International Journal of Scientific Engineering and Research (IJSER)
ISSN (Online): 2347-3878
Impact Factor (2020): 6.733

Review Paper On: Seismic Analysis of Normal Brick and Interlocking Block

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Abstract: ***Nowadays, due to rapid growth, expensive materials, and time-consuming processes, various construction methods are being considered and developed. One breakthrough in the construction industry is the interlocking of bricks. It is one of the best technologies for producing low-cost building materials. The purpose of this technical paper is to investigate how effectively a wall built using interlocking blocks withstands lateral loads, such as seismic loads. The analysis is compared with the conventional bricks. The structure is modelled in STAAD PRO software.***

Keywords: Infill, Interlocking blocks

1.Introduction

Interlocking tiles are an improvement over traditional clay tiles. Each brick is designed to adhere to other surrounding bricks without the use of mortar. Automatic locking is by shear key and locking mechanism. Depending on the design, shear wedges vary in shape and provide complementary lock on opposite sides of the stone. Load transfer is by shear transfer and gravity. Composite bricks are compressed and stabilized adobe bricks that add strength to the structure. Usually not boxed. Suppliers offer interlocking bricks in a variety of sizes and locking systems. They are the best solution for buildings in hot climate areas that are prone to earthquakes. They help cut cost by 35%. These bricks do not use cement mortar to bind together. Instead, there is a projection that sticks out on one side of a brick that perfectly fits into the depression of another brick. Different types of interlocking blocks are being developed worldwide. In this paper the sesmic analysis of interlocking blocks and normal are studied and discussed from varies papers investigators.

2.Literature Review

Mubeena Salam et al., 2018, RC frame structures are generally designed without considering the structural effects of masonry infill. Masonry infill walls are often used as partitions. These buildings are usually designed as framed structures without considering the static effect of masonry panels. They are considered non-structural elements. RC frame structure floors with an open ground floor are known to be vulnerable to strong earthquake tremors. Clearly, soft floor failure is most common in RC buildings. Soft floors put a lot of stress on the supports, inability to provide sufficient shear strength during an earthquake.

Chukwudi Onyeakpa et al., 2014, Different techniques are used to manufacture wall building blocks; it can be in the form of hollow or solid blocks, made in different shapes, and laid with mortar. Improved type without mortar blocks that are innovative structural components for the construction of masonry structures called interlocking blocks. Made mechanically or manually using an interlocking block production machine, especially an improved interlocking block machine with dual mould. This result in economical production, reduced labour costs, and increased availability of the site materials for building the fabric of both rural and urban development in today's world.

M. S. Jaafar et al., 2010, Structural components developed in the construction of masonry buildings are novel interlocking blocks. It is a concrete masonry block without the use of mortar and there is a worldwide interest in developing this type of masonry. This study attempted to analyze a special hollow concrete block system without composite mortar. Developed by Putra Malaysia University Housing Research Centre. A seismic load was applied to the system with the finite element method. This analysis is performed taking into account the interactions between hollow block walls, foundations, and soil. For this purpose, a finite element code was developed to analyze masonry systems under seismic excitation. To do interface elements were used to account for dry joint contact between blocks and foundations.

Jeba Jeslin, 2019, The compressive strength of interlocking blocks increases by 15% to 30% when compared with nominal brick. Interlocking blocks are more tolerant and efflorescence-free. The bond strength of interlocking blocks is greater than that of nominal bricks. The impact resistance of interlocking blocks is 80% to 85% higher compared to nominal bricks. The energy absorbed by interlocking blocks is 60%-70% higher than by regular bricks.

Parimal Borbar, July 2020, Concept, design, and application of interlocking precast block design; It will prove to be an effective example of a sustainable approach to construction. According to the analysis in ANSYS clearly shows that the retaining wall has a deformation of less than 3 mm. This can be clearly observed when comparing the RCC wall stress with the precast wall. The induced influence on precast walls is very low compared to RCC walls.

BJ Stirling et al., 2012, Interlocking Compressed Earth Blocks (ICEBs) are a type of dry-stacked masonry unit. Most are manufactured by inexperienced workers using

cheap materials. This paper presents the results of the testing program to study flexure-dominant ICEB walls. Four 1.8 m high ICEB walls were constructed and tested under in-plane cyclic loading. The sample was modified to identify the effects of height and width aspect ratios and the presence of a flange on one end, and the presence of openings in the wall on the performance of the system. Test results show that flexure dominated. The ICEB wall exhibits stable hysteretic behaviour until ductile failure occurs.

Farzad Hejazl, 2014, The interlocking key provided for this system allowed the blocks to be integrated into a sturdy wall, replacing layers of the mortar used in traditional masonry construction in low-earthquake areas.

Bhavani Shankar, October 2016, It was observed that the overall displacement of interlocking block walls decreased by about 69% compared to frames without infill walls and by about 15% compared to brick infill walls. In both cases, the stress values are higher in the y direction. Therefore, interlocking blocks effectively withstand seismic loads.

3.Methodology

Dimension of residential structure, dimension of normal brick, frequency of the earthquake, start and stop time of earthquake, dimension of Interlocking blocks, load values applied on structure are collected from various research papers, books and internet. Both the types of bricks are studied. Two models are designed: 1. Structure with normal bricks.2. Structure with rectangular interlocking blocks. Examination of beam load and frequency conditions is done. Seismic behaviour of structures in analysed and results of both the models are compared to frame the conclusion.

4.Conclusion

- It is observed that interlocking block will be effective in resisting the earthquake loads as;
  1. Structure with infill wall built using interlocking block has lowest value of displacement.
  2. Structure with infill wall built using interlocking block has lowest value of stress.
  3. Displacement of interlocking block wall is reduced by 15% when compared with brick infill wall.
  4. Ordinary brick relies on mortar for its support system. If the mortar fails, the entire wall or building will fail. But interlocking bricks have their own support system that does not depend on the mortar. They effectively support each other.
- Based on the literature survey cost of interlocking block is less than brick.
- Interlocking bricks are also suitable for hot areas. Because it is compressed, it has more mass and the brick keeps the interior of the building cooler.
- It also requires less effort and fewer workers to be set up.
- They are durable and less maintenance is required.
- Self-locking bricks require only 7 days of curing, it is most time efficient way of construction
- They can be reused as it is easier to restore the bricks without damaging them.

After considering all these advantages it can be concluded that interlocking block is the best component in masonry construction.

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