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ANALYSIS OF BEAM COLUMN JUNCTION USING HIGH GRADE CONCRETE

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Abstract -*In Reinforced Concrete Framed Structure, the beam column Junction is Critical Zone. Especially when it experiences lateral loads, joints Provides a structures stability and forces at the end of member are transmitted. The beam-column joint is one of the most crucial parts of reinforced concrete constructions because it frequently experiences failure in a beam. The joints should be strong and rigid enough to resist the internal forces generated by the frame members. The Present paper is based on using high grade concrete at beam column junction. Structural model is prepared and analysis is done for the beam and node displacement.*

***Key Words*: Lateral loads, Stiffness, Beam-column joint, Node displacement, beam displacement.**

1.INTRODUCTION

In a reinforced concrete frame construction, a beam-column joint—where the elements are joined in all three directions—is an extremely important zone—is where the elements come together. The stability of a structure is ensured by joints, which also transmit forces at the ends of the members. The beam-column joint is one of the most critical parts of reinforced concrete constructions because beam failure frequently occurs at this point. Their determined behavior is brought on by a sudden change in shape and a complex stress distribution at the joint. Early on, the design of joints in structures made of reinforced concrete was mostly restricted to meeting anchorage requirements. In succeeding years, the behavior of joints was found to be reliant on a number of factors related with their geometry; amount and detailing of reinforcement, concrete strength and loading pattern. Present Paper is based on the to prepare structural model by using staad pro and analysis is done for node and beam displacement to increase joint Stiffness.

2. Methodology

By using Staad pro software, two bay symmetrical model prepared, symmetrical model was prepared as we only focus on effect of high-grade concrete at the joints. Height of each floor was 3m and center to center distance of bay was 5m. also dimensions of beam and column were assumed. Density of concrete were assumed to be 25KN/m ^{3}, modulus of elasticity was calculated. Seismic Load in both directions i.e. X and Z direction, Live Load and Dead Load these loads are considered. The various load combinations considered. Following are some of them,

1. 1.5(DL+LL)
2. 1.2(DL+LL)
3. 1.2(DL+LL+SZ)
4. 1.2(DL+LL+SX)

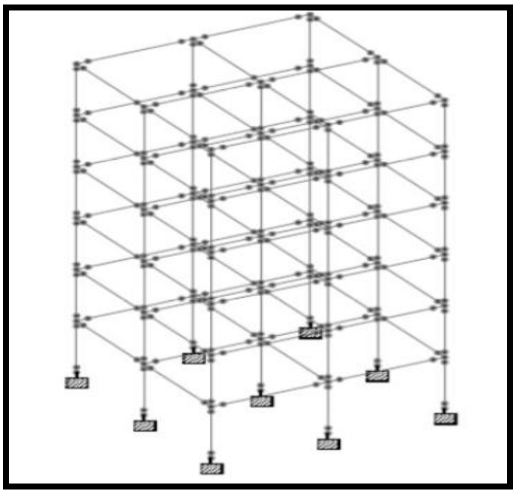


Fig: Node created at Joints

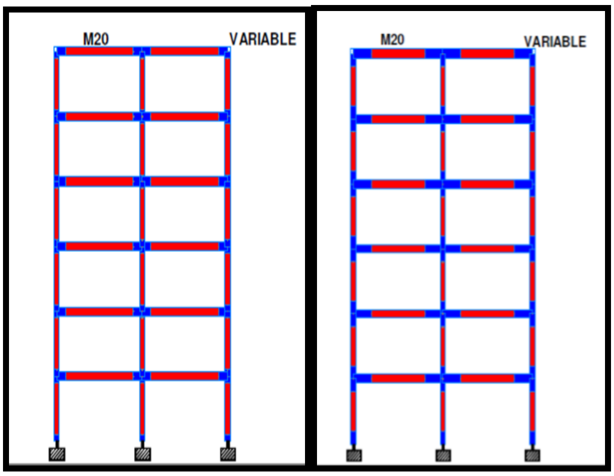


FIG: HIGH GRADE CONCRETE AT JOINTS

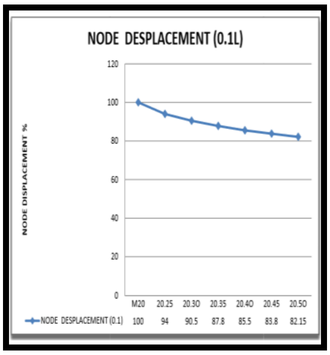
Initially M20 material was assigned and analysis is done. Then the same structure with same loading condition but the nodes where created at 0.1 length of element and 0.2 length of element respectively. In this region high grade concrete were assigned initially M25, M30, M35……up to M50.analysis was done for beam and node displacement.

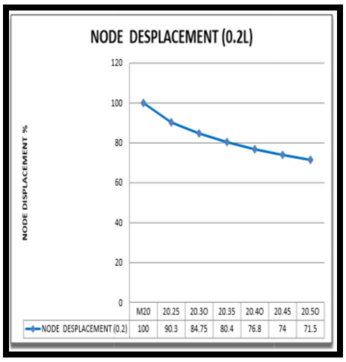
3.RESULTS-

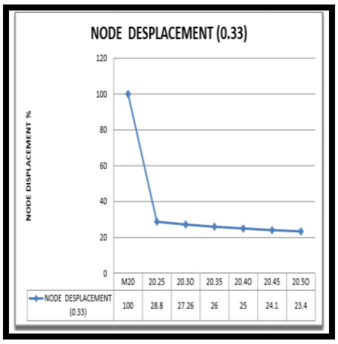
Node Displacement for 0.1 X Length of Element.

Node Displacement for 0.2 X Length of Element.

Node Displacement for 0.3 X Length of Element.



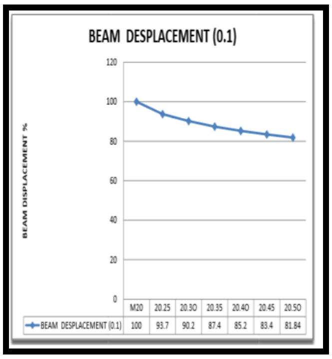


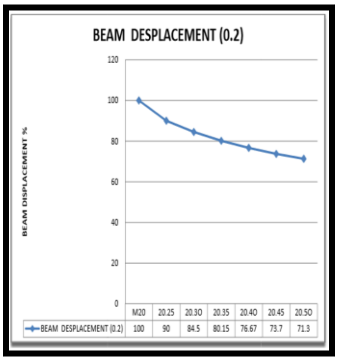


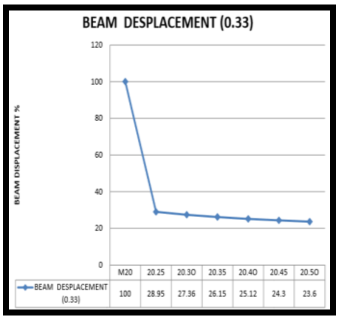
Beam Displacement for 0.1 X Length of Element.

Beam Displacement for 0.2 X Length of Element.

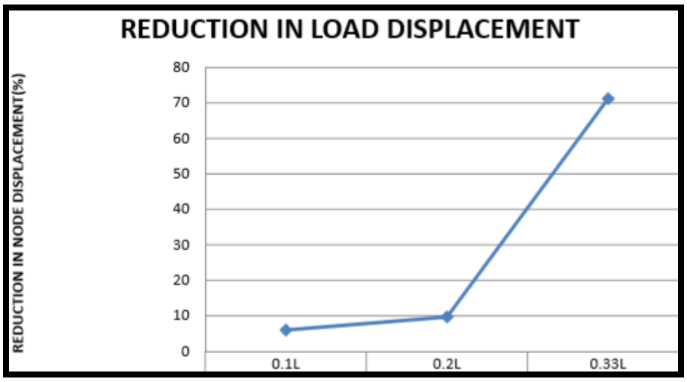
Beam Displacement for 0.3 X Length of Element.







4. CONCLUSIONS



1. For Node Displacement, improvement in joint behavior for 0.1L was very less when M20 concrete assigned but for M25, 6% reduction and for M50 20% reduction in the displacement of Joint.

2. For 0.2L reduction was 10% for M20 concrete and For M50 30% reduction in the Joint.

3. For 0.3L reduction was 72% for M20 concrete and For M50 77% reduction in the joint displacement was very significant.

4. Reduction in beam displacement when M25 concrete was assigned to 0.1L was 8% and 19% for M50 concrete.

5. Reduction in beam displacement when M25 concrete was assigned to 0.2L was 10% and 29% for M50 concrete

6. Reduction in beam displacement when M25 concrete was assigned to 0.3L was 71% and 76% for M50 concrete.

7. On increasing the grade of concrete at joint length = 0.1 L,0.2L,0.3L, max. storey drift can be reduced to 6 mm, 4mm and 0.32mm by using M50 concrete.

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