Seismic Evaluation and Comparision of Plan Irregular and Plan Irregular Soft Storey Building with Cross Bracing and Shear Wall System

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Abstract— *Generally improvement of reinforcement concrete frame structures against lateral loading is shearwall and cross bracing system. The use of cross bracing and shearwall has advantage over other scheme like higher stiffness, strength, and adds much less weight to existing structure. The seismic analysis of reinforced concrete G+6,G+12,G+18 buildings with Cross bracing and shearwall is studied. The cross bracing is provided at the outer peripheral columns. The building models are analyzed by nonlinear push over analysis method using Etabs software. The main parameters compared are the buildings are lateral displacement, base shear, storey drift, storey, axial force shear and natural time period.*

Keywords— Cross bracing , Shearwall , Soft storey, Push over analysis.

I. INTRODUCTION

The building undergoes deformation at the time of earthquake, due to earthquake waves the energy will transfer to the building and structures behaves with respect to earth motions. The structure which is having low stiffness against lateral load and having higher mass at the higher levels will experience more effect and under goes more structural damage compare to structure with less mass and having more stiffness. And it also depend on the type of soil on which building is situated and earthquake zones. Damage will be more on soft soil condition then hard soil condition.To improve the lateral load resistance capacity of the structure some of techniques are adopted in that bracing and shearwall systems are the major systems for buildings with use of these bracing and shearwall the stiffness of the structure increases.

II. MODELLING OF THE BUILDING

TABLE.1
MODELLING DETAILS

Beam Size	300X450 mm
Column Size	350X650 mm
Slab Thickness	150 mm
Spacing In X Direction	4 m
Spacing In Y Direction	4 m
Storey Height	3.2 m
Live Load On Floor	3 KN/ m^2
Live Load On Roof	1.5 KN/m^2
Floor Finish	1 KN/m^2
Wall Thickness	230 mm
Shearwall Thickness	100 mm
Bracing Size	ISA 200X150X18 mm
Zone	III
Importance Factor	1
Seismic Reduction Factor	5
Concrete Grade	M 30
Steel	Fe 415

PLAN OF IRREGULAR STRUCTURES

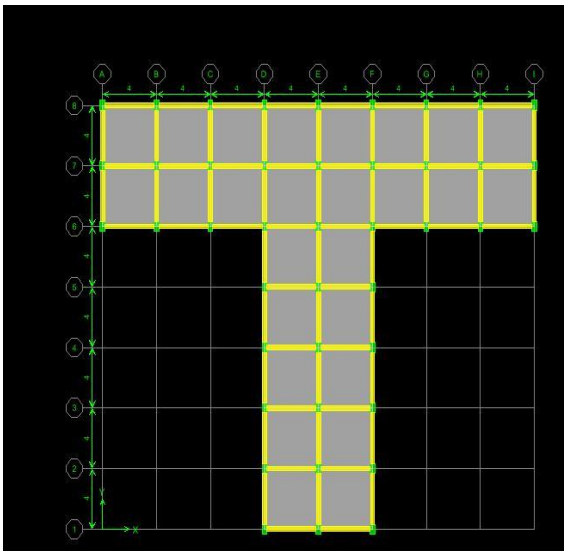


FIG.1. T SHAPE BUILDING

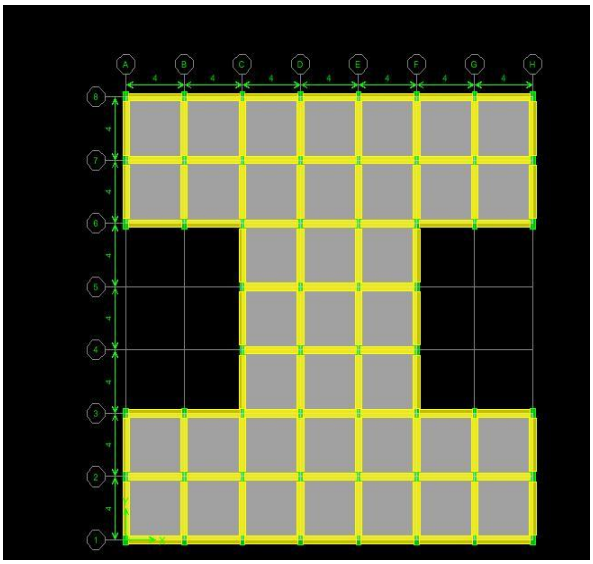


FIG.2. I SHAPE BUILDING

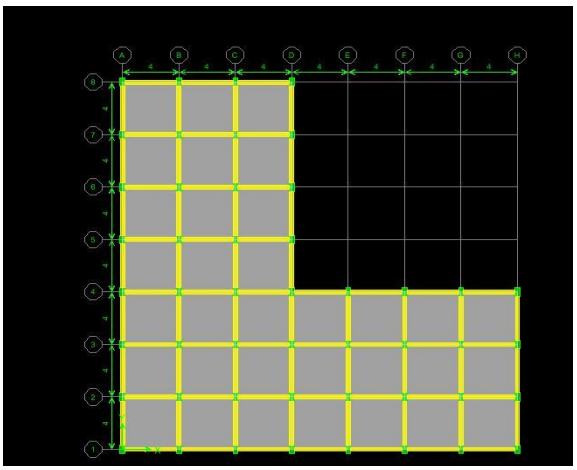


FIG.3. L SHAPE BUILDING

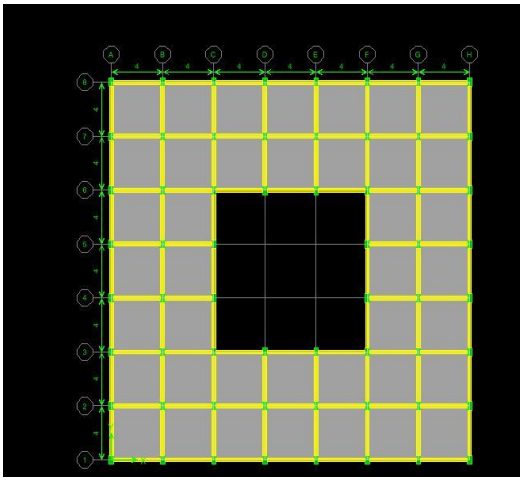


FIG.4. DIAPHRAGHM OPENING

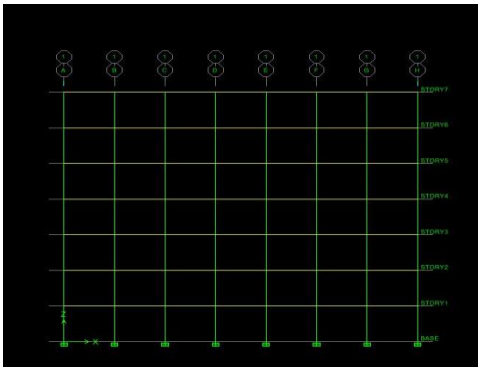


FIG.5. ELEVATION OF G+6 IRREGULAR

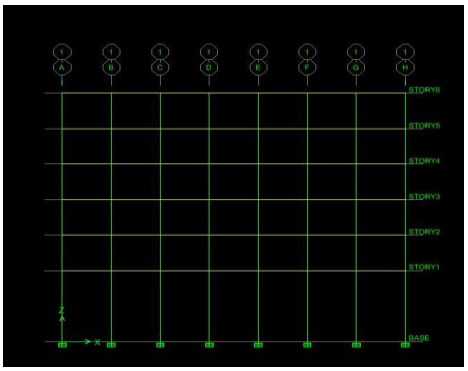


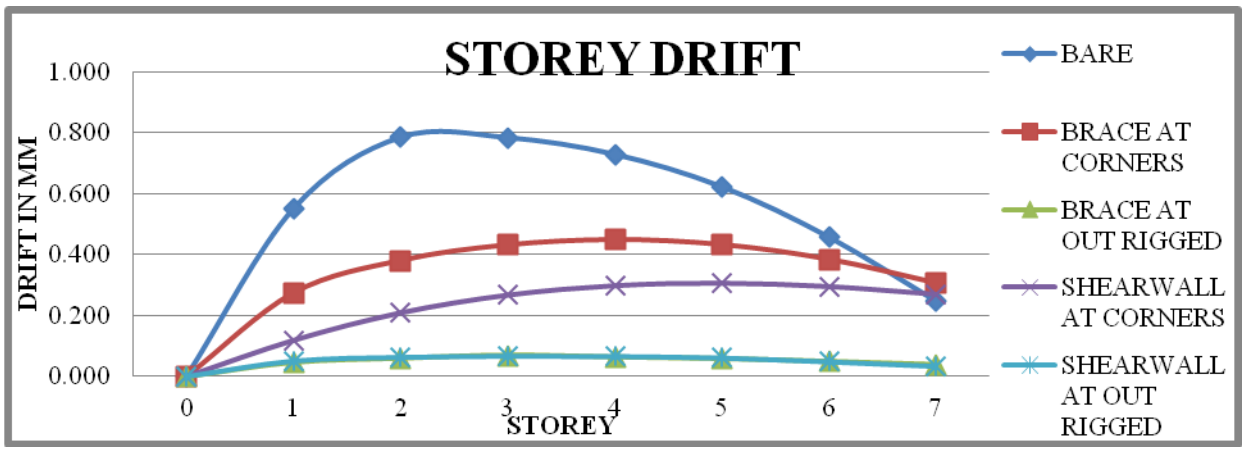
FIG.6. ELEVATION OF G+6IRREGULAR SOFT STOREY BUILDIG

III. METHODOLOGY

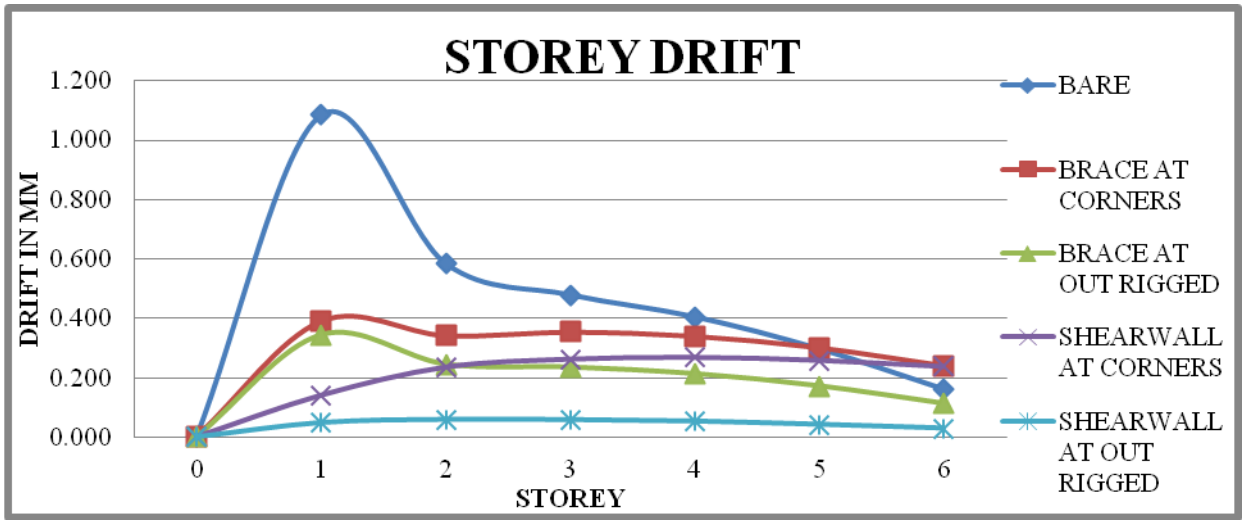
The Earthquake analysis is carried out with X bracing and shearwall system for Plan irregular structures and Plan irregular Soft storey structures.

- The analysis will be carried out for different storey heights G+6,G+12,G+18.
- The bare frame has been analyzed
- Then X bracing and shearwall are provided at the all corners of Plan irregular building and Plan irregular soft storey building.
- Finally X bracing and shearwall are provided at the fully out rigged portion of the structure.
- The analysis will be carried out at using ETABS software.
- The results are Plotted and comparing the effect of X bracing and shearwall on Plan irregular building and Plan irregular soft storey building

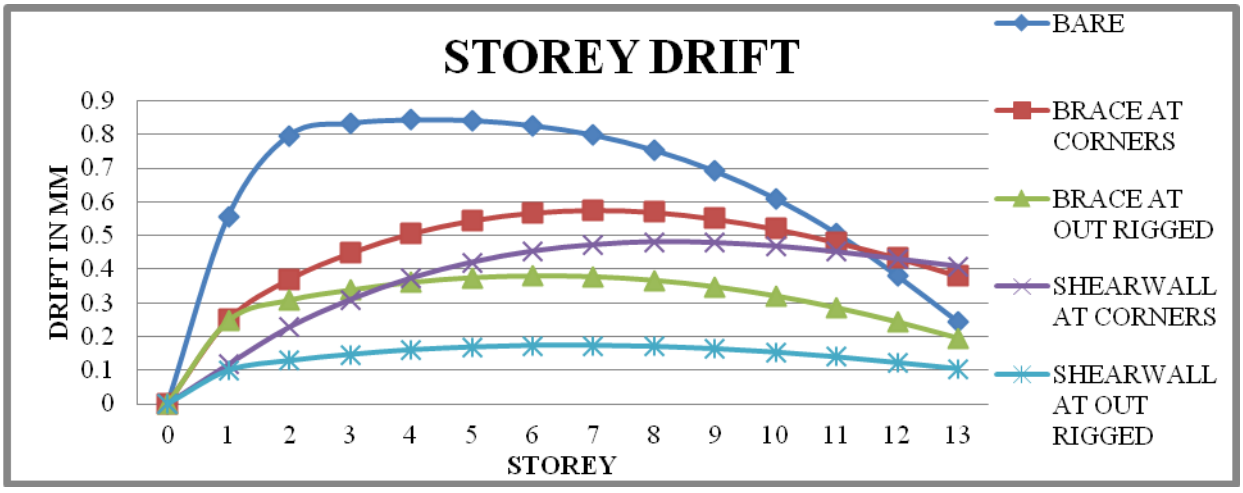
IV. RESULTS AND COMPARISIONS



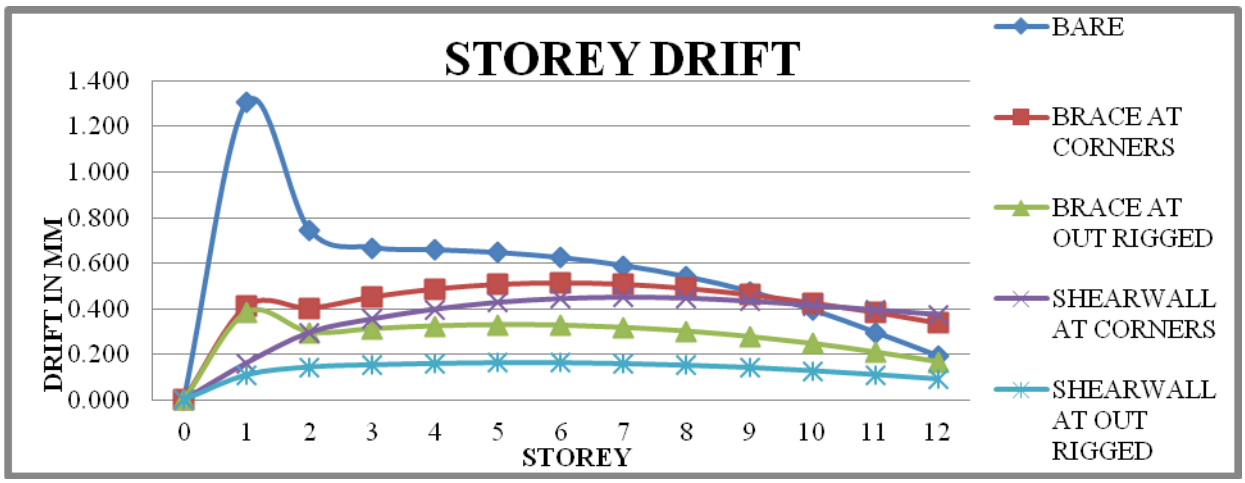
GRAPH.1. PLOT OF STOREY DRIFT OF G+6 T SHAPE BUILDING



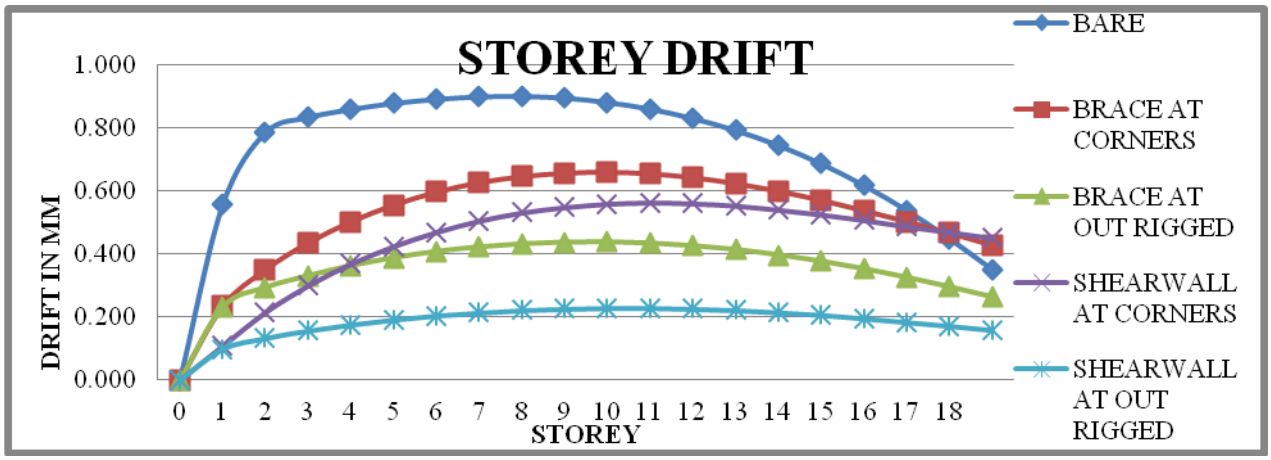
GRAPH.2. PLOT OF STOREY DRIFT OF G+6 T SHAPE SOFT STOREY BUILDING



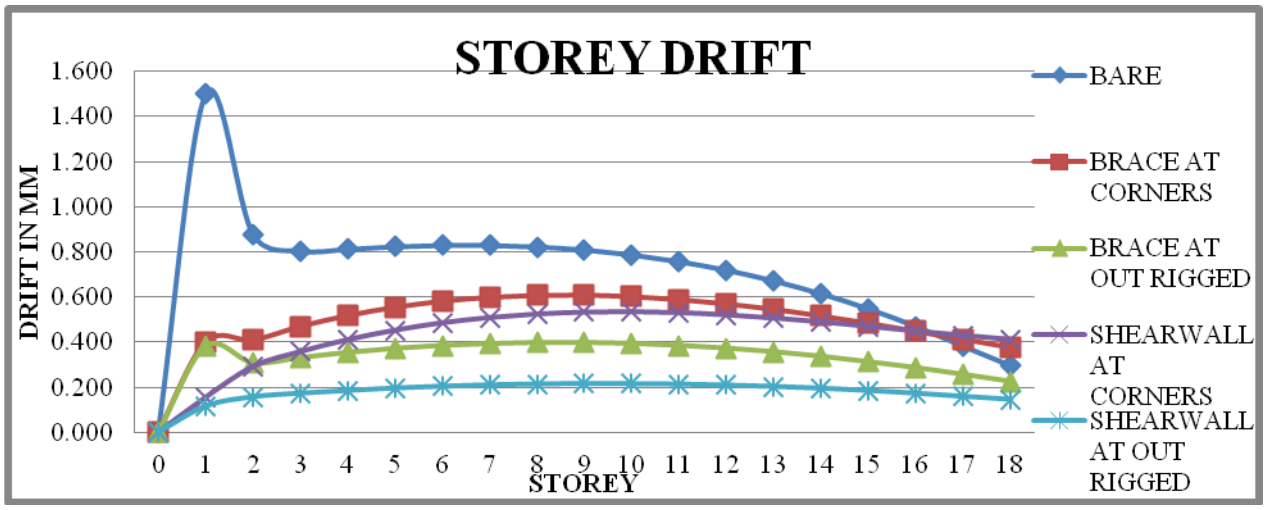
GRAPH.3. PLOT OF STOREY DRIFT OF G+12 T SHAPE BUILDING



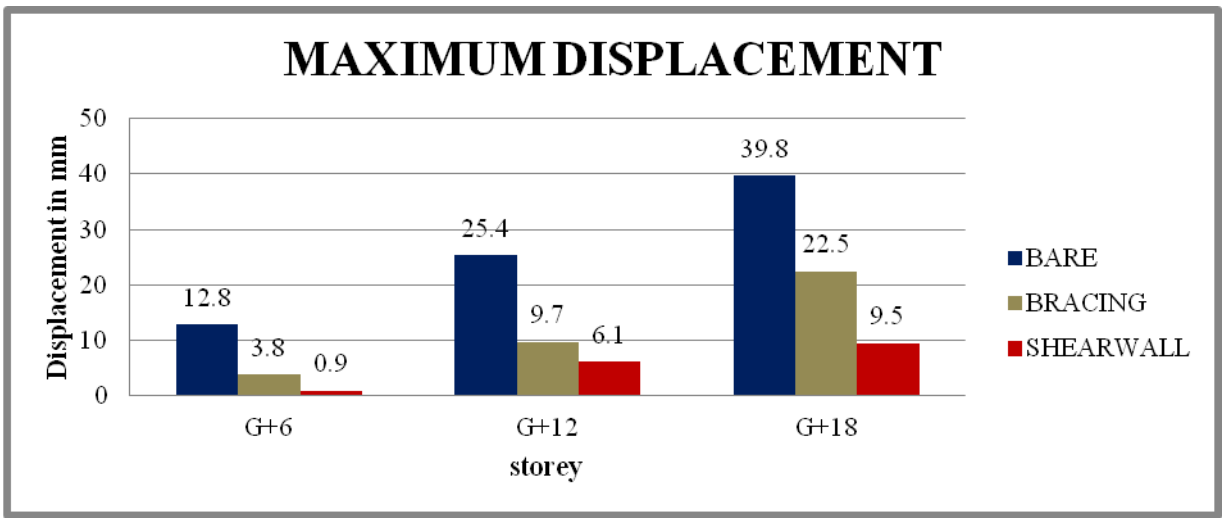
GRAPH.4. PLOT OF STOREY DRIFT OF G+12 T SHAPE SOFT STOREY BUILDING



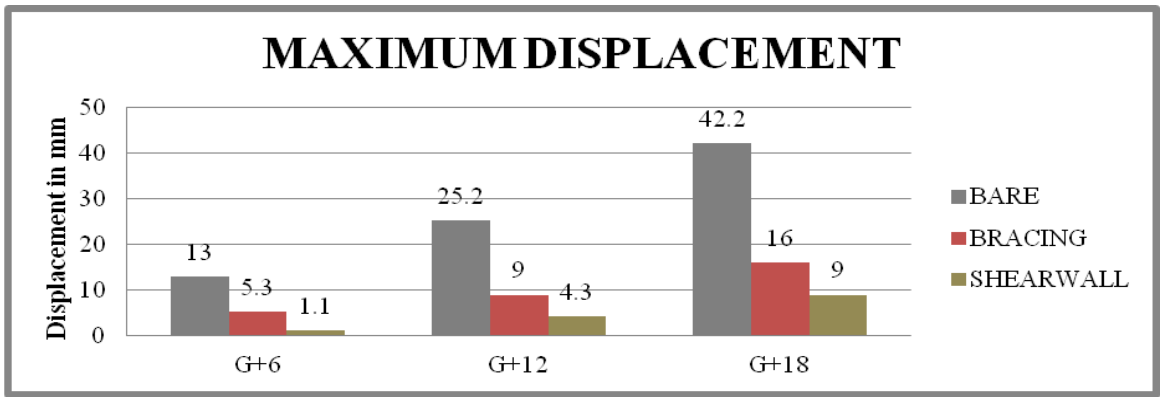
GRAPH.5. PLOT OF STOREY DRIFT OF G+18 T SHAPE BUILDING



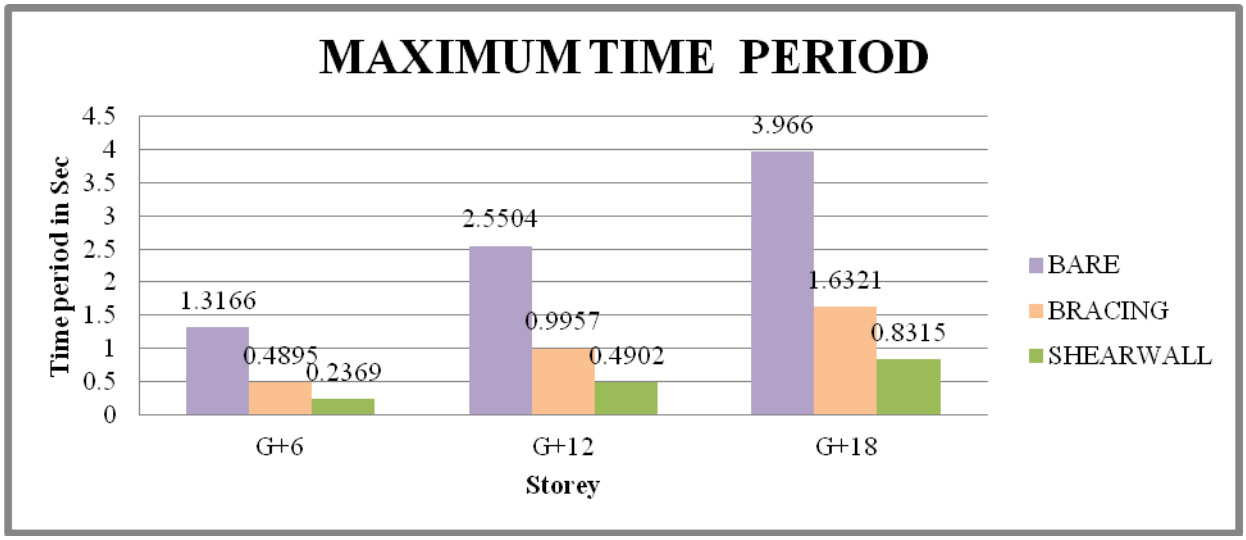
GRAPH.6. PLOT OF STOREY DRIFT OF G+18 T SHAPE SOFT STOREY BUILDING



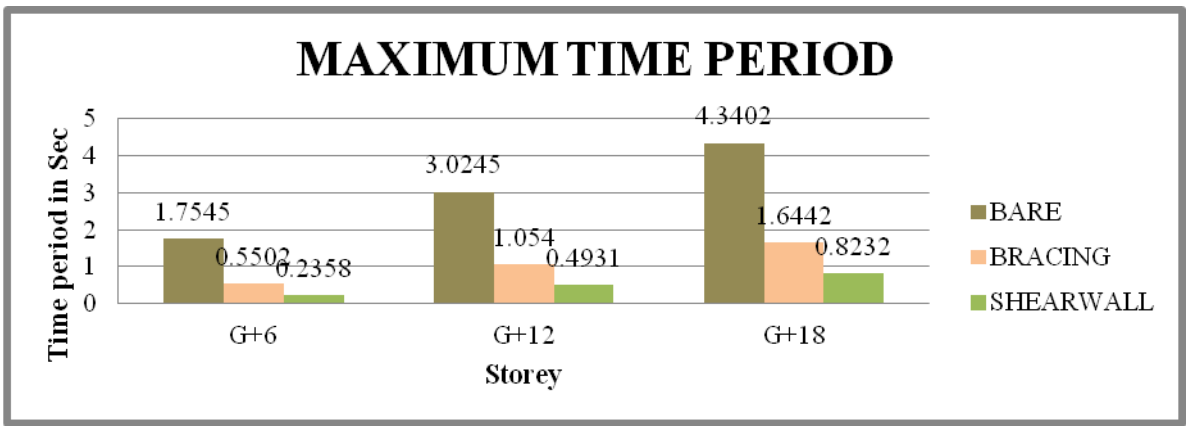
GRAPH. 7.PLOT OF MAXIMUM REDUCED DISPLACEMENT OF T SHAPE BUILDING



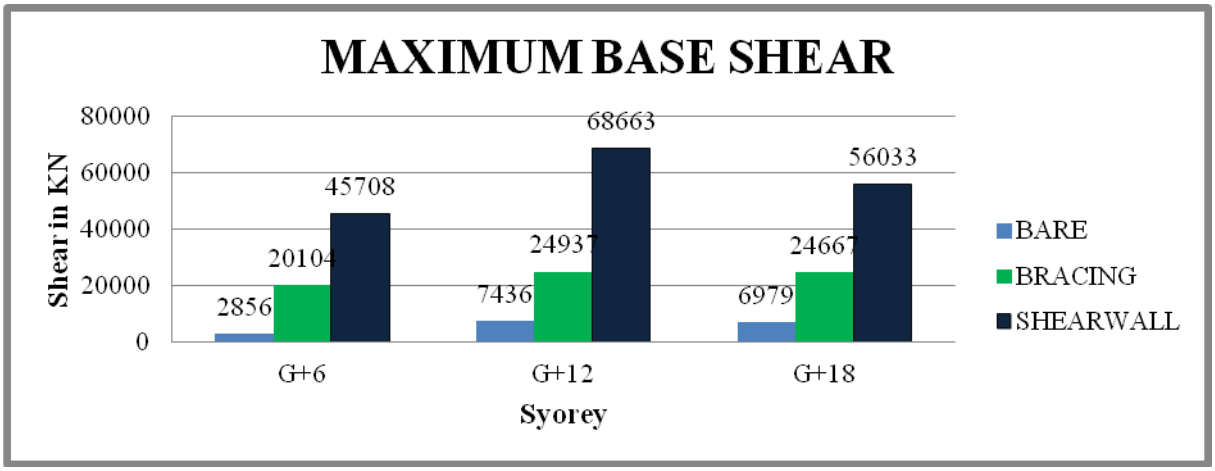
GRAPH.8. PLOT OF MAXIMUM REDUCED DISPLACEMENT OF T SHAPE SOFT STOREY BUILDING



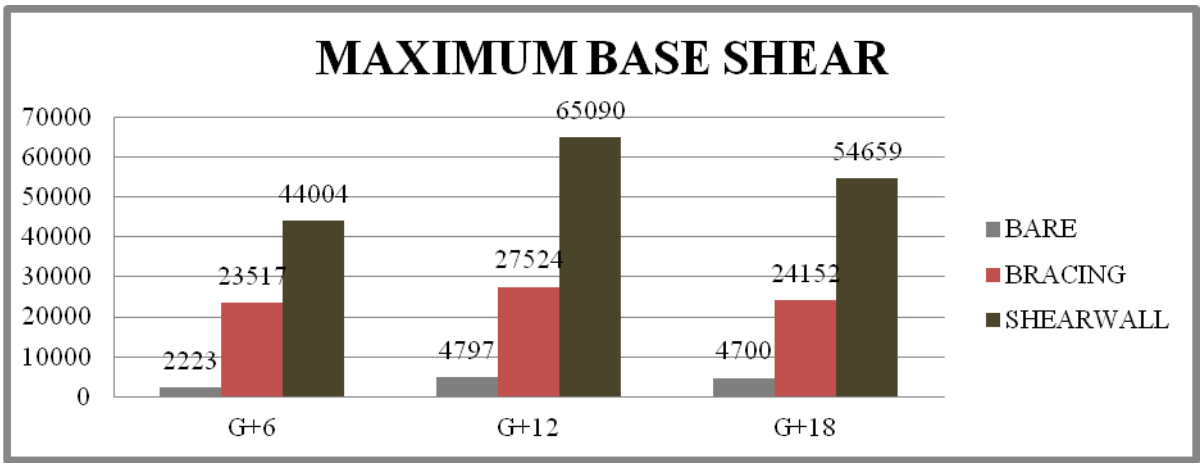
GRAPH.9. PLOT OF MAXIMUM REDUCED TIME PERIOD OF T SHAPE BUILDING



GRAPH.10. PLOT OF MAXIMUM REDUCED TIME PERIOD OF T SHAPE SOFT STOREY



GRAPH.11. PLOT OF BASE SHEAR OF T SHAPE BUILDING



GRAPH.12. PLOT OF BASE SHEAR OF T SHAPE SOFT STOREY BUILDING

V. CONCLUSION

The Cross bracing and Shearwall are effectively increases the stiffness of the structure from the Push over analysis its concluded that,

1. Storey drift of the structure heavily reduces after the application Cross bracing and Shearwall. The percentage of reduction is more with Shearwall.
2. The Bare Soft storey structure has maximum storey drift at the ground storey level, after the application of Shearwall it is heavily reduces and concentration changes to other storey level.
3. The Natural time period of the structure greatly reduces with Shearwall compared to Cross bracing and reduces intensity of earth quake waves and make the structure more stable.
4. The structure has a minimum Lateral displacement with Shearwall and Cross bracing compared with Bare frame. Structure with Shearwall system has a least lateral displacement.
5. The Base shear of the structure heavily increases and make the structure more stable against lateral loading.
6. The Shearwall and Cross bracings increases Storey shear and make structure stable at storey levels against lateral loading.
7. The Shearwall has better performance compared Cross bracing systems.

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