$$h_L = h_m + h_f$$

h_m → minor / Component

h_f → friction

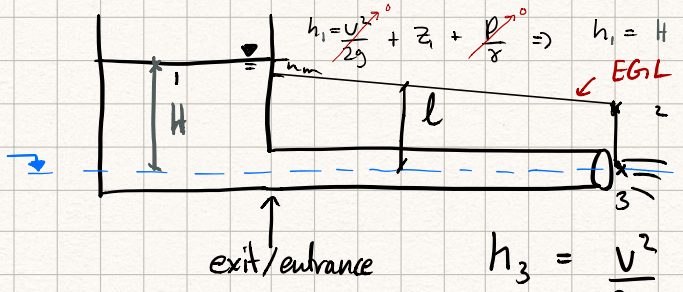
$$h_m = K \frac{v^2}{2g} \longrightarrow \text{abrupt / sudden}$$

$$h_f = \frac{fL}{D} \times \frac{v^2}{2g} \longrightarrow \text{gradual}$$

$$h_1 + h_p = h_2 + h_T + h_2$$

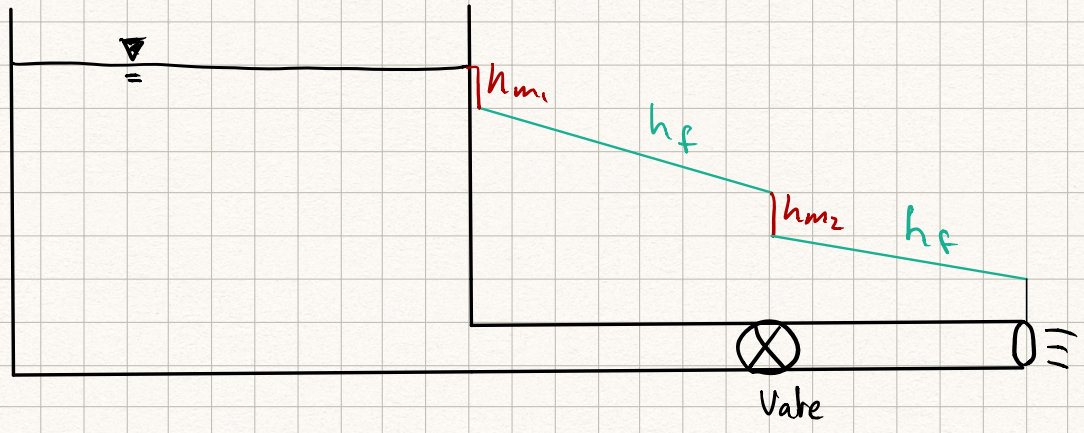
EGL : Energy grade line * WILL-BE IN FINAL

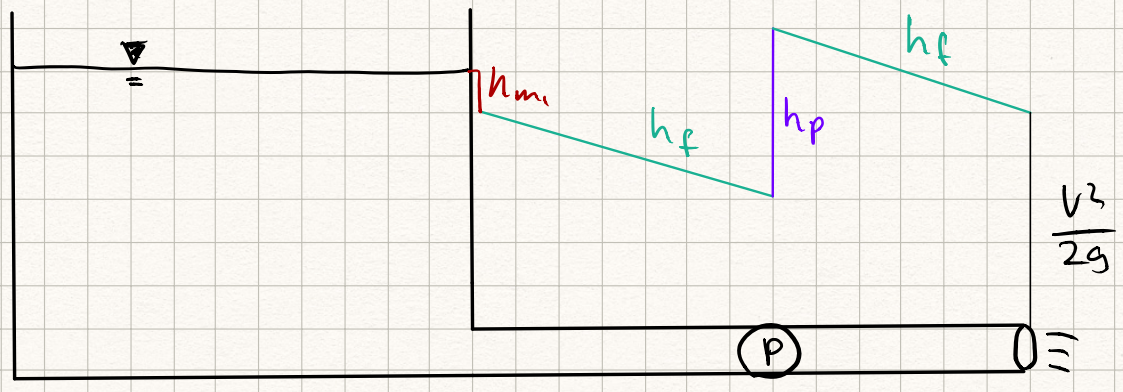
HGL : hydrolic grade line

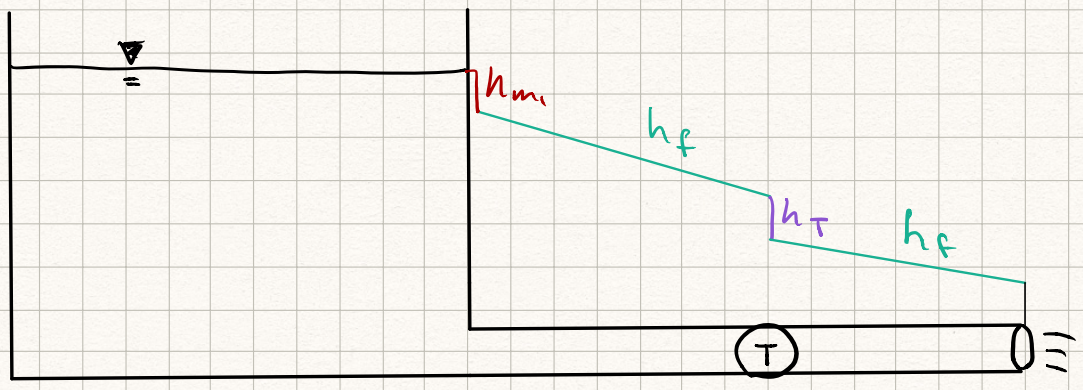


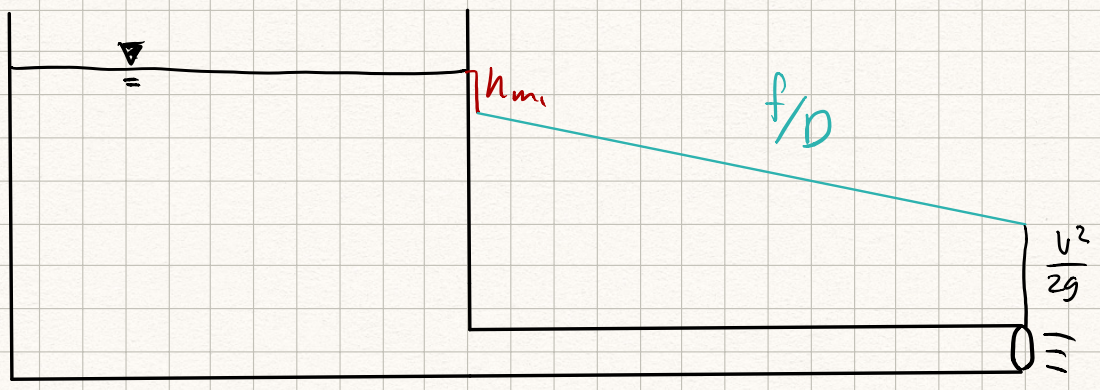
$$h_3 = \frac{v^2}{2g} + \cancel{z_3}^{\to 0} + \frac{p}{\gamma}^{\to 0}$$

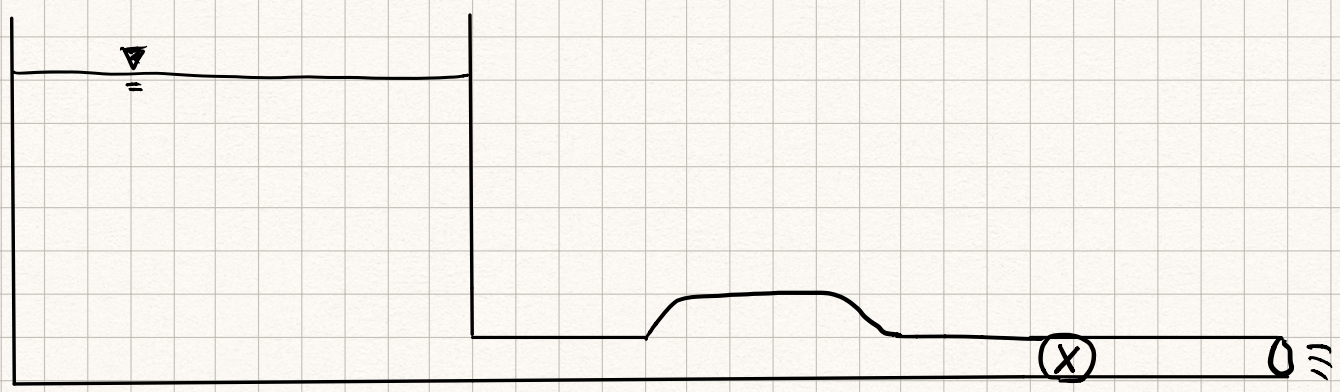
$$h_3 = \frac{v^2}{2g}$$



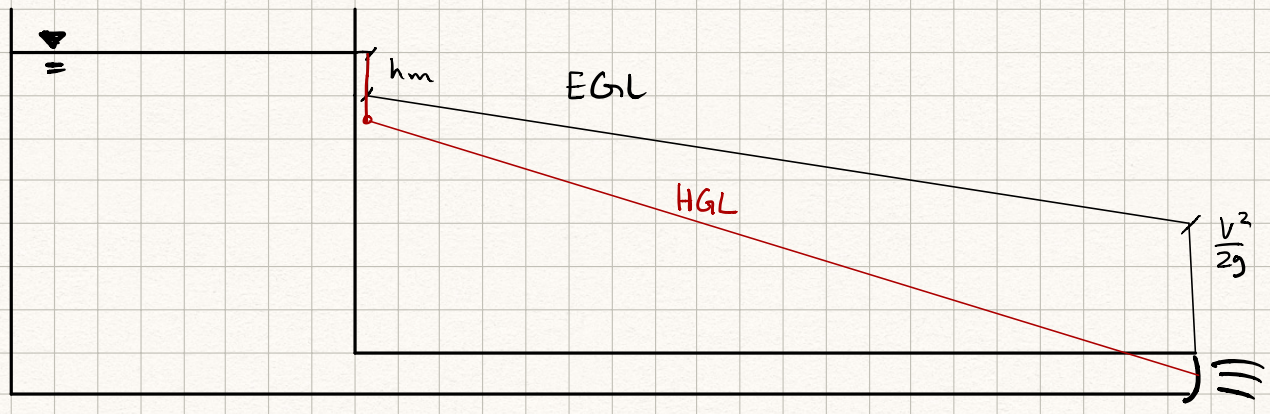

h_{m_1}
h_f
h_p
h_f
$\frac{V^2}{2g}$
P

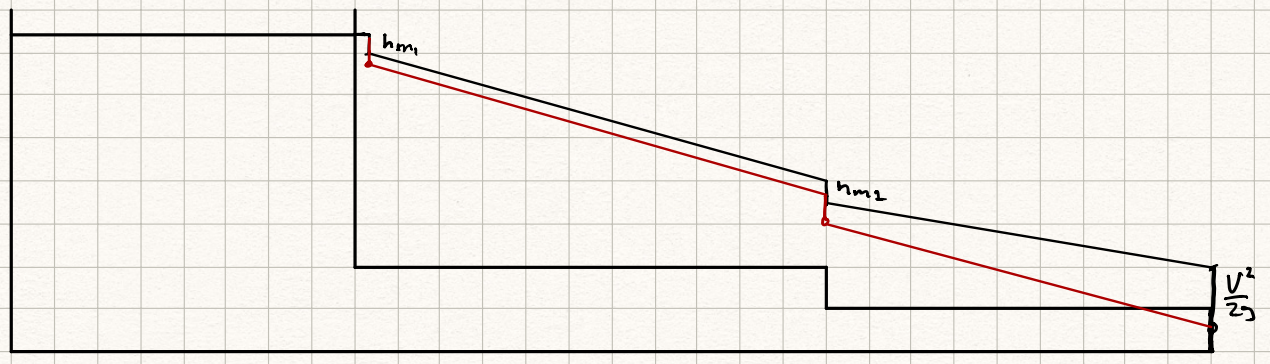

h_{m_1}
h_f
h_T
h_f
T


h_{m_1}
f/D
$\frac{V^2}{2g}$


X

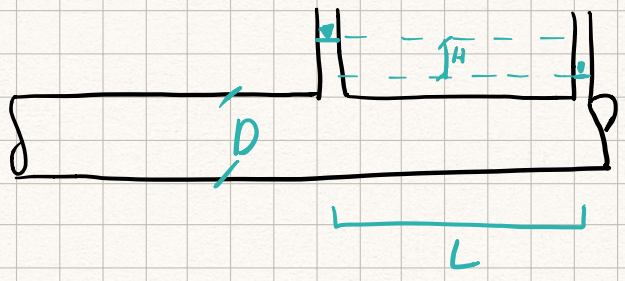
HGL - Hydrolic grade line → $EGL - \frac{V^2}{2g} = \frac{P}{\gamma} + Z$





* Water tank → EGL / HGL are at Surface
* Outlet → EGL → $\frac{V^2}{2g}$
  HGL → ∅

Friction loss : $h_f = \frac{fL}{D} \times \frac{V^2}{2g}$



EE.

$h_1 + h_p = h_2 + h_T + h_L$

$z_1 + \frac{v_1^2}{2g} + \frac{P_1}{\gamma} = z_2 + \frac{v_2^2}{2g} + \frac{P_2}{\gamma} + h_m + h_f$

$\frac{P_1}{\gamma} - \frac{P_2}{\gamma} = h_f$

$H = \frac{fL}{D}\frac{V^2}{2g} \Rightarrow f = \frac{H2gD}{V^2L}$