# Literature review for strengths calculations:

## Base Design

In order to start on the calculations for the base design, a few assumptions need to be made for the calculations to make sense. The first of which would be the weight which the base structure must hold up.

The weight that will be used was drawn from a website of a company called Interfreight. On their site they provide the empty weight, and maxim capacity loads of various containers which can then be used to determine the max total load required for the base to carry. A 45’ high cubed container was chosen for its extra vertical height which allows for extra internal space for the home.

The next assumption that needed to be drawn from a source, is the safety factor that needed to be used. This was found in Machine Component design, which has a chapter on safety factors, their purpose and how one goes about determining them for the purpose required. Due to the fact that human life is involved, it was set at 5. (Juvinall and Marshek, 2006)

Finally the specifications that will be used for the various materials come from a website called engineering toolbox. This site provides a large variety of specifications for a large variety of materials. The chooses of galvanized steel and stainless steel because they are both rust protected, which is important in Cape Town, as well as the fact that they are not overly expensive. (Need References?)

## Bed Design

The first assumption that needed to be sourced was a reasonable weight/ load to be used for the bed. It proved difficult to find a source that directly stated the average weight for a South African male (male because it would be a maximum limit). Instead a value for the average BMI of South African males was found on a site called BioMed Central, on an article about obesity in the country. A value was then found, in an article on the BusinessTech site, for the average height of the South African male. These values were used to calculate the average weight that would be used as the assumed load on the bed.

The safety factor for the bed was deduced similarly to the container base, using the Machine Component textbook. Due to the fact that human life is involved, it was set at 5. (Juvinall and Marshek, 2006)

Finally the material specifications for the bed were sourced from the same website, engineering toolbox. The materials of galvanized steel and stainless steel were chosen for comparison for similar reasons to that of the base, however aliminium was also chosen for comparison due to its light weight.

## Geyser Support Design

The safety factor of the geyser support was chosen at 2 using the Machine Component textbook. This was done using the recommended values for a safety factor list. It isn’t as high as the other two due to the fact that it doesn’t directly involve human life.

The material specifications for the support were sourced from the same website, engineering toolbox. The materials of galvanized steel and stainless steel were chosen for comparison for similar reasons to that of the base, namely their rust resistance and their being of lower costs.

## Source of Calculations

The calculations that are to be used to facilitate the comparison of the various designs mentioned above, will be mostly drawn from Strength of Materials for Technologists. It will focus on analysis of the stresses of the structures versus their material components as well as an analysis of the deflection under load. These calculations will assist in determining the required design specifications of the structure under load for the various materials and thus the cost and feasibility of the design and material choice. (JG Drotsky, 1997)