Elephant Foot - Update from Test Series in Haiti, Feb 2014

(For more basic information regarding the Elephant Foot please refer to http://www.saevfors.se/Seismic.html)

A simulation test took place in Port au Prince, Feb 18 in order to evaluate the functions of used tires as seismic shock absorbers under Haitian conditions.

The local NGO, Haiti Communitere and their helpful contact network brought us to Reginald Simon, an engineer at Tecina Contractors. He kindly provided a flatbed truck, a loader tractor, concrete weight and manpower free at our disposal and he deserves all the credit for implementation of the exercises.

Technical Background

Lacking the extensive funds needed for a shake table test at a seismic laboratory we are developing a new, low-cost method in Sweden: A vehicle driving on a bumpy road will produce acceleration forces in three dimensions similar to an earth quake. (Up to 1-2 g, depending on speed, which is usually more than in seismic history as recorded by seismographs)

The idea of the Elephant Foot is to utilize the energy absorption possible in scrapped tires and pad them like seismic mitigation cushions under the foundation beams. Much compression resistance remains in a used tire even if the surface pattern is worn out; otherwise you would not see so many old tires hanging in harbors. To evaluate the performance of tires in a house foundation a weight has to be mounted on the tire which is proportional to that of a single story house wall. If all components are loaded on a truck accelerometers can then measure the movements under various speeds and road conditions.

Test implementation

The quality of used tires varies immensely and so do the sizes. Therefore a pre-selection process is extremely important. We gathered 40-50 dumped tires to get three high-ranking ones of about the same size. In a real construction situation the softer tires can still be useful as vertical side padding in the foundation ditch.

We then built a solid wooden frame at the Haiti Communitere workshop to keep the tires in place on the truck. The concrete weight was a road separation block weighing over 1.1 ton, which corresponds to a house wall on top of three tires in a row.

Youtube: **http://youtu.be/qvvUfwdXndo**

Results

The immediate evaluation of this first test series can intuitively be done by studying the video recordings. The concrete block is gently moving on top of the tires whereas the flatbed truck is shaking as expected on the unpaved road.

Important to note is also that the tires are not at all flattened by the weight of the concrete block: the three tires sustain easily 1.1+ ton, which corresponds well to the typical concrete hollow block house as can be seen in most low income urban areas all over the world.

The test series is likely to continue with more explanatory data collection later this year.