



ISIR Journal of Arts, Humanities and Social Sciences (ISIRJAHSS)

ISSN: XXXX-XXXX (Online)

Frequency: Bimonthly

Published By ISIR Publisher

Journal Homepage Link- <https://isirpublisher.com/isirjahss-home/>

ISIRJAHSS Vol - 1 Issue - 1 (July - August) 2024

OPEN ACCESS



The tragic retribution for this will be very heavy and sorrowful: Seismic isolation

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Article History

Received: 01/07/2024

Accepted: 12/07/2024

Published: 15/07/2024

Vol – 1 Issue – 1

PP: -01-03

Abstract

Frequent earthquakes of medium and high intensities in different countries of the world constantly testify that engineers in most cases are illiterately solving the problem of the interaction of load-bearing and non-load-bearing structures in the buildings. As a result, the mass destruction of non-load-bearing walls and damage in load-bearing structures take place, and they are illustrated in the paper for various buildings in different countries. We must always remember the quote of Galileo Galilei: “Ignorance is the mother of malice, envy, greed, and all other low and gross vices, as well as sins”. Therefore, this paper points to the total illiteracy and corruption that reign in the construction industry of Armenia in all cycles, starting from design, project expertise, issuing construction permits, and ending with construction and its technical and author’s supervision. It shows that the people employed in the construction complex have completely forgotten about the lessons of the devastating Spitak earthquake and completely ignored the high seismic danger in the territory of Armenia. Design organizations envisage old, unreliable methods for mass construction, where the dilemma of how to simultaneously minimize inter-story drifts and floor accelerations along the height of the buildings cannot be solved. This quite obviously leads to a significant increase in the cost of construction, which fully satisfies corrupt builders and corrupt state bodies. In the second part of the paper, the author states that one of the ways to overcome the current situation is the widespread application of the seismic isolation systems created by him and largely implemented in Armenia. In terms of the number of seismic isolated buildings per capita, the author brought Armenia to the second place in the world after Japan. The advantages and reliability of structures with seismic isolation systems both in the construction of new buildings and in the retrofitting of existing buildings are clearly illustrated. A comparative analysis of deformed states and values of accelerations along the height of buildings with and without seismic isolation systems is given. Paper also demonstrates the high economic efficiency obtained from the use of seismic isolation systems.

KEYWORDS: total illiteracy in construction; unreliable methods in mass construction; corrupt construction and state bodies; modern and cost-effective seismic isolation systems

INTRODUCTION

Total illiteracy in construction—The tragic retribution

Armenia is located in an earthquake-prone zone. What is expected if a strong seismic event occurs in our country, this will definitely take place, as evidenced by the 1988 Spitak earthquake. At that time, according to our research, in a matter of seconds, we lost 52,000 people and had many cities and villages destroyed[1]. In order not to be unfounded, I will refer to the World Bank Working Paper Series No.9 of 2004[2], where it is mentioned:

We must finally learn lessons from our own experience, as well as from the world’s experience. How much longer should our population remain uninformed because of the criminal negligence of semi-literate officials? How much longer will the brains of our people be brainwashed by idiotic serials, programs on cooking all kinds of dishes and advertising their recipes, low-grade, so-called “humorous” programs, low-grade music, and other useless, moreover, and hostile to the spirit of the people information? At the same time, no information is given to people by the government propaganda about the hazardous situation with the existing building stock, schools, hospitals, etc. which, practically, do not have the



required level of earthquake resistance. Also, no information is given about extremely low quality and illiterate construction of new buildings.

In such conditions, will a very limited number of government rescue units be able to achieve tangible positive results in rescuing people from the 32,000–33,000 buildings and structures destroyed in the capital? Of course not. Let's recall, for example, the sad experience of rescue operations on a small recently exploded building in Yerevan, where 200(!) rescuers worked, and as a result, they did not even temporarily fix one of the façade walls, which posed a threat of collapse. As a result, in a couple of days, this wall collapsed and brought new hardships.



Figure 1. Examples of illiterate construction currently going on in Armenia

- (a). Reinforced concrete frames in these buildings have unreinforced masonry infills constructed without soft joints with columns and beams.
- (b). The same as for the above examples plus the unacceptably small width of the piers between two doors or between a door and a window aperture.
- (c) The same as for the above examples plus unacceptable execution of the windows lintels.

Thus, we can unequivocally state that, by and large, we have not learned anything after the Spitak earthquake. Moreover, we have simply forgotten this tragedy! Based on the above mentioned it should be stated that there is a danger that our people living in the territory of present-day Armenia will be wiped off the face of our earth by strong earthquakes.

Why is this happening? Mainly because the construction industry is now flooded with people who have completely forgotten the tragedy of 1988, who, due to their own illiteracy, do not even want and do not try to learn lessons from past disasters. These are also those who, at one time, used money to purchase term and diploma projects and in the same manner “delivered” these works, “defended” these projects, not caring at all about future crimes that are now taking place in construction. These people do not read anything and practically do not know the requirements of the current Standards for the Design and Construction of Earthquake-Resistant Buildings and Structures. And why should they do this, if the state bodies responsible for the mandatory observance of these norms and for the policy in the construction industry, as well as the regulatory authorities, are practically inactive due to their corruption?

All this is also negatively condoned by the State Supervision Service of Armenia, to which the author has repeatedly appealed with demands to inspect the disgraceful and illiterate construction. However, no action was taken by this state organization, and the author did not receive any written responses to his appeals. What can be said, the author's conscience is clear. He has a better chance of surviving the coming devastating earthquake because he lives in a base-isolated house. Then, after the devastating earthquake, the author will be able to show the people and the judiciary all his programs, publications, speeches, and letters, with which he has warned illiterate and corrupt state actors and builders of the dangers and hell in which our nation will find itself. Then all of them, as well as various controlling organizations, will be held accountable to the people for what happened in the course of numerous court hearings.

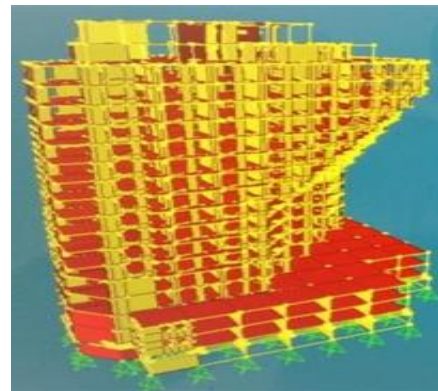


Figure 2. Limit deformed states of the 18-story buildings of the residential complex “Northern Ray” with (a,c) and without (b,d) seismic isolation systems.

Results of calculations show that inter-story drifts in base-isolated buildings are smaller than in fixed base buildings by 2.6 times on average and horizontal shear forces are smaller by 2.3 times on average. The other example (Figure 2) shows that in a base-isolated building reduction of 0.4 g input acceleration takes place along the height of the superstructure by 2.6 times on average, but in fixed base building vice versa amplification of 0.4 g input acceleration takes place along the height of structure by 2.25 times. Similar results were received by the author when carrying out comparative analyses for many other base-isolated and fixed-base buildings.

Conclusion

In the end, the author would like to stress that illiterate construction and corruption in the construction industry encouraged by some corrupt governmental bodies in Armenia must stop. Tragic consequences of the Spitak and other devastating earthquakes in the world must never be forgotten and lessons must be learned. The population of Armenia deserves to live in resilient buildings and should not become the victim of the future strong earthquakes and of illiterate, irresponsible dregs who lack a moral compass and overlook the problem of national security.

To overcome the current poor situation in the construction industry of Armenia the old conventional methods of

construction must be left away and changed by the modern and highly reliable construction technologies and materials. One such technology is seismic isolation which, as evidenced by the consequences of the strong earthquakes in different countries, proves to be the most reliable technology providing an incomparably high extent of increase of earthquake resistance of newly constructed and retrofitted buildings and structures. Moreover, the seismic isolation strategy leads to huge savings in construction costs and improves the quality of life for people who live in such buildings.

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