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DYNAMIC ANALYSIS OF HIGH RISE BUILDING WITH TRANSFER FLOOR

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Abstract: As the population rises, so does the need for land and the infrastructure that goes with it. Furthermore, architectural considerations dictate differences in the vertical parts of the structure across levels, as well as the introduction of transfer floor constructions that supply all services in one area while also supporting the vertical and lateral load systems and transfers. According to the current study, three 12-story models were built using ETABS software with transfer slabs on the first, third, and fifth floors, and the response spectrum analysis was performed and the findings were compared to reach a conclusion.
Index Terms **- Transfer floor, Seismic load, Lateral & Vertical load, response spectrum analysis.**

I. INTRODUCTION

In developing countries such as India, China, Turkey, and Qatar, population is increasing every day, as is the demand for land with multiple uses and facilities in one location, i.e. commercial and residential. Similarly, inventive architecture designs necessitate a change in the position of the vertical elements of the structure between floors. In a commercial, function room, malls, parking areas, etc. below the transfer floors system and above the building structure can be used both for residential and offices purposes, while the structure with transfer floor can be used for commercial and residential purposes, with an economical layout. The columns are arranged in a longer span, however the top structure contains a close spacing for a shorter span. For this purpose, the podium or mall structure is spacious. The utilisation of transfer floors has become known among different building components. Today, numerous structures have been designed with vertical irregularities and can be columns or shear walls. The floor transfer system is the palace between the two columns. The two different floor systems of the transmission dome and the transfer dome are used in accord with the load distribution on the structure. The figures on the first floor transfer slab are shown and in figure 1.1 and in figure 1.2 shear wall above the transfer slab the irregular column arrangement is shown.

FIGURE 1

FIGURE 2

II. METHODOLOGY & BUILDING DETAILS

This study illustrates the spectrum of response & wind analysis for the analysis using the E-Tabs programme of a specified model. References to the Indian IS 1893 & IS 875 code are analysed (PART3). The floor plan is 28m X 48m and a model with 12 floors is chosen. The model was picked with the transmission sheet at different building levels. The biaxial symmetric construction plan was chosen to exclude the effect of torsion. There were three separate models, 3.5 m below and 3.0 m above the transfer plate, and the model was analysed in the 1st, 3rd and 5th floors on the transfer plate.

A. Loadings

Live load Above and at the transfer slab level = 2 kn/m2

Below the transfer slab = 3.5 kn/m2

Dead load

Wall load

Above the transfer slab = (4.14 + 2.07) kN/m2

Below the transfer slab = (3.312 + 1.656) kN/m2

Floor finish

Above and at the transfer slab = 1 kN/m2

Below the transfer slab = 1.5 kN/m2

Response reduction factor = 3

B. Dimensions of the Building

Storey =12 storey

Column dimensions

Above the transfer slab = 0.3 x 0.6 m

Below the transfer slab = 0.5 X 1 m

Slab thickness- Transfer slab = 1m

Above & below transfer slab = 0.15m

III. ANALYSIS

Analysis of the response spectrum is a linear statistical dynamic. Analytical approach representing the highest possible earthquake. Reaction of the inherent elastic structure Vibration. The dynamics of response spectrum analysis Speed or measuring behaviour by spectral speed. Displacement according to a certain building era Time and weather history. The scaling factor for the response range function is assigned.

S.F = I x G / R

Where, I = Importance factor

R= Response reduction factor

G=Gravity force

Re-scaling = (I x G / R) x (Static base shear / Response spectrum base shear)

IV.STRUCTURAL MODELLING

For the analysis, a transmission sheet in the structure with columns below and above a transmission sheet was chosen. Model was examined for vertical positioning on E-tabs software. The analysis was performed using E-tabs, following three models with a transmission plate at the 1st, the 3rd and 5th floors.

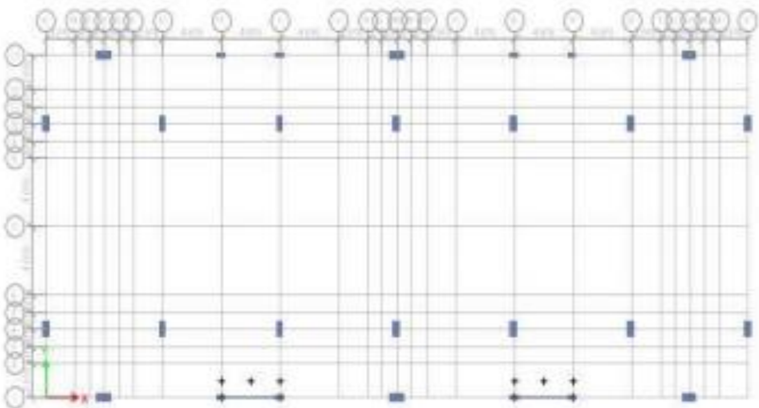


Figure 3

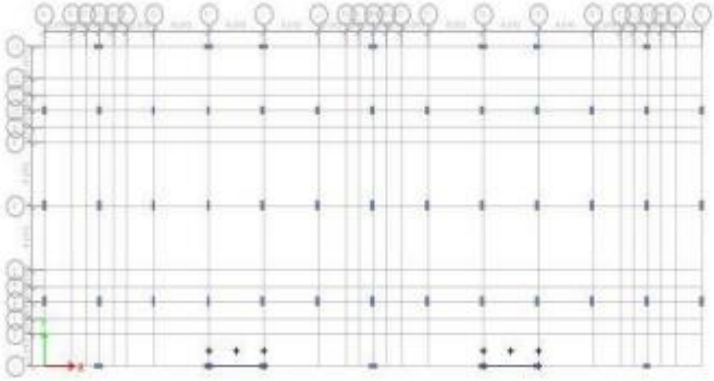
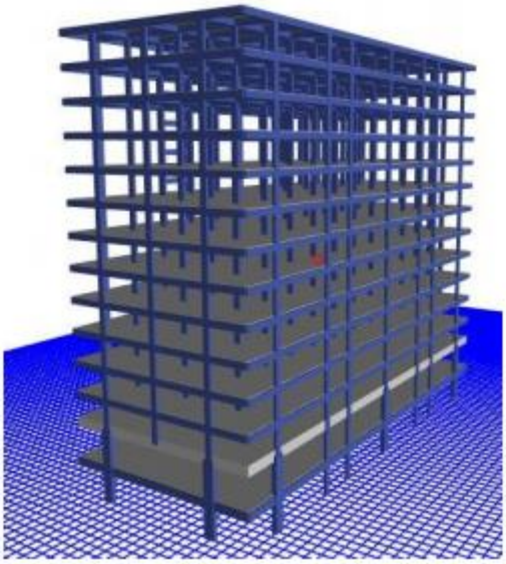


Figure 4



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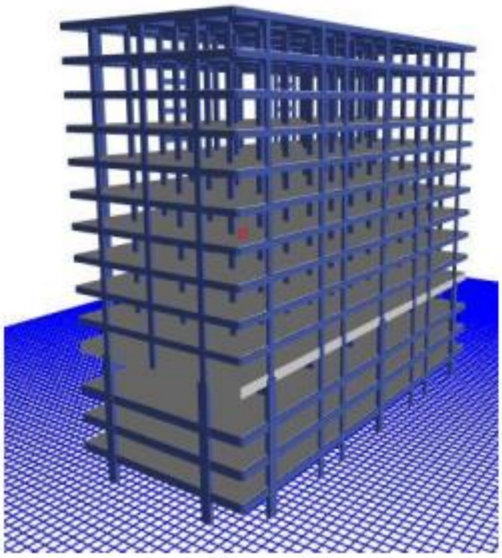

Figure 6

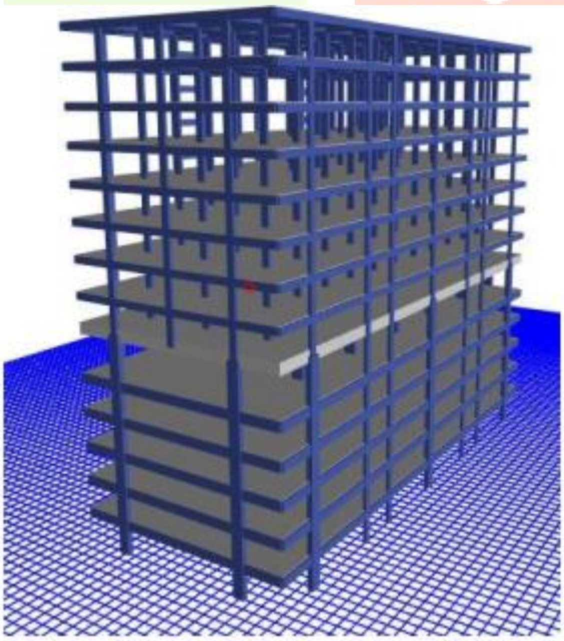

Figure 7

IV. RESULT AND DISCUSSION.

In order to assess the structure's behaviours, the vertical position of the transfer sheet in the structural software was analysed in the E-tabs. Three different 12 stories were examined and analysed. 12 floor models were studied using 1st floor transfer slabs, 3rd floor & 5th floor Shear and drift results given in the form of diagrams from the analytical displacement. The section shows all models in the following way about the position of the transmission slab results.

A. Storey shear

B. Lateral displacement

C. Storey drift

1) Model 1: (Transfer slab at 1st floor level)

a) Storey Shear: The following graph shows maximum floor shear for each storey, fig. 8 for the first model with a 1-st floor transfer plate. Linearly, shelf shearing in x-direction decreases on the top floor levels, with a maximum floor shear of 1398,507 KN dropped to a maximum level of 241,97. Fig. 9 shows the shelf shear in Y-direction at the lower and the lower level of the models.

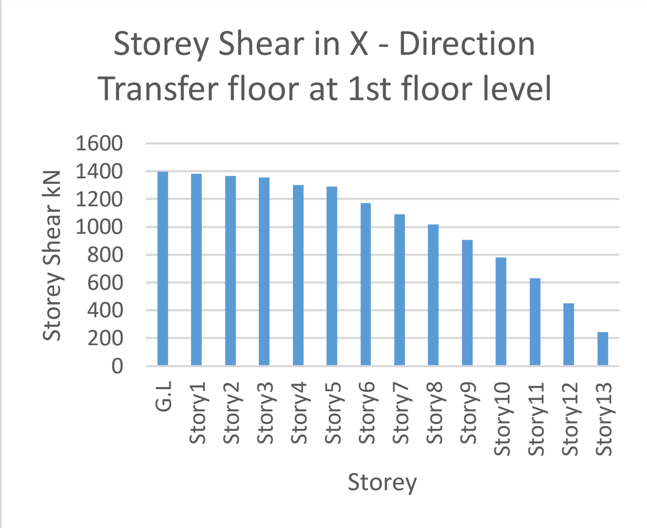

Fig 8 Max. storey shear in direction of x

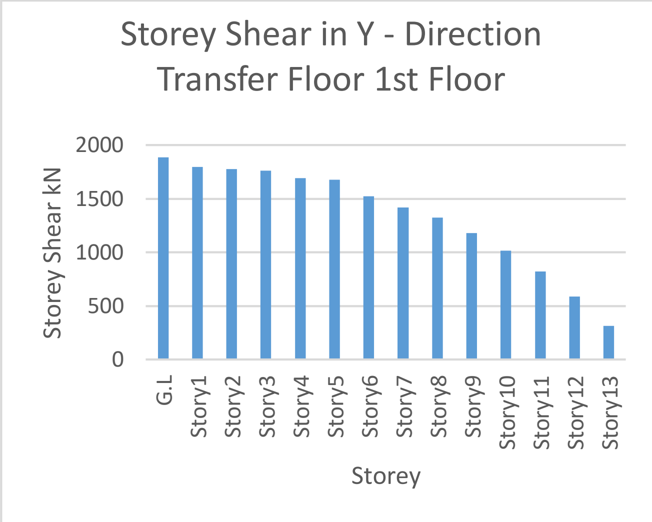

Fig 9 Max. storey shear in direction of y

b) Displacement: the X-direction & Y-direction joint displacement depicted in Fig. On the top floor, with a value of 24.374 mm & 21.906 mm correspondingly, maximum displacement in the 1st model with transducing plate is seen.

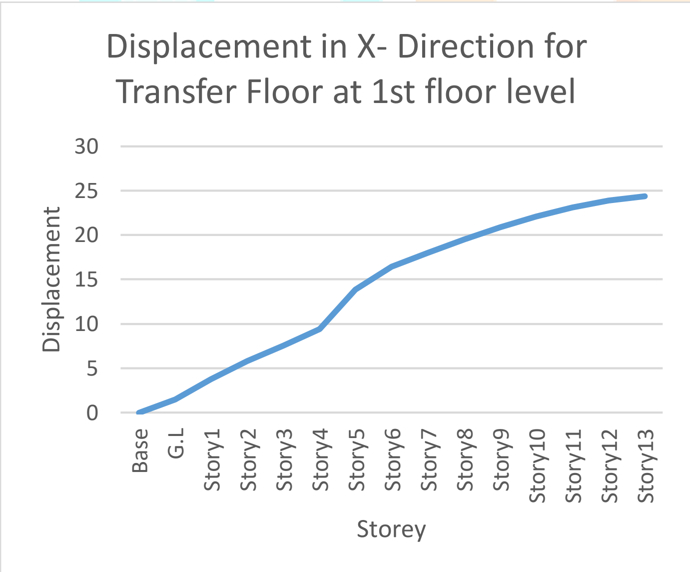

Fig 10 displacement in direction of x

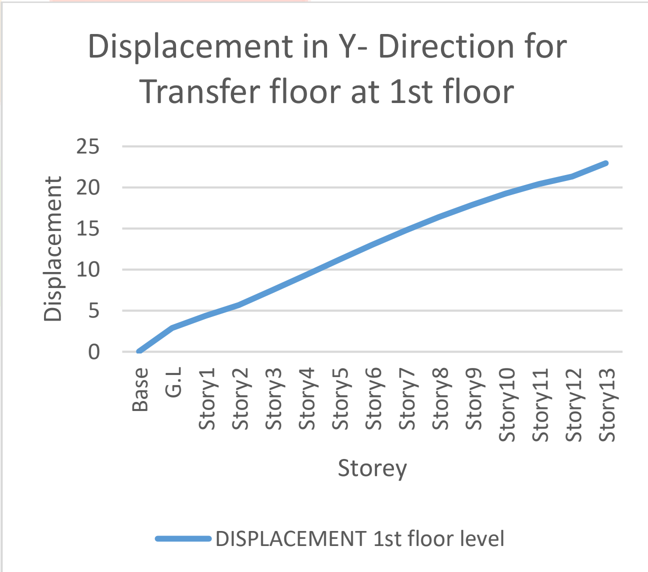

Fig 11 displacement in direction of y

b) Storey drift: The largest value of storey drift is at first level and thereafter declines to the top level in Figure 12.

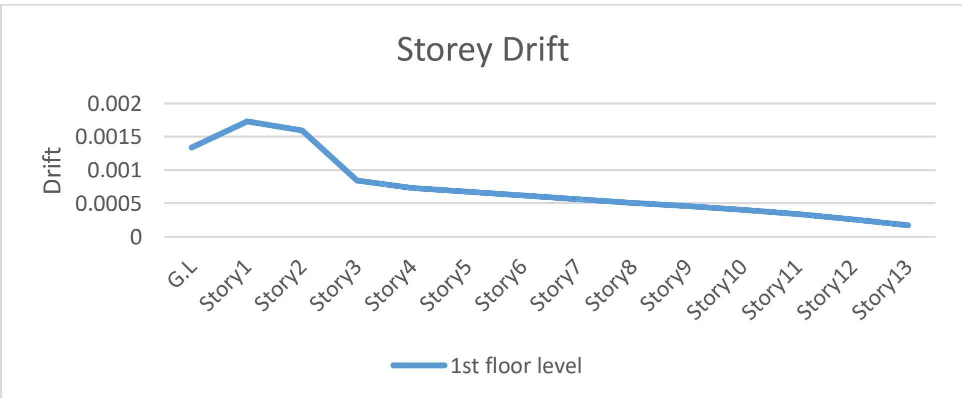

Fig. 12 Storey drift

2). MODEL 2 (Transfer slab at 3rd floor level)

a) Storey Shear: Fig. 13 & 14 displays the graph of shear values at each level shown by the Transfer Slab model on the ground level of 1447.224 & 1963. 261 KN are the maximum value of shear on the lower level of the structure in this model.

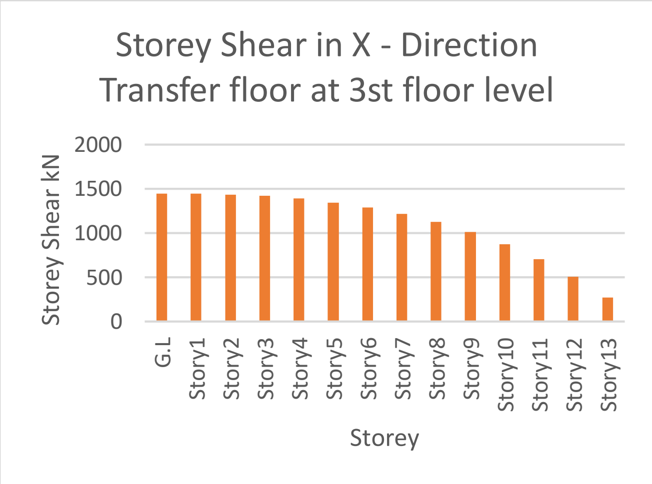

Fig 13 Max. storey shear in direction of x

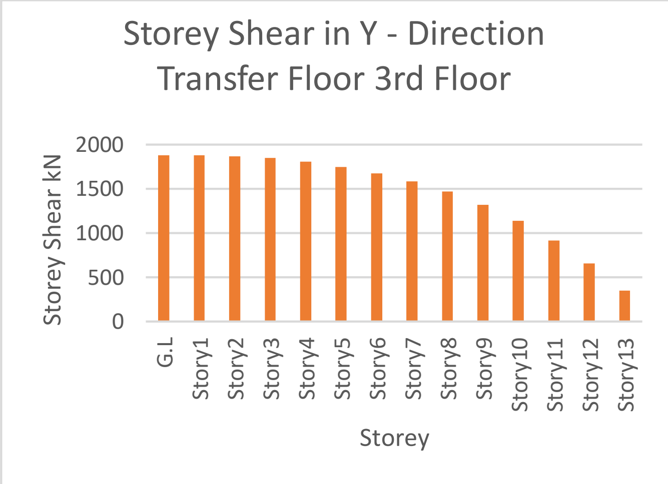

Fig 14 Max. storey shear in direction of y

b) Displacement: The transfer plate of this model is located at the 3rd floor. This model gives the magnitude of the lateral shift in the x-direction & y-direction, as illustrated in Fig 15 & 16, respective 26.281 mm and 32.413 mm respectively.

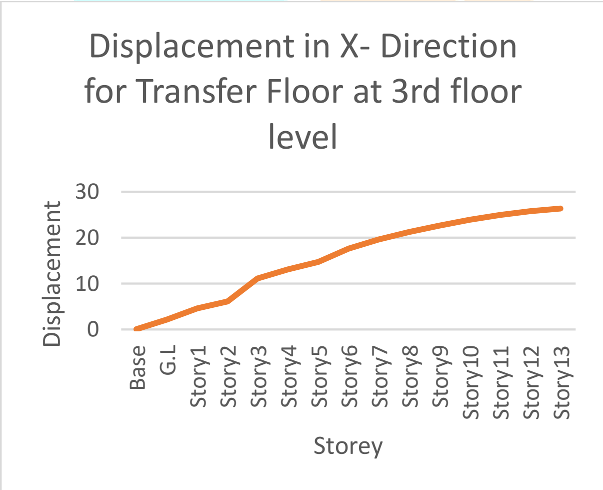

Fig 15 displacement in direction of x

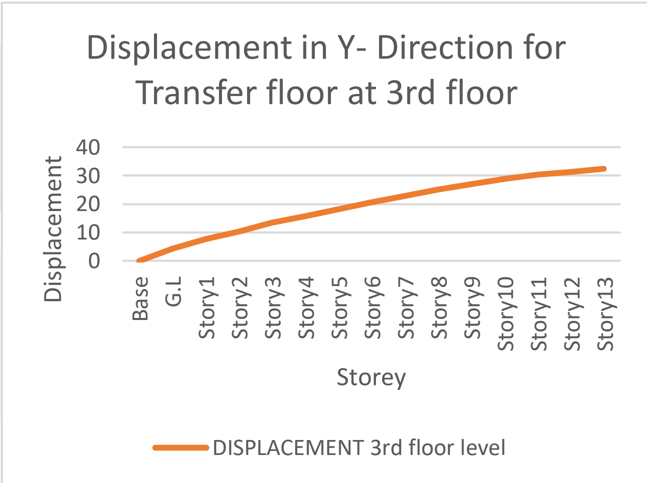

Fig 16 displacement in direction of y

c) Storey Drift: Figure 17 depicts the floor drift of the model-2, where the transfer layer is on the 3rd floor level. The next figure The graph demonstrates that the drift value continues to grow up to the transfer plate level, which then decreases to the third level.

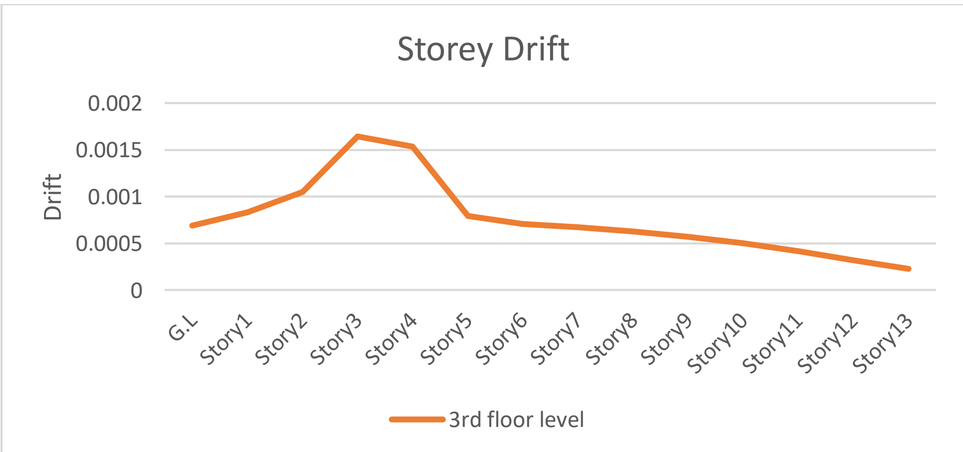

Fig. 17 Storey drift

3) Model 3: (Transfer slab at 5th floor level)

a) Storey Shear: This model depicts the transmission plate on the fifth floor. Fig. 18 & Fig. 19 show the shear values. In the x-and-y-direction, the greatest value observed of the shear values are 1610.67 KN& 1983.24 KN.

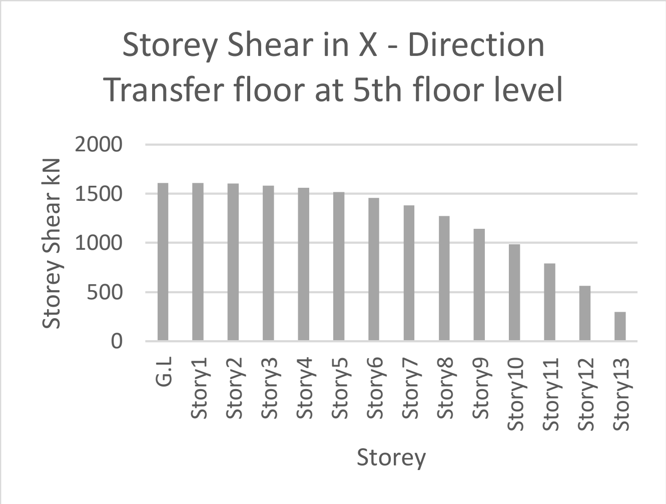

Fig 18 Max. storey shear in direction of x

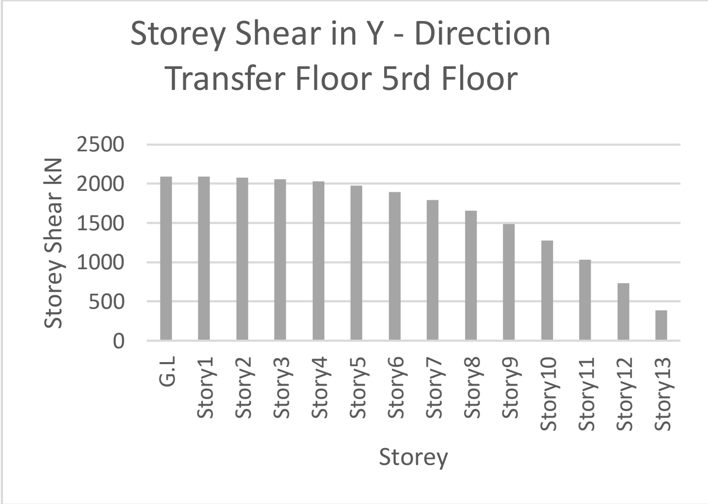

Fig 19 Max. storey shear in direction of y

b) Displacement: The displacement graphs Fig. 20 & Fig. 21 highlight the movement from the ground floor to the top floor in the lateral X & Y-Director graphics. On the top floor of a structure with the values of 29,932 mm & 33,413mm are the greatest values of joint displacement noted.

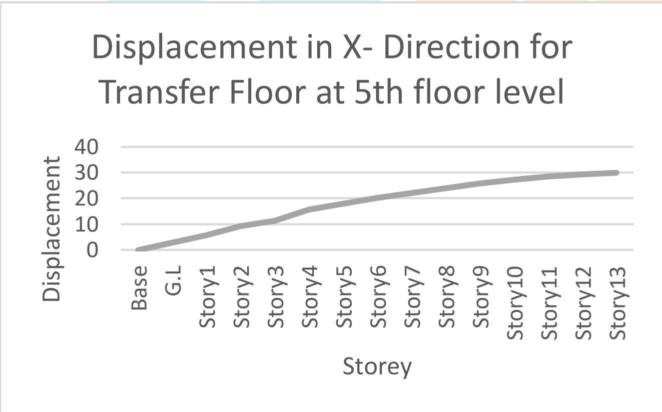

Fig 20 displacement in direction of x

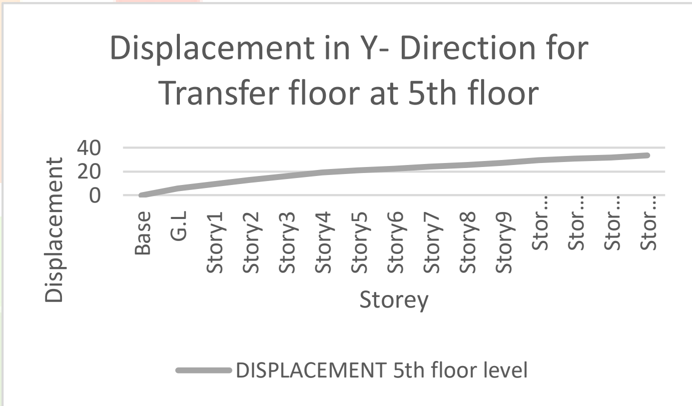

Fig 21 displacement in direction of y

c) Storey Drift: The following graph Figure 22 demonstrates how the floor drift of model-2 is located on the 3rd floor of the transfer sheet. The graph demonstrates that the drift value continues to grow up to the transfer plate level, which then decreases to the third level.

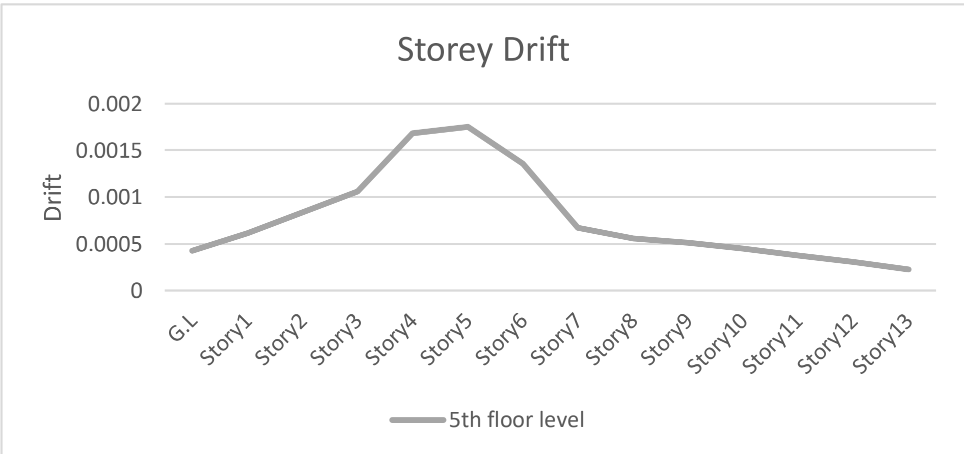

Fig. 22 Storey drift

V. CONCLUSION

A research was conducted in order to monitor the vertical position of the transfer plate on the structure at various sites of the transmission plate at structural level. The next conclusion is the study. The results.

• The level of shear increases as the position of the transmission floor system in the building is the lowest compared with the total building height.

• The storey shear is lowering in any way due to the unique mass devaluation over a transfer slab.

• Reduction of movement at the lowest level as transfer platform position and rise in X & Y directions when at the top of the platform.

• Drift value continues to rise until the level of the transfer plate and then suddenly drops down.

• When the position of the transfer shear is at a lower and a higher level, the maximum base shear value is rising.

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