Water Calcs Guide:

Equation for determining rated capacity

$$Q_R = Q_F\left(\frac{H_R^{0.54}}{H_F^{0.54}}\right)$$

Set $Q_R = 1000\ GPM$ to find H_R, which equals the pressure drop from static to residual pressure @1000 GPM (this is because that is what Q_R is set to).

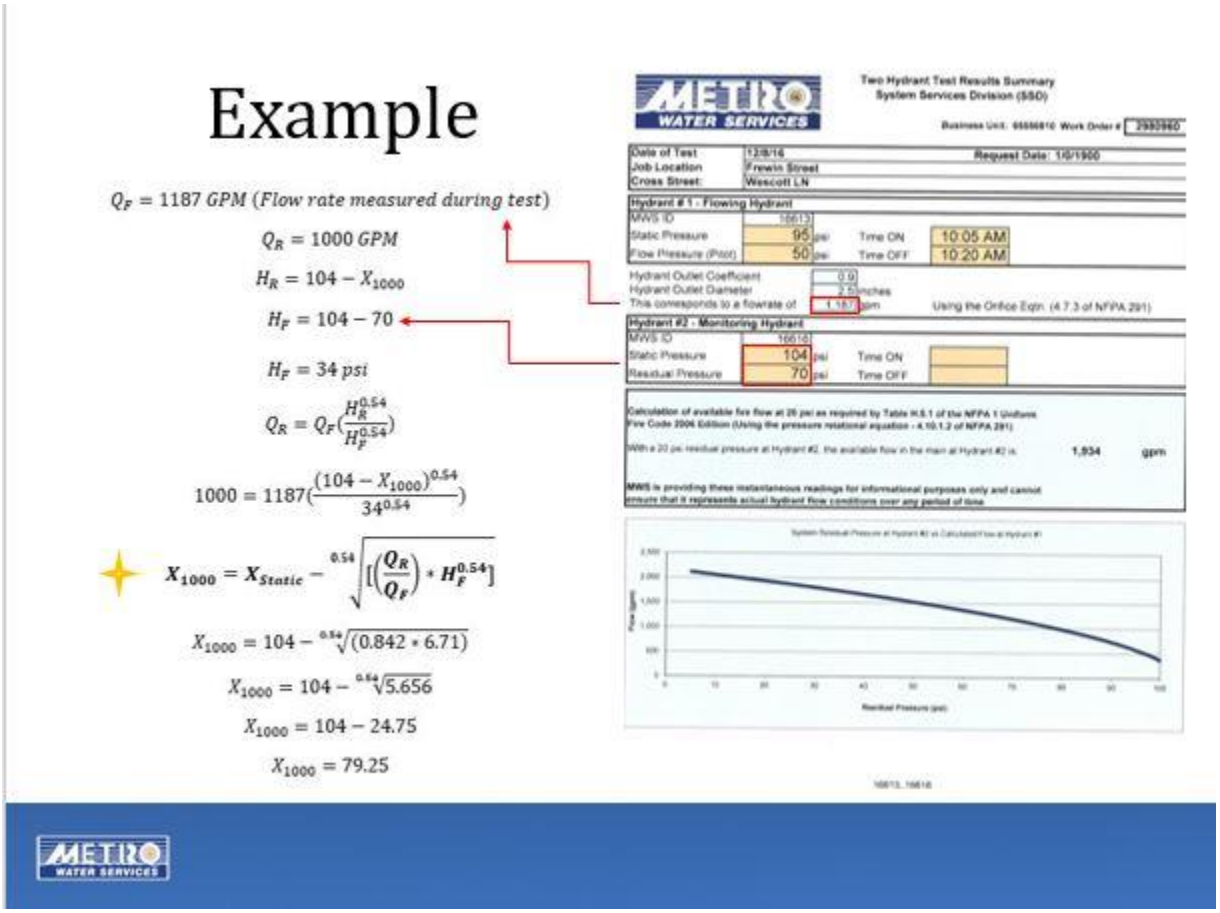
$$Q_F = Flow\ rate\ measured\ during\ test$$

$$H_F = Actual\ pressure\ drop\ measured\ during\ the\ test\ (Static - Actual\ Residual)$$

$$taken\ from\ monitoring\ hydrant$$

There is an alternative way to do this calculation, finding Q_R and setting the H_R , pressure drop, from static to a residual pressure of 20psi. 20 psi is the minimum pressure allowed lower pressures would begin to cause negative pressures potentially allowing cross contamination to occur.

However, we like to determine the residual pressure at 1000 gpm because it makes subsequent calculations easier and consistent.



Now that we have the pressure available at 1000 gpm. We want to know what losses can be expected for a new development to determine if fire flow is acceptable for the proposed hydrants.

Water Calcs Guide:

Typical losses: Friction Loss, Elevation Loss (if the proposed hydrant is lower in elevation than the elevation of the flowing hydrant, it would be a gain), Minor Loss or Losses due to fittings or local losses.

Most minor losses are negligible.

Calculating Friction Losses also referred as Head Loss: Hazen-Williams.

Requires the Hazen Williams roughness coefficient C

$$h_f = \frac{10.44 * L_{ft} * Q_{gpm}^{1.85}}{C^{1.85} * d_{in}^{4.87}}$$

$$Q = 1000\ gpm\ (the\ flow\ rate\ should\ stay\ consistent\ through\ the\ calculations)$$

$$C = Roughness\ Coefficient\ always\ use\ C = 130\ for\ new\ pipe\ (C\ decreases\ with\ age\ of\ pipe)$$

$$d = diameter\ of\ proposed\ main\ (in")$$

$$L = Length\ of\ proposed\ main\ (ft)\ to\ proposed\ hydrant$$

Then find the elevation difference from monitoring hydrant to proposed. Convert difference in FT to PSI. Feet (of H2O) X 0.4333 = PSI

The net gain/loss in PSI is subtracted (so Friction losses will also need to be converted to PSI), from the Residual pressure at 1000 gpm to determine the residual pressure of the proposed hydrant.

Example: $X_{1000} = 79.25$

Net gain/loss (PSI) is subtracted from the residual pressure of the proposed hydrant
$h_f = 7.25\ ft = 3.15\ psi$

$\Delta Z = 30\ ft = 12.9\ psi$

Proposed Hydrant Pressure @1000gpm

$= 79.25 - 3.15 - 12.9 = 63.2\ psi$