

Earthquake Considerations for Infrastructure Delivery

Presented by Ing. Carlien Bou-Chedid

From Leonora Otu-Boateng

1. Ing Carlien, where are the historical records of earthquakes (as far back as 1636) located? And how were the magnitudes measured at that time?

Response from Carlien: Information on historical events in West Africa can be found in the following paper - Ambraseys NN, Adams RD (1986): Seismicity of West Africa. Annals of Geophysics, Series B, Terrestrial and Planetary Physics. 4 (6), 679–702.

Earthquake magnitudes of historical events are estimated from the effects they had on people, buildings and the environment as well as how widely they were felt.

From Stephanie Pearl L. Adams

2. Could you shed light on the recent earthquake (2020) in Accra, Ghana and whether there was an impact on national infrastructure in your records.

Response From Carlien: The earthquakes that occurred on June 24, 2020 were widely felt around Accra. They occurred as three events with the largest assessed to be magnitude 4.0. There were no reports of damage and one would not normally expect damage in well-constructed infrastructure for this magnitude.

From Stephanie Pearl L. Adams

3. What is halting the acquisition of necessary equipment to cover recording earthquake zones in north & south for research?

Response From Carlien: It is mainly from a lack of funds. Also, I believe researchers have not placed much importance on monitoring areas that did not appear to have any history of earthquakes.

From Dr. Patrick Bekoe

4. Thank you for the excellent Presentation Ing. Carlien. With the limitations indicated in the current code what specific modifications will you recommend for the current building code.

Response From Carlien: There is an urgent need to conduct a Probabilistic Seismic Hazard Analysis for the country and based on the results to produce a new seismic Zonation Map to replace the existing one in the code.

From Morris Effah

5. Please can you help us understand earth Tremors and its impact on infrastructure

Response From Carlien: Earth Tremors or earthquakes as we prefer to call them are natural events that occur as a result of a shaking of the earth's surface from a sudden release of energy within the earth's crust. Depending on the amount of energy released, the shaking of the earths

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surface can be so violent that infrastructure that has not been constructed to withstand that level of shaking will simply come apart and be destroyed. It is important therefore in the construction of infrastructure to ensure that the likely levels of ground shaking possible in the lifetime of the infrastructure are known and are adequately catered for.

From Owuraku Otchere-Darko

6. Is the Ghana Building Code by the Ghana Standards Authority a working/ legal document now? The last time I checked it was only a draft?

Response From Carlien: The Ghana Building Code has now been published by the Ghana Standards Authority. It is a working document but can only be made legally binding by the regulator, in this case, the Engineering Council of Ghana

From komla

7. The June 2020 tremor was reported by the USGS as a “Global Event”. What’s your view on that? Was it really global? Can there be “global” quakes?

Response From Carlien: Perhaps the term “Global event” was used in the sense of an event that could be recorded by other countries on the globe. Larger earthquake events are picked up by instruments all over the world whereas smaller events can only be picked up by the local instruments.

From Benjamin McApuseyine

8. Thank you Ing. Carlien for such an in-depth synopsis of Ghana's seismic history

Response From Carlien: Thank you

From John Riverson

9. Interesting research reporting. Looking forward to results influencing policy!

Response From Carlien: Noted. A comprehensive document has been presented to government and we await their actions.

From Ing. Abraham Steele-Dadzie

10. Please is there any comprehensive study being conducted into the geological history of Ghana?

Response From Carlien: I have no knowledge of any specific research but I believe this is ongoing.

From Kingsley Akosah

11. Thank You Ing. Carlien for such great presentation. I will like to ask in your presentation you made mention of seismic codes and codes for buildings and the likes. Do we have specific building designs for the earthquake prone areas and if there is, is it been rolled out on the grounds? Thank you.

Response From Carlien: The Ghana National Building code mainly gives guidelines for reinforced concrete construction but you can use most materials and follow a seismic code

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From Kwasi Bempong

12. Please for Ing. Carlien is it possible that there are more indicators that directly contribute to degree of seismic risk in a particular region such as the population density, general type of structures in the region such as wooden structures, emergency risk and recovery services, etc., if we exclude the magnitude of the seismic event?

Response From Carlien: Yes indeed Ing. Bempong. Indicators that contribute to degree of seismic risk in a particular region include the population density, general type of structures in the region such as wooden structures, emergency risk and recovery services. But the magnitude and frequency of earthquakes will still feature.

From Morris Effah

13. Ing. Carlien please how do we make designers and contractors understand the importance of earthquake consideration because of the extra cost it might add to projects and most people feel that it isn't a looming need

Response From Carlien: In general, earthquake resistant design does not add a large cost especially for smaller structures. Most of the resilience is built in through detailing. With larger structures, a site-specific analysis may allow you to use lower loads and reduce the extra cost.

From komla

14. Thanks Ing. Carlien: So the USGS report, after the June 2020 event, may have just meant that there were over 4000, or so, ground movements recorded within the space of a short time. That's why they called it "global", since they were widely spread across the globe. From you response, I gather that is what they were trying to communicate. Thanks for the clarification.

Response From Carlien : Noted

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