Lift a House

Calculate the net lift on a 15 m x 15 m house when a 30 m/s wind (1.29 kg/m^3) blows over the top.

$P_1 + \rho g y_1 + \frac{1}{2} \rho v_1^2 = P_2 + \rho g y_2 + \frac{1}{2}\rho v_2^2$

$P_1 - P_2 = \frac{1}{2} \rho (v_2^2 - v_1^2)$

$\qquad = \frac{1}{2} \rho (v_2^2 - v_1^2)$

$\qquad = \frac{1}{2} (1.29) (30^2)$ N / m^2

$\qquad = 581$ N/ m^2

$F = P\,A$

$\qquad = 581$ N/ m^2 (15 m)(15 m) $= 131{,}000$ N

$\qquad = 29{,}000$ pounds! (note roof weighs 15,000 lbs)