

**ANALYTICAL STUDY OF BASE ISOLATION SYSTEM  
ON MEDIUM-RISE REINFORCED CONCRETE  
BUILDING FOR INDIAN SUBCONTINENT**

भारतीय उपमहाद्वीप के लिए मध्यम-राइज़ प्रबलित कंक्रीट बिल्डिंग  
पर बेस आइसोलेशन सिस्टम का विश्लेषणात्मक अध्ययन

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The primary goal of this effort was to analyze and construct a medium-rise reinforced concrete framework that used base isolation bearings. When opposed to a fixed base construction, base isolator bearing optimization produces better outcomes. Time duration, base shear, storey displacement, storey drift, percentage of steel reduction, and overall cost economy are several of the characteristics that examined for their effect.

In the present study, a G+12 storey & G+22 storey RC building was analyzed using response spectrum method for Case (a) G+12 Storey RC Structure viz. Case-I: Fixed base structure, Case-II: LRB base structure & Case-III: TFPB base structure and Case (b) G+22 Storey RC Structure Viz. Case-IV: Fixed base structure, Case-V: LRB base structure & Case-VI: TFPB base structure. According to chapter 6's (Analysis of Results) findings, base isolation systems are more important during earthquakes than fixed based framework.

The Time period in Case-II & Case-V is increased by 26.23% and 14.89% respectively and in Case-III & Case-VI is increased by 17.60% and 11.63% respectively which result into increase in reaction time of structure during earthquake against fixed base framework Case-I & Case-IV.

The Base shear in Case-II & Case-V is reduced by 61.07% and 42.81% respectively and in Case-III & Case-VI is reduced by 62.91% and 44.45% respectively which reduces the seismic effect on framework during earthquake against fixed base framework Case-I & Case-IV.

The Storey-displacement in Case-II & Case-V is increased by 58.74% and 39.76% respectively and in Case-III & Case-VI is increased by 49.41% and 30.94% respectively makes framework more flexible during earthquake against fixed base framework Case-I & Case-IV.

The Storey-drift in Case-II & Case-V is reduced by 64.06% and 55.07% respectively and in Case-III & Case-VI is increased by 49.72% and 44.14% respectively which makes the structure ideally stiff & Compared to fixed Case-I & Case-IV, the structure sustains less damage. The storey-drift obtained are well within the limit as per IS 1893:2016.

The percentage of steel in Case-II & Case-V is reduced by 25.67% and 21.20% respectively and in Case-III & Case-VI is reduced by 26.69% and 21.98% respectively which result into cost saving against fixed base framework Case-I & Case-IV.

The Overall cost economy in Case-II & Case-V the construction cost is fairly increased by 7.00% and 8.00% respectively and in Case-III & Case-VI the construction cost is fairly increased by 4.00% and 5.33% respectively as against to fixed base framework Case-I & Case-IV.

From the above studied, we can conclude that the effectiveness of the LRB based isolated structure is better TFPB based isolated structure. Base isolation system plays a vital role at the time of earthquake and perform well compare to fixed base structure. Cost difference is also very limitedly increased by approx. 7.0 to 8.0% for LRB and 4.0 to 6.0% for TFPB. With base isolation system provision, a structure is offered a discount of approx. 30% by Insurance Company. With base isolation system provision, maintenance cost of the structure is reduced which increases the life of structure compared to fixed base structure.

## **7.1 Future Work**

Here we have consider square building with residential usage loading criteria from Indian Standards and height limitation of 45 meter and 70 meter according to the DCR. One can take rectangle / square building and can go beyond 70 meter height and also can analyze for commercial buildings.