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A Review of Seismic Evaluation and Strengthening of R.C Framed Structure

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ABSTRACT

Late tremors in India demonstrate that non-built as well as designed structures in our nation are powerless even to direct quakes. Indian Standard IS 1893 is overhauled in 2002. Various structures those were planned according to the past code may not conform to the present code. Along these lines assessing seismic execution of a structure and proposing reasonable retrofit measure is a significant zone of concentrate in this specific circumstance. In the present examination an endeavor has been made to assess a current structure situated in Bhopal (seismic zone V) utilizing proportional static investigation. Indian Standard IS-1893:2002 (Part-1) is pursued for the comparable static examination methodology. Building is displayed in business programming STAAD Pro. Seismic power interest for every individual part is determined for the plan base shear as required by Seems to be 1893:2002. Relating part limit is determined according to Indian Standard IS456:2000. Insufficient individuals are distinguished through interest to-limit proportion. Various shafts and segment components in the primary floor of the present structure are observed to be inadequate that needs retrofitting. A neighborhood retrofitting procedure is embraced to redesign the limit of the insufficient individuals. This investigation demonstrates that steel jacketing is a proficient method to retrofit RC individuals to improve flexure just as shear limit.

Keywords: STAAD Pro., Seismic Force, Seismic Performance, Retrofit, Shear Capacity.

I. INTRODUCTION

Retrofitting alludes to the expansion of new innovation or highlights to more seasoned frameworks. control plant retrofit, improving force plant effectiveness/expanding yield/diminishing emanations. home vitality retrofit, the improving of existing structures with vitality effectiveness hardware.

Benefits of a retrofit

- Saving on capital use while profiting by new advancements
- Optimization of existing plant segments
- Adaptation of the plant for new or changed items
- Increase in piece number and process duration
- Guaranteed save parts accessibility
- Reduced upkeep costs and expanded unwavering quality.

Manufacturing

Principally retrofitting portrays the measures taken in the assembling business to permit new or refreshed parts to be fitted to old or obsolete congregations (like sharp edges to wind turbines). The creation of retrofit parts is vital in production when the structure of an expansive get together is changed or overhauled. In the event that, after the progressions have been

actualized, a client (with an old form of the item) wishes to buy a new part at that point retrofit parts and collecting methods should be utilized so the changed parts will fit reasonably onto the more seasoned gathering. Retrofitting is a significant procedure utilized for valves and actuators to guarantee ideal task of a modern plant. One model is retrofitting a 3-path valve into a 2-way valve, which brings about shutting one of the three openings to keep utilizing the valve for certain mechanical frameworks. Retrofitting can improve a machine or framework's general usefulness by utilizing progressed and refreshed gear and innovation, for example, incorporating Human Machine Interfaces into more established industrial facilities. Another case of this is vehicle altering, where more established vehicles are fitted with new innovations: control windows, journey control, remote keyless frameworks, electric fuel siphons, and so on.

Objective

To perform seismic assessment of a private structure in Bhopal and give strategies to retrofitting of individuals in the event that the individuals bomb under the heap blends recommended in IS 1893-2002

II. LITRECHAR REIVEW

C.Neeladharan et al (2017) was considered R.C segments display pain and breakdown because of different elements and thus need fortifying. In this examination the execution of R.C. bars is fortified by epoxy infusion and Ferrocement.15 light emissions cross area were threw utilizing M20 grade concrete and were tried for breakdown load. Further shafts were focused on upto 70%, 80%, 85%, and 90% individually. The examination demonstrates that upto 85% the pre-harmed pillars can be fortified utilizing epoxy and Ferro bond.

Dinesh Kumar et al (2018) was researched completed to examine the RC Beams Retrofitted by fibrocement Laminates with expansion of Alcco fine. Examination concerning the exchange of powers over the solid fibrocement interface, the impacts of the dimension of harm continued by the first bars preceding fix. The outcomes demonstrate that fibrocement is a suitable elective fortifying segment for the restoration of strengthened solid structures. The task has approved and assessed the flexural conduct of RC bars with various extents of incomplete substitution of bond by Alcidine in fibrocement overlays. And furthermore finishes up as Retrofitted shaft relating to 10% and 20% of Alcco fine has the most noteworthy burden conveying limit when contrasted with other example. Besides, subsequent to retrofitting all the example demonstrated decreased break width, huge redirection at a definitive burden

III. METHODS AND MATERIAL

The approach received to play out the seismic assessment of the structure requires a comprehension of equal sidelong power technique likewise perceived as proportional static strategy in writing.

An inside and out learning of STAAD Pro programming is required as the structure was demonstrated in STAAD Pro and post examination information got from it was utilized in the investigation of the structure. The interest to limit proportion of individuals was determined to examine the seismic dependability of the structure under the different burden blends as per IS 1893-2002 (section 1) Appropriate retrofit measures were proposed for bars and sections bombing in shear and flexure

Response spectra

A reaction range is a plot of the pinnacle or consistent state reaction (removal, speed or increasing speed) of a progression of oscillators of changing common recurrence, that are constrained into movement by a

similar base vibration or stun. The subsequent plot would then be able to be utilized to pick off the reaction of any straight framework, given its normal recurrence of wavering. One such use is in evaluating the pinnacle reaction of structures to tremors. The exploration of solid ground movement may utilize a few qualities starting from the earliest stage range (determined from chronicles of surface ground movement from seismographs) for relationship with seismic harm. In the event that the info utilized in ascertaining a reaction range is relentless state intermittent, at that point the enduring state result is recorded. Damping must be available, or else the reaction will be vast. For transient information, (for example, seismic ground movement), the pinnacle reaction is accounted for. Some dimension of damping is commonly expected, yet an esteem will be gotten even with no damping..

Seismic Evaluation Methods

Seismic assessment strategies:
Starter examination
Itemized assessment
Starter examination:
The starter assessment is a brisk method to set up genuine basic format and survey its attributes that can influence its seismic defenselessness. It is an estimated strategy dependent on traditionalist parameters to recognize the potential seismic tremor danger of a structure and can be utilized for screening of structures for point by point assessment. It additionally causes the plan designers to get to know the structure, its potential inadequacies and conduct. A site visit is done as a piece of starter examination so as to acclimate with the structure and observe the ground conditions which are not announced in the illustrations.

IV. RESULTS AND DISCUSSION

The outcomes got for the dcr values and the status of the individuals in the structure are talked about beneath. The outcomes are for light emissions 2 and arbitrary segments were chosen (explicitly the establishment ones) and their dcr values were determined

Table 4.1 : status of beams of level 2 in flexure

beam no.	beam type	dcr	status
21101	1b3	2.08	fail
21102	1b3	1.99	fail
21103	1b3	1.66	fail
21104	1b3	1.60	fail
21105	1b3	1.59	fail
21106	1b3	1.57	fail
21107	1b3	1.74	fail
21108	1b3	1.87	fail
21111	1b6	0.01	safe
21112	1b6	0.01	safe
21121	1b4	-0.15	safe
21122	1b4	1.82	fail
21123	1b4	1.84	fail
21124	1b4	1.06	fail
21201	1b8	0.01	safe
21202	1b8	-0.97	safe
21203	1b8	-1.07	fail
21204	1b8	1.52	fail
21205	1b8	1.94	fail
21206	1b8	1.65	fail
21207	1b8	-0.26	safe
21208	1b8	-0.68	safe

21209	1b8	-0.70	safe
21210	1b8	0.01	safe
21211	1b6	0.01	safe
21221	1b5	0.01	safe
21222	1b5	1.87	fail
21223	1b5	2.43	fail
21224	1b5	1.67	fail
21225	1b5	2.46	fail
21226	1b5	1.87	fail
21227	1b5	0.01	safe
21301	1b9	2.45	fail
21302	1b9	1.17	fail
21303	1b9	-1.02	fail
21304	1b9	2.40	fail
21305	1b9	0.01	safe
21306	1b9	-0.69	safe
21307	1b9	-0.50	safe
21308	1b9	0.01	safe
21311	1b4	1.15	fail
21312	1b4	1.54	fail
21313	1b4	-0.74	safe
21314	1b4	-0.72	safe
21315	1b4	1.51	fail
21316	1b4	1.13	fail
21401	1b5	2.24	fail
21402	1b5	-0.12	safe
21403	1b5	-0.82	safe
21404	1b5	2.08	fail
21411	1b5	-0.08	safe
21412	1b5	-0.08	safe
21421	1b5	1.81	fail
21422	1b5	-0.88	safe
21423	1b5	-0.09	safe
21424	1b5	1.73	fail
21501	1b2	1.68	fail
21502	1b2	-0.38	safe
21503	1b2	1.42	fail
21504	1b2	1.57	fail
21505	1b2	1.55	fail
21506	1b2	1.57	fail
21507	1b2	1.55	fail
21508	1b2	1.41	fail
21509	1b2	-0.39	safe
21510	1b2	1.62	fail
22101	1b10	2.57	fail
22111	1b10	2.49	fail
22112	1b10	-2.42	fail
22121	1b10	-0.24	safe
22132	1b11	0.01	safe
22141	1b15	0.01	safe
22142	1b15	1.18	fail
22143	1b15	0.01	safe
22151	1b12	0.01	safe
22152	1b12	0.01	safe
22161	1b5	0.01	safe
22171	1b7	-0.98	safe

22172	1b7	-1.26	fail
22181	1b13	2.23	fail
22182	1b13	-1.11	fail
22201	1b5	2.76	fail
22202	1b5	-2.35	fail
22203	1b5	2.15	fail
22204	1b5	-1.11	fail
22205	1b5	-2.06	fail
22221	1b5	2.91	fail
22231	1b5	2.38	fail
22232	1b5	1.34	fail
22301	1b13	2.05	fail
22302	1b13	0.01	safe
22303	1b13	1.39	fail
22311	1b5	0.01	safe
22312	1b5	0.01	safe
22321	1b5	0.01	safe
22322	1b5	0.01	safe
22331	1b5	2.41	fail
22332	1b5	1.36	fail
22341	1b5	2.93	fail
22401	1b5	3.06	fail
22402	1b5	-2.33	fail
22403	1b5	2.44	fail
22404	1b5	-1.68	fail
22405	1b5	-2.11	fail
22411	1b13	1.14	fail
22412	1b13	0.01	safe
22421	1b7	0.01	safe
22422	1b7	0.01	safe
22431	1b5	0.01	safe
22441	1b12	0.01	safe
22442	1b12	0.01	safe
22451	1b15	-0.87	safe
22452	1b15	-1.00	safe
22453	1b15	0.01	safe
22461	1b11	0.01	safe
22471	1b10	-1.47	fail
22501	1b10	2.61	fail
22502	1b10	-2.37	fail
22511	1b10	2.59	fail

V. CONCLUSION

The results for first floor beams and a large sample of columns showed that a number of beams and all the foundation columns checked were found to be deficient under the applied seismic load combinations. Number of beams failing under flexure was more than the number of beams failing under shear. The dcr of columns under biaxial bending gradually decreased with height, although it was greater than one in most of the cases.

For providing retrofit measures for the deficient members, concrete jacketing was found to be a suitable method for retrofitting of columns. It was also concluded that steel plating would be an efficient method of retrofitting of a number of deficient beams.

VI.FUTURE SCOPE

- In the proportionate static system of seismic examination, the seismic burdens are connected

to the focal point of mass of the story, yet in STAAD Pro I have accepted the seismic burdens to be nodal stacks and connected it to hubs isolating the absolute horizontal story stacks in equivalent extent per hub and not at the definite focus of mass of the story.

- While considering retrofit measures for the structure, investigation of structure post concrete jacketing was kept outside the extent of this examination and just flexural examination of individuals post steel plating was taken up. It was accepted that there would be adequate grip among plates and cement so that there is no disappointment because of holding.

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VII. REFERENCES

[1]. http://help.solidworks.com/2012/English/SolidWorks/cworks/c_Definitions_Response_Spectra.htm.
[2]. A. Meher Prasad: “Response Spectrum”, Department of Civil Engineering, IIT Madras
[3]. Bobby Motwani: “Are We Ready for El Centro”.
[4]. Pankaj Agarwal, Manish Shrikhande: “Earthquake Resistant Design of Structures”, PHI Learning Private Limited, 2011.
[5]. David T. Finley, Ricky A. Cribbs: “Equivalent Static vs Response Spectrum – A comparision of two methods”
[6]. Durgesh C. Rai, “Seismic Evaluation and Strengthening of Existing Buildings”, IITK-GSDMA –EQ24-V2.0
[7]. http://www.microstran.com/faq_dynamics.htm#ResponseSpectrumAnalysis.
[8]. Joao Luis Domingues Costa: “Standard Methods for Seismic Analyses”, Report BYG.DTU R-064, 2003