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ANALYSIS OF MULTISTORIED BUILDING RESTED OVER SOFT, MEDIUM, AND HARD SOIL USING DIFFERENT GRADES OF CONCRETE IN BEAMS HAS INCREASED ACCUMULATIVE STABILITY

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ABSTRACT

To ensure that the building faces, all loads affect the building, such as the structure's own weight, live loads, and lateral loads and its impact action on the structure such as earthquakes and wind force. In this project, the impact of Grade of concrete can be asset to ensure the stability of multi storey building. A G+16 Storey building having a plane area 576 m2. The two types of grade of concrete i.e. M25 & M40 is used in the building. A concrete up gradation or concrete belt is used in the structure on the 8th & 16th floor of the building. The Impact of Concrete belt is analyzed in soft, Medium & Hard soil. The results are based on the max. Displacement, base shear, bending moments, Torsional moments & Stresses. The project concluded that The Structure Models ASI 3,6,9 (All 8th floor beam M- 40 Grade of Beam) Show the optimum Structure with All 8th floor beam M- 40 Grade of Beam. The priority basis structure construction is used as M-40 grade concrete belt with 8th floor, at plinth, all structure with M25 grade of concrete and then at the top floor(18th floor) in decrement order. If N no. of storey is there than the concrete belt with change in grade is best placed at the position of N/2 Storey. Soft Soil Exhibits less parametric magnitude value and it goes in increment mode in the medium and hard soil.

Keywords— Concrete Belt, M-25 & M-40, soft, Medium, Hard soil, Strength, Stability

INTRODUCTION

Buildings are subject to different types of lateral loads such as earthquake & wind loads. The behavior is vary with type of soil. The type consist as dense soil, medium & soft soil. The affection of different soil type when seismic waves as they pass through the soil layer. When a structure is exposed to an earthquake, it impact with the foundation & soil mass. Thus changes the movement of the earth. This shows that the type of soil, & also based on type of structure, affects the movement of the entire system of ground structures. Because seismic waves are transmitted from the ground, they consist of changes in the properties of the soil and work in different ways according to the corresponding properties of the soil.

Vibrations that disturb the earth's surface caused by waves generated in the earth are called earthquakes. It is said that earthquakes do not kill human life, but structures that are not built taking into account the forces of an earthquake. Currently, earthquake-resistant structures in India attach great importance to human security. India is a subcontinent with more than 60% of the area in an earthquake prone area. Most buildings built in India are designed with permanent, semi-permanent moving loads in mind. But an earthquake is a random burden that leads to deaths, but it also violates the social conditions of India. The degree to which the structural response alters the characteristics of seismic movements observed at the foundation level depends on the relative mass and stiffness properties of the soil and structure. Thus, the physical property of the foundation environment is an important factor in the earthquake response of the structures it supports. The future demand of each city will ultimately contribute to attracting population and living demand. This requirement leads to the development of a multi-story building. To resist lateral forces and stay in place, tall structures need stability with or without any improvement in the same soil type. Optimization of stability.The issue of high construction stability has now become a major issue as communities approach cities that provide them with amenities. Along with the stability issue, another thing is optimization that maintains the efficiency of the massive structure and its load on the soil that ultimately carries it. Concrete is mainly the indisputable and necessary material that is used in construction to develop infrastructure around the world.

OBJECTIVE OF THEWORK

Stability of elastic structures appears to be reasonably well understood at present although many refinements are still needed and some basic advances may still be expected. The greatest challenge and opportunity probably lies in stability analysis of damage and fracture, and its interaction with geometrical nonlinearity of deformation. Coupled problems, in which structural stability analysis interfaces with chemical processes in materials, hygrothermal effects and various types of long-time degradation will no doubt play an increasingly important role. So will the probabilistic treatment of safety against the loss of stability or excessive deflection (Bolotin, 1969) a subject that has also seen considerable advances but lies beyond the scope of this survey.

Result:-

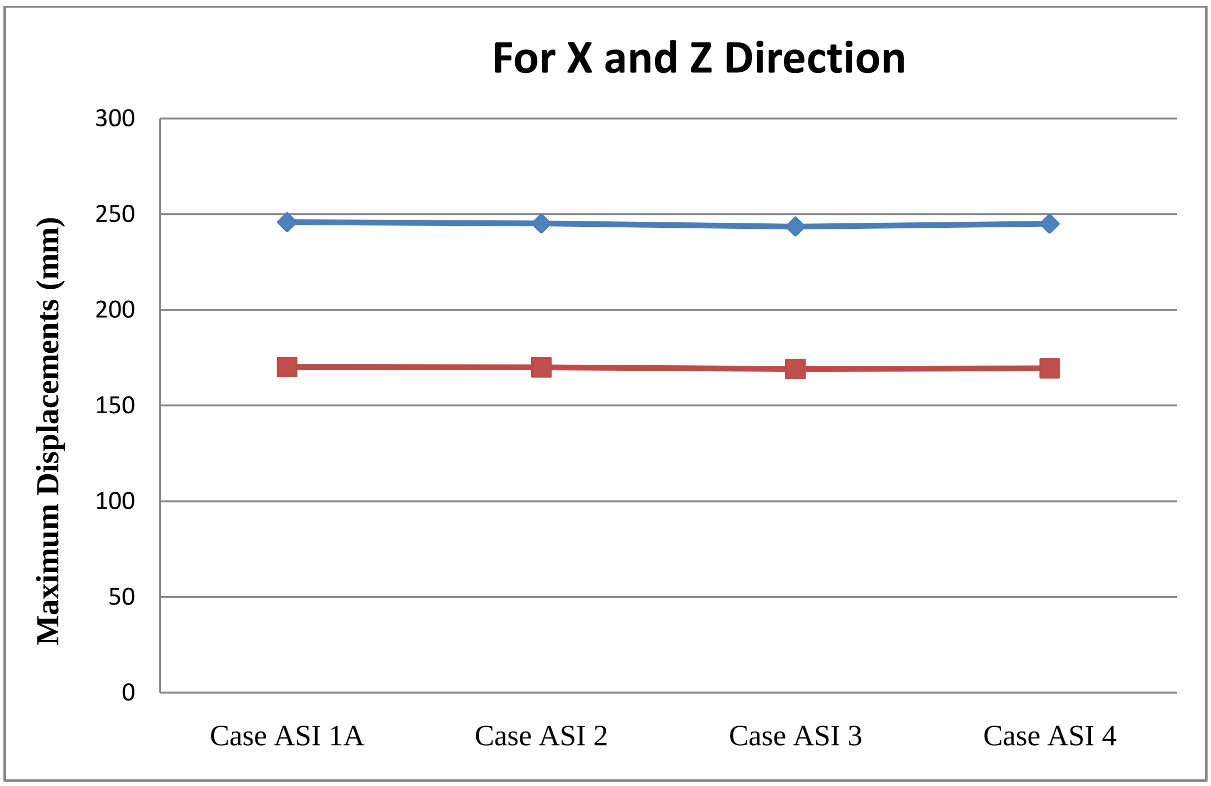

Fig. 1: Graphical Representation of Maximum Displacement in X direction for all for Beam Stability Cases on soft soil

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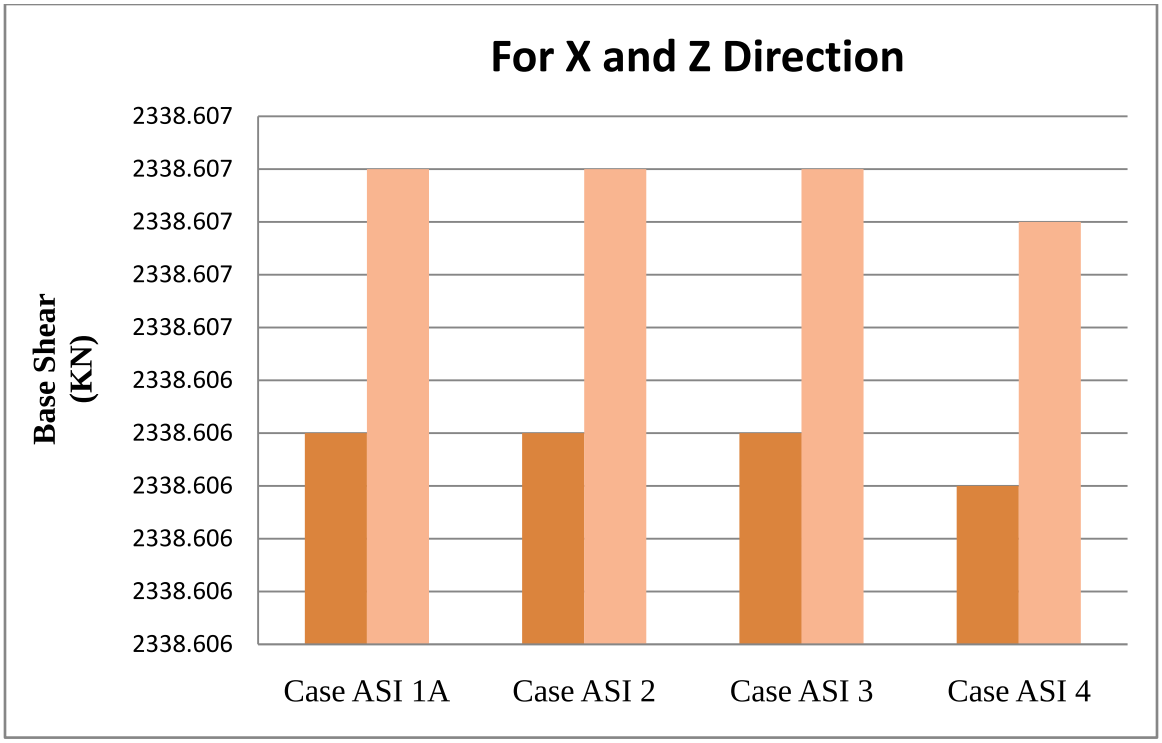

Fig. 2: Graphical Representation of Base Shear in X direction for all for Beam Stability Cases on soft soil

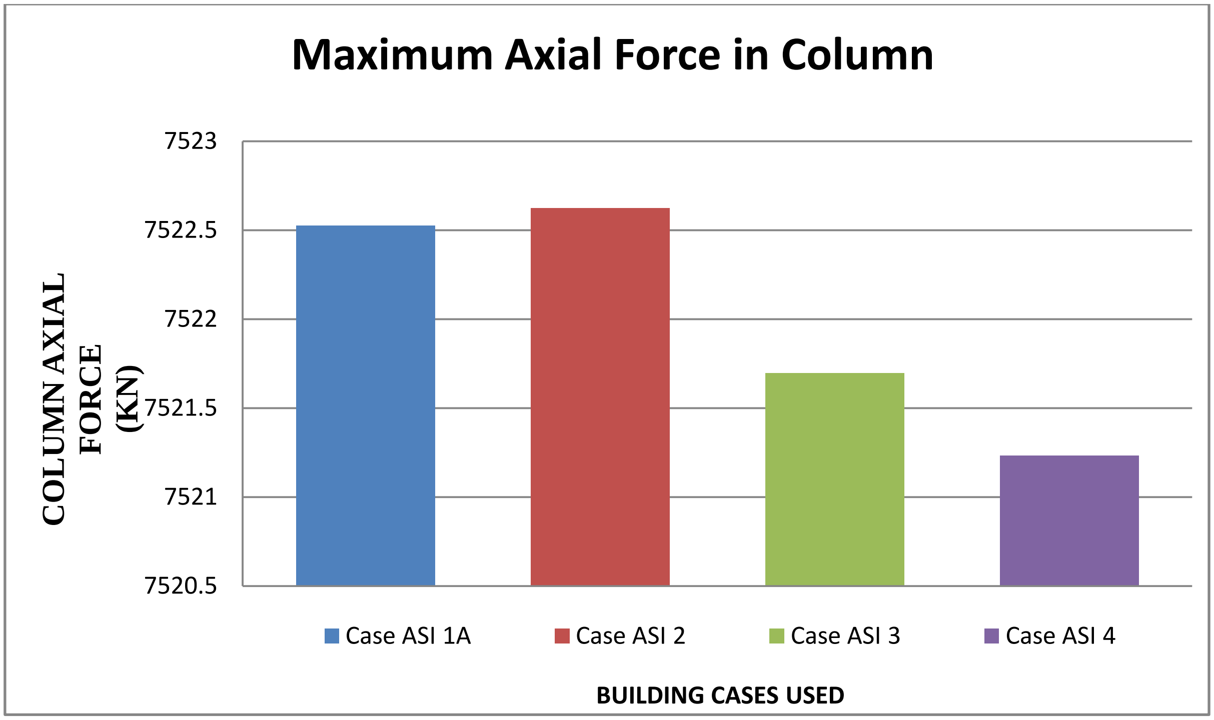

Fig. 3: Graphical Representation of Maximum Axial Forces in Column for all for Beam Stability Cases on soft soil

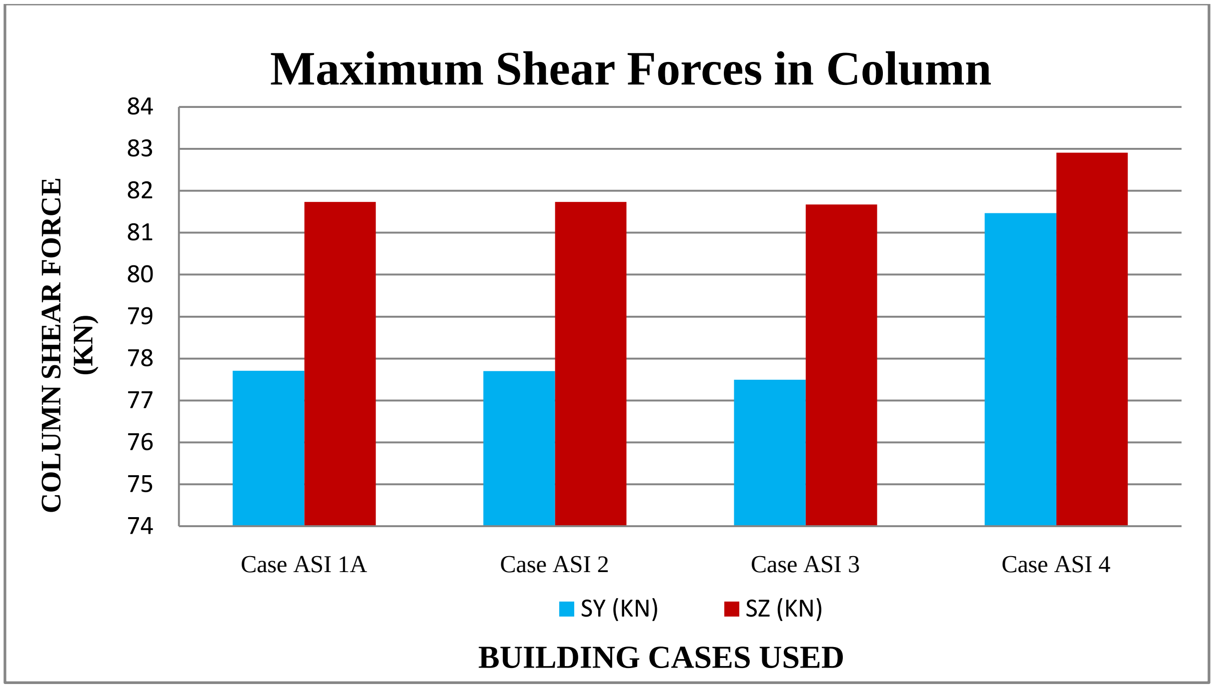

Fig. 4: Graphical Representation of Maximum Shear Force in Column for all for Beam Stability Cases on soft soil

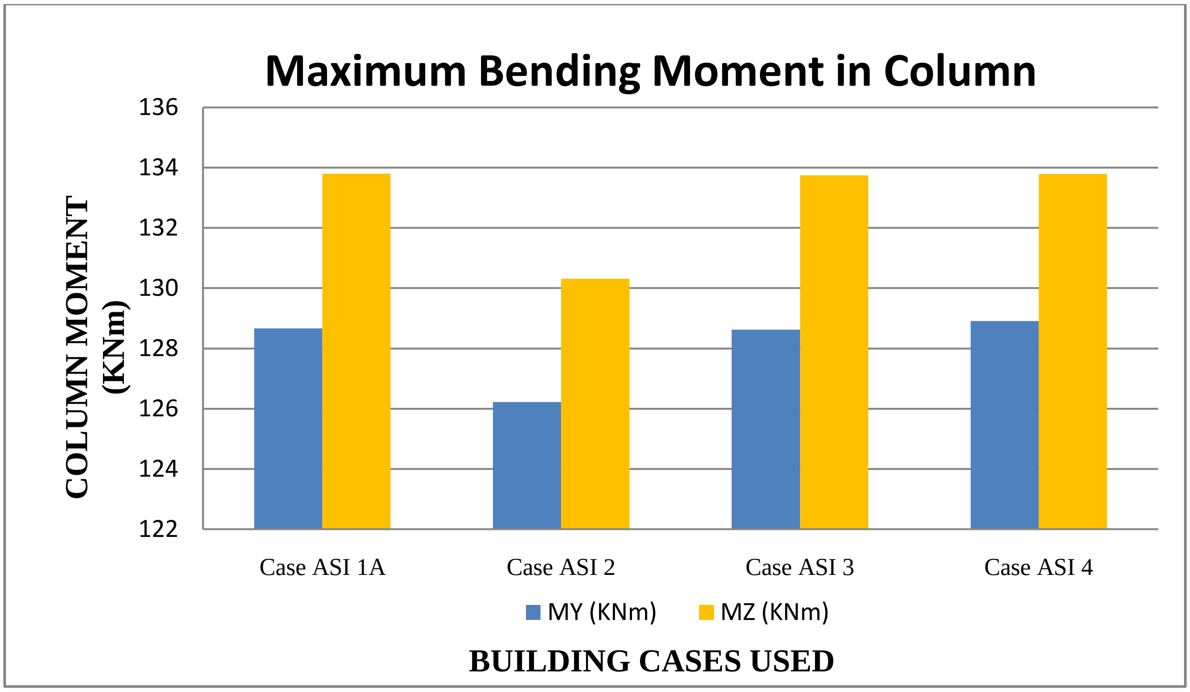

Fig. 5: Graphical Representation of Maximum Bending Moment in Column for all for Beam Stability Cases on soft soil

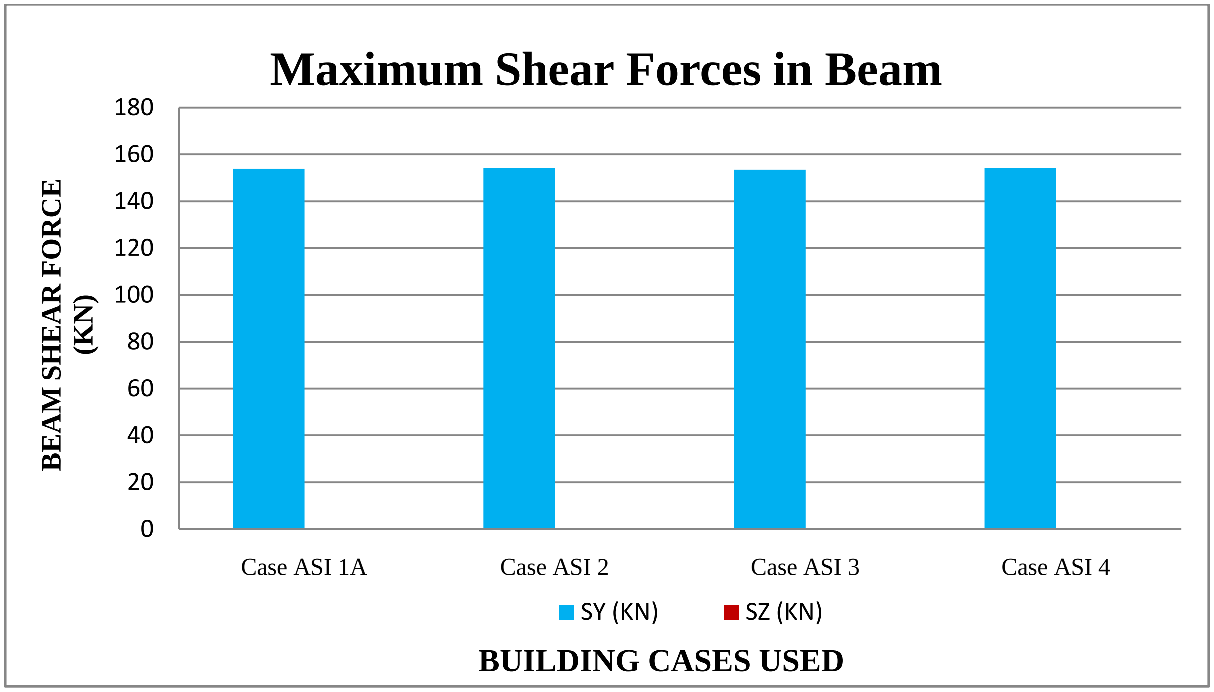

Fig. 6: Graphical Representation of Maximum Shear Force in Beam for all for Beam Stability Cases on soft soil

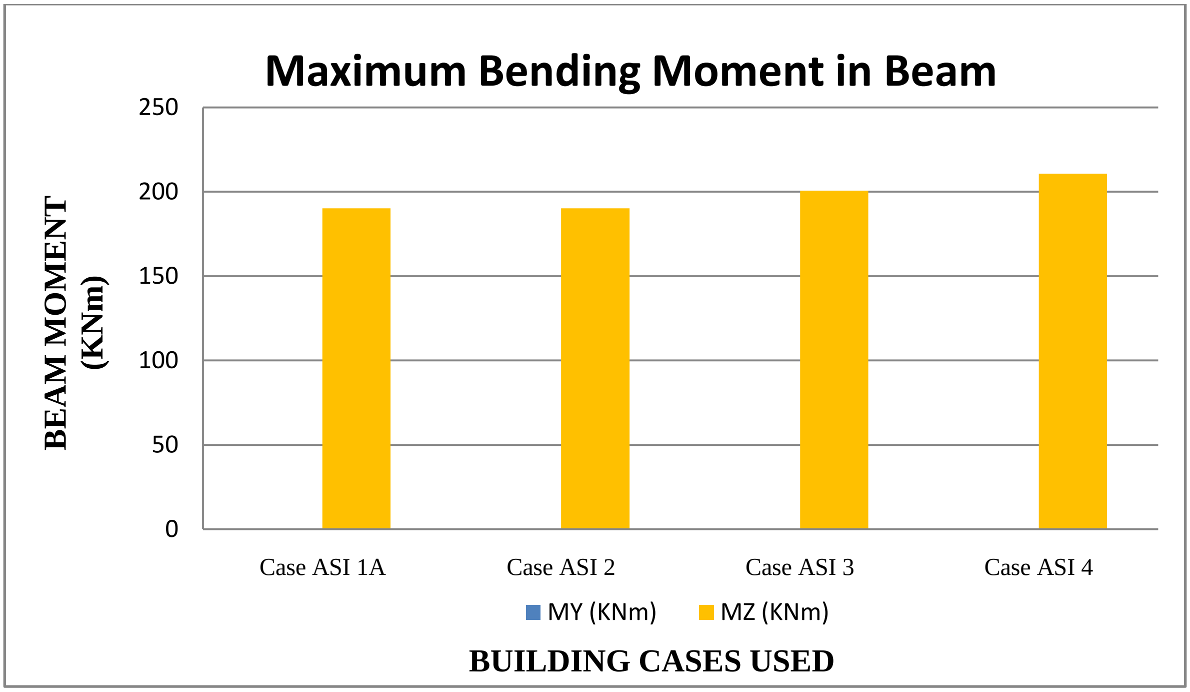

Fig. 7: Graphical Representation of Maximum Bending Moment in Beam for all for Beam Stability Cases on soft soil

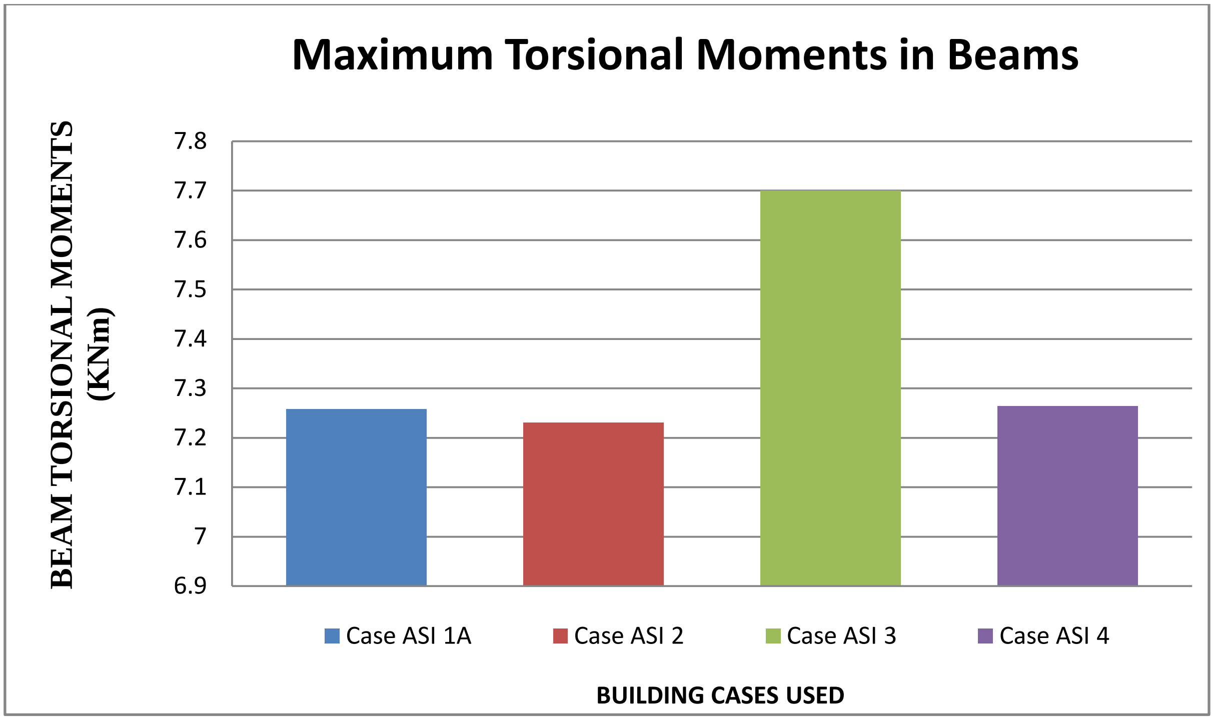

Fig. 8: Graphical Representation of Maximum Torsional Moments in Beam for all for Beam Stability Cases on soft soil

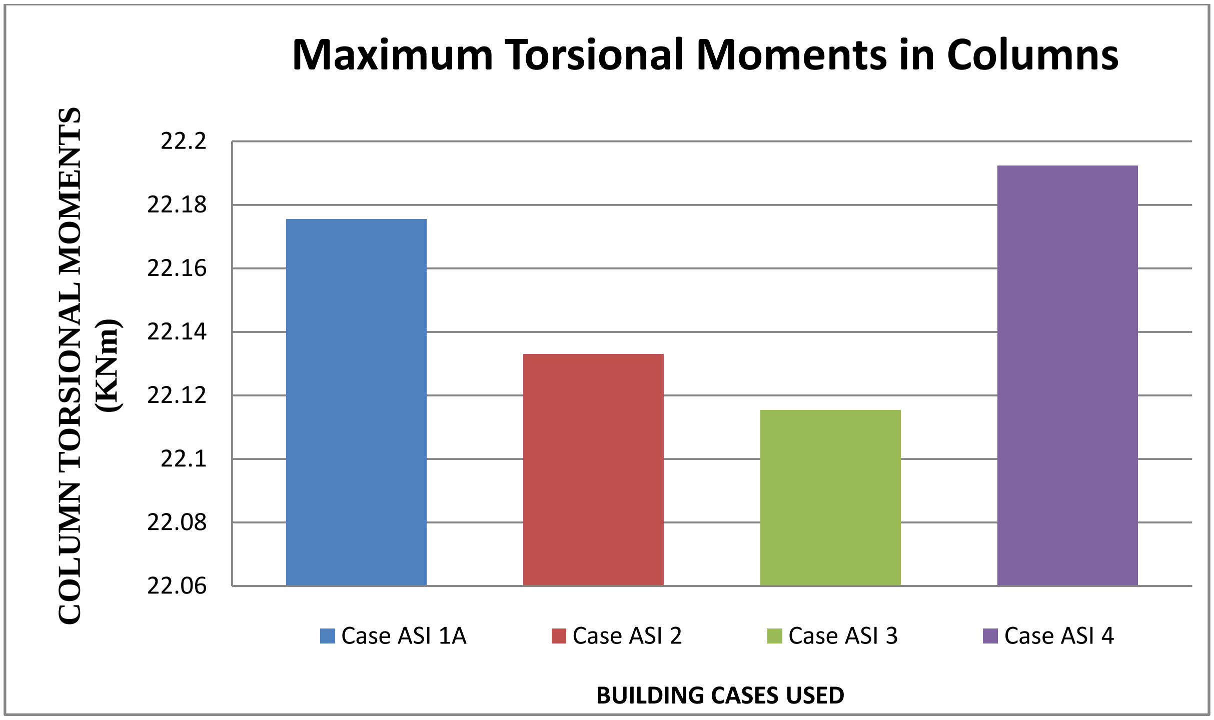

Fig. 9: Graphical Representation of Maximum Torsional Moments in Columns for all for Beam Stability Cases on soft soil

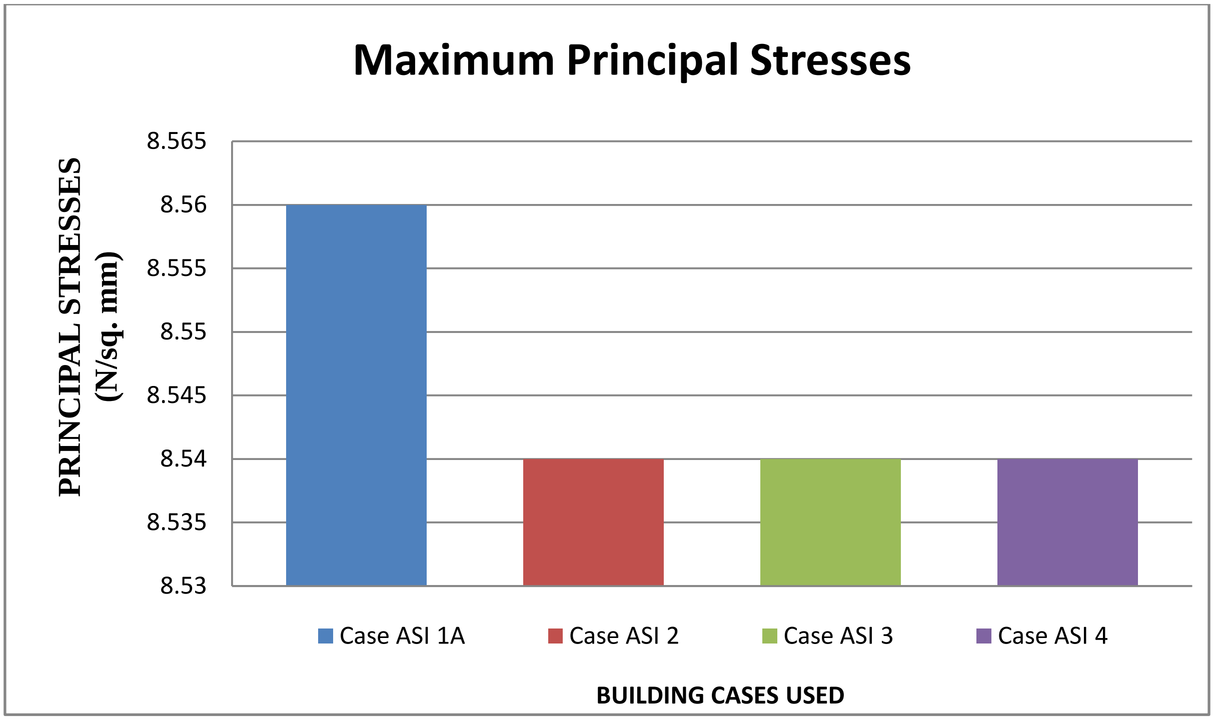

Fig. 10: Graphical Representation of Maximum Principal Stresses for all for Beam Stability Cases on soft soil

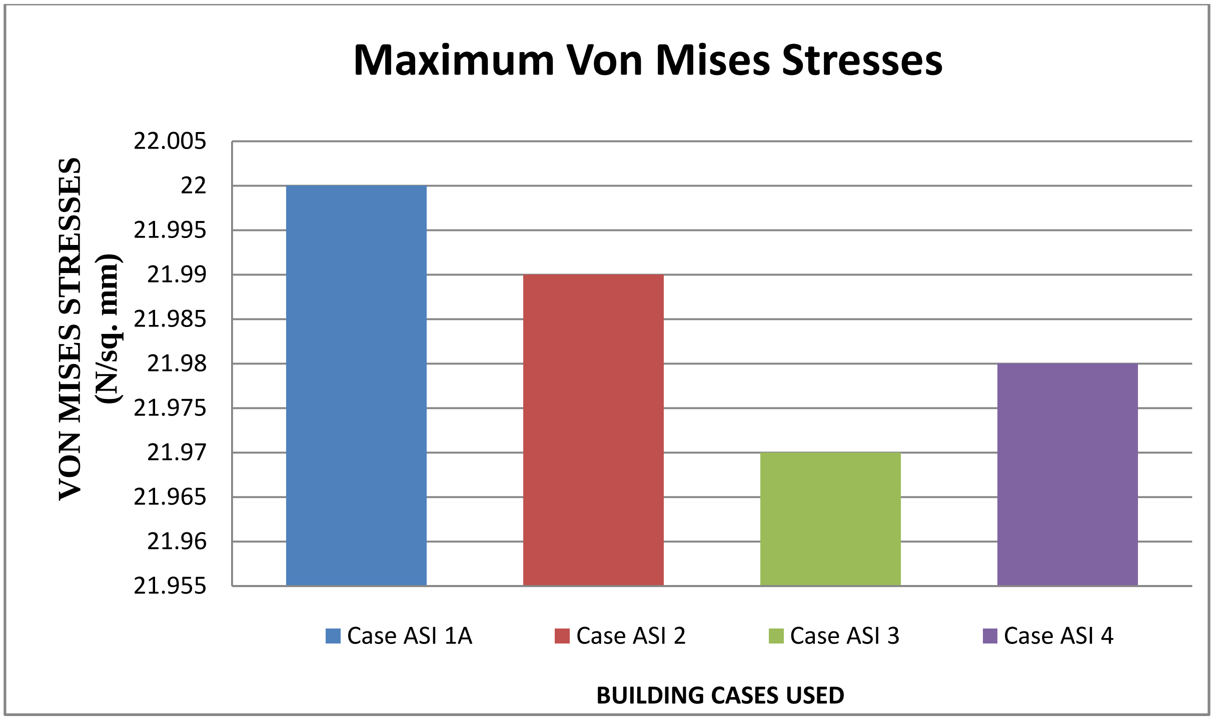

Fig. 11: Graphical Representation of Maximum Von Mises Stresses for all for Beam Stability Cases on soft soil

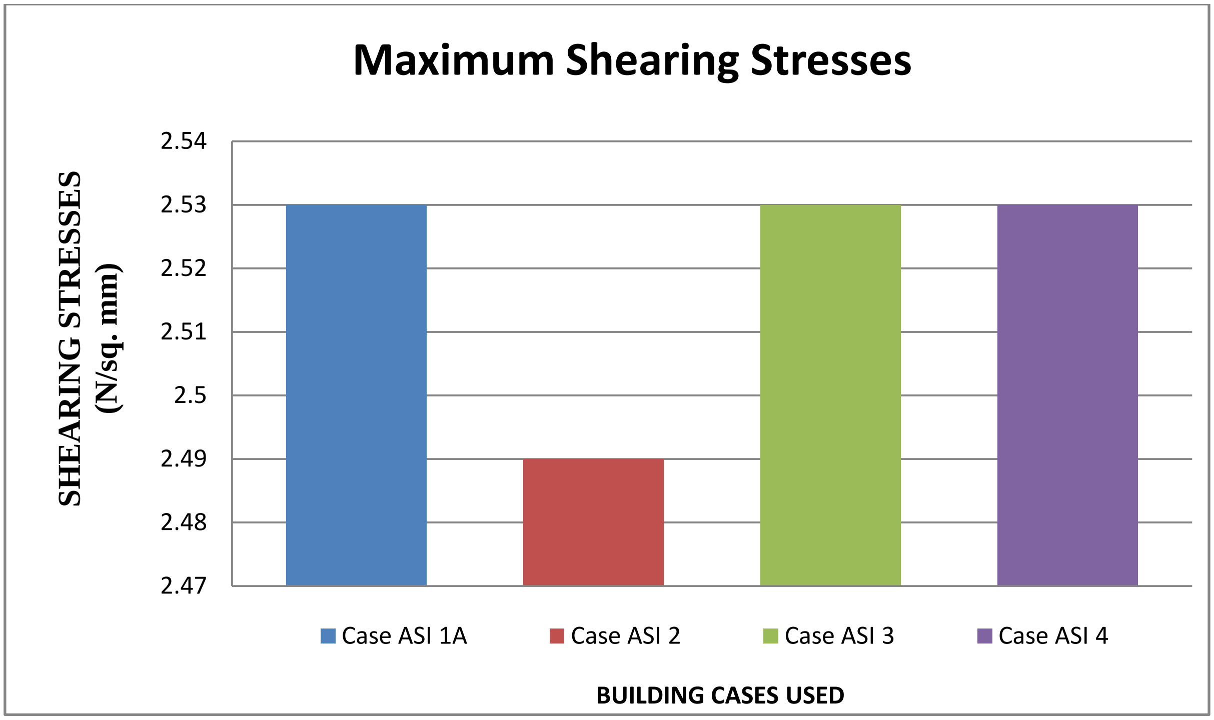

Fig. 12: Graphical Representation of Maximum Shearing Stresses for all for Beam Stability Cases on soft soil

Discussionsfor Beam Stability Cases on Medium soil

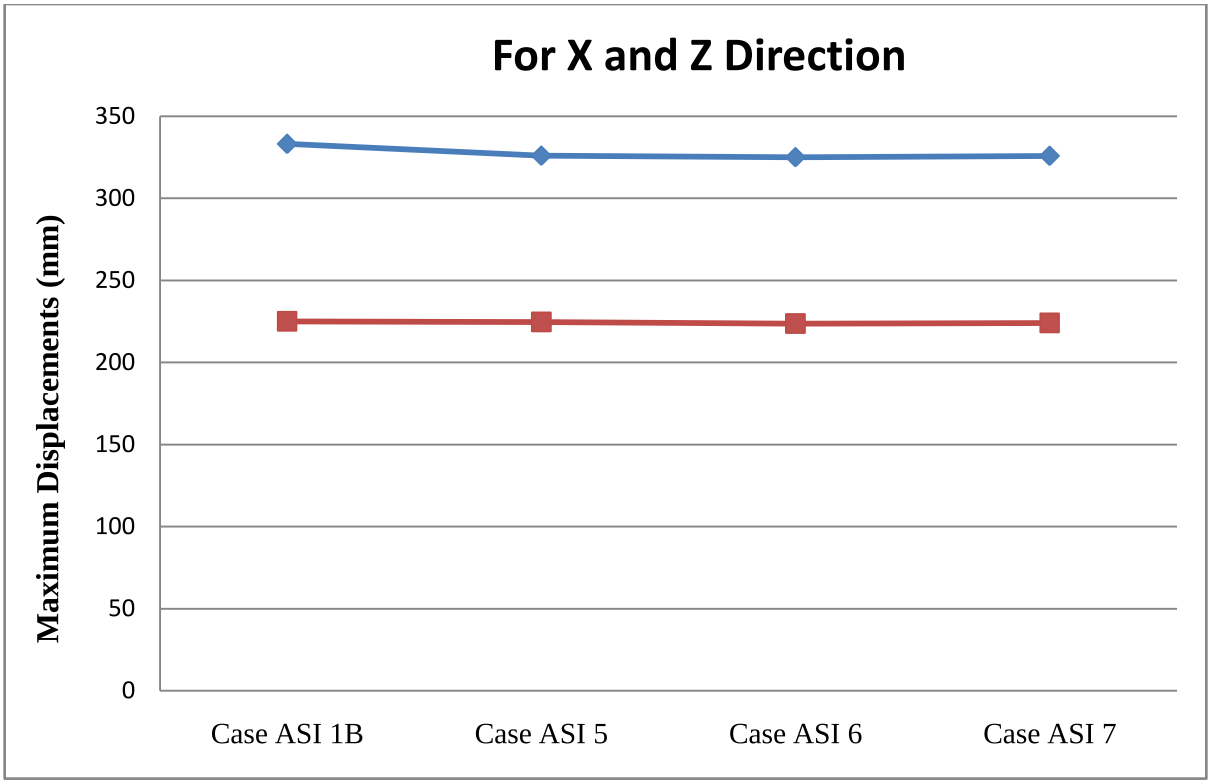

Fig. 13: Graphical Representation of Maximum Displacement in X direction for all for Beam Stability Cases on Medium soil

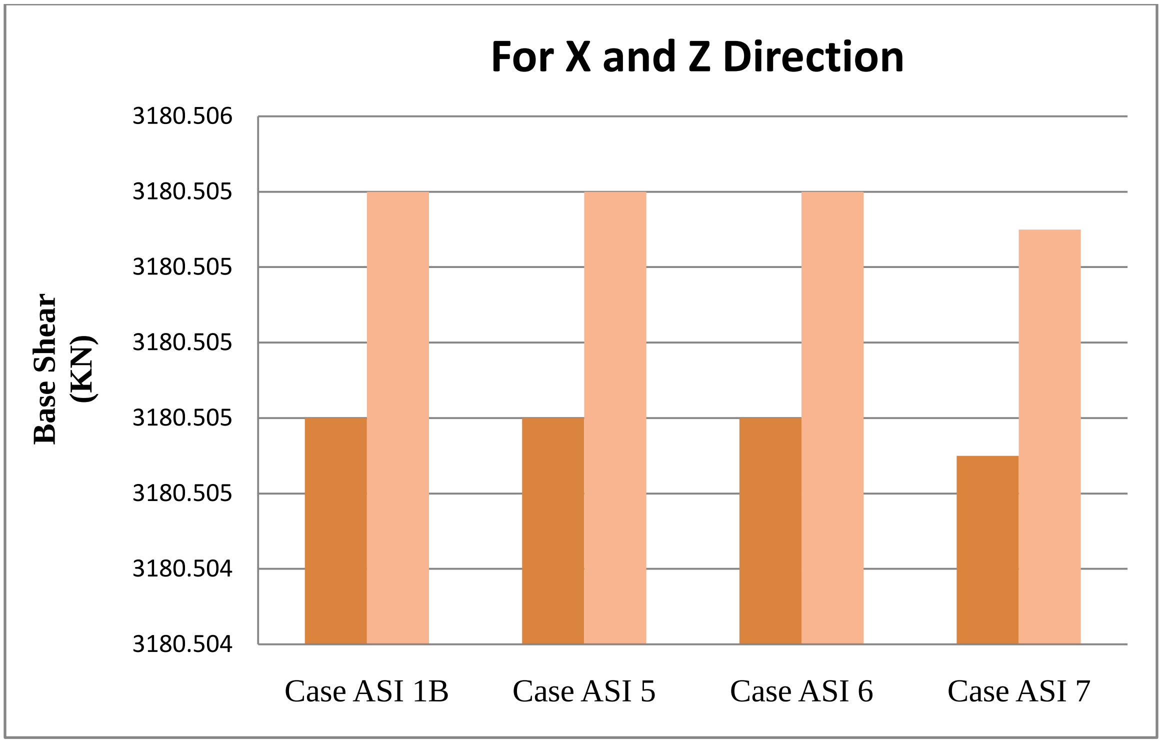

Fig. 14: Graphical Representation of Base Shear in X and Z direction for all for Beam Stability Cases on Medium soil

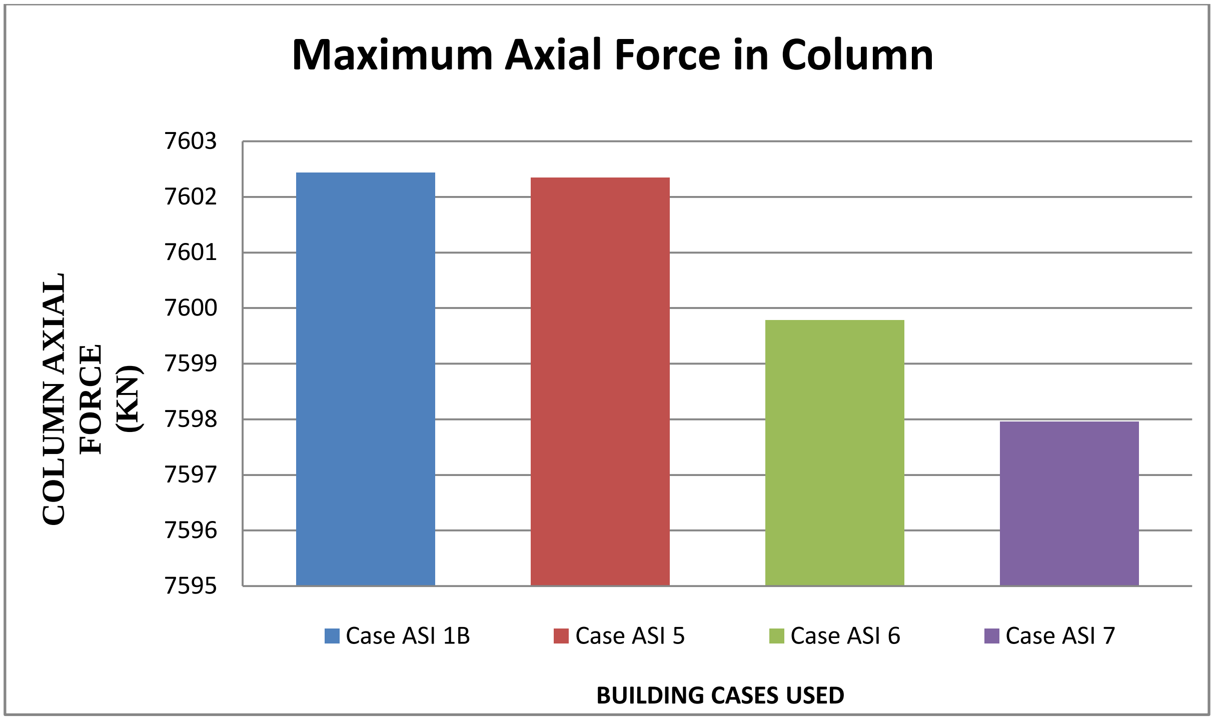

Fig. 15: Graphical Representation of Maximum Axial Forces in Column for all for Beam Stability Cases on Medium soil

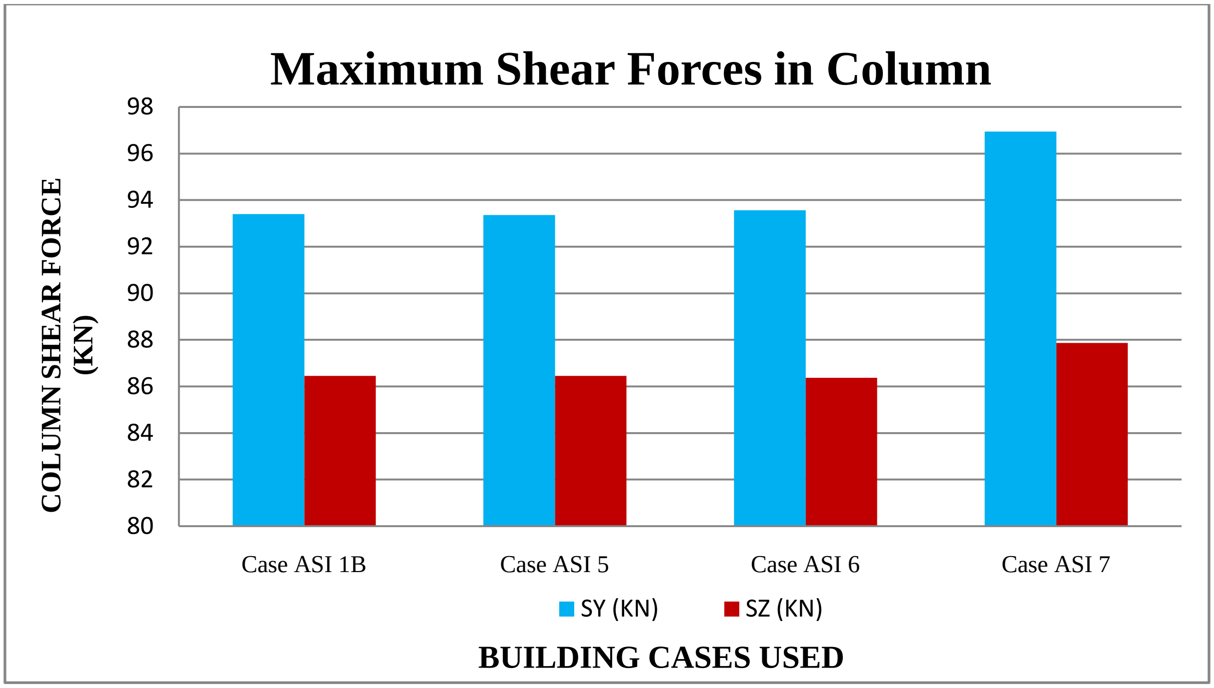

Fig. 16: Graphical Representation of Maximum Shear Force in Column for all for Beam Stability Cases on Medium soil

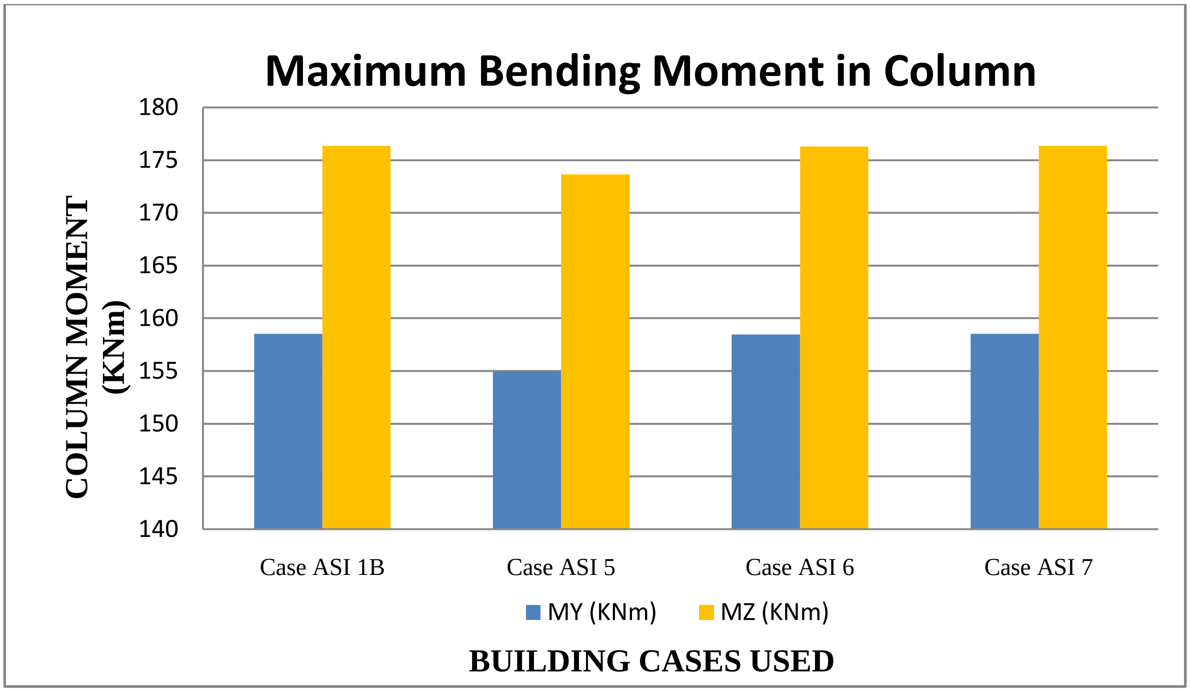

Fig. 17: Graphical Representation of Maximum Bending Moment in Column for all MediumBeam Stability Cases on Medium soil

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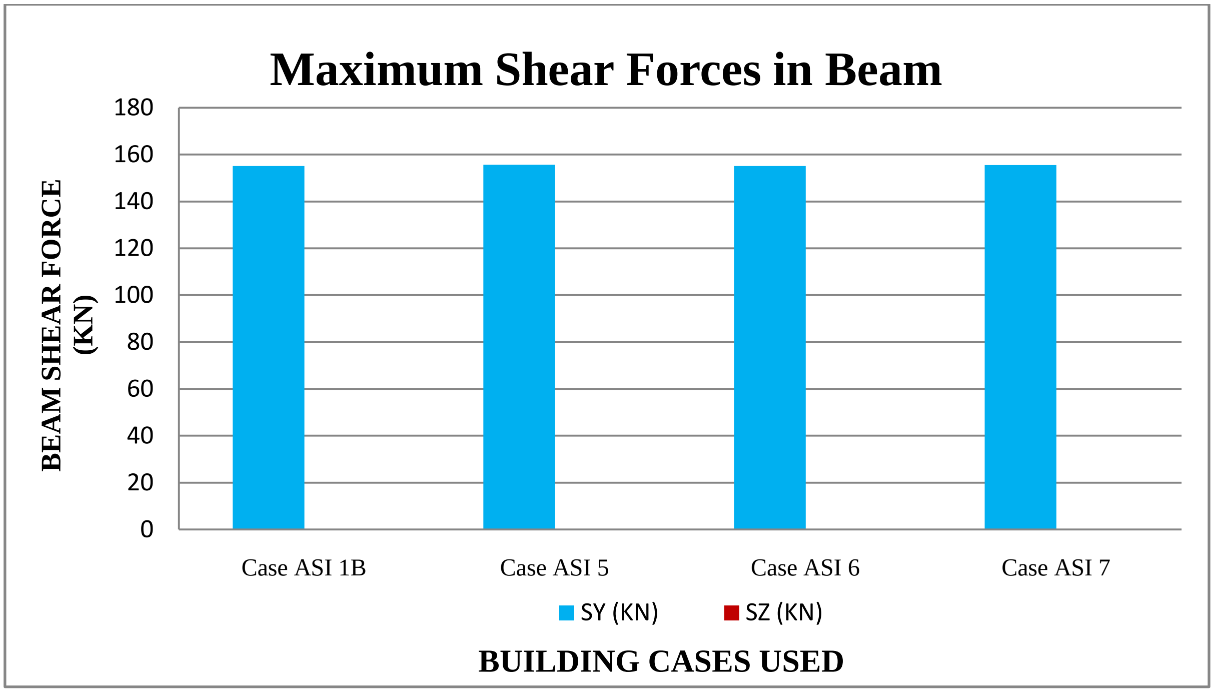

Fig. 18: Graphical Representation of Maximum Shear Force in Beam for all for Beam Stability Cases on Medium soil

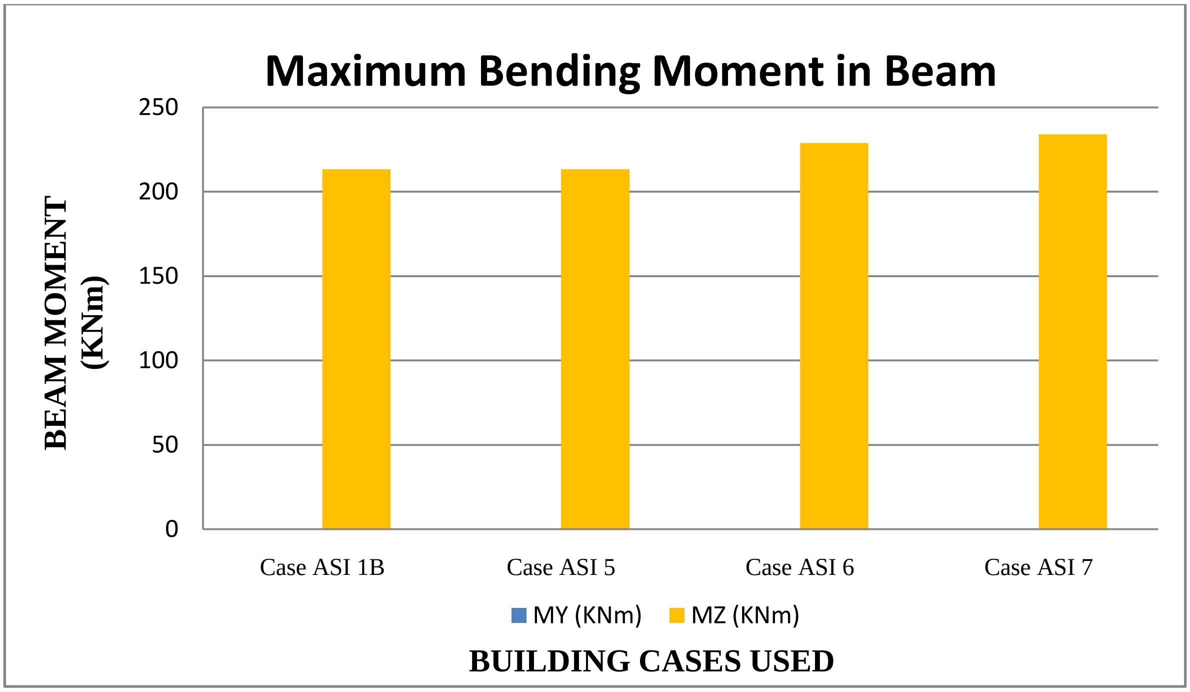

Fig. 19: Graphical Representation of Maximum Bending Moment in Beam for all for Beam Stability Cases on Medium soil

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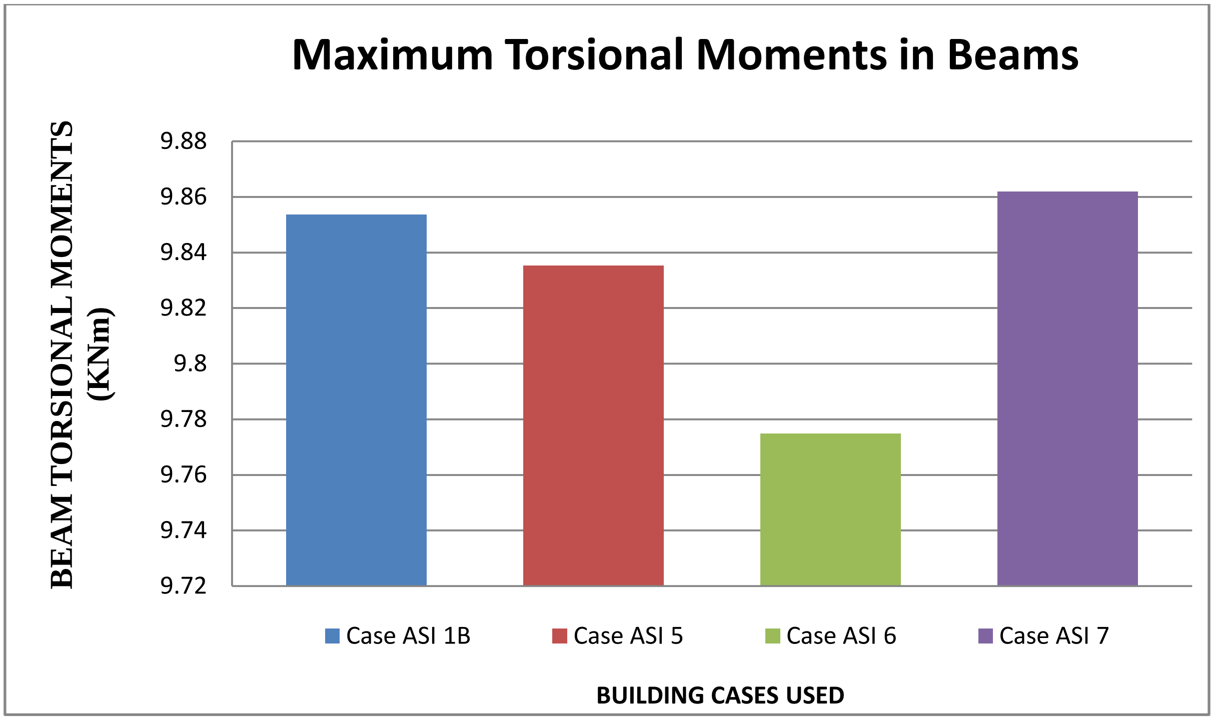

Fig. 20: Graphical Representation of Maximum Torsional Moments in Beam for all for Beam Stability Cases on Medium soil

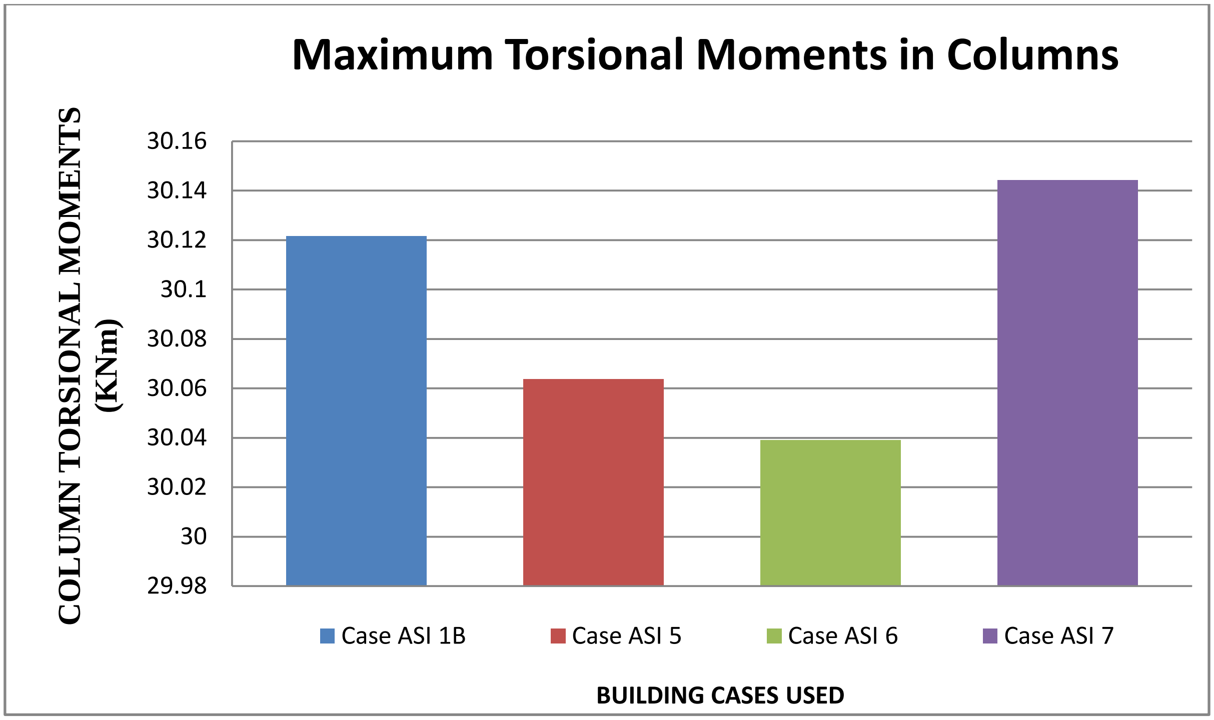

Fig. 21: Graphical Representation of Maximum Torsional Moments in Columns for all for Beam Stability Cases on Medium soil

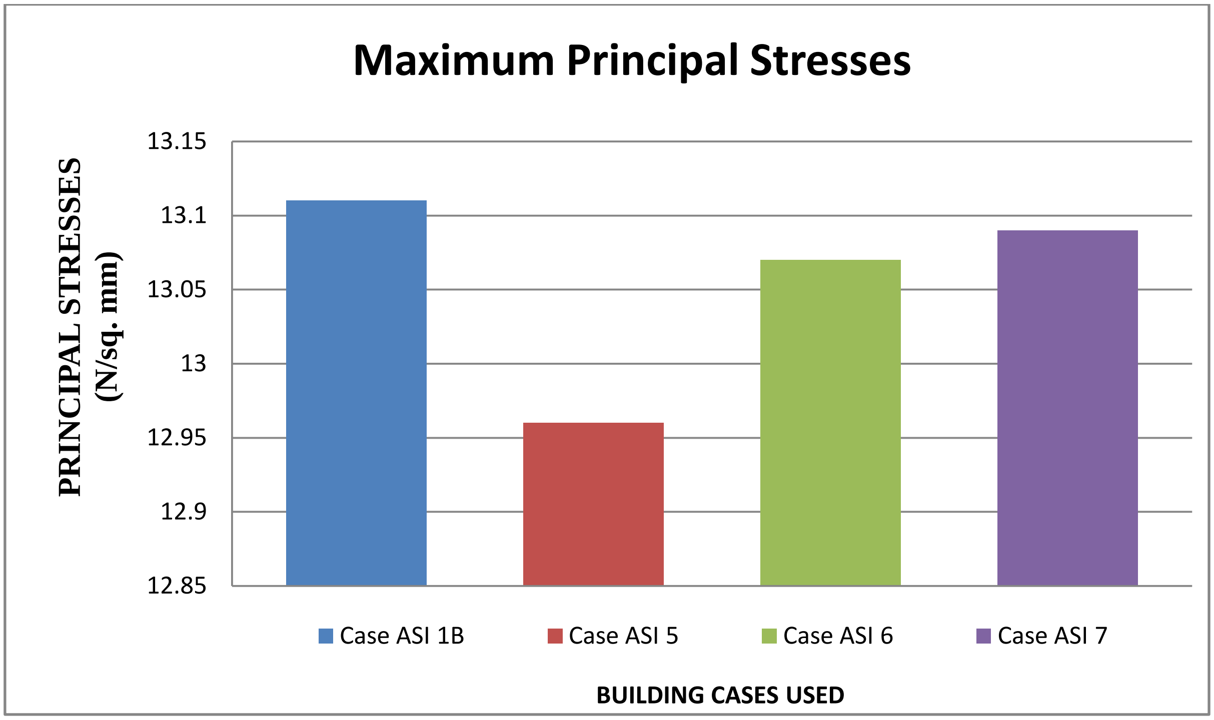

Fig. 22: Graphical Representation of Maximum Principal Stresses for all for Beam Stability Cases on Medium soil

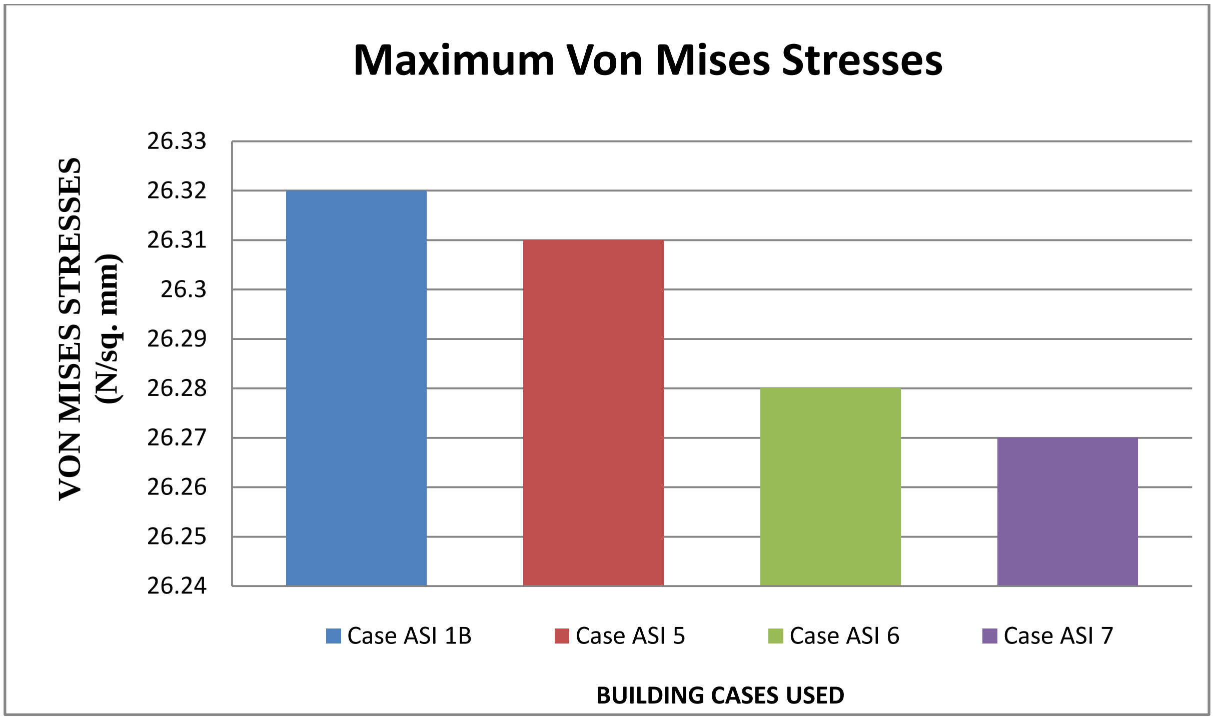

Fig. 23: Graphical Representation of Maximum Von Mises Stresses for all for Beam Stability Cases on Medium soil

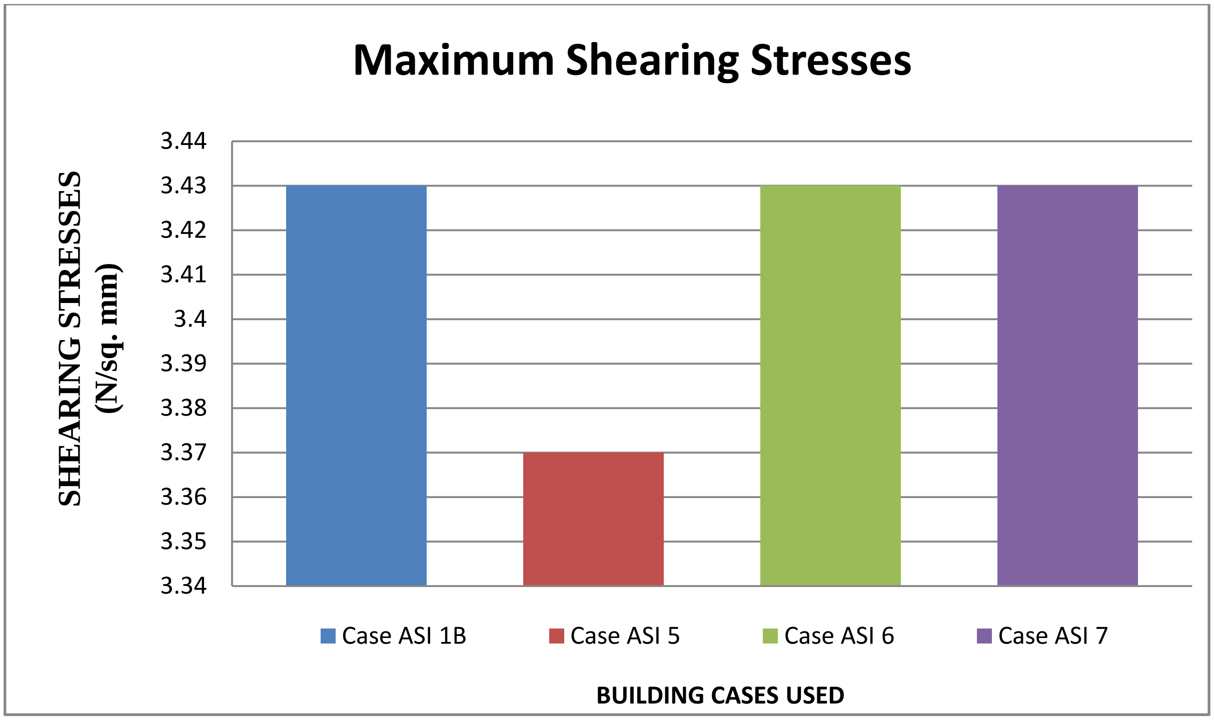

Fig. 24: Graphical Representation of Maximum Shearing Stresses for all for Beam Stability Cases on Medium soil

Discussionsfor Beam Stability Cases on hard soil

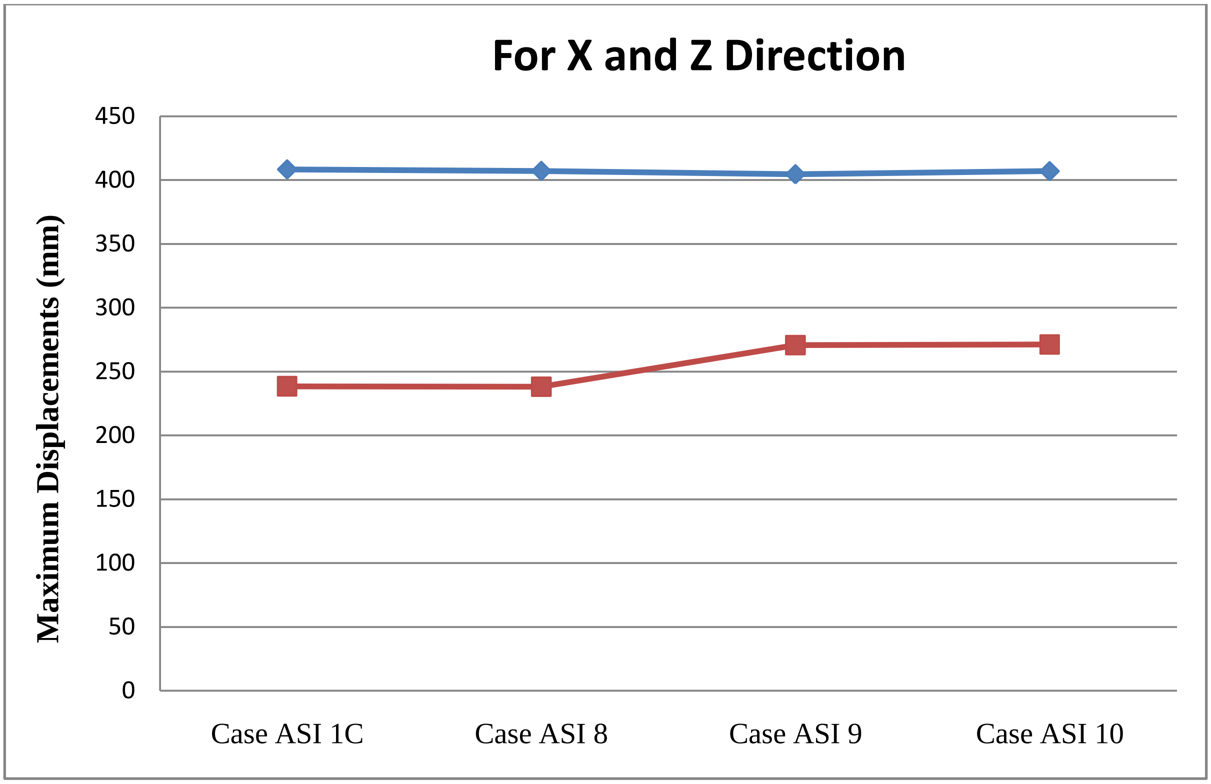

Fig. 25: Graphical Representation of Maximum Displacement in X direction for all for Beam Stability Cases on hard soil

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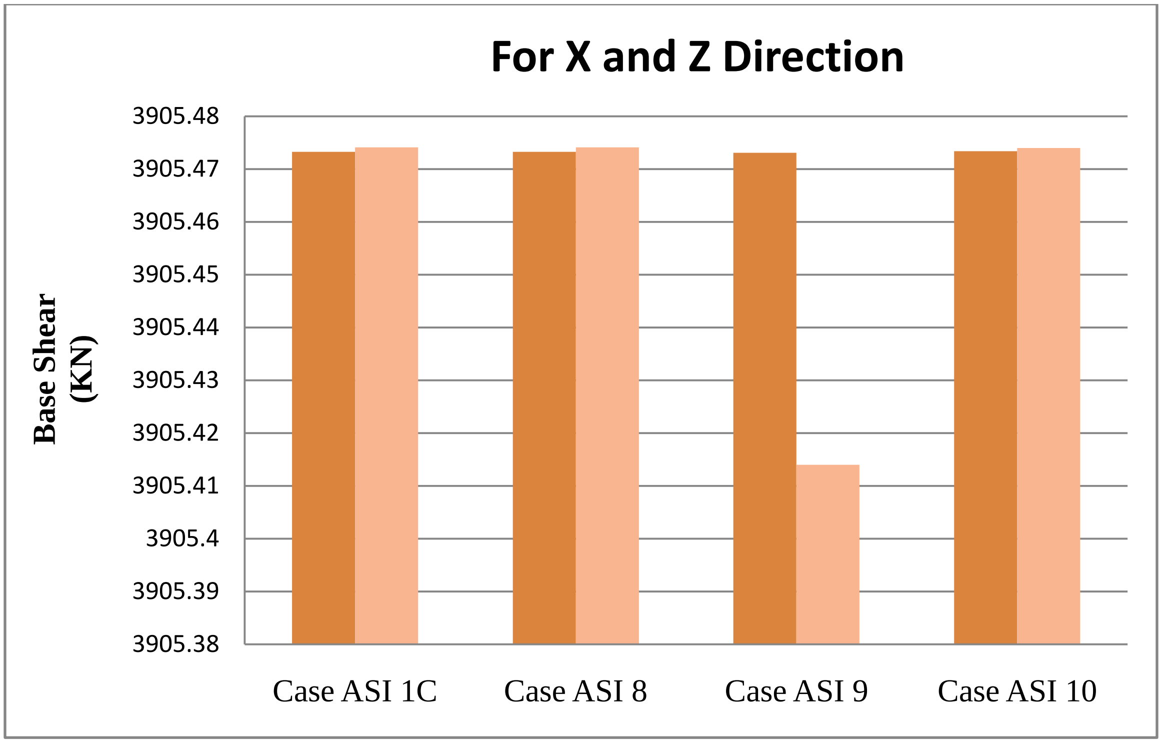

Fig. 26: Graphical Representation of Base Shear in X direction for all for Beam Stability Cases on hard soil

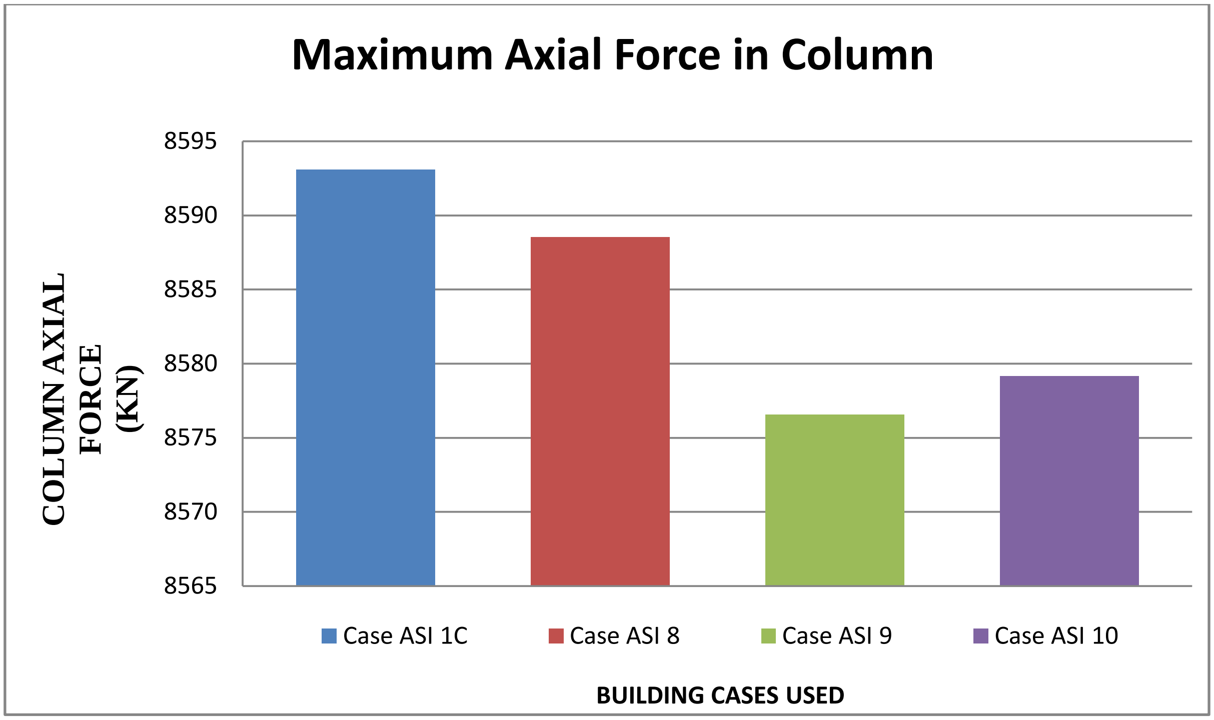

Fig. 27: Graphical Representation of Maximum Axial Forces in Column for all for Beam Stability Cases on hard soil

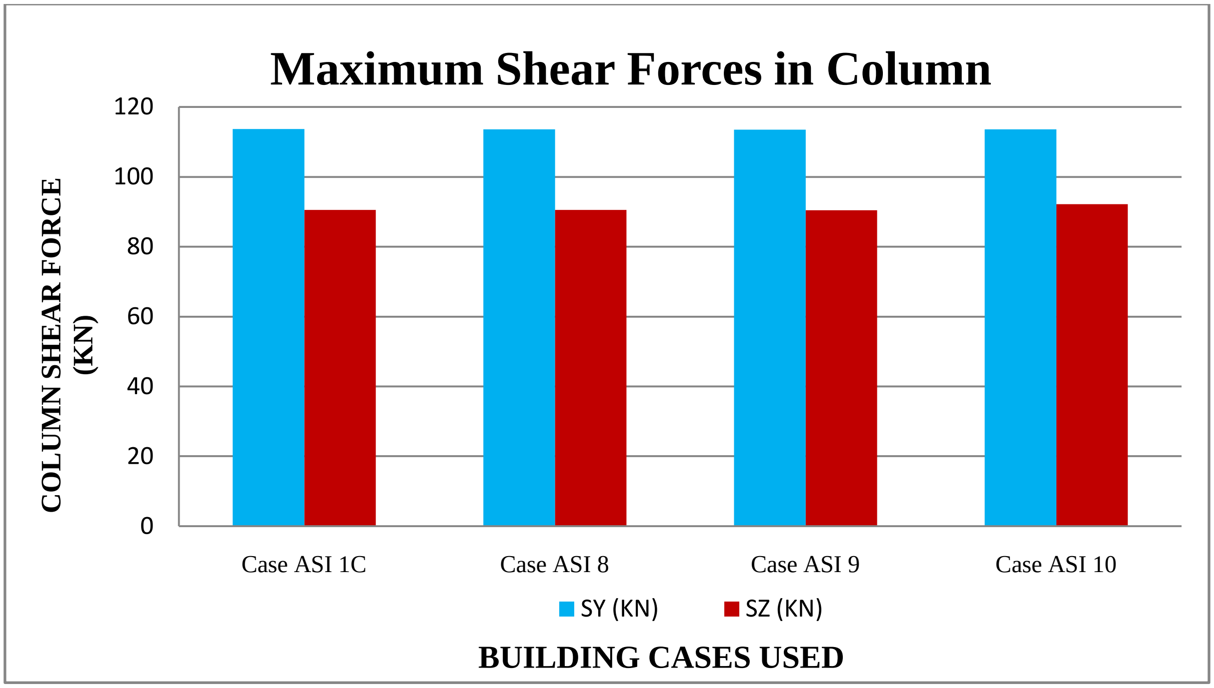

Fig. 28: Graphical Representation of Maximum Shear Force in Column for all for Beam Stability Cases on hard soil

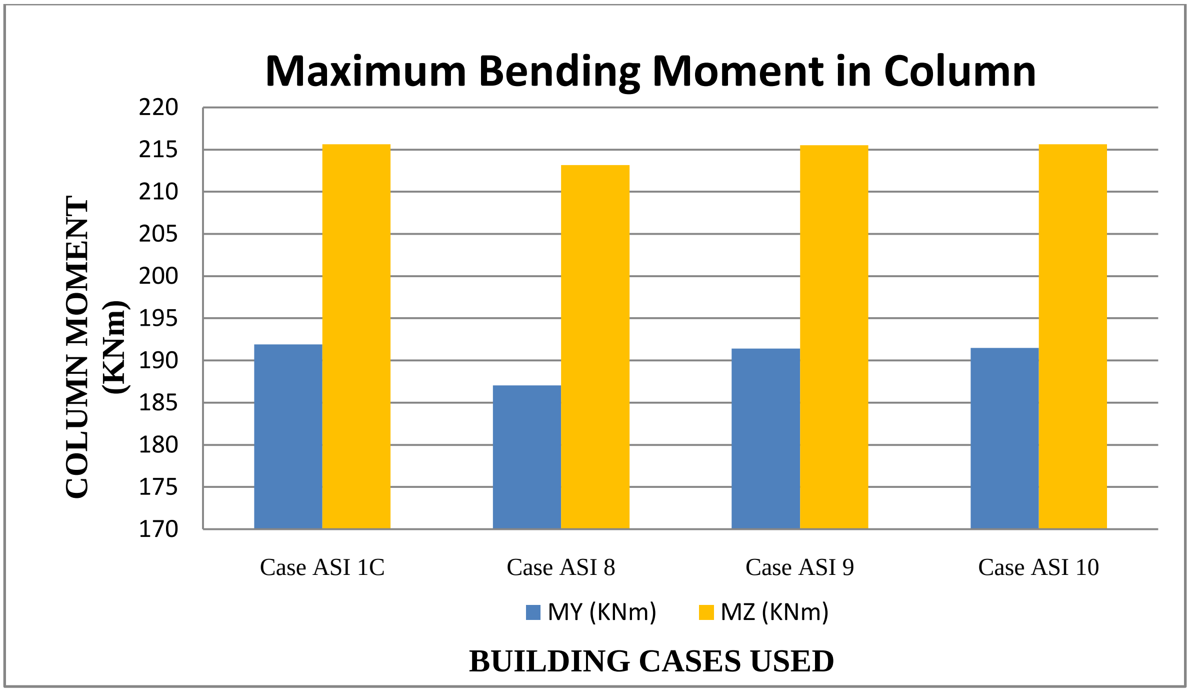

Fig. 29: Graphical Representation of Maximum Bending Moment in Column for all for Beam Stability Cases on hard soil

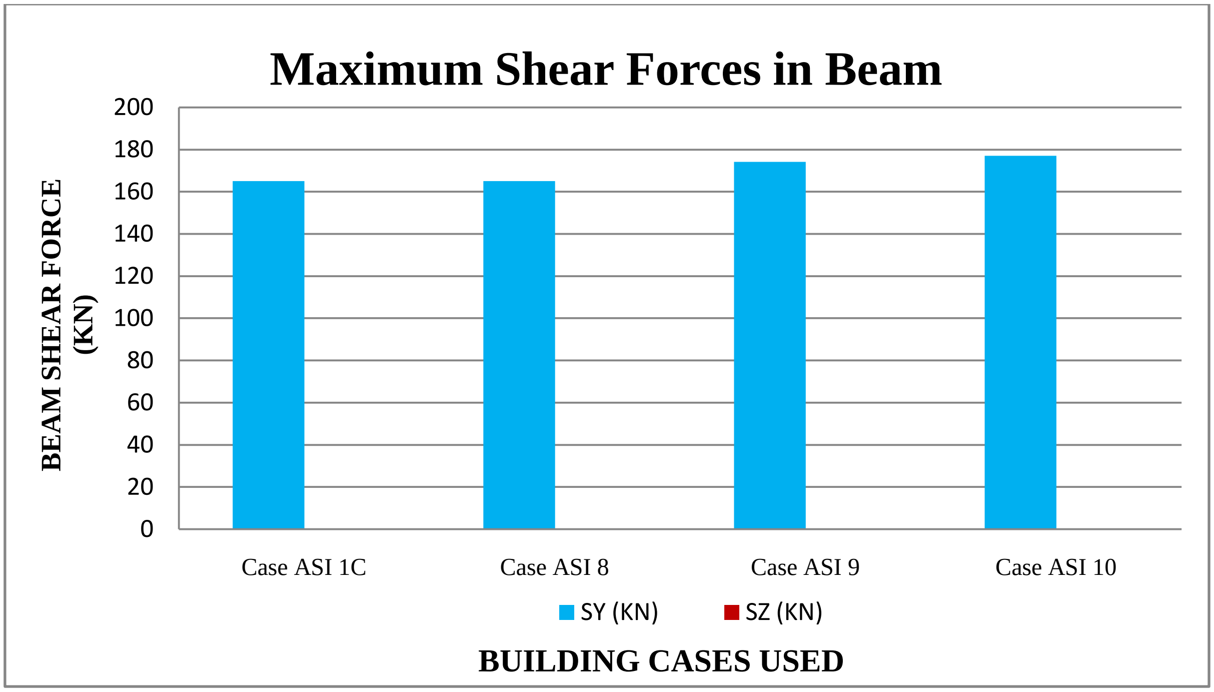

Fig. 30: Graphical Representation of Maximum Shear Force in Beam for all for Beam Stability Cases on hard soil

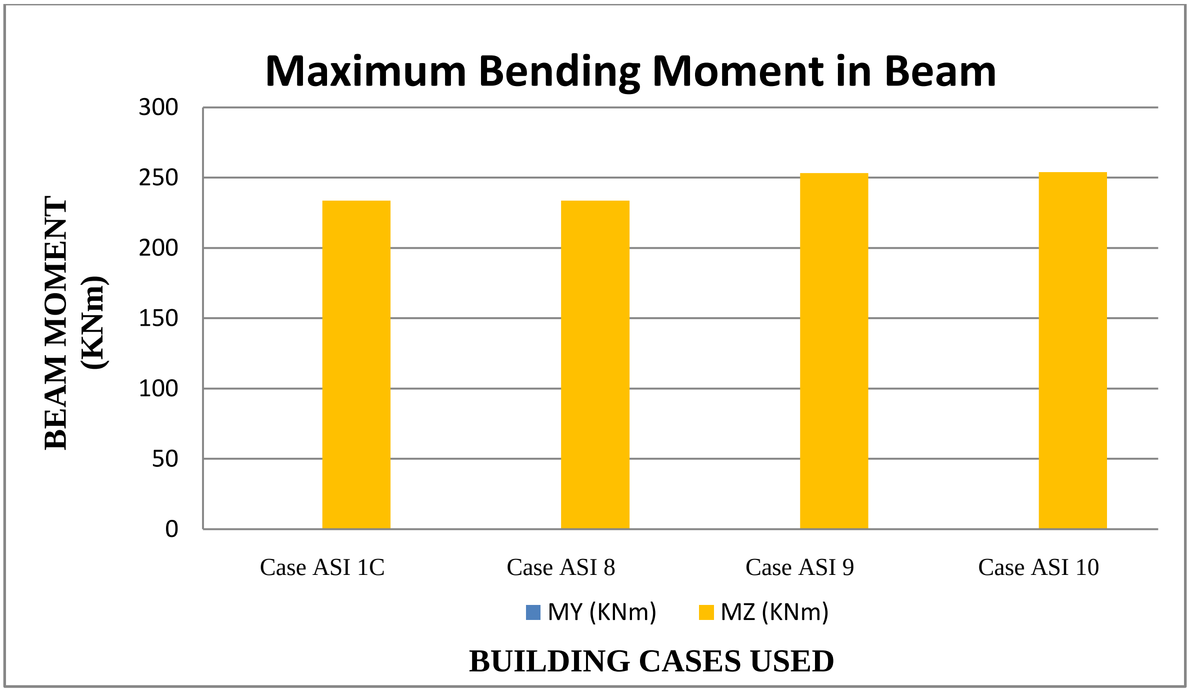

Fig. 31: Graphical Representation of Maximum Bending Moment in Beam for all for Beam Stability Cases on hard soil

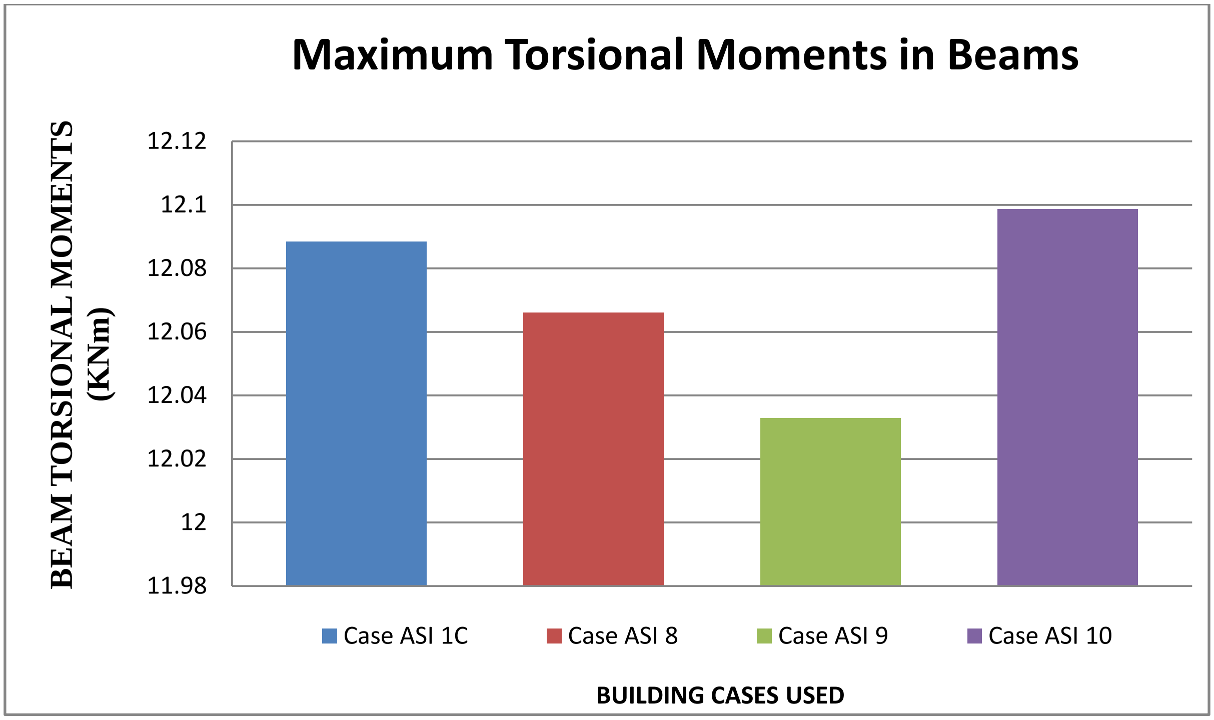

Fig. 32: Graphical Representation of Maximum Torsional Moments in Beam for all for Beam Stability Cases on hard soil

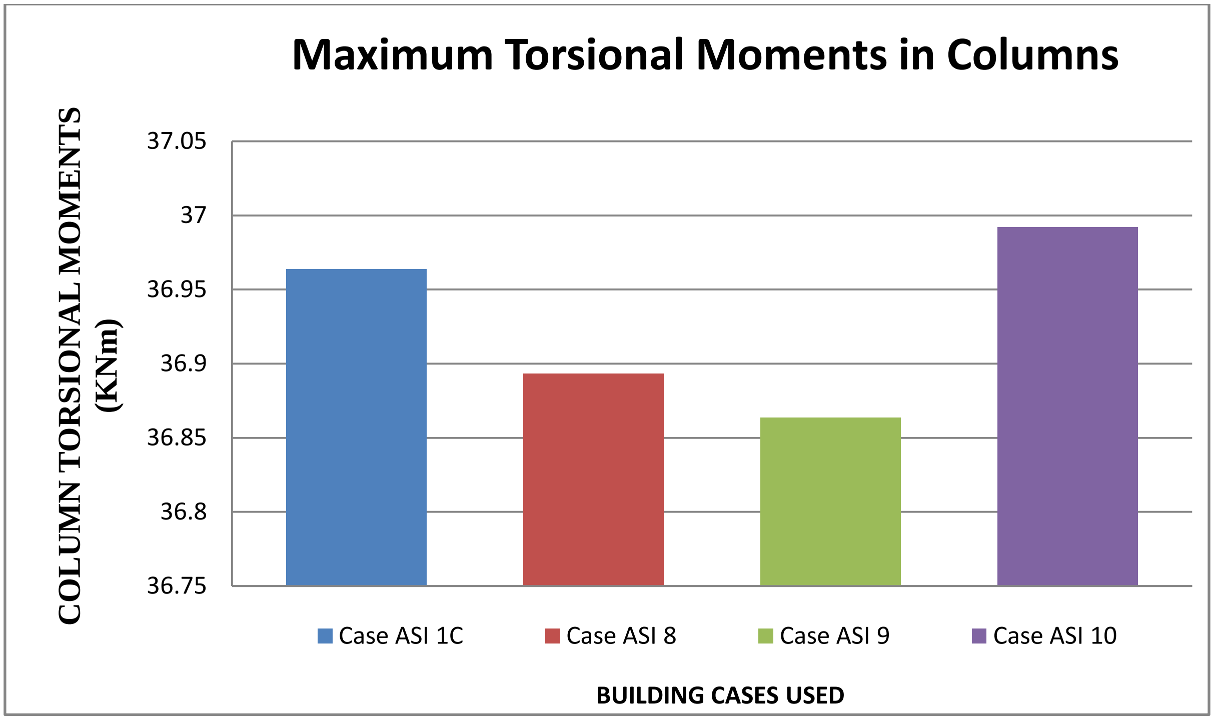

Fig. 33: Graphical Representation of Maximum Torsional Moments in Columns for all for Beam Stability Cases on hard soil

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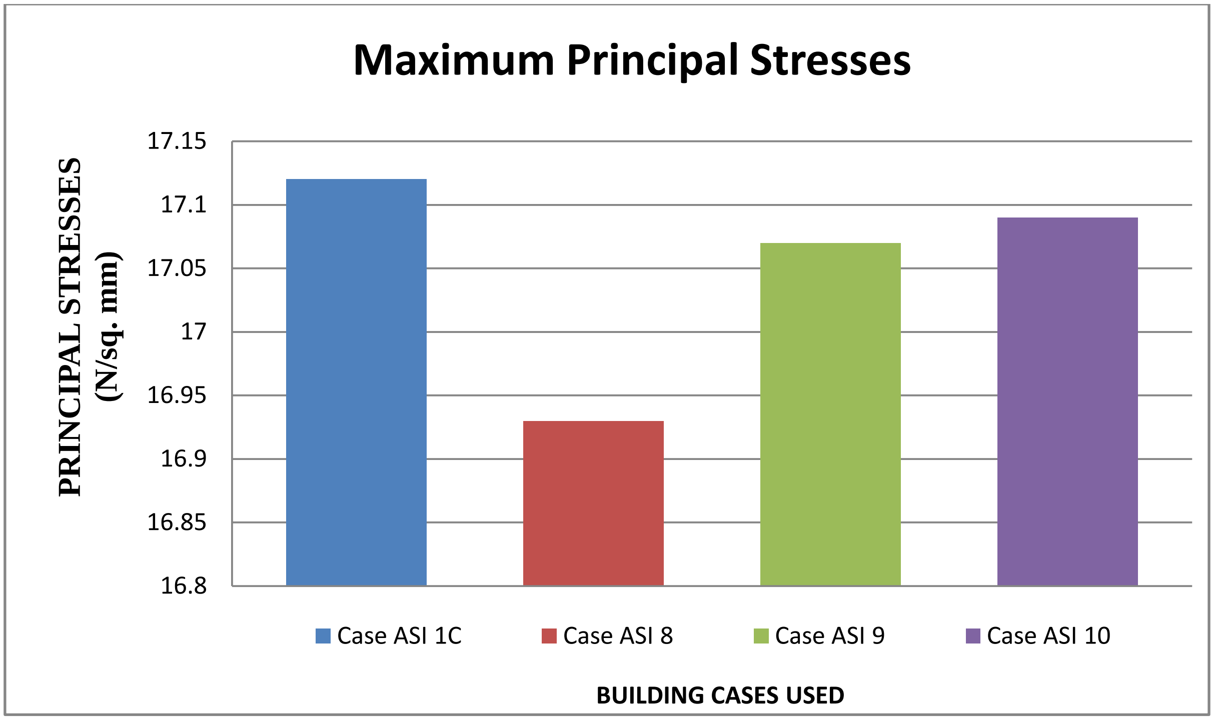

Fig. 34: Graphical Representation of Maximum Principal Stresses for all for Beam Stability Cases on hard soil

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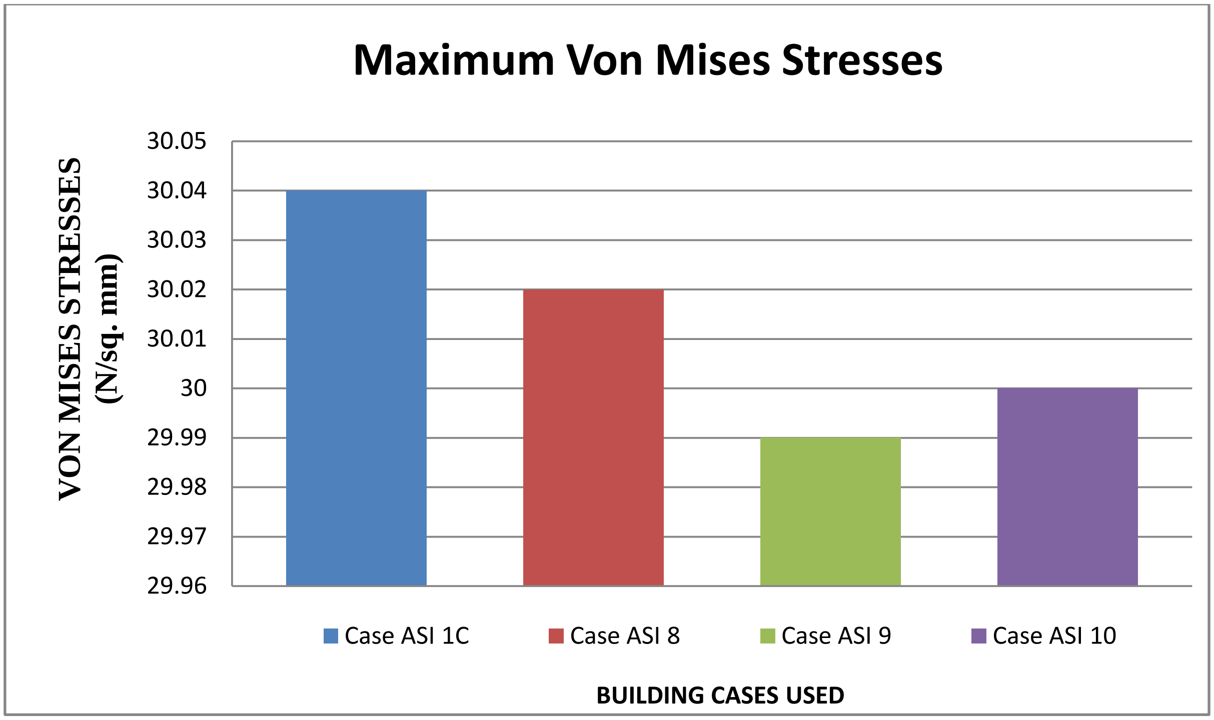

Fig. 35: Graphical Representation of Maximum Von Mises Stresses for all for Beam Stability Cases on hard soil

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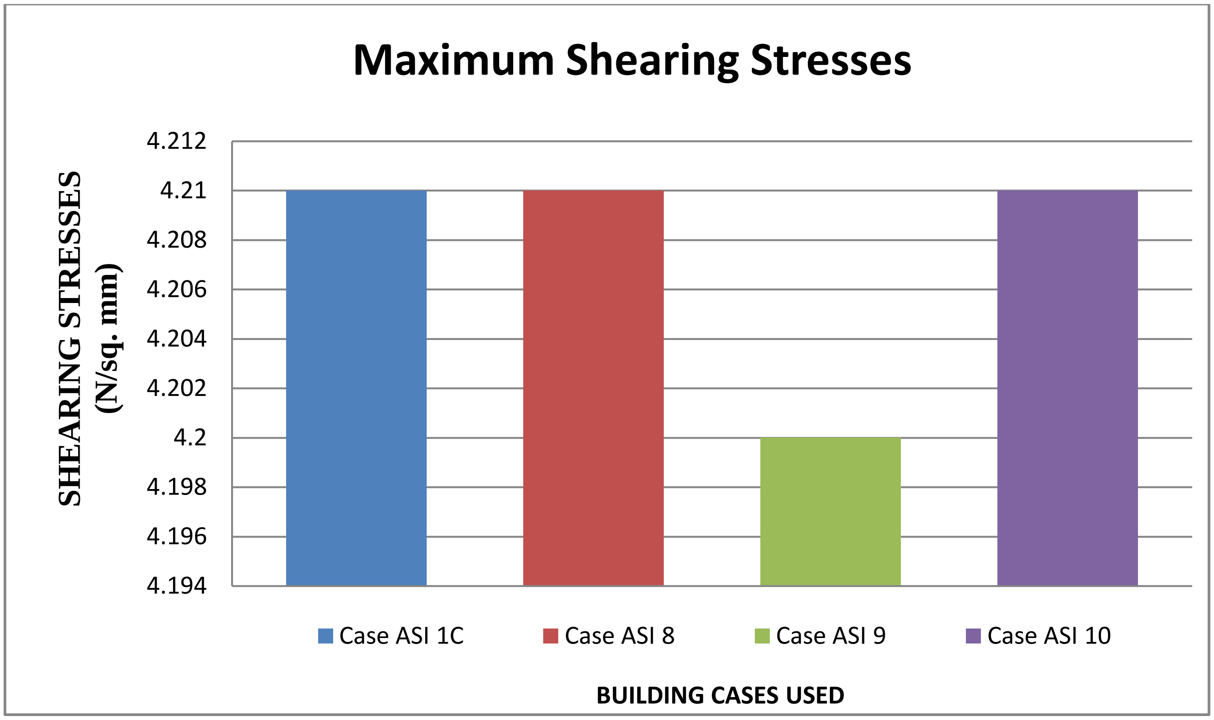

Fig. 36: Graphical Representation of Maximum Shearing Stresses for all for Beam Stability Cases on hard soil

Conclusion-

We studied about different grade of concrete in different level of building and there are 12 cases in different soil grade. In this research work we study about which floor is suitable for concrete grade for accumulative stability increment of multistoried building. On the basis of above parameters following results are obtained from this comparative study.

For Soft Soil

1. On comparing it has been concluded that the maximum displacement in X direction obtained for case 3 with a minimum value respectively in soft soil.
2. On comparing it has been concluded that the maximum displacement in Z direction obtained for case 3 with a minimum value respectively again as well as X direction.
3. As per comparative results, Case 4 for base shear forces in X direction values are efficient among all cases.
4. As per comparative results, Case 4 for base shear forces in Z direction values are efficient among all cases..

5. As per comparative results in axial force, Case 4 is very effective than other cases.
6. Comparing the column shear force for all cases shape 3 is the optimum than other cases.
7. As per comparative results in column bending moment, Case 2 is very effective than other cases.
8. Comparing the beam shear force in X direction for all cases shape 3 is the optimum than other cases.
9. Comparing the beam shear force in Z direction for all cases shape 3 is the optimum than other cases.
10. As per comparative results in beam in X direction bending moment, Case 3 is very effective than other cases.
11. As per comparative results in beam in Z direction bending moment, Case 2 is very effective than other cases.
12. On analyzing the Torsional Moment in beams Case 4 is very efficient and Torsional Moment in column case 3 is very efficient
13. As per comparative results in Smax stress case 3 is very effective than other cases.
14. Comparing the Svm Top stress for all cases case 3 is the optimum than other cases.
15. Comparing the S12 Top stress for all cases case 2 is the optimum than other cases.
16. Comparing all the parameter of building in various aspect, in Medium soil Case 3 is find out the best among all cases.

For Medium Soil

1. On comparing it has been concluded that the maximum displacement in X direction obtained for case 6 with a minimum value respectively in Medium soil.
2. On comparing it has been concluded that the maximum displacement in Z direction obtained for case 6 with a minimum value respectively again as well as X direction.
3. As per comparative results, Case 7 for base shear forces in X direction values are efficient among all cases.
4. As per comparative results, Case 7 for base shear forces in Z direction values are efficient among all cases..
5. As per comparative results in axial force, Case 7 is very effective than other cases.
6. Comparing the column shear force for all cases shape 6 is the optimum than other cases.

7. As per comparative results in column bending moment, Case 5 is very effective than other cases.
8. Comparing the beam shear force in both direction for all cases shape 6 is the optimum than other cases.
9. As per comparative results in beam in X direction bending moment, Case 6 is very effective than other cases.
10. As per comparative results in beam in Z direction bending moment, Case 5 is very effective than other cases.
11. On analyzing the Torsional Moment in beams Case 6 is very efficient and Torsional Moment in column case 6 is very efficient
12. As per comparative results in Smax stress case 5 is very effective than other cases.
13. Comparing the Svm Top stress for all cases case 6 is the optimum than other cases.
14. Comparing the S12 Top stress for all cases case 5 is the optimum than other cases.
15. Comparing all the parameter of building in various aspect, in Medium soil Case 6 is find out the best among all cases.

For Hard Soil

1. On comparing it has been concluded that the maximum displacement in X direction obtained for case 9 with a minimum value respectively in hard soil.
2. On comparing it has been concluded that the maximum displacement in Z direction obtained for case 9 with a minimum value respectively again as well as X direction.
3. As per comparative results, Case 9 for base shear forces in X direction values are efficient among all cases.
4. As per comparative results, Case 9 for base shear forces in Z direction values are efficient among all cases.
5. As per comparative results in axial force, Case 9 is very effective than other cases.
6. Comparing the column shear force for all cases shape 9 is the optimum than other cases.
7. As per comparative results in column bending moment, Case 8 is very effective than other cases.
8. Comparing the beam shear force in Y direction for all cases shape 8 is the optimum than other cases.

9. As per comparative results in beam in Z direction shear force, Case 9 is very effective than other cases.
10. As per comparative results in beam in Z direction bending moment, Case 9 is very effective than other cases.
11. On analyzing the Torsional Moment in beams Case 9 is very efficient and Torsional Moment in column case 9 is very efficient
12. As per comparative results in Smax stress case 8 is very effective than other cases.
13. Comparing the Svm Top stress for all cases case 9 is the optimum than other cases.
14. Comparing the S12 Top stress for all cases case 10 is the optimum than other cases.
15. Comparing all the parameter of building in various aspect, in Medium soil Case 9 is find out the best among all cases.

As we study in this research and also which is shown in the above result that case 3, case 6 and case 9 are the best suited case in respective soil which is respectively soft , medium and hard. The major outcome is that grading of concrete in beam accumulative stability increment of multistoried building in 8th floor consider the best suited for all type of soil.

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