**Iteration 0 – Measure a Real Elevator**

Chosen Elevator: Canal Building

Peak Velocity

To measure the peak velocity, we measured the time it takes for the elevator to reach each individual floor without stopping. Starting the timer at floor 1, once the next floor was reached (floor 2), we lapped the timer every floor until we reached floor 7.

We took the average of the measurements to determine a peak velocity for the elevator.

Rate of Acceleration

Measuring the rate of acceleration required us to reach the peak velocity for a moment in time. By traveling two floors, we can find the rate of acceleration. Since the elevator must first accelerate reach the peak velocity and then decelerate after, we can divide the time interval by two (under the assumption that the elevator accelerates and decelerates at the same rate).

Testing our values

The time it takes to reach the peak velocity can be calculated using the following equation:

During this time, the distance travelled can be calculated

The time it takes to accelerate and decelerate is 2.476\*2 or 4.952 seconds, during which 4.106 meters is covered. The remaining distance is covered at the peak velocity.

Calculating the time to cover the distance can be calculated using the following formula:

The total time of the elevator ride would be 16.292 seconds. This value is far from our average ride of 14.32 seconds.

Average Closing Times as a Function

The average time it takes the elevator doors to open and close is 7.01 seconds. During experimentation, it took 0.82 seconds for a single person to board and approximately the same amount of time for each additional person.

The average closing time can be modeled by the following linear function:

Where f(x) is the amount of time it takes for an elevator to be loaded.

x is the number of people boarding the elevator.