

Structural Analysis  
Of  
500 LB Intelli-Lift Pro Dumbwaiter System

For  
Elevation Innovation Inc.  
6200 Enterprise Dr. Suite H  
Diamond Springs, CA. 95619

By  
Greg Yarlott  
SELKIRK DESIGN, LLC

6/18/08

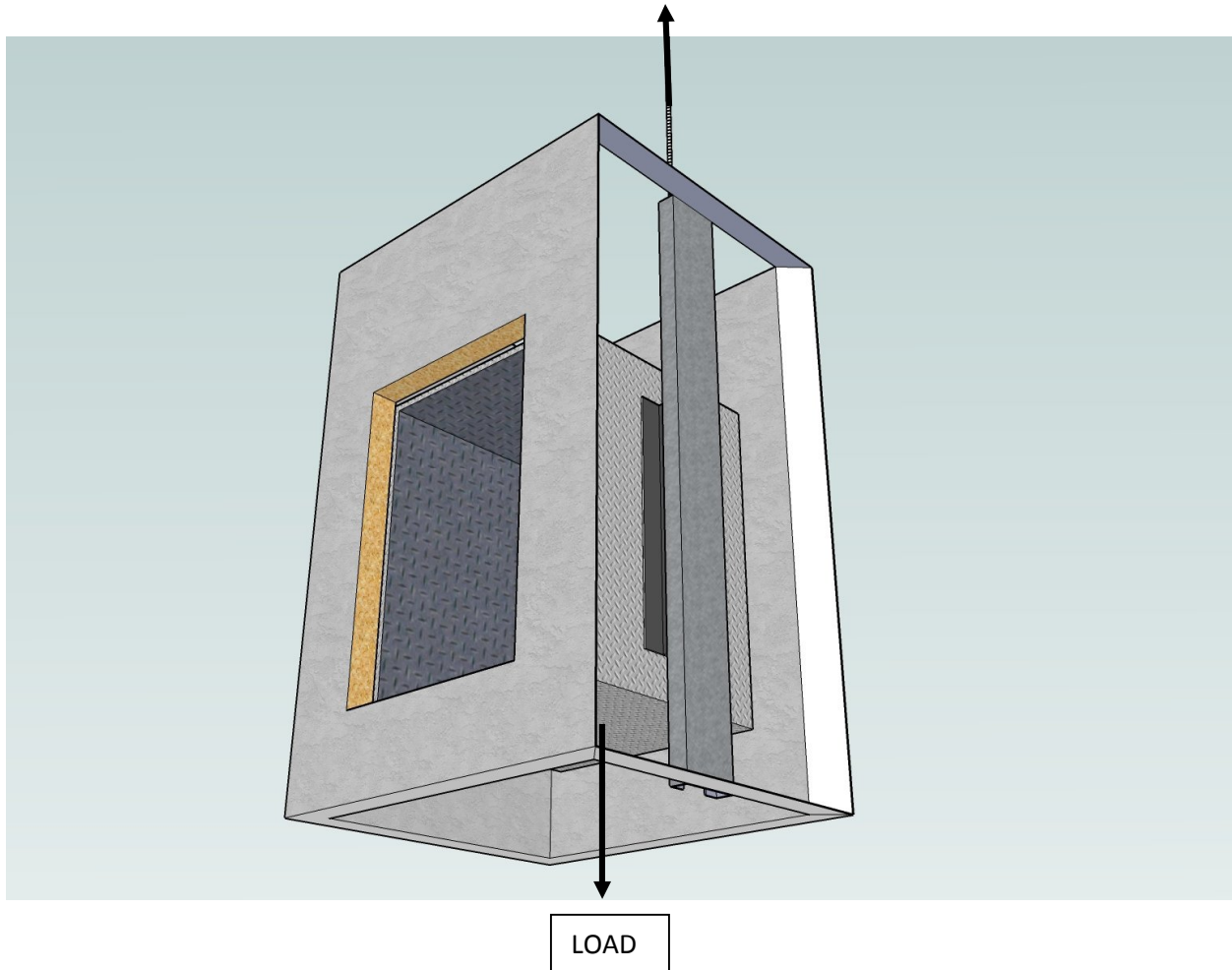


Fig. 1

The purpose of this analysis is to find the reactions at the trolley wheels as they load the c-channel used to guide the dumb waiter car. The car is constructed of steel and fully supported by the trolley. The load from the carbody structure and the 500 lb usable load will be considered in the reaction calculations. For the reactions of the trolley wheels and the winching mechanisms, the total load factor will be  $2g$ , for impulse loads.

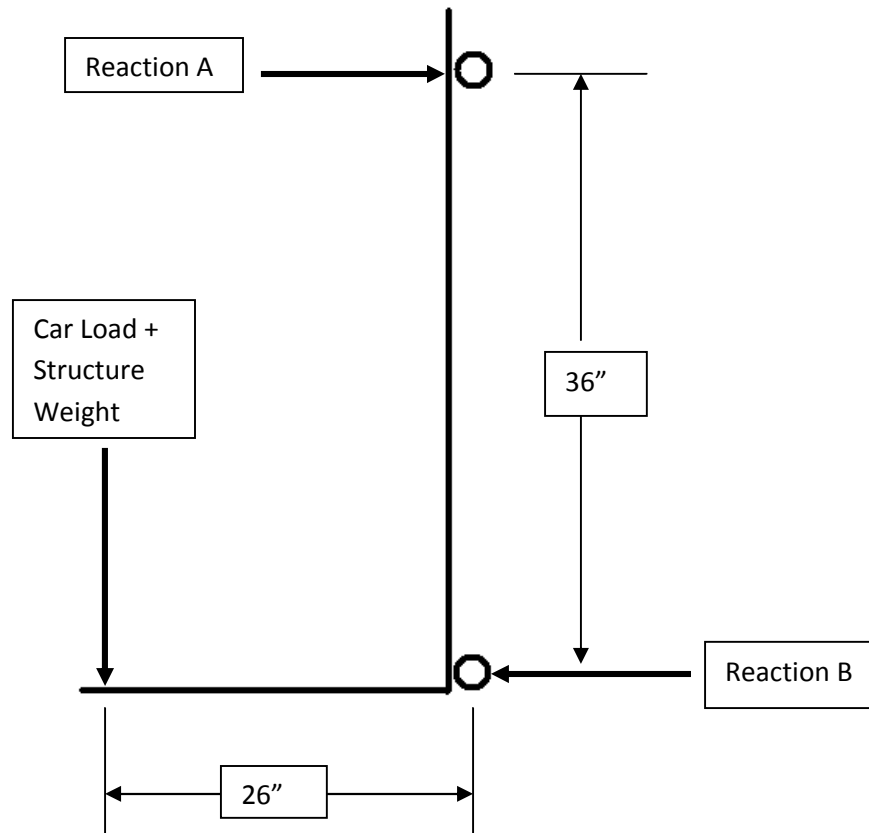


Fig. 2

Sum moments about point A:

$$R_b \times (36") = \text{Load} \times (26")$$

At 900 lbs,  $R_b = R_a = 650$  lbs; at 2g or 1,800 lbs  $R_a = R_b = 1,300$  lbs

This translates into 325 lbs per bearing and 650 lbs per bearing.

For this type of dumb waiter, the lifting mechanism can be mounted either at the bottom of the elevator shaft or at the top. If mounted at the top, it will need to be mounted with a minimum of (4)  $\frac{1}{2}$ " fasteners, min. pullout 8,000#. The deck should be designed to support the static load of 900 lbs as well as the impulse load of 1800 lbs, see Fig. 3.

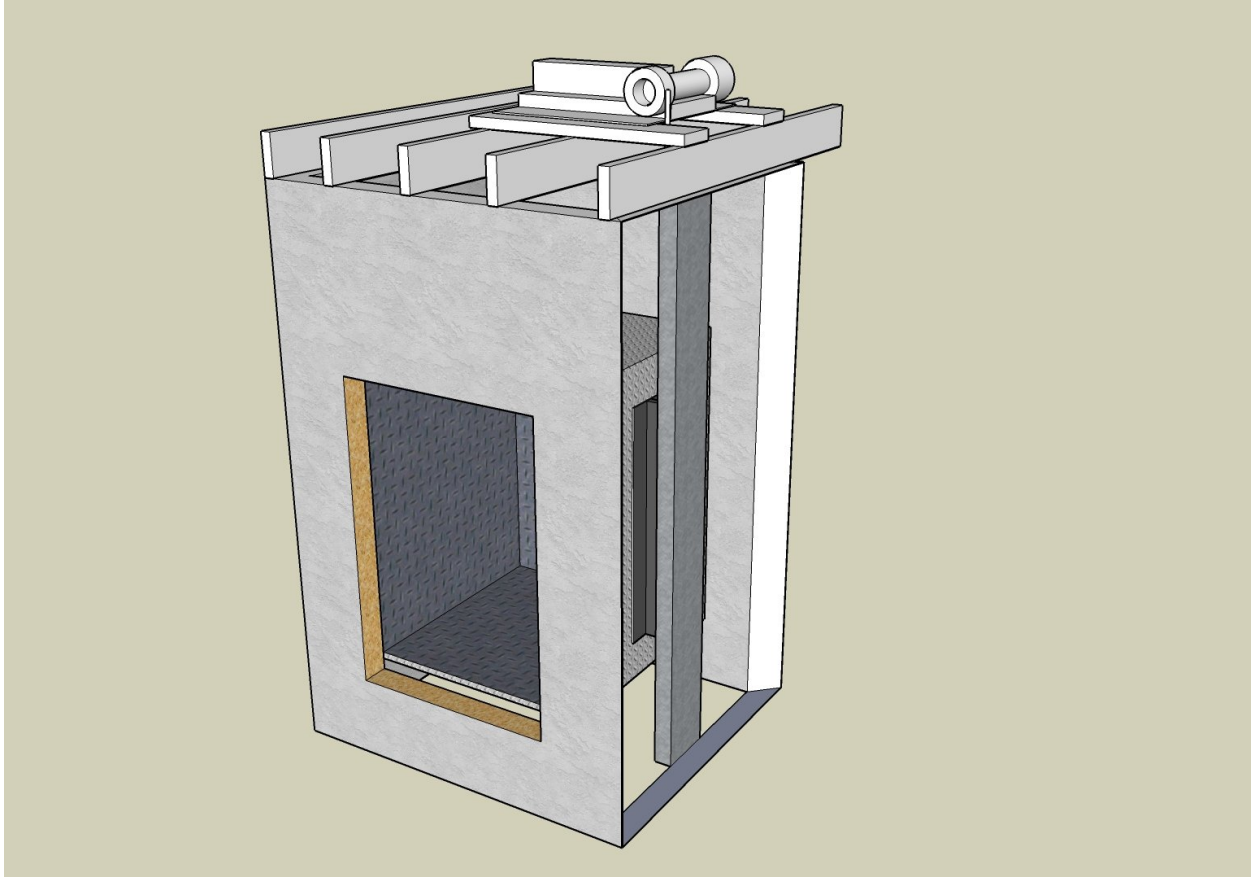


Fig. 3

The aluminum channel takes all the reaction load from the trolley wheels. It is made from 6061 T6 Aluminum with a yield strength of 31ksi. The following finite element analysis shows that the highest stress is at the bolt hole location, approximately 8,000 psi and that the maximum deflection is around 0.022" see Fig. 4 and 5.

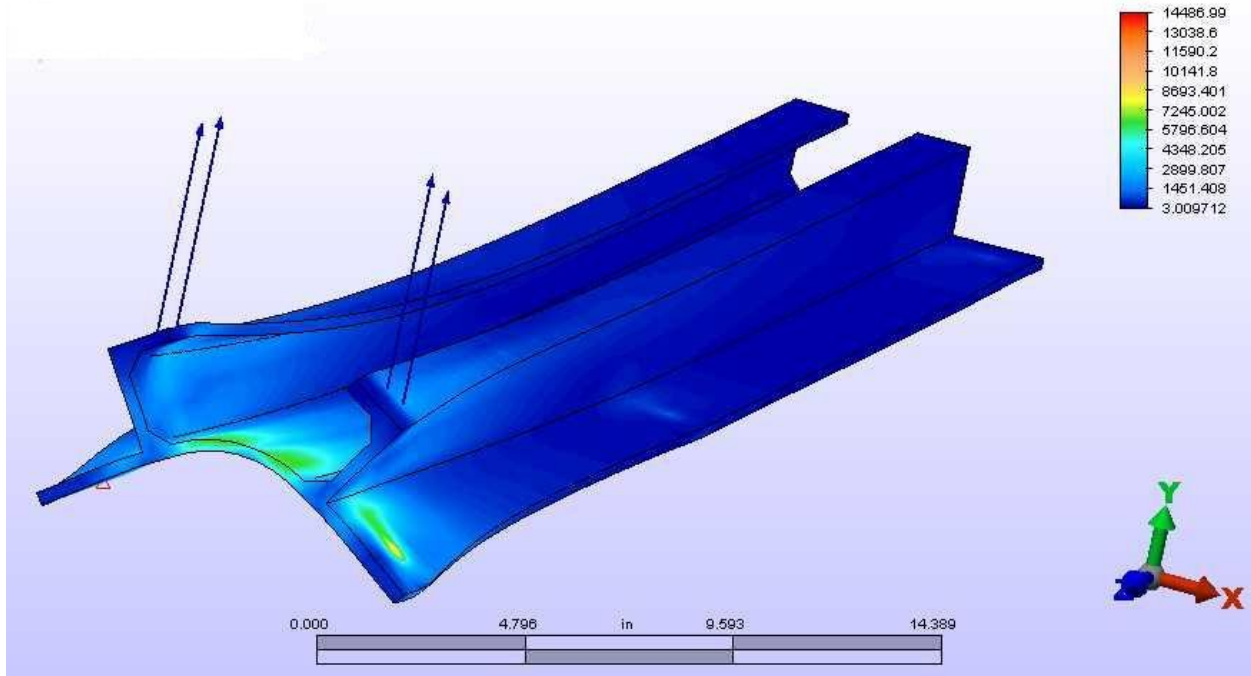


Fig. 4

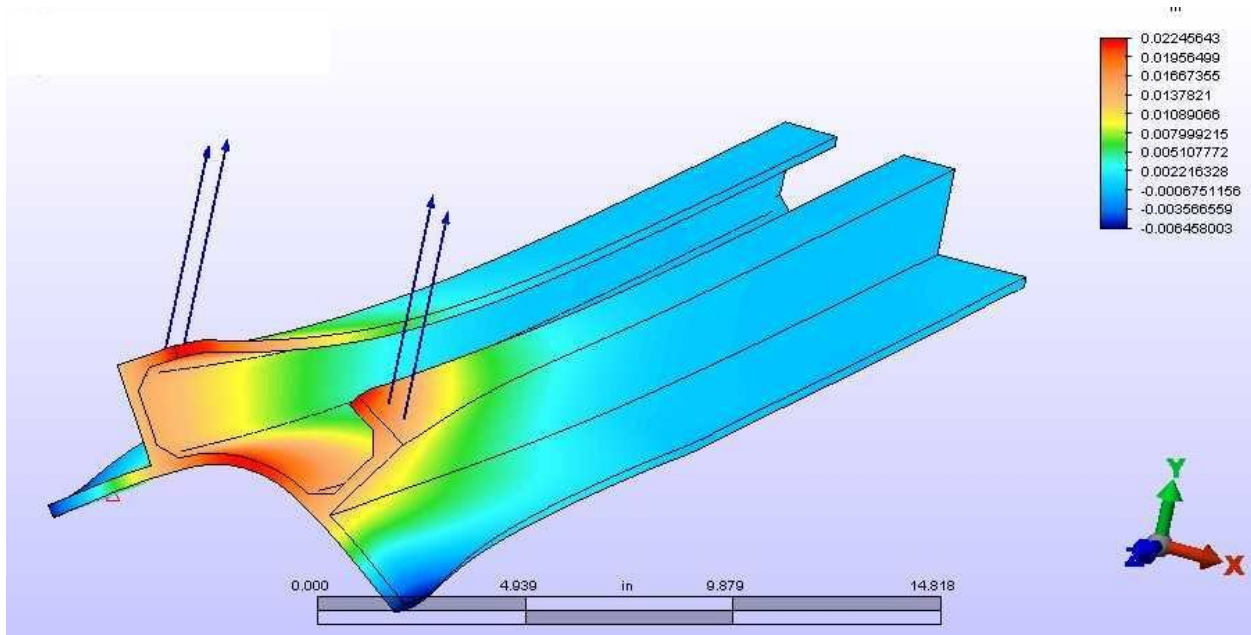


Fig. 5