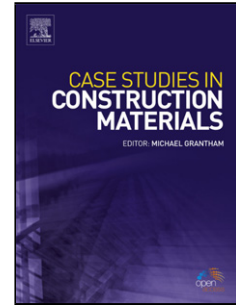


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## Analysis of Natural Stone Block Pavements in Urban Shared Areas

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**Abstract:** This paper analysed and verified an existing block stone pavement in an urban shared area. Fatigue and rutting verification was performed respectively for bound and unbound pavement materials using analytical curves available in the literature. The commercial finite element (FE) software Abaqus® was used to calculate the response of the pavement when subjected to different loading, construction and geometrical configurations (i.e. type of analysis, shape and size of meshes, boundary conditions, and bonding contacts between the pavements layers). At the end of this study, a static model of a structure with hexahedral blocks having sides of 0.02 m, with full bonded layers and restrained horizontal displacements on the model sides, was implemented to evaluate the maximum tensile stress induced in a block when the load is applied at its centre. This analysis highlighted the need for rigorous criteria for a correct design, in order to avoid inappropriate and expensive use of road materials.

**Keywords:** Block pavement; Commercial vehicle loads; Finite Element Model; Hexagonal Stone block; Pedestrian pavement; Shared area

### 1. Introduction

Block or modular pavements are structures composed of pre-formed modular pavers of brick or concrete, which have been successfully used worldwide for low-volume roads. In the last couple of decades, the use of this type of structures has increased, especially for pedestrian zones, cycle paths, residential driveways, parking lots, industrial areas, and historic centres [1,2]. In these applications, modular pavements proved both technical and economic good performances, as well as low life cycle costs [3].

Besides the modular blocks or pavers located at the surface of the structure, these pavements commonly include a bedding sand course, a base layer and a foundation layer [4,5]. Figure 1 shows a typical cross section of this type of pavements.

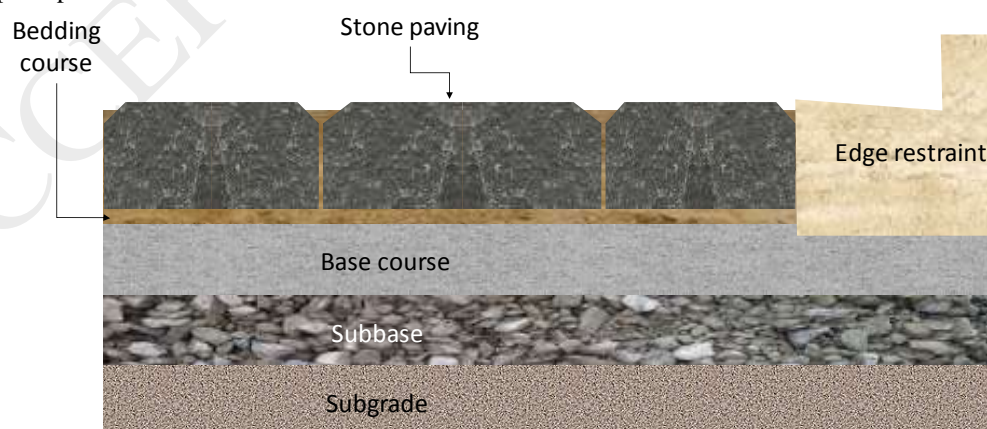


Fig. 1- Typical cross section of a block pavement structure

In historic neighbourhoods and towns, modular pedestrian stone pavements are often used because of their architectural and environmental impact [6], durability and low maintenance [7], if correctly designed.

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