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## Explosion Damping Device (Blast Shield)

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# Explosion Damping Device (Blast Shield)

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Faculty adviser: Dr. Mossi

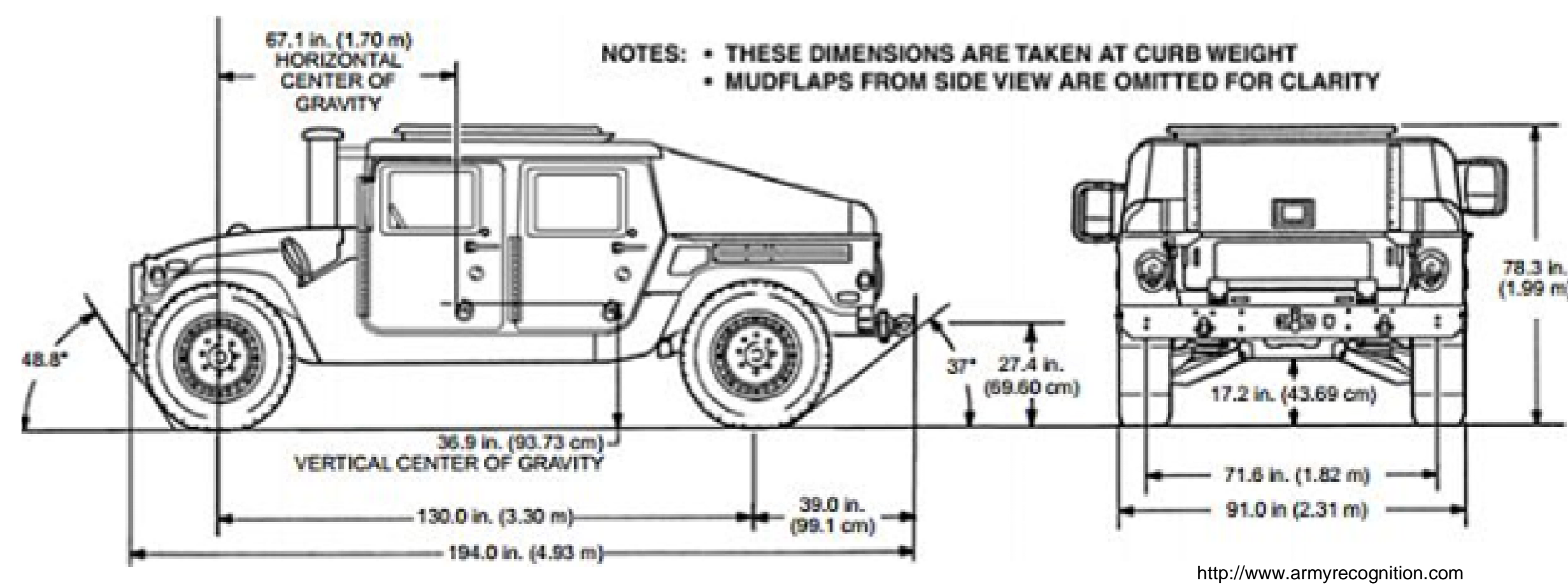
## Problem

IED explosions underneath vehicles causes shrapnel and a shock wave to travel in an outwards direction from the explosion resulting in fatalities or injuries.

Who is at risk?

Soldiers and their cargo traveling in a Humvee or a similar vehicle..

## Constraints



The shield should have the capability to be retrofitted to current Humvees with minimal modifications.

Decreasing height excessively will reduce ground clearance making it treacherous for the vehicle to travel over rough terrain.

Increasing height excessively will increase the chance of rollovers.

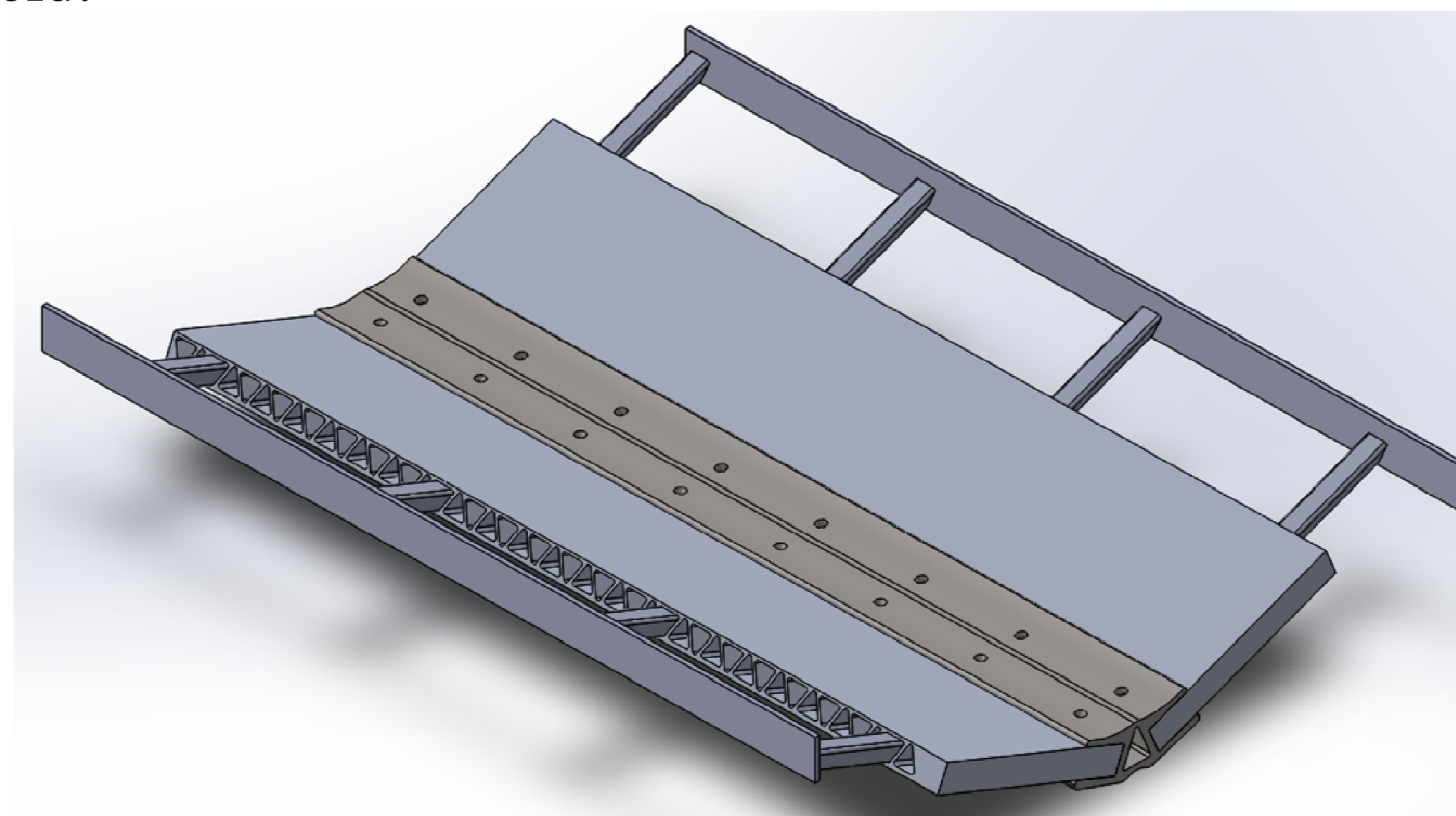
The Humvee must sustain the same level of accessibility of entering and exiting as before.

Survivability should not be sacrificed by the implementation of this device.

## Design

The shield is meant to deflect the blast outwards and away from the vehicle and its occupants.

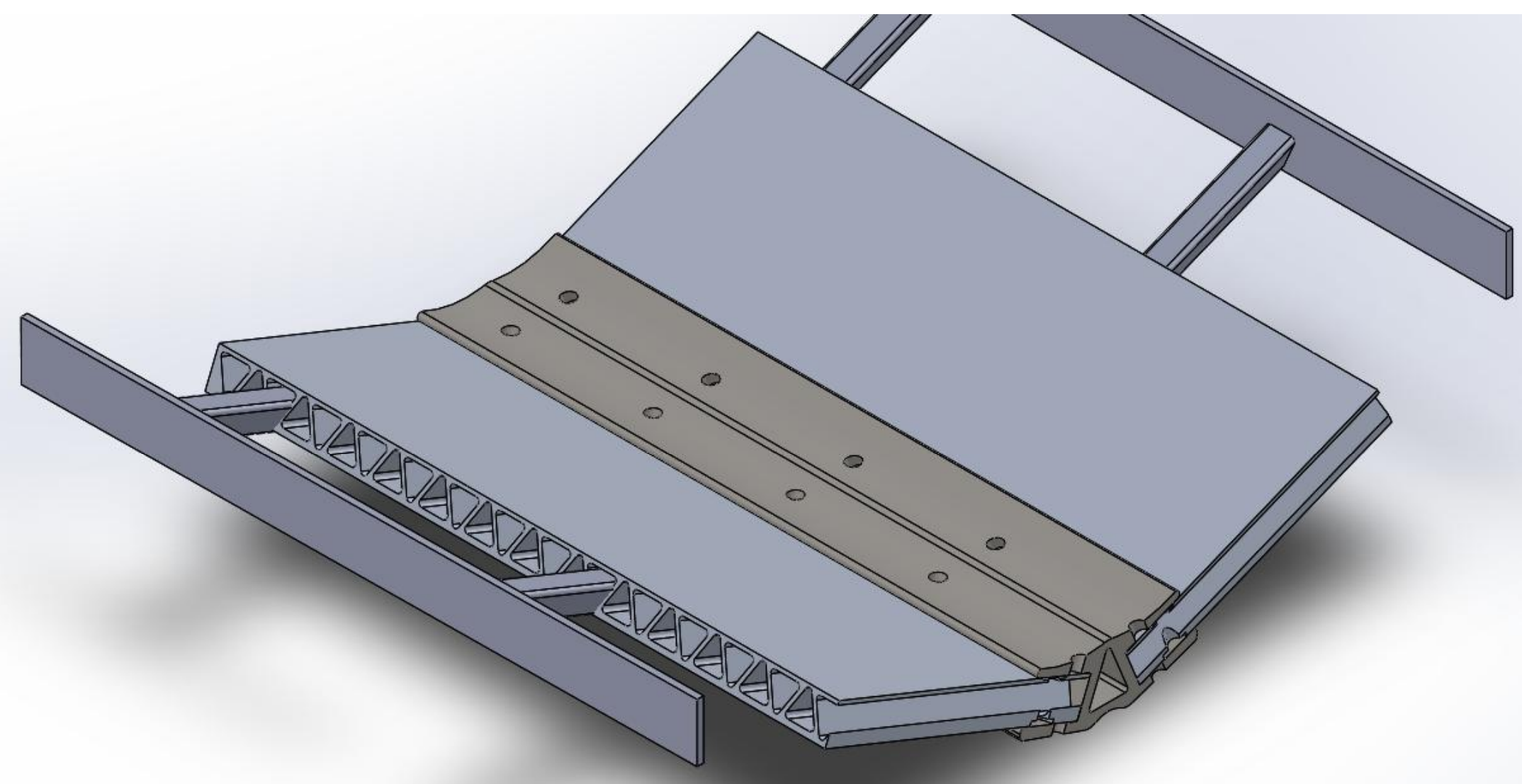
Through our calculations we discovered you could reduce the force in the y-direction by 37.4% with an angle of 22° on the blast shield.



Blast Shield Assembly

The assembly consists of an I-beam which supports and offsets the two blast plates.

The apparatus is fully adjustable to vehicle width and length.



Blast Shield Cross Section

## Theory and Functionality

The design consists of a lightweight I-beam and two metal plates which will serve as the blast shields.

The whole apparatus will be adjustable to the length and width of the vehicle. Figures 1 - 3 show the deformed component when a 100lbf blast force is applied.

The I-Beam will be able to maintain the stability of the blast plates as the end sections are fixed to the vehicle.

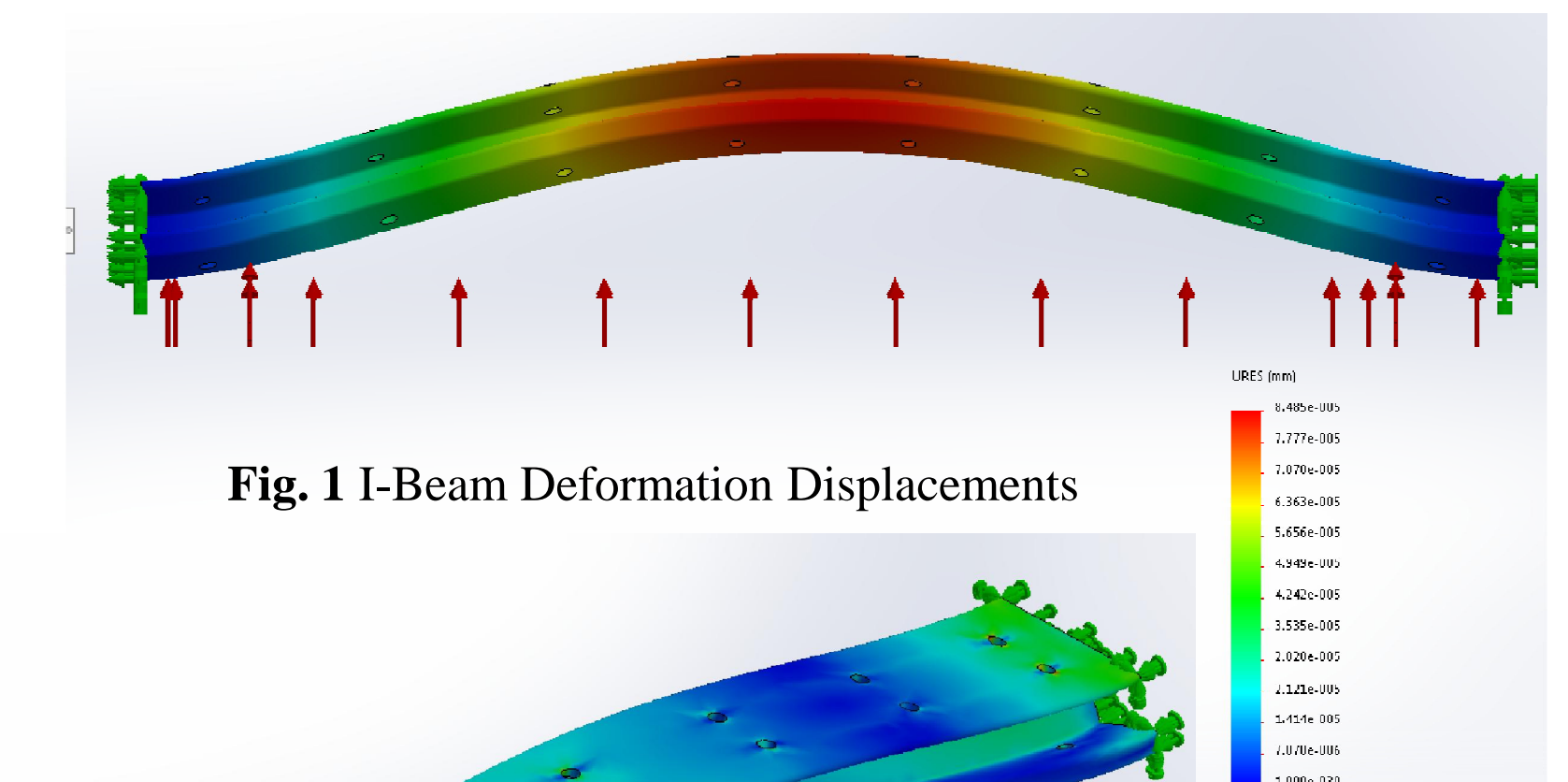


Fig. 1 I-Beam Deformation Displacements

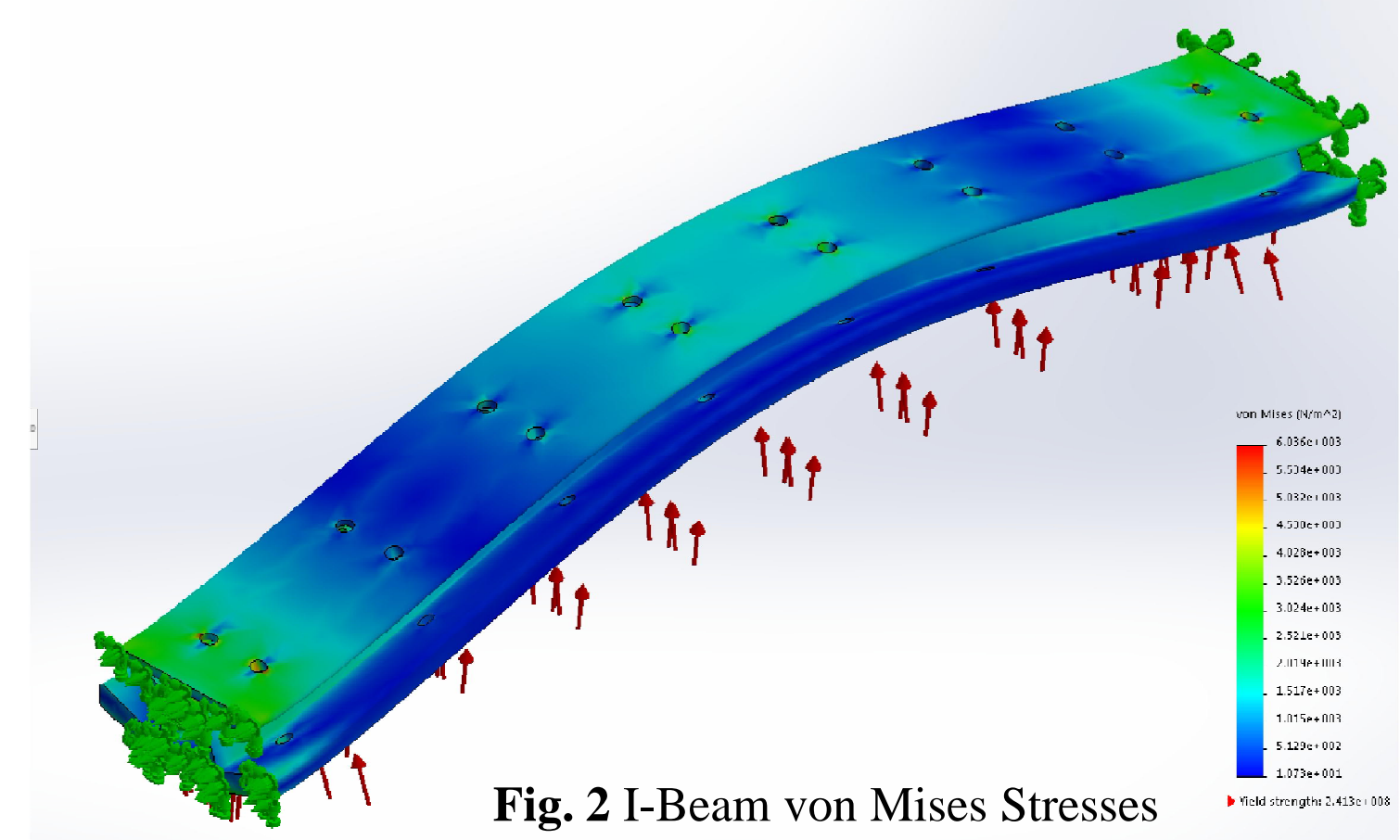


Fig. 2 I-Beam von Mises Stresses

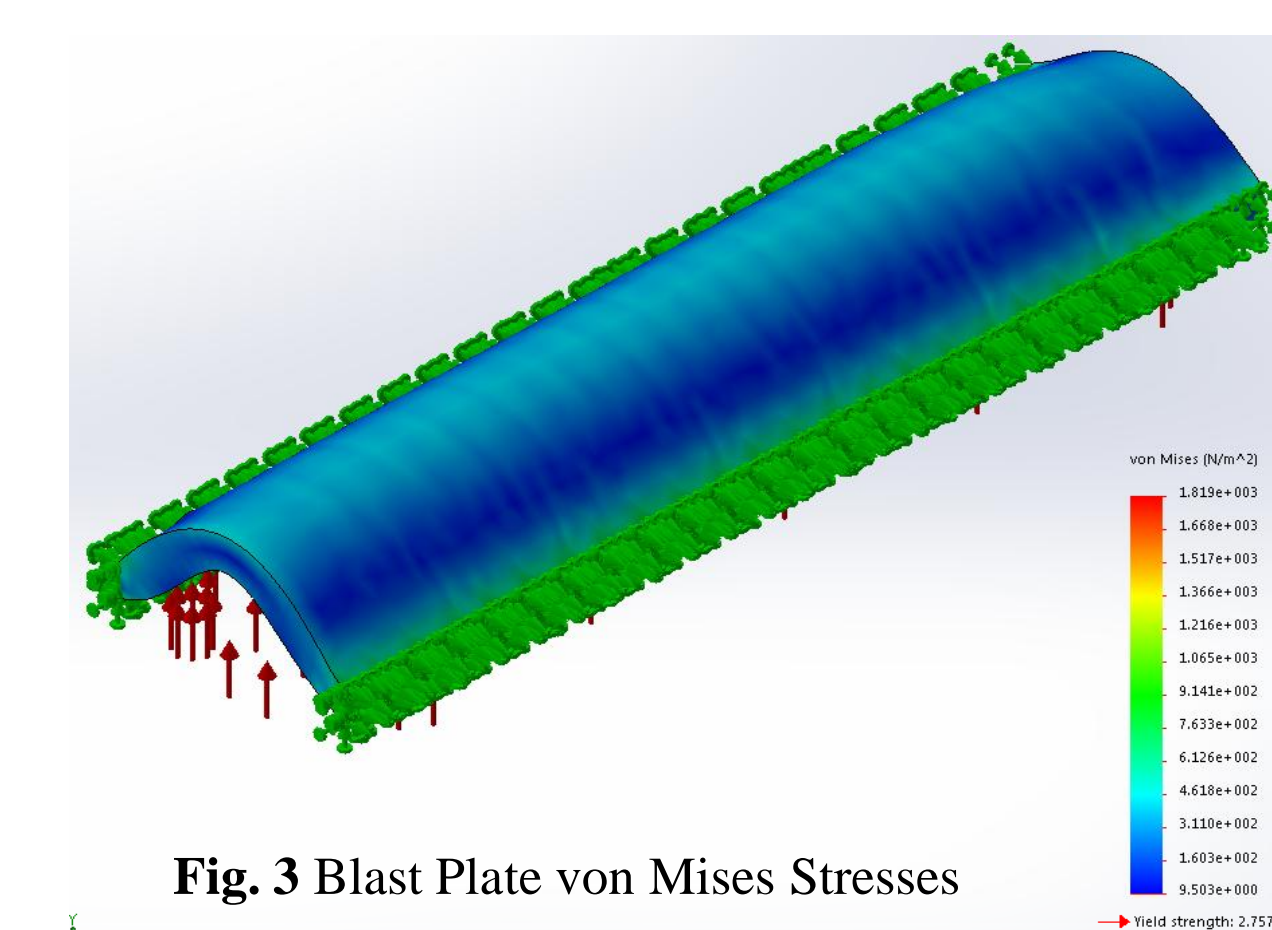


Fig. 3 Blast Plate von Mises Stresses

The plates will be set up underneath the respective vehicle and will be angled to accommodate the blast force and the shock wave.

## Future Consideration

An adaptation that will be able to reduce risk of rollovers to prevent additional injuries.

A more versatile shield for civilian vehicles.

