

## **A SEISMIC STUDY BY PERFORMANCE BASED ENGINEERING AT ZONE-II BHOPAL.**

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**ABSTRACT-** From the consequences of serious earthquakes (since the first 1980s) it's terminated that the seismic risks in urban area unites area unit increasing and are off from socio-economically acceptable levels. there's associate degree imperative got to reverse this case and it's believed that one in all the foremost effective ways that of doing this is often through: (1) the event of a lot of reliable seismic standards and code provisions than those presently offered and (2) their rigorous implementation for the entire engineering of latest engineering facilities [9]. A performance-based style is aimed toward dominant the structural injury supported precise estimations of correct response parameters. this is often attainable if a lot of correct analyses area unit dispensed, as well as all potential necessary factors concerned within the structural behavior [6].

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### **(2). INTRODUCTION**

Performance based mostly earthquake engineering implies style, evaluation, construction, observation to perform and maintenance of designed facilities whose performance below unstable hundreds responds to the various desires and objectives of householders users and society. it's supported the premise that performance is foretold and evaluated with quantitative confidence to form, at the side of the shopper, intelligent and well-read trade-offs supported life-cycle concerns instead of construction price alone [7]. PBEE could be a fascinating idea whose implementation contains a good distance to travel. There are legal and skilled barriers however there also are several queries whether or not PBEE are able to deliver its guarantees. It guarantees designed structures whose performance is quantified and confirmed to the owner's wishes. PBEE implies, as an example, accepted harm in unstable events, if that proves the foremost economic resolution. This needs, however, that structural engineers be able to predict these damages and there chance therefore on build well-read selections. Implementation of such a style call method necessitates a shift off from the dependence on empirical and experience-based conventions, and toward a style and assessment method a lot of firmly frozen within the realistic prediction of structural behaviour below a practical description of the spectrum of loading environments that the structure can expertise within the future. This means a shift toward a lot of scientifically directed style and analysis approach with stress on a lot of correct characterization and predictions, typically supported a better level of technology than has been utilized in the past.

### **(3). METHODOLOGY**

In this study, steel reinforcement ratios square measure taken as style variables throughout the planning improvement method. Miss treatment the principle of virtual work, the nonlinear spring less unstable drift responses generated by the pushover analysis are often expressly expressed in terms of part style variables. Associate optimality criteria technique is conferred during this paper for determination the specific performance-based unstable style improvement drawback for RC buildings. 2 building frame examples square measure conferred parenthetically the effectiveness and utility of the projected optimum style methodology. The design improvement procedure for limiting performance-based unstable drifts of associate RC building structure is listed as follows:

1. Establish associate initial style with optimum member dimensions, which might be obtained from the elastic unstable style improvement by minimizing the concrete value of associate RC structure subjected to a minor earthquake loading mistreatment the elastic response chemical analysis methodology [37].
2. Verify the planning spectra; admire completely different earthquake demand levels, which can be employed in the nonlinear pushover analysis.
3. Conduct a static virtual load analysis to get the member internal forces that may be employed in formulating springless drift responses by using the principle of virtual work.
4. On the premise of the optimum member size, verify the minimum and most size bounds of the steel reinforcement ratios,  $\rho_i$  and  $\rho_u$ , in accordance with the strength-based code needs.

5. Apply the initial pre-processor on the premise of a representative single drift constraint to determine an affordable beginning set of steel reinforcement style variables for the multiple drift strained improvement.
6. Perform the nonlinear pushover analysis mistreatment commercially accessible package like the SAP2000 package [14] to see the performance purpose of the structure and therefore the associated springless drift responses of the structure at the performance purpose.
7. Hunt the locations of the plastic hinges, establish the instant lower and edge move limits of pi for those members with plastic hinges and verify the values of the first-order and second order derivatives of the drift responses.
8. Establish the specific interstory drift constraints employing a second-order Taylor series approximation and formulate the specific style drawback.
9. Apply the algorithmic Optimality Criteria improvement algorithmic program to size all steel reinforcement style variables and to spot the active springless drift constraints.
10. Check convergence of the steel value and therefore the springless drift performance of the structure. Terminate with the optimum style if the answer convergence is found; otherwise, come back to Step half-dozen.

#### (4). FIGURES

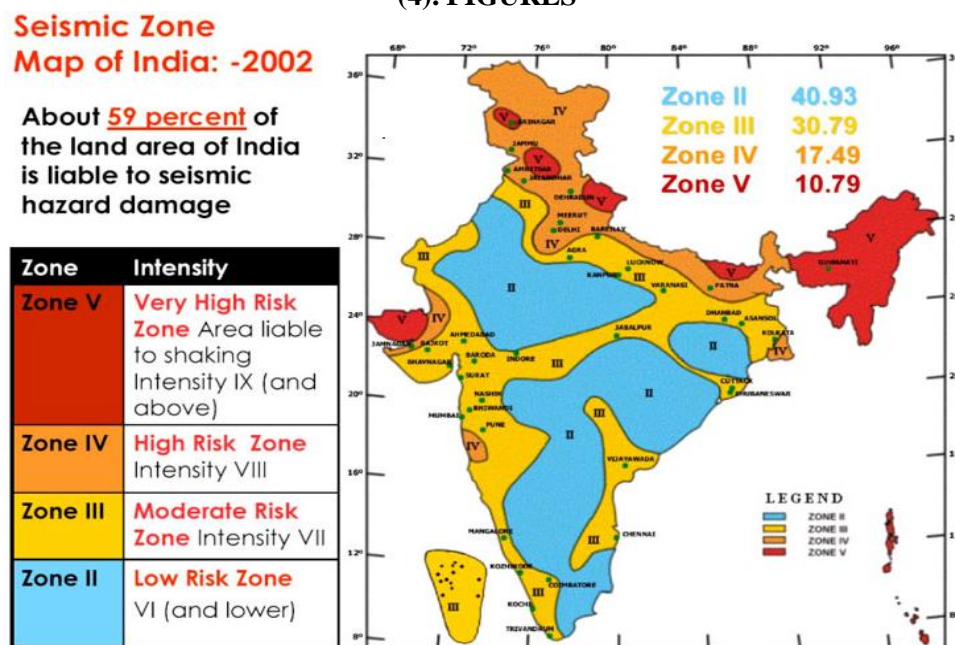
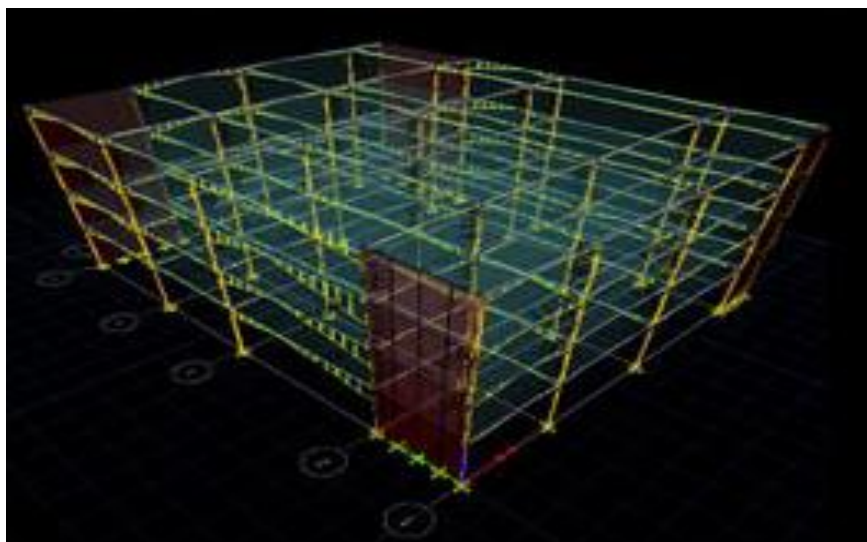
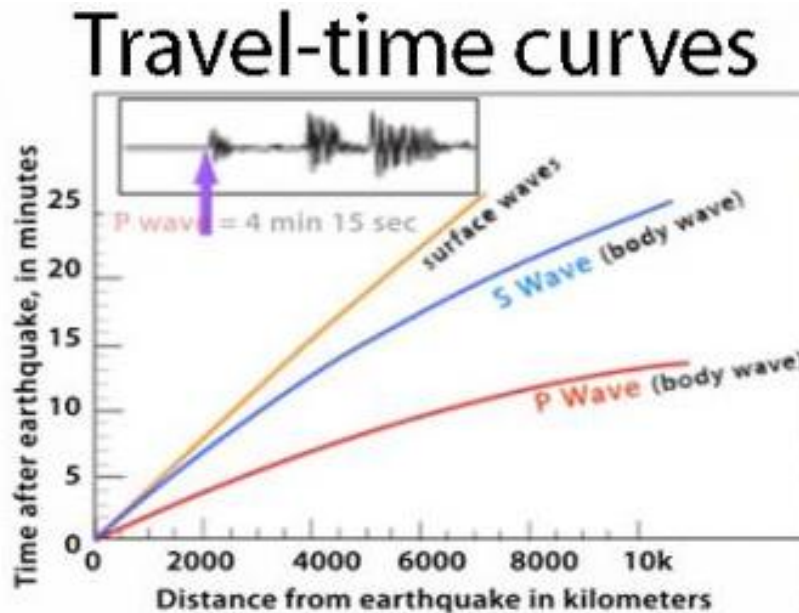


Fig. 1 Seismic zonation and intensity map of India



ISOMETRICAL VIEW OF STRUCTURE



## (5). RESULTS & CONSLUSION

In this study of performance in institutional building frames is studied considering varied combination and seismic parameters. Results of this constant quantity study are as follows

- 1) In beam forces, most bending moment and most shear force are calculated and it's observed that second floor is essential and ground floor is economical attributable to direct contact with soil and foundation.
- 2) In column force, most axial force is calculated and it's discovered that most loads is in base columns as a result of it resist complete load of institutional building and as seen in high floor axial force is reduced up to four times of base
- 3) In joint displacement, most displacement is seen in high floor in each direction (X and Z direction)
- 4) In section displacement, most displacement is seen in storey section in each direction (X and Z direction)
- 5) Irregularity in plan can result in complex dynamics and irregular response as the above discussion in performance analysis the irregular responses we are getting for models.
- 6) Where Plan irregularities exist, check the lateral-force resisting elements using a dynamic analysis so that more realistic lateral load distribution can be achieved because irregularity in plan can result in irregular response so to resist the lateral loads it is necessary to check lateral- force resisting elements.
- 7) The Complete quadratic combination (CQC) rule for modal combination is applicable to a wider class of structures as it overcomes the limitations of the other rule because the method is based on random vibration theory.

## ADVANTAGES OF PERFORMANCE-BASED SEISMIC DESIGN

In distinction to prescriptive style approaches, performance-based style provides a scientific methodology for assessing the operating capability of a building. It are often wont to verify the equivalent performance of alternatives, deliver commonplace performance at a reduced price, or make sure higher performance required for vital facilities [6]. It additionally establishes a vocabulary that facilitates purposeful discussion between stakeholders {and style|and style} professionals on the event and choice of design choices. It provides a framework for determinative what level of safety and what level of property protection, at what price, are acceptable to stakeholders based mostly upon the precise desires of a project. Performance-based seismic design can be used to:

- Design individual buildings with the next level of confidence that the performance supposed by gift building codes are going to be achieved.
- Design individual buildings that square measure capable of meeting the performance supposed by gift building codes, however with lower construction prices.
- Design individual buildings to realize higher performance (and lower potential losses) than supposed by gift building codes.
- Assess the potential unstable performance of existing structures and estimate potential losses within the event of an unstable event.

- Assess the potential performance of current prescriptive code necessities for brand spanking new buildings, and function the idea for enhancements to code-based unstable criterion in order that future buildings will perform a lot of systematically and faithfully.

Performance-based unstable style offers society the potential to be each additional economical and effective within the investment of economic resources to avoid future earthquake losses. Further, the technology wont to implement performance-based unstable style is transferable, and might be tailored to be used in performance-based style for alternative extreme hazards as well as fireplace, wind, flood, snow, blast, and terrorist act.

The advantages of PBSB over the methodologies used in the current seismic design code are summarized as the following six key issues [37]:

- Multi-level unstable hazards area unit thought-about with a stress on the transparency of performance objectives.
- Building performance is secured through restricted inflexible deformation additionally to strength and malleability.
- Unstable style is adjusted by performance objectives understood by engineering parameters as performance criteria.
- Associate analytical technique through that the structural behaviours, significantly the nonlinear behaviour is rationally obtained.
- The building can meet the prescribed performance objectives dependably with accepted confidence.
- The planning can make sure the minimum life-cycle value

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