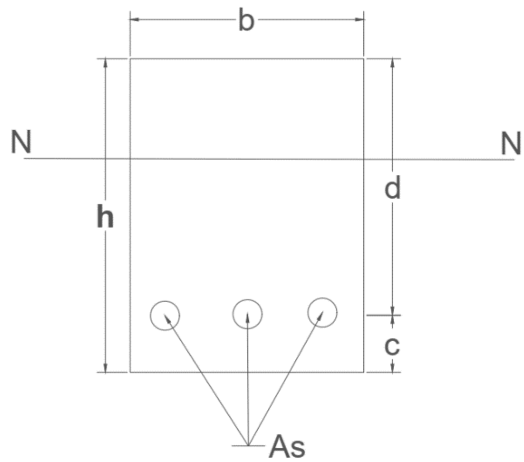
Learning Tool for Reinforced Concrete Design	Project				Job Ref.	
	Section				Sheet no./rev. 1	
	Calc.by	Date	Chk'd by	Date	App'd by	Date

CRACK WIDTH CALCULATION (EC2)

Reference	Calculations	Remarks
	 f_{ck} = f_{yk} = E_s = A_s = b = h = c = $\emptyset$ = M =	
Note 1	**<u>STEP 1</u>** Calculate the neutral axis depth of the cracked section $\boldsymbol{x = \frac{-\alpha_e A_s \pm \sqrt{(\alpha_e A_s)^2 + 2b\alpha_e A_s d}}{b}}$	$\boldsymbol{x =}$
	<u>STEP 2</u> Calculate the steel stress at the crack ($\boldsymbol{\sigma_{s2}}$) $\boldsymbol{Lever\ arm(Z) = d - \frac{x}{3}}$ $\boldsymbol{\sigma_s = M/Z\ A_s =}$	$\boldsymbol{Lever\ arm(Z) =}$ $\boldsymbol{\sigma_s =}$

Learning Tool for Reinforced Concrete Design	Project				Job Ref.	
	Section				Sheet no./rev. 2	
	Calc.by	Date	Chk’d by	Date	App’d by	Date

Reference	Calculations	Remarks
Clauses 7.3.4(2) Eq. 7.10	**STEP 3** Calculate the effective reinforcement ratio $\boldsymbol{\rho_{p.eff} = \frac{A_s}{A_{c,eff}}}$	$\boldsymbol{\rho_{p.eff}} =$
Clauses 7.3.4(3)	**STEP 4** $\boldsymbol{S_{r,max} = K_3 C + K_1 K_2 K_4 \frac{\emptyset}{\rho_{p,eff}}}$	$\boldsymbol{S_{r,max}} =$
Clauses 7.3.4(1) Eq. 7.8 Table 7.1N	**STEP 5** $\boldsymbol{\varepsilon_{sm}} = \frac{\boldsymbol{\sigma_s}}{E_s}$ Calculate the maximum crack width; $\boldsymbol{w_K = S_{r,max} \times \varepsilon_{sm}}$ $\boldsymbol{w_K} =$	$\boldsymbol{\varepsilon_{sm}} =$ $\boldsymbol{w_K} =$

Note of Calculations

1. The serviceability calculations are based on triangular stress block for concrete only above neutral axis-i.e. a cracked section. There is no restriction on the x/d ratio, as in ultimate limit state calculations. Instead of using this formula for x/d, we could have found the value of x by equating the first moments of area of a transformed (cracked)section about the neutral axis, the area of steel can be converted to an equivalent concrete area based on $\propto_{eff}$ We then have

$$\{\boldsymbol{b.x.}(\boldsymbol{x}/\boldsymbol{2})\}/\propto_{\boldsymbol{eff}} = \boldsymbol{A_s(d-x)}$$