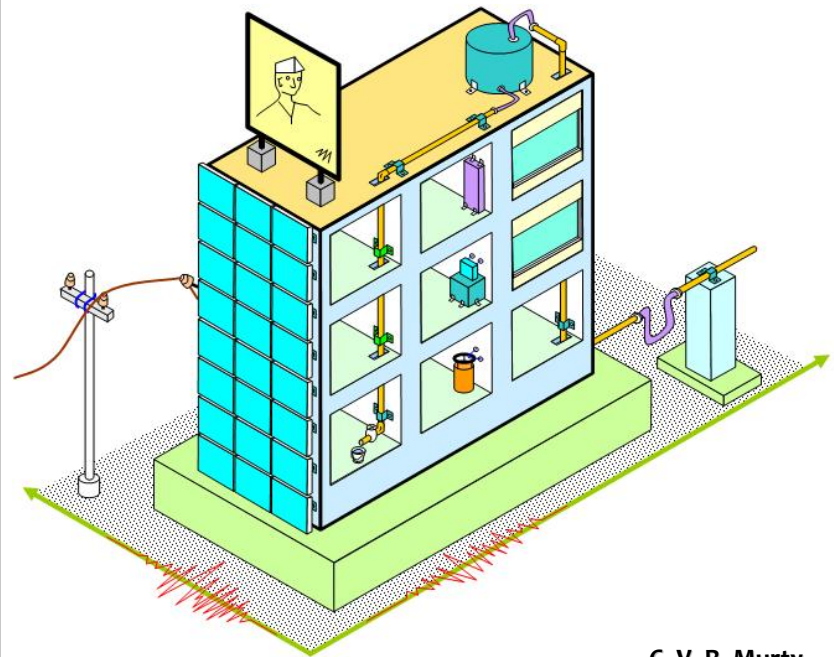


Introduction to
**Earthquake Protection of
Non-Structural Elements in Buildings**



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Countries with advanced seismic safety initiatives have managed to reduce losses due to building collapses, and have made significant progress in protecting *contents, services & utilities, and appendages* of buildings, together called *Non-Structural Elements*. But, the situation is not encouraging in many other countries, like India, where earthquake safety of buildings is itself in the nascent stage, not to mention earthquake protection of NSEs. In countries with advanced strategies for earthquake protection of built environment (like USA), the costs of NSEs in hospital structures have already touched the 90% mark of the total building project (construction) cost, excluding that of land. This investment is made consciously in NSEs, backed by strong code provisions for seismic design of NSEs. Likewise, in many other seismic countries (like India), the costs of NSEs in buildings are soaring fast and already touching the 70% mark. But, this investment is happening with NO provisions available for earthquake protection of NSEs in the national standards for seismic design.

This book is meant to introduce the fundamentals of earthquake protection of *Non-Structural Elements* in buildings to first time readers, wishing to get a grip of the basics of the subject. It employs exaggerated shapes of buildings (cartoons) to emphasise deformation sustained by buildings and NSEs, to help understand behaviour of buildings and NSEs during earthquake shaking and implications of these deformed shapes on seismic design of NSEs. The book brings basic research results to readers, and presents under pair of covers, the basics concepts available in international literature related to seismic protection of NSEs. Some design provisions are presented as available in international literature for seismic protection of NSEs, even though not comprehensive enough.

It is hoped that the book will help draw urgent attention of professional architects and engineers, especially in countries like India, where large investments are being made on NSEs in building projects without verifying their earthquake safety. Hence, the target audience of the book includes practicing *Architects* and *MEP Design Engineers*, in addition to teachers and students of architecture and engineering colleges.