Specific Gravity (Relative Density) of a Blended Aggregate

The specific gravity of a blended aggregate is <u>not</u> simply the weighted average of the specific gravities of the individual components. To derive an appropriate equation, let's assume a blend of two aggregates (A and B). The weight of the blend is given by

$$W_{blend} = W_A + W_B$$

and the volume occupied by the individual particles of the blend is given by

$$V_{blend} = V_A + V_B$$

The weight and volume of the aggregate particles are related through specific gravity:

$$V_{agg} = \frac{W_{agg}}{G_s \gamma_w}$$

Let G_A, G_B, and G_{blend} be the specific gravities of materials A and B and the blend. Then the volume equation above can be rewritten as

$$\frac{W_{blend}}{G_{blend}\gamma_w} = \frac{W_A}{G_A \gamma_w} + \frac{W_B}{G_B \gamma_w}$$

Multiplying through by γ_w and dividing through by W_{blend} leaves

$$\frac{1}{G_{blend}} = \frac{W_A / W_{blend}}{G_A} + \frac{W_B / W_{blend}}{G_B}$$

If the aggregate is being blended by weight, then W_A/W_{blend} is the fraction of the blend contributed by material A (call it f_A) and W_B/W_{blend} is the fraction of the blend contributed by material B (call it f_B). The equation above can therefore be written as

$$\frac{1}{G_{blend}} = \frac{f_A}{G_A} + \frac{f_B}{G_B}$$

So the ***inverse*** of the specific gravity of the blend is equal to the weighted average of the ***inverses*** of the specific gravities of the components.

For example, of 25% Material A and 75% Material B has a specific gravity given by

$$\frac{1}{G_{blend}} = \frac{0.25}{G_A} + \frac{0.75}{G_B}$$

What would happen if we blend the aggregate by volume instead of weight?