



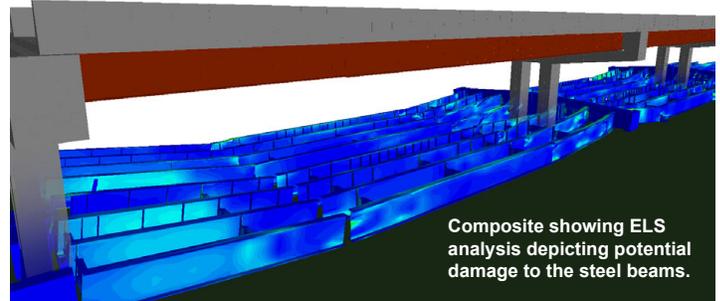
PERIMETRAL HIGHWAY DEMOLITION

PHASE 01

Rio de Janeiro, Brazil, 2013

Powerful Iterative Engineered Analysis for Material Preservation

Explosives brought down a one kilometer section of Rio's Elevado da Perimetral in just five seconds on the morning of Sunday, November 24th. Located in Rio's Port Zone, the section of the important highway linking the South Zone's Aterro do Flamengo (Flamengo Park) and the Rio-Niterói Bridge was demolished by the city government in preparation for the 2016 Olympics and accompanying downtown revitalization effort.

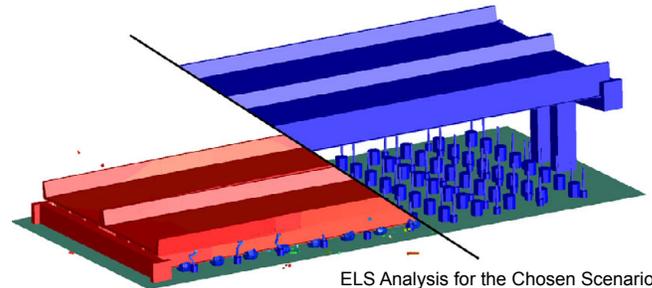


Composite showing ELS analysis depicting potential damage to the steel beams.



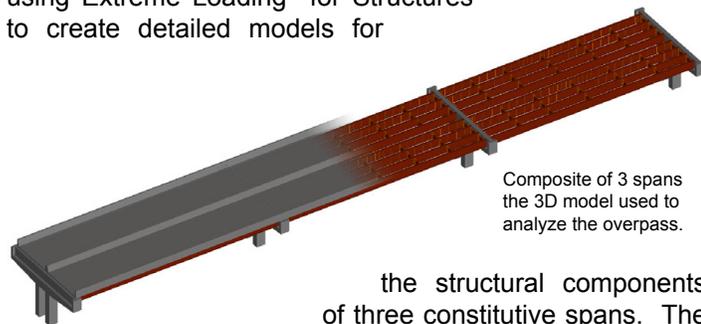
Perimetral Raised Highway Post-demolition

truck tires filled with sand. The railroad ties were used to dissipate an amount of high energy while simultaneously breaking up the road surface, reducing the velocity and impact of the supporting beams on the surface below. The tires were used to cushion the steel beams further.



ELS Analysis for the Chosen Scenario

Prior to the event, the demolition team, Fábio Bruno Construções, tasked Applied Science International with discovering the best method for bringing down the elevated road quickly while minimizing damage to the highly valued steel beams that needed to be preserved for future construction projects. ASI engineers went to work using Extreme Loading® for Structures to create detailed models for



Composite of 3 spans the 3D model used to analyze the overpass.

the structural components of three constitutive spans. The span of each bay was 41 meters, and upon completion of modeling, engineers ran multiple nonlinear dynamic analysis scenarios on the road in an effort to solve the problem. Notable ideas included sand mounds, water tanks and various tire and scaffold configurations.

After 34 separate and unique trials, the final proposed plan by ASI included the use of railroad ties embedded in concrete-filled steel drums, coupled with the placement of stacked

Using ASI's analysis results and recommended demolition plan, Fábio Bruno Construções used approximately 1,200 pounds of explosives to bring down the kilometer long section of highway, including 232 steel beams, weighing more than five tons. The railroad ties and the roughly 2,000 sand-filled tires successfully cushioned the falling debris and were able to preserve the expensive beams.



Railroad Ties and Tires Pre-demolition

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