Summary

The dissertation concerns the determination by the research of the effect of the simultaneous addition of silica fly ash and waste granite powder on selected properties of the cementitious mix and composites. The conducted analysis of the properties of fly ash, granite powder and cement grains allowed to indicate their morphological properties and define the differences between them. The grains of cement and granite powder have a slender, parallelogram-like structure and have similar morphological properties, while fly ash grains are rounder and have a larger specific surface area than cement. The test results of the cement mix showed that the simultaneous addition of silica fly ash and waste granite powder allowed to obtain properties similar to the reference series (without simultaneous addition of siliceous fly ash and granite powder waste), additionally it also reduced the drainage of water from the cement mix and improved the homogeneity of the surface layer as a function of its thickness. The strength properties of cement surface layers modified with the simultaneous addition of fly ash and granite powder show an improvement compared to the reference series and allow for the replacement of up to 30% of cement in the composite with the simultaneous addition of 20% of silica fly ash and 10% of waste granite powder. The strength and cost analysis as well as the strength and ecological analysis made it possible to highlight the advantages of composites modified with the simultaneous addition of fly ash and granite powder, which leads to an increase in mechanical properties while reducing the cost of manufacturing the composite and reducing its environmental footprint. The dissertation also indicated the application significance of the conducted research by describing the implementation of the dissertation results in construction practice.