A tank, which has a circular cross-section with diameter $D$, contains water to a depth $L$. Water flows out of the tank with uniform speed $V$ through a circular drain, with diameter $d$, at the bottom of the tank. Using the equation for conservation of mass, express $dL/dt$, the rate at which the free surface falls, in terms of the other variables given. Use the control volume indicated by the dotted lines.

\[ 0 = \frac{1}{2} \rho \int \rho \, dV + \int \rho ( \mathbf{V} \cdot \mathbf{dA}) \]

\[ \Rightarrow \frac{dL}{dt} = -\frac{d^2}{D^2} V \]