

SkyHighScrapers

To: Structural Engineering Team #5

From: R. Shreve, Chief Architect

We just got back the data from wind tunnel testing for our proposed "double-decker sports arena" (see diagram 1).

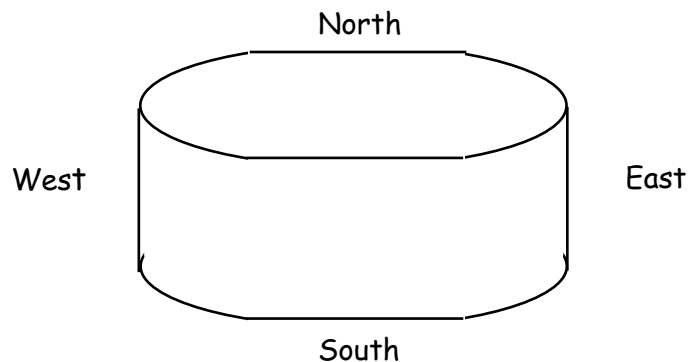


Diagram 1: the "Double-Decker"

Table 1 shows the pressure when the wind blows from the east.

Table 2 shows the pressure when the wind blows from the north.

The pressure, of course, increases with higher wind speed. Theoretically, we expect that the relationship is quadratic:

$$p = av^2 + bv + c$$

Can you help us out?

- 1) For table 1, graph the data, then find the values of a , b , and c for the quadratic equation that gives a good fit to the data in the table. Draw the graph of your equation on top of the graph of the original data, so I can see how well it matches. Use that equation to give us an estimate for the pressure for wind speeds for 5 mph and 100 mph.
- 2) Do the same thing for table 2.

Thanks.

Rich

Table 1: East Wind

Wind speed (miles per hour)	Pressure (pounds of force per square foot)
10	1
20	1.6
30	2.8
40	4.3
50	5.9
60	8.1
70	11
80	14

Table 2: North Wind

Wind speed (miles per hour)	Pressure (pounds of force per square foot)
10	2
20	3
30	4.5
40	6.5
50	10
60	13
70	16.5
80	22