The Balsi-Beam is a mobile barrier system currently used on California highways. In an accident event of a collision of an erratic vehicle into the barrier, the Balsi-Beam system should be able to contain and redirect the impacting vehicle to protect workers in the work-zone and also reduce the danger to occupants of the impacting vehicle and to other traffic.

The objective of the study is to investigate potential improvements to the crashworthiness of the Balsi-Beam system if layers of energy absorbing material are added to the outside barriers. Low density, closed-cell polyurethane foam is proposed for the application, because of its special mechanical characteristics. In efforts to simulate the oblique collision events of the modified Balsi-Beam system, it is necessary to select an appropriate constitutive model to represent polyurethane foam by evaluating the model against test data from similar loading conditions. Simulations are conducted, using a finite element code LS-DYNA, at impact angles of 25°, 35° and 45°, for initial velocities of the impacting vehicle of 50, 70, 80, and 100 km/h (31, 43, 50, and 62 mph). The simulations indicate quantitatively that a layer of foam will enhance the purpose of the Balsi-Beam system to protect workers and drivers of other vehicles, by increasing both energy absorption and impact duration. However, the design modification results in higher decelerations of the impacting vehicle, which could increase injuries to the occupants of that vehicle.