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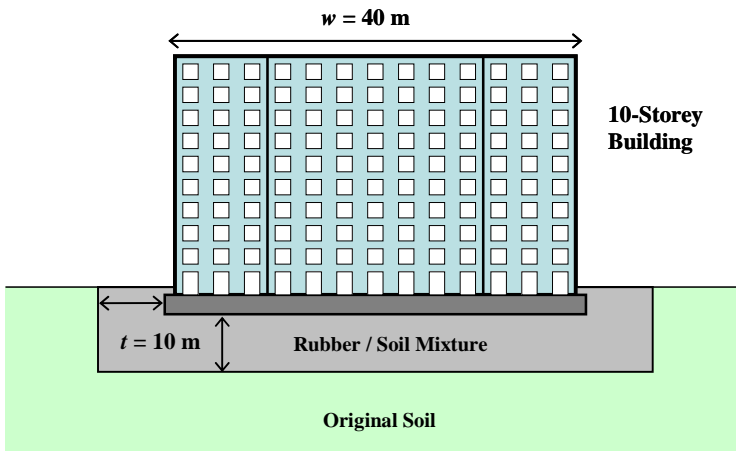
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Rubber-Soil CUSHION for Earthquake Protection

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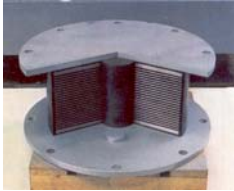
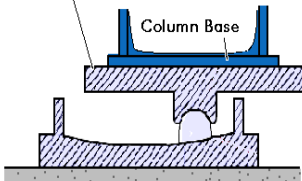
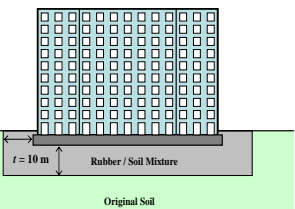
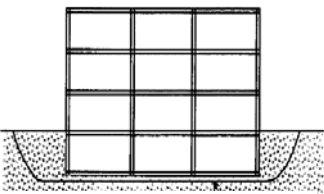
Summary: This paper proposes a promising seismic isolation method particularly suitable for developing countries using rubber-soil mixtures – the CUSHION. Apart from reducing the level of shaking in the horizontal direction, the distinctive advantage of the proposed method is that it also significantly reduces the shaking level in the vertical direction, to which increasing attention has been paid by the earthquake engineering community. The use of scrap tyres as the rubber material can provide an alternative way to consume the huge stockpile of scrap tyres from all over the world. Moreover, the low-cost of this proposed seismic protection scheme can greatly benefit the developing countries where resources and technology are not adequate for earthquake mitigation with well-developed, yet expensive, techniques. The proposed method has been demonstrated through a series of numerical simulations.



FEATURES:

- ~ Reduce 60-70% of **horizontal** and 80-90% of **vertical** shakings
- ~ **Use of Scrap Tyres** – two million tyres consumed in each project
- ~ **Low-Cost** – particularly suitable for developing countries

Proposed Classification of Seismic Isolation Techniques

	Stiffness / Damping	Sliding / Friction
Conventional "Structural"	<p>Laminated Rubber Bearing</p>  <p>DEFINITION: A flexible or sliding interface positioned between a structure and its foundation for the purpose of decoupling the motions of the ground from that of the structure.</p>	<p>Spherical Sliding Bearing</p> 
New "Geotechnical"	<p>Rubber-Soil CUSHION</p>  <p>PROPOSED DEFINITION: A flexible or sliding interface is in direct contact with geological sediments and the isolation mechanism primarily involves geotechnics.</p>	<p>Smooth Synthetic Liner</p>  <p><small>Yegian MK, Catan M. (2004). Soil Isolation for Seismic Protection Using a Smooth Synthetic Liner. JGGE (ASCE), 130(11):131-9.</small></p>

Program QUAD4M has been employed for numerical simulation - a dynamic, time-domain, equivalent linear 2-D FE program.

