For a venturi meter with a manometer, the volumetric flow rate $\dot{V}$ is calculated with:

$$\dot{V} = C_f A_t \sqrt{2\,g\,h\left(\frac{\rho_m}{\rho} - 1\right)} \tag{1}$$

where C_f is the meter's flow coefficient, A_t is the cross-section area at the throat, ρ_m is the density of the manometer fluid, and ρ is the density of the pipe fluid. This equation can be re-written as:

$$\dot{V} = C_f A_t \sqrt{2\,g\left(\frac{\rho_m}{\rho} - 1\right)} \cdot \sqrt{h} \tag{2}$$

The fact that $\dot{V} = 400\,\text{gpm}$ for $h = 8\,\text{in}$, can be used with equation (2) to determine that:

$$C_f A_t \sqrt{2\,g\left(\frac{\rho_m}{\rho} - 1\right)} = 141.42\,\frac{\text{gpm}}{\text{in}^{1/2}} \tag{3}$$

In other words, we recognize that the left side of equation (3) is a constant and its numerical value is the same if only the height h changes. Therefore, equation (2) can be re-written as:

$$\dot{V} = \left[141.42\,\frac{\text{gpm}}{\text{in}^{1/2}}\right]\sqrt{h}$$

which yields $\dot{V} = 283\,\text{gpm}$ for $h = 4\,\text{in}$. The average fluid velocity in the pipe $V = \dot{V}/A$ is then

$$V = \frac{283\,\frac{\text{gal}}{\text{min}}\left|\frac{1\,\text{ft}^3}{7.48\,\text{gal}}\right|}{\pi\left(\frac{2.067\,\text{in}}{2}\right)^2\left|\frac{1\,\text{ft}}{12\,\text{in}}\right|^2} = 1{,}623\,\frac{\text{ft}}{\text{min}}$$

The correct answer is (D)