement production (OPC) imposes a very significant lien to the environment [12] since it is of one of the most energy-intensive industrial processes in the world, contributing around 7% of the world's total CO2 emissions [13,14]. During intensive intensive care For alternative binders for OPC, alkaline activated cements (AACs) are rapidly gaining ground, as it involves mainly industrial waste, and the results are competitive with those produced by OPC. Despite being a recent technique, many studies on the alkaline activation of wastes have already shown several advantages of these alternative materials, high compressive strengths, low levels of contraction, acid and fire resistance, and low thermal conductivity [15,16,17,18, 19,20,21,222,23]. The activation of alqualine is, in general terms [24,25,26,27], a reaction that occurs when materials rich in silica (SiO2) and Aluminum (ALO4) come into contact with a highly alkaline medium that usually provides alkaline substances such as sodium. (Na +) or potassium (K+). These alkaline substances initially increase the pH of the medium, accelerating the solubility and promoting the dissolution of elements such as silica and allomine present in the material; that is, there is a phase of breaking the ionic and covalent bodes of the vitreous phase of the raw material and then the colloids of the material. lyce and alloomin are released in the solution that forms a coagulated structure (gel) that favors the condensation reactions that lead, finally, to the polymerization of the structure that results in compounds with greater resistance to compression. If calcium is present in the mixture in significant amounts, the dissolved SI complex â¨¬ "will diffuse from the solid surface and produce a dominant gel phase. If calcium is present in the mixture in significant quantities, the SI complex dissolved to it â¨¬ If it will spread from the solid surface and produce a dominant gel phase of C: the use of industrial waste and / or by-products such as It was shown that precursors for the development of AAC are a highly viable alternative to replace cement Portland on the Civil, presenting not only an excellent performance in terms of mechanical characteristics, but also several advantages from an environmental perspective. In addition to De. To the reduction of CO2 emissions caused by the Portland cement industry, CCAs contribute to the conservation of non-renewable natural resources used in Portland cement production. The incorporation of industrial waste as raw material in binders allows its reintroduction in the economy, avoiding its elimination in landfills, which can reduce environmental pollution [28]. The production of urban waste and industrial waste has rapidly grown throughout the World in the last decades [29]. An important example is glass, which is essentially an inert material that, under common environmental conditions, can be recycled in many ways without modifying their chemical properties. Thus, the collection and recycling of glass waste have become very common and inclusive and now they are part of the environmental policies of the developed world. However, residual glass must meet a series of requirements for reusing in the manufacture of other glass products. In addition, the mixture of different types of glass with different chemical compositions and particle sizes is only possible with very complex technological processes. As a result, in Brazil, only about 47% of all glass containers were recycled in 2011 for a total of 470,000 tons; While in the United States, this percentage was a lower, with 40% in 2015 [30]. Recent studies have explored the Puzolanic properties of residual glass and their application to a new variety of binders, which include recycling different types of waste and industrial byproducts (industrial, agricultural and urban), and have gained notoriety as soil stabilizers . In substitution of the OPC in soil-cement [8,17,20,313,32,33,34]. The glass, in general, has as the main dixture constituent of silicon (SiO2), and the material resulting from its production process (at high temperatures) is a SLO an essentially amorphous frame. Thus, finely ground residual glass obtained from the grinding of sodium-lime glass containers represents a viable alternative source of silica for alkali-activated materials [13,29,35]. This residue has already been used in several studies, combined with hydrated lime, for the stabilization of various soils. These materials were characterized by equalizing and even improving the mechanical performance, both in strength and durability, compared to the materials produced from the Portland clinker [33,34,36,37,38,39,40,41].Recently, [34] evaluated the mechanical performance of the same mixture used in this study, it is i.e., sandy soil modified with an AAC composed of crushed residual glass (GWG), carbide. lime (CL) and sodium hydroxide (NaOH) with a concentration of 3 molals. The effect of key factors, such as the presence of a NaOH solution, the dry unit weight and the amount of binder, on the unconfined compressive strength (qu), the initial cut-off modulus (G0) and the accumulated loss of mass (ALM) was evaluated. Higher qu values were observed with less porous samples containing higher amounts of binder (about 2.0 MPa). The authors conclude that this high performance is associated with the reaction mechanism (polymerization-condensation) in which the cementing reaction products are formed in these high alkalinity media [39], through tests of compressive strength and durability, concluded that the compacted mixture of finely ground residues carbide-glass with an alkaline solution of ground 3-sodium hydroxide has proven to be a viable material that can be used in engineering applications as an alternative and sustainable substitute geomaterial for earthmoving, pavement and soil stabilization work. Finally, ref. [41] used calcium carbide (CL) residues for Alkly recycled glass powder (RGP) and improve the mechanical properties of the clay soil, finding significant values of compression resistance (greater than 2 MPa) for the GP content of However, most of the research reported on the use of alternative binders for soil stabilization continues, and only, to focus on laboratory characterization, while the feasibility and impact of the construction process associated with these alternative solutions, as well as the effect of in situ curing conditions on mechanical properties. stabilized soil, require real-scale field tests.Recently, ref. [37] study the use of an alternative cement based on glass residues and lime carbide (without the addition of an alkaline solution) to stabilize the fine sand and evaluate its use in the field as a reinforced layer under the surface foundation. The failure mechanisms presented were very similar to those found in similar studies with Portland cement. However, no field studies were found in the literature that addressed the implications of adding an alkaline solution to activate these precursors (glass residues and lime carbide). Thus, the present study is, to the best of the authors' knowledge, the first complete evaluation of the application of an alternative cement based on ground glass waste (GWG) and lime carbide (CL) residues activated with an alkaline solution of sodium hydroxide (SHS) to stabilize the sand. fine. After laboratory evaluation of the binders, several layers of fine sand were stabilized with two different types of binders, both based on GWG and CL, which were activated by alkalis in one case and hydrated with water in the other and analysed after 14 and 120 days of curing by their resistance. a non-confined compression (UCS) and shear modulus initial stiffness of the material (G0). These tests were carried out on samples collected in the field and the results obtained were compared with those obtained from samples of the same material, manufactured under controlled laboratory conditions. evolution of the mechanical behavior of these materials under controlled laboratory conditions is presented along the Period, up to a maximum of 120 days. Finally, the results of the plaque loading tests are presented. The sand used in this study came from the region of Osorio, Southern Brazil. It can be classified, according to the unified soil classification system [42], such as low graduation sand (SP). It is fine quartz sand with rounded particles and a uniform distribution of grain size. The density of the grains is 2.65 g / cm3, and the maximum and minimal vacuum relations were 0.6 and 0.9, respectively. The distribution of the size of the particles (Figure 1) shows an effective diameter (D50) of 0.16 mm, and the coefficients of uniformity and curvature were 1.9 and 1,2 respectively. The physical properties are shown in Table 1.The GWG, used as a precursor, was obtained from the transparent flashing glass grinding (ie, containers and windows) of the soda-lime type in a ball mill. It was classified as a lime material (ml) in the size of the particles [43]. The grinding process followed a regular procedure that included a fixed time, a defined amount of glass residues and a certain amount of metal balls. After this process, the resulting glass powder was subjected to a screening process, with the aim of increasing its chemical reactivity and standardizing the material up to a maximum particle size of 0.075 mm (Sieve # 200) and a surface Specific 3,28 cm2 / g. The distribution of the size of the particles is presented in Figure 1, while the physical properties are shown in Table 1. The chemical composition of the GWG obtained by X-ray fluorescence (XRF) shows a majority content of SiO2 (69 , 09 WT%) (Table 2). The analysis of X-ray diffraction (Figure 2A) shows the presence of some amorphous content, characterized in by the presence of a large hump between the hangles 15 and 40 (Â, " 2 i§), as well as the absence of prominent peaks, which indicates the absence of crystalline phases. Southern Brazil). This this was received in the form of agglomerated powder (lumps) due to its high humidity. The CL was dried for 48 h at 60 Â°C and then ground by hand with porcelain mortar and sieved to ensure a maximum size of 0.075 mm. The particle size distribution is shown in Figure 1 and the physical properties are shown in Table 1. Chemical composition (Table 2) reveals an important calcium content (69.62 wt %), while the high material loss (23,58 wt %), after calcination at 1000 Â°C, is mainly due to the presence of calcium carbonate [44,45]. Minerally, the XRD pattern (Figure 2b) of the CL shows the main presence of the portlandite and crystallized carbonate phases (mainly calcium carbonate-calcite). A complete and detailed physical, chemical and mineralogical characterization of this residue can be found in [45].SHS was used as an activator. Sodium hydroxide of analytical purity (99.0%), in the form of pellets, was dissolved in distilled water to obtain the alkaline solution with a concentration of 3 molals. This was based on the literature review of the alkaline activation of GWG [16,46,47,48].The experimental program was divided into two phases: laboratory and field testing of two different families of binders: those activated with SHS and those hydrated with water. According to previous laboratory studies, for both sets of mixtures, the GWG content was 30% of the dry weight of the sand, while the LC content was 7% of the total mass of solids [16]. Therefore, the two binders differ only in their liquid phase:BSHS (activated with a 3 molal sodium hydroxide solution);BH2O (hydrated with water).All samples were moulded with a water content (Â¦) of 11%, for a dry unit weight m Maximum (Ã©3d) of 16,0 kN/m3 (e = 0,60), according to Proctor compaction tests [49]. Although Proctor's compaction tests revealed that higher values of dry unit weight, this value was chosen to facilitate the manufacture of the living vivid scale Samples measuring 50 mm in diameter and 100 mm in height were moulded in the laboratory. The sample moulding process consisted of the following steps: (1) individual weighing of dry materials (Osorio sand, GWG and CL) on two-digit precision scales; (2) manual mixing of solid materials until visual homogeneity is achieved; (3) addition of hydroxide solution Sodium (SHS), or distilled water, followed by manual mixing for 10 min, or until complete homogeneity. (4) weighing the pastes according to established parameters; (5) separating the paste into three small portions, to check the moisture content of the mould; (6) static compaction into moulds cylindrical, considering three sequential layers, with the top of each layer scarified to improve adherence to the next layer; (7) weighing and meditation of each specimen, with accuracies of 0.01 g and 0.1 mm, respectively; (8) sealing of the moulded specimen in a plastic bag. The following molding specifications were observed: Maximum variations of ±1.5% and 1.0%, in the mean dimensions and mass of each specimen, respectively, were tolerated. The degree of compaction was always between 99 and 101% of the target value, while a maximum variation of 5% was allowed for the average moisture content. The specimens were cured in a humid room at a temperature of 23 Â°C Â± 2 Â°C and a relative humidity of 90% [50]. Three samples were manufactured per result and curing periods of 7, 14, 28, 60 and 120 days were adopted. The mixing proportions used are shown in Table 3.For the field test program, a total of four circular layers of glass waste (GWG) -lime carbide (CL) -sand were assembled, each with a thickness of 300 mm (Hr) and a diameter (Dr) of 450 mm. These dimensions were established according to the equipment available for their construction, which would ensure a good homogenization of the material would allow the extraction of a number of cylindrical samples suitable for carrying out the determined analyses. determined. With the specified dimensions, they were manually excavated on the surface of the soil. The molding of the field layers followed a procedure similar to that which is already used in the laboratory. However, in this case, the materials were prepared in a capacity mixer 450 L, while the compaction of each layer was performed manually. In order to control the weight and specific humidity, samples were taken from each compacted layer according to NBR 9813 [51], in which a cylinder with a cutting edge sits on the surface of the soil, suitably leveled and, Through the fall of a socket stamping, it is compressed in the material until its upper edge is 1.0 cm below the surface of the soil. Subsequently, with the help of spatulas, the floor is cut around the cylinder and below its lower edge. With a beveled rule, the faces of the specimen are scratched. The mass of the cylinder containing the material is determined immediately in order to avoid moisture loss. Therefore, knowing the mass and the volume of the cylinder, the dry unitary weight of the soil is obtained in situ. Table 4 summarizes the dry weight unit (Žâ €) and the moisture content values (I) obtained in the field during the molding process. These results were similar to the initial requirements of I = 11% and ÃŽÂ³D = 16.0 kN / M3, which indicates the homogeneity of mixing and compacting efficiency. The field molding process can be followed by layers 3.Two, BSHS and BH2O, were allowed to cure for 14 days, while two two cured for 120 days. During the curing period, the climatic conditions of the place where the layers were made (southern of Brazil) were monitored (ie, these data were recovered from the local meteorological station, located near the experimental field) in order to present the actual conditions (temperature and precipitation) in which the layers of the field were presented during the After the curing period, the layers were extracted from the ground (Figure 4a), and the cylindrical samples were manually removed from layers Carefully trimmed up to 50 mm diameter and 100 mm height (Figure 4B) for subsequently checking the unconfined compression. The non-confined compression resistance assays (UCS) were performed in an automatic press, under conditions controlled tension (axial displacement of 1.14 mm / min), following the contents of ASTM C39 [52]. Approximately 24 h before the test, the specimens were submerged in water to mitigate the possible effects of suction [53]. The initial cutting module (G0) was determined by ultrasonic pulse speed assays. The shear wave was measured in samples before the UCS tests, considering that the ultrasonic pulse speed test is not destructive. An ultrasonic pulse device was used to measure the shear waves. A high viscosity gel was applied to the transducers, which were then attached to the extremities of the samples for the measurement of the waves. For a homogenic and elastic medium, G0 is the product of apparent density by the square of the speed of a shear wave that crosses it [45]. Seven circular layers stabilized with BSHS or BH2O, with diã Meters (DR) of 450 and 900 mm and thickness (HR) of 300 mm (Figure 5), on light cement residual soil, fully characterized by [11] and [54]. Initially eight layers were planned, but one was damaged during the manufacture. These layers were subjected to plaque loading tests (PLT) using a circular rigid plate of 300 mm. The dimensions of the layers were chosen based on previous works [11,37,55]. Figure 6 shows the relative distribution of the stabilized layers in the field. The distances between layers were defined taking into account the minimum spacing required between the edges of the adjacent layers, which, as recommended [10], was fixed by double the diameter of the largest layer. The tests were performed after period of of 14 and 120 days. The PLT procedure followed the recommendations of [56]. The load (Q) was applied by a hydraulic cat installed under a charged charged reaction (Figure 7a, b). The readings were carried out with a load cell, properly calibrated in the laboratory, and a data acquisition system. Vertical displacement was measured using resistive rules with a travel of 50 mm and a resolution of 0.01 mm, positioned at three different points on the plate (Figure 7c). The load increments applied at each stage were previously defined as 10% of the expected breaking load. For the definition of load capacity, the criterion of [18] was used, where the breaking load (Qu) is defined as the point on the stress settlement curve corresponding to a relative settlement (Ã©'/D) of 3%.The results obtained during the tests of unconfined compressive strength (UCS) are shown in Figure 8. The results for mixtures with SHS ranged from 400 kPa to 5000 kPa and from 155 to 5000 kPa without SHS. These values are the mean of three tests, with none of the resistance values deviating more than ± 10% from the mean. An increase in resistance is observed with the curing time, until day 120. This behavior is related to the pozzolanic capacity of the residual glass, which reacts with the calcium hydroxide [Ca (OH) 2] available in the CL, forming a union matrix. It is known that these pozzolanic reactions develop during periods much longer than the 28-day period usually considered for the evaluation of OPC-based sensors. In addition, the higher short-term resistance produced by the material activated by alkalis compared to the material hydrated with water is relevant. Since pozzolanic reactions depend on the development of a strongly alkaline environment, the presence of the activator creates such an environment immediately after mixing the materials. In contrast, LC is less effective in increasing the pH of the mixture, resulting in lower dissolution rates of the silica. (from After 120 days, the differences are practically nil, as the hydrated material had time to develop similar volumes of bonding gel. bonding. stabilized and natural specimens, which were initially about 2.6 (i.e. more than double), declined to 1 after the longest curing period considered. According to [28], the biggest difference between pozzolic reactions and alkaline activation is that alkaline metal (NaOH) is more effective than alkaline earth metals (calcium) due to the higher initial pH provided by the activating solution, dissolving and breaking the original structure more effectively.Samples extracted from the field layers were also subjected to UCS tests. Figure 9 shows the CSU of samples recovered from the field after 14 and 120 days and compares these values with those obtained in the laboratory. Field results for mixtures with SHS ranged from 850 to 1730 kPa and from 220 to 940 without SHS. As is often the case, field results are lower than those obtained with samples manufactured in the controlled laboratory environment. This difference is more significant after 120 days, as the material spent more time exposed to the environment and, therefore, was less able to develop higher levels of SCU (compared to those obtained in the laboratory).After 14 days of curing, the field/laboratory relationship was 0,80 for BSHS material and 0,49 for BH2O material. After 120 days, the same ratio decreased to 0.35 (BSHS) and 0.18 (BH2O), suggesting that curing conditions (relative humidity, temperature and precipitation) assumed an important role in the production and development of the cementing gel. In addition to curing conditions, an important factor to take into account for the results of the UCS is the difference of the moulding process from field to laboratory, since in the laboratory there is greater control and precision over the moulding conditions, such as the homogeneity of the mixture, the degree of compaction and the guarantee of shape and measurements. of the sample (i.e., the sides) and the flat surfaces), which Dan Dan resistance results. In addition, the extraction of the samples taken from the field sample may have interfered with the results of the CSU of the samples recovered from the field, since, when sculpted by hand, the sides and loading surfaces of the samples were not exactly regular (Figure 4b), which certainly interfered with the strength, negatively. It should also be noted that the lowest proportions for each curing period were obtained by SHS, which can be interpreted as an indication of greater durability of the activated alkaline material.Figure 10 shows the monitoring of the climatic conditions to which the stabilized layers were exposed during the curing period. The average temperature was around 15oC, therefore lower than in the laboratory environment, which probably hampered the field results. According to the data collected at the weather station, a precipitation of about 100 mm was recorded in the first 14 days of curing, with an increase to 230 mm in the third week. Such precipitation during the initial and crucial phase of the reactions may have reduced the pH of the pastes and, therefore, conditioned the development of the force. These climatic conditions, specific to the Southern region of Brazil, can significantly influence field performance, especially of layers without alkaline activator, which generally show slower development rates than activated systems.Figure 11 shows the variation of the initial shear modulus (G0) (average value of three specimens) for the same specimens subjected to the UCS tests. In all cases, the G0 increases with the curing time. However, the BSHS/BH2O laboratory ratios for samples cured for 14 and 120 days were 2.85 and 2.34, respectively. This difference was even greater for field-cured material, with ratios of 3.85 and 4.31 after periods of 14 and 120 days, respectively. As expected after the analysis of the results of the CSU, the field samples showed less rigidity than those of the laboratory. with laboratory/field ratios of 2.58 (14d) and 2.39 (120d) for the BH2O material, and 1.70 (14D) and 1.44 (120d) for the BSHS material.Figure 12 shows the results of the load versus the plate tests performed in The Seven Field Layers. The carrying capacity of the natural soil, which was used as a reference in this study, was determined by [11]. Stabilization resulted in an initial increase in force in relation to the response of the natural soil. For a better observation of the general trends verified in the two diameters used, the applied loads and the respective settlements were normalized by the area, and then the resulting stress was plotted according to the relative liquidation (Ã©'/ DR). Figure 13 shows that, after normalization, most of the curves overlap approximately, including those of the natural soil. The representation of the normalized results suggests that, with respect to the 450 mm DR tests, the failure was controlled by the load capacity of the soil underlying the stabilized layer. As the load increases, there is a progressive breakage of the bonds of the weakly cemented residual soil that supports the stabilized layers, resulting in vertical penetration of the base with virtually no lateral movement of the soil. This behaviour is typically observed when structured soils lose their tissue [54]. The layers of the DR 900 mm reached the failure before the load capacity of the natural soil was exceeded (note that this capacity is higher than that of the soil at the base of the layers DR 450 mm), which justifies that the superposition of the standardized 900 mm curves With the standardized 450 mm curves occur only for a deformation initial relative value of about 0.1%. Overall, there was a proportionality between the load capacity and the reinforced diameter "for the same load, more displacements were observed for the top diameter. However, the failure mechanism was different for each diameter. For the smallest diameter (DR450BSHS and DR450BH2O), A A The failure mechanism occurred when the steel plate and the stabilized layer underneath behaved as a single element and penetrated the ground without any lateral movement. This mechanism was fully observed during the analysis of the exhumed layers, when penetration of the soil without visible cracks was evidenced (Figure 14).The larger diameters (Dr900BSHS and Dr900BH2O) showed a different failure mode, characterized by the puncture cut, which resulted in the separation of the soil. Clear cylinder located below the circular plate of the rest of the body of the stabilized layers (F Figure 15). Some tension cracks also formed inside the cylinder when it tried to expand laterally due to the PoissonÃ¢Âs effect. In addition, two or three radial cracks were developed from the center to the edges. Similar failure modes and cracking patterns were found in [11,24], soil stabilized with Portland cement.This work evaluated the application of alkali-activated cement based on industrial waste to stabilize the residual layer that supports a surface load. The following conclusions were drawn from the results obtained: a) With regard to laboratory mixtures, material activated with a 3M sodium hydroxide solution had a higher compressive strength (CSU) than material hydrated with water, but only for short curing periods. The alkalinity of the activator improves the initial dissolution of the original silica, resulting in a resistance 2.6ÂÂ superior to that of water-based mixtures. With increasing curing time, the latter was able to develop similar volumes of binder, obtaining similar values of UCS. In the present study, results for NaOH mixtures ranged from 0.4 MPa to 5.0 MPa for laboratory tests and from 0.2 MPa to 1.7 MPa for field results, depending on the curing period. So, some of the results are contained in the minimum values required by the soil-cement standards and can also be considered for projects with lower voltages; b) Comparison of the field field the UCS laboratory data, it is clear that the former showed lower resistance for both types of mixtures, which is attributed to the influence of climatic conditions during curing, controlled in the laboratory, and to a precision of molding of samples made in the laboratory with greater control in terms of mixtures homogeneity, degree of compaction and control shape and measurements (i.e. vertical sides and flat surfaces). As the curing period increased, the difference between field and laboratory became more significant, aggravated by the higher precipitation recorded in the region during the last 7 weeks of the curing period, compared to the first 10 weeks; c) The rigidity results (G0) obtained in the field were lower those obtained in the laboratory for both types of mixtures. With the increase in healing time, there was an increase in stiffness. However, AAC-based mixtures showed higher initial stiffness values than water-based mixtures in the laboratory and in the field. This was contrary to what was observed with the CSU, after 120 days, when the hydrated material showed greater resistance to compression than the activated material; (d) Load tests of the plate showed that stabilization of the surface layer significantly increased the load capacity compared to natural soil. The increased diameter of the stabilized layer also provided a higher load capacity. Two different failure mechanisms were observed, depending on the dimensions of the reinforcement layers, with the 450 mm layer showing a puncture mechanism, while the 900 mm layer showing the appearance of cracks; e) The standardization of the data suggests that, in the case of the 450 mm layers, the base (plate) and the stabilized layer behaved as a single element, supported by the stabilized lower stabilized base, meaning that the failure is controlled by the capacity of the soil below it. For the 900 mm diameter, the failure occurred when the applied load applied Your tracing stress. Methodology, N.C.C.; Research, M.P.S. and d.t.m.m.; Resources, N.C.C. and m.f.f.; Data Curation, M.P.S. and d.t.m.m.; Writing the draft of the original preparation, m.p.s.; write by: revision and editing, d.t.m., n.c. and t.m.; Supervision, N.C.C.; Project management, N.C.C.; Procurement of financing, N.C.C. All authors have read and agreed to the published version of the manuscript. 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