37.62 $900gpm$ **of a fluid flows through** $500ft$ **of a** $8in$ **pipe. The Reynolds number is** $80,000$ **and the relative roughness is** 0.0003**. What is the total pressure drop?**

A. $2.5ft$

B. $3.5ft$

C. $5.8ft$

D. $8.2ft$

The pressure drop is calculated with the Darcy-Weisbach Equation.

$$h_f = \frac{fLv^2}{2Dg}$$

The Reynolds number and relative roughness are given. Use the Moody diagram to obtain the friction factor.

$$Re = 80,000$$

$$\frac{\epsilon}{D} = 0.0003$$

$$f = f\left(Re, \frac{\epsilon}{D}\right) \approx 0.021$$

Use the Steel Pipe Friction Tables to obtain the velocity and exact diameter based on the gpm and nominal pipe size.

$$v = 5.77\frac{ft}{s}$$

$$D = 7.981in$$

Substitute into the Darcy Equation and solve. Keep the final result with units of ft.

$$h_f = \frac{(0.021)\,(500ft)\left(5.77\frac{ft}{s}\right)^2}{2\left(\frac{7.981in}{12\frac{in}{ft}}\right)\left(32.2\frac{ft}{s^2}\right)} = 8.2ft$$

Answer D