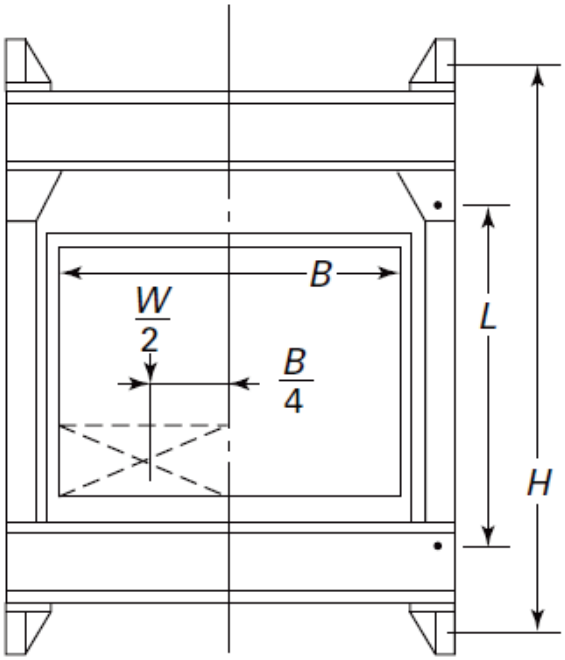
OLS NA – engineering calculations based on the following:

- Maximum Capacity 4000 LBS – passenger elevator only
- Car + Sling = 2700 Lbs
- Max DBG = 74 7/8”
- Max Car size = (D)60 5/8” x (W)72”
- Rails 8 lb/ft
- Vertical distance between guide shoes = 120 ½”
- Ø of cylinder supporting rod(s) = 1”

8.2.2.5.1 Turning Moment Based on Class of Loading

8.2.2.5 Car Frame Uprights (Stiles).



$$K = \frac{WB}{8}$$

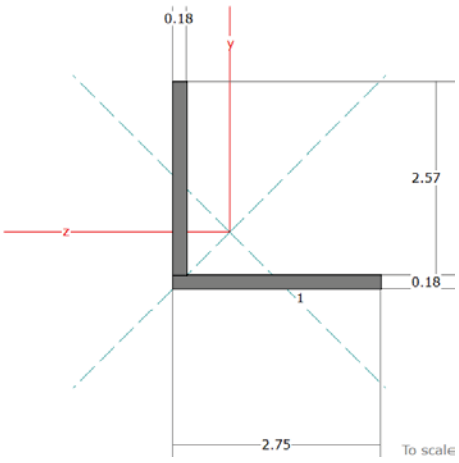
Class A Freight Loading or Passenger Loading

W = 4000 Lbs

B = 72”

K = 36,000 lbs in = total stress in left or right uprights.

OLS design has a combination of two angles per side as uprights (2 ¾ x 2 ¾ x 0.18)



8.2.2.5.3 Moment of Inertia. The moment of inertia of each upright shall be not less than determined by the following formula:

$$I = \frac{KL^3}{18EH}$$

As per OLS drawing # 200254 → L = 127.5 – 2x (5.5) = 116.5”

E = 29 x 10^6 psi

H = 120.5”

I = 0.905 in^4

The above is for one side uprights → one OLS angle is seeing ½ of the above = 0.4525 in^4

The moment of inertia of OLS upright is I = 0.7081 in^4

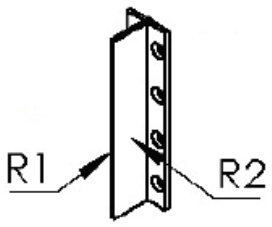
Uprights angles are OK

Calculation for rail reactions R2 & R1

R2 = AW/8H

A = half of car depth = 30 5/16”

R2 = 125.77 lbs



(2x) Ø1” rods per side

Each rod will see half of the R2 = 62.885 lbs

R1 = EW/8H

E = width of the car = 72”

R1 = 298.75 lbs

(2x) Ø1” rods per side

Each rod will see half of the R1 = 149.377 lbs

STRESS AND DEFLECTION IN RAILS

σ = (R1 or R2) x L / 4 Z

Z = rail section modulus (Zxx = 0.8695 in^3 and Zyy = 0.72 in^3)

Max σ = 15,000 psi

L = 174”

Max Deflection = 0.25” = (R1 or R2) x L^3 / 48 EI

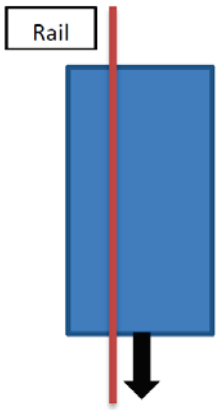
I = rail moment of inertia (Ixx = 1.428 in^4 and Iyy = 1.2576 in^4)

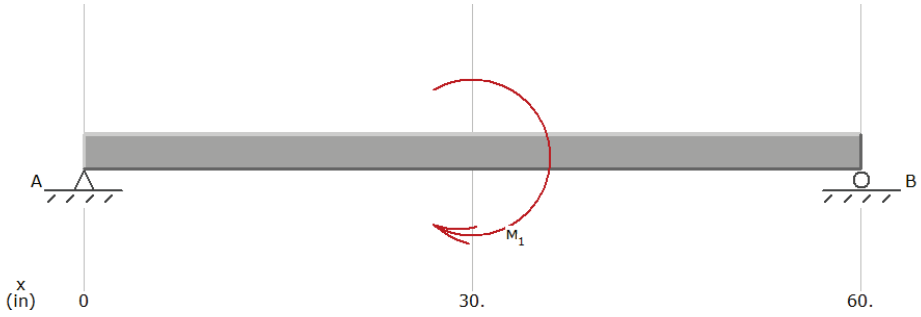
L = 113.5”

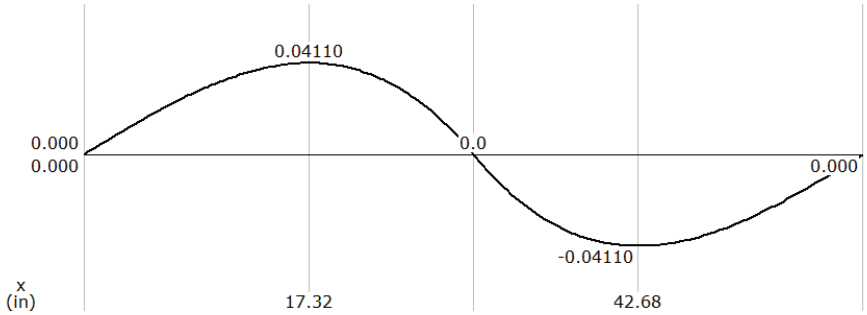
The rails are offset from the CAR centerline by 15 ½”

This offset will create a turning moment in the rails: 6700 x 15 ½ =103,850 Lbs in

Each rail will see half of this moment M1 = 51,925 Lbs in







With rail brackets spaced 60” apart the rail deflection is below the maximum of 0.25 in (B44-2010 Code)

STRESS AND DEFLECTION IN RODS

σ = (R1/2 or R2/2) x Λ / 4 Z

Z = rod section modulus = 0.0982 in^3

Max σ = 15,000 psi

Λ = 39.44”

Max Deflection = 0.25” = (R1/2 or R2/2) x L^3 / 48 EI

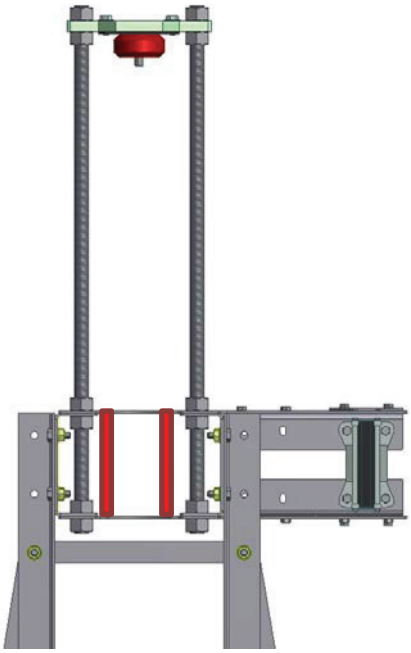
I = rod moment of inertia = 0.0491 in^4

Λ = 48.54”

Recommended maximum rod extension without extra support = 40”

Extra Note:

For the mounting design of the rods I advise to introduce a permanent spacer close to each rod to maintain the same tension and distance in the horizontal top channels:



Bv: Florin Bistriteanu P.Eng

January 30, 2019