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Patent Search

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Abstract:

Progressive collapse refers to the phenomenon in which the local damage of a primary structural element leads to total or partial structural system failure, without a proportionality between the initial and final damage. Even if the probability of structural collapse is low, if it occurs, it can cause significant losses. In the past few decades incidents of the total or partial collapse of structures due to fire, explosions or impacts have occurred. In the present invention, Multi storey structure is considered. T and analysis are carried out using E-tabs software. The different bracing systems are used to analysis the structural behavior. The Structure is later verified for progressive collapse analysis at 3 different locations such as corner, Centre and middle of the structure. The progressive analysis is carried out and results are extracted and displacement control can be easily achieved by providing bracings. The displacement of bare frame models can be reduced by 55%, 55% and 63% by adopting bracing Diagonal bracing, V Bracing and X Bracing systems. The progressive collapse analysis shows the failure of upper level beams. It is estimated that, the maximum increase percentage of DCR value for beams are around 38%, 52% and 59% for location A, B and C respectively. And hence the beams are super designed for these additional avoid progressive collapse. From the overall results, it is concluded that, the bracings are very much necessary for the reductions of displacement and drift effect in a However, its Importance is not of much use in case of progressive collapse state. The X Bracings are preferred for bracing system.

Complete Specification

Description: Bracing systems are very simple to construct and also to understand the theory behind it. This system is the economic way to construct a lateral load resistant system. These systems are in expensive and works exactly like truss behaviour. It will not transfer the bending moment. It can only transfer the axial loads. Bracing take care of lateral loads whereas frames take care of axial loads.

The primary function of bracings is to provide stability and resist lateral loads, either from diagonal steel members or from concrete 'core'. Due to bracing, displacement of the structure gets reduced considerably it is up to 90% but in case of X-bracing material required will be more and hence V or Inverted V bracing effectively resist the displacement as compared to all other types of bracings. Using bracing systems axial reaction is reduced and hence the footing size also gets reduced. Also, reduction in moment at base will definitely help to reduce the size of the footing and due to bracing the torsional moment in base column increases.

In this invention the different bracings such as Diagonal bracing, V Bracing and X Bracing systems are used to analysis the structural behavior. The Structure is later verified for progressive collapse analysis at 3 different locations such as corner, Centre and middle of the structure. The progressive analysis is carried out and results are extracted and discussed activity. However, fully braced systems are having highest rigidity compared to partially braced system.

The biggest aim of the engineer is to achieve the highest stability of the structure with nominal structural cost. The Shear wall and Bracing systems are found to be effective in achieving this. These systems are also reliable and works effective under lateral force effect.

In this present invention, 20 storey building is considered for the analysis. And attempts are made to invention the behavior of the structure in severe wind and earthquake zones of India and seven models (bare frame, bare frame with V bracing, bare frame with inverted V bracing, bare frame with diagonal bracing, bare frame with X bracing, bare frame with shear wall at centre and bare frame with shear wall at ends) are analyzed using ETABS 2017 software by equivalent static method of analysis.

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