STRUCTURAL PERFORMANCE OF LATERAL LOAD RESISTANT CONFINED MASONRY WALL WITH AND WITHOUT OPENING

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***Abstract*—**The objective of this paper is to compare lateral load behaviour under different tie beam and column size in stadpro. Model behaviour is examine in staadpro. Their absolute stress, shear force diagram, bending moment diagram, maximum stress, stress variations in columns and beams are compared with and without opening wall and also with three dimensional hall and rc frame. Their results are tabulated in table. Cost of confined masonry structure and RCC structure will compare for same size and loading. Structural behaviour will compare under different size of tie columns and tie beams and with different size of opening.

Keywords— Confined wall, tie beam, tie column, Staadpro,

I. INTRODUCTION

Confined masonry construction is a type of construction in which masonry walls are surrounded by a reinforced concrete frame. Construction sequence in case of RCC frame construction is that RC frame constructed first and masonry wall constructed next. Whereas in case of confined masonry construction walls are constructed first and followed by concrete confined element. Confined masonry is famous as economical construction. The main feature of confined masonry construction is that the masonry wall is constructed first and tie columns and tie beams are later thus both elements respond integrally when subjected to lateral load. In general, tie columns have a rectangular section whose dimensions is same as that of wall thickness. Confined masonry is use worldwide because of it resist lateral load as well as behave as combination of frame and load bearing structure. In confined masonry construction same amount of bricks are uses but very less steel reinforcement uses compare to reinforced frame construction.

Fig. 1. Confined masonry wall

II. REVIEW OF LITERATURE

Vaibhav Singhal and Durgesh (2018) presented a paper on behaviour of confined masonry walls with openings under in-plane and out-of-plane loads. Their experimental studied concerned that evaluation of out of-plane response of confined masonry walls with openings when damaged due to in-plane forces. **Kiran Rangwani and Svetlana Brzev (2017)** studied about seismic analysis of confined masonry shear walls using the wide column model. The results showed an increase in displacements with respect to panel aspect (H/L) ratio, and it was confirmed that walls with higher H/L ratio have lower stiffness than the walls with lower H/L ratio because slender walls are more flexible. **Husseinokail et. al (2016)** presented a paper on experimental and analytical investigation of the lateral load of confined masonry walls. They conclude that strength of the bricks play a significant role in increasing the walls ultimate resistane and displacement ductility. **Svetlana Brzev et al. (2010)** had carried out investigation to performance of confined masonry buildings in the february 27, 2010 chile earthquake. They conclude that confined masonry buildings performed very well in the February 2010 earthquake.

III. OBJECTIVE OF PAPER

Main objective is to compare lateral load behaviour of confined masonry wall under different tie beam and column size. Modelling, Analysing & design confined masonry building with the relevant loading conditions & seismic zones in staadpro. Obtaining results. Comparing results between confined masonry wall and RC frame. And also compare Behaviour of confined masonry under blast loading.

IV. PROBLEM FORMULATION

Many researchers have investigated the structural performance of confined masonry wall. Some researchers studied the behaviour of confined masonry structures, whereas, others have observed the benefits of confined masonry wall during earthquakes. Software's have also been used to study the behaviour and failure patterns of confined masonry walls. But yet no one has used staadpro software to model & analyse confined masonry wall or structure. In present study we are modelled and analysed confined masonry wall in stadpro and comparing their results thereafter we will coming in conclusion that to know weather it gives results or not

A. Strucutral modelling

Confined masonry wall is just like shear wall. In shear wall concrete and steel is used which is costly compared to bricks used in CM wall. Shear walls are provided at specific locations whereas CM wall is nothing but brick wall which is confined with column and beams. The modelling is done to examine the behaviour of confined masonry wall. 4 type of model behaviour is examine in staadpro. First with opening confined masonry wall. Second without opening confined masonry wall. Third RCC frame. And fourth confined masonry hall.

Type of building	Confined masonry wall
Tie beam size	0.23 x 0.23 x 4 m
Tie column size	0.23 x 0.23 x 3 m
Wall thickness	230mm
Wall material	Brick masonry
Wall density	20
Concrete grade	M25
Slab thickness	0.150

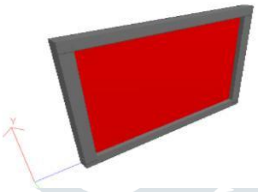

Fig. 2. Confined masonry wall without opening

Fig. 3. Confined masonry wall with opening

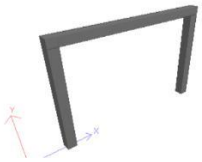

Fig. 4. Rcc frame

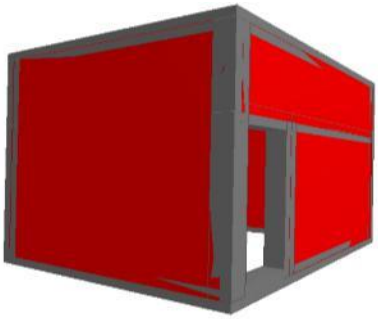

Fig. 5. Confined masonry hall

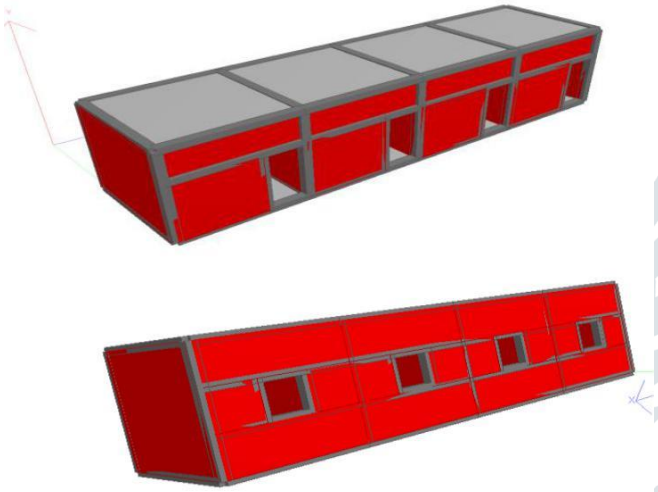

Fig. 6. confined masonry structure

1 *Methodology*

2 The modelling is done to examine the behaviour of confined masonry wall.
3 4 type of model behaviour is examine in staadpro.
4 Defining the material property for the structure.
5 Assigning beam and column size for different load calculations.
6 Analysing the structure.
7 Run the model to obtain shear force, bending moment, displacement.
8 Observation of result & discussion.

V. RESULT AND DISCUSSION

Absolute stress, stress variation for beam columns, graphs of shear force diagram bending moment diagrams, maximum stress are calculated in stadpro software for confined wall with and without opening. Absolute stress occurs at base corner of wall in case of without opening wall and minimum at top of the wall. Tie member is provided at opening so there is less stress occurred. Stresses occurring in confined wall at base corner side of the wall is more compared to top side of wall in case of without opening of confined masonry wall.

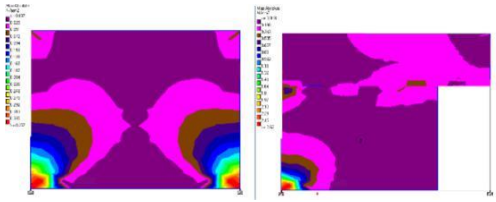

Fig. 7. Absolute pressure

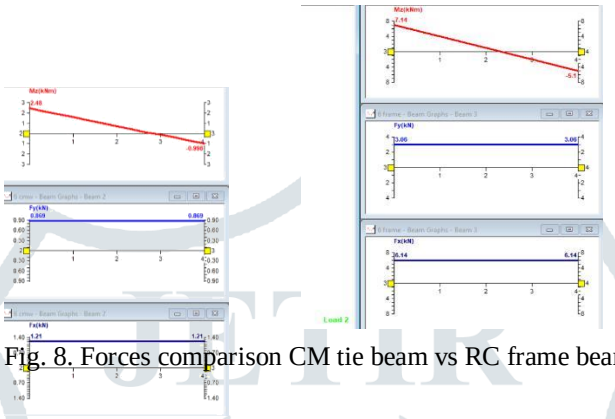

Fig. 8. Forces comparison CM tie beam vs RC frame beam

masonry uses same amount of bricks but less amount of steel. In frame structure wall does not take any load but if it confine then same wall resist lateral load. Wall and ties acts like confine attach member which help to improve resistance capacity.

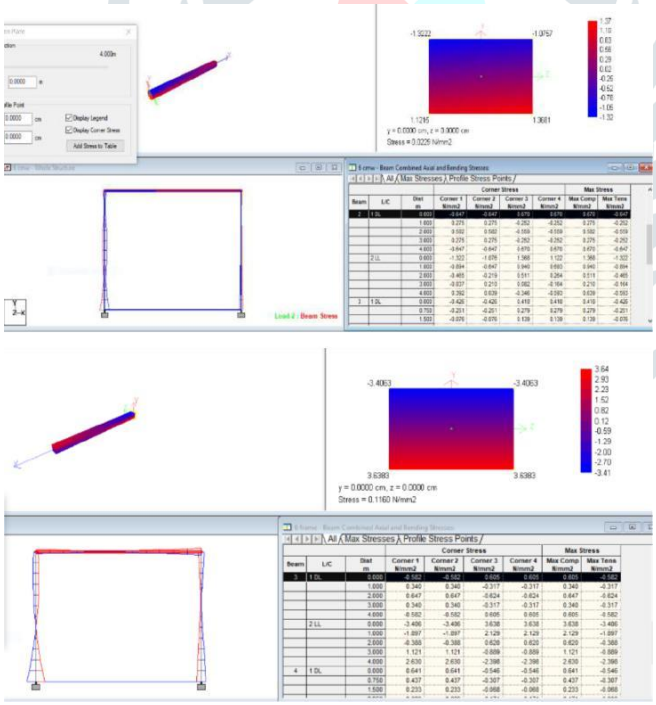

Fig. 9. Stress difference between CM tie beam vs RC frame

VI. CONCLUSION

Stresses occurring in confined wall with opening is less at opening side due to tie band. Shear force is less in confined masonry wall compare to RC frame for same size and loading. Beam column size reduce in CMW so that more space available and it gives good appearance also. Confined masonry uses same amount of bricks but less amount of steel. In frame structure wall does not take any load but if it confine then same wall resist lateral load. Wall and ties acts like confine attach member which help to improve resistance capacity

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