



APPLIED SCIENCE INTERNATIONAL SUCCESS STORY

# UNIVERSITY HOSPITAL IMPLOSION

Rio de Janeiro, 2010

## *Demolition & Ground Vibration Analysis on a Massive Scale*

The Perna Seca or University Hospital is considered to be the first reinforced concrete building constructed in Rio Di Janeiro, Brazil. The structure is composed of 3 wings, each 16-stories tall, totaling more than 25,000m<sup>2</sup>. During its lifespan and due to financial reasons, the owners were required to reduce the use of the building to only half of its capacity. The remainder was left unused and over time the unused half suffered deterioration and became unsafe to patients and employees working in the occupied portion of the hospital. This forced the owners to demolish the unused section. Safely demolishing only half of a structure presented several challenges to the implosion team, Fábio Bruno Construções, since they were required to leave the occupied half of the structure undamaged.



Fábio Bruno Construções proposed a demolition plan that included the manual demolition of a 15 meter section of the building. This divided the building in half, allowing the deteriorated side of the structure to fall away from the occupied side during implosion. To ensure the safety of the remaining structure and other surrounding buildings, Fábio Bruno Construções tasked Applied Science International (ASI) to analyze the demolition plan. ASI used their proprietary Extreme Loading® Technology -(ELT) to model and analyze the behavior of the building using the proposed demolition plan.

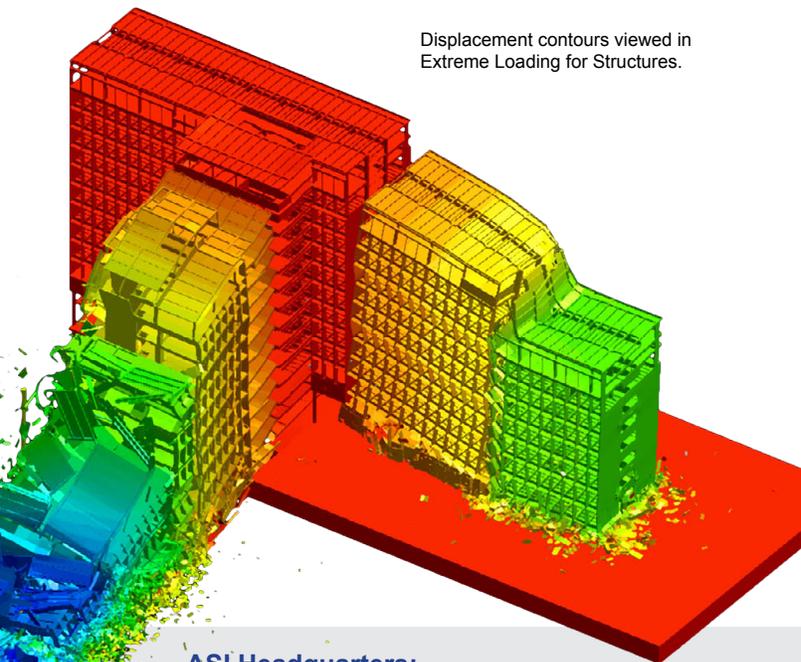
ASI modeled every structural detail in 3D which included columns, beams, slabs, masonry walls, expansion joints, and the components corresponding reinforcement detail. The model also included weakened material models in corroded areas of

the structure to reflect real-world conditions. Furthermore, the sensitivity of adjacent buildings and equipment within the occupied wing of the hospital necessitated that ASI analyze for potential soil vibration effects, both above and below ground, caused by debris impacts during the demolition.



The hospital being divided in half prior to the implosion of the south wing of the building.

The analysis concluded that all ground acceleration levels caused by impacting debris would occur within acceptable limits. Using ASI's reported findings the demolition team was able to safely implode one half of the Perna Seca Hospital without damaging the rest of the building, its sensitive health care equipment, or surrounding structures.



Displacement contours viewed in Extreme Loading for Structures.

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