PROCEDURE CIRCULAR UNBRACED(SWAY) LONG COLUMN

REFERENCES	STEP	DESCRIPTION	DESIGN AID
	Given:	Pu , Mu , $fc`$, fy	
	Required :	Design along unbraced column.	
	1- Calculate the Area *If given the dimension or by assuming ρ_g then. $Ag \geq \frac{Pu}{0.45(fc`+\rho_g fy}$ Use	» A==$\frac{\pi(D)^2}{4}$ =0.125 m^2	
(10.11.4.1) (10.11.5.1) (10.11.4.3)	2-Calculate the Slenderness Ratio $\frac{Klu}{r}$	» To find $\frac{Klu}{r}$ 1 – Calculate Ψtop and Ψbottom Where: $\psi = \frac{\sum \frac{EcIc}{Lc}}{\sum \frac{EbIb}{Lb}}$ 2 – Read K from graph 3 –For Unbraced Column Check » If $\frac{Klu}{r} \leq 22 \Rightarrow Short...Column$ » If $\frac{Klu}{r} \geq 22 \Rightarrow Long...Column$ » If $\frac{Klu}{r} \geq 100 \Rightarrow$ P-Δ analysis must be calculated	Fig10.11.2 of ACI318R-89
	3- Calculate Pu , Mns and Ms , using case of loading $Mmax=Mns+Ms\delta s$	»By Applying Case of Loading 1 – D.L+L.L(case 1) Pu=1.4$D.L$+1.7$L.L$ Mns=1.4$MD.L$+1.7$ML.L$ Ms=0.0 2 – $D.L$+$L.L$+$W.L$(case2) Pu=0.75(1.4$D.L$+1.7$L.L$+1.7WL) Mns=0.75(1.4M_D +1.7M_L) Ms =0.75(1.7M_w) 3 – $D.L$+$W.L$(case3) Pu =0.9 $D.L$+1.3 $W.L$ Mns=0.9M_D	

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		$Ms = 1.3M_w$	
	4- Calculate Moment magnification factor δ_s	$\delta s = \frac{Cm}{1 - \left(\frac{P_u}{\phi P_{cr}}\right)}$ Where: » Cm=0.6(exterior column) Cm=1.0(Interior column) »Φ=0.75 $» Pcr = \frac{\pi^2 (EI)eff}{(Klu)^2}$ $» EIeff = \frac{EcIg}{2.5(1+\beta d)}$	
	5- Determine ρg for Vertical loads Plus lateral force	1 – Calculate $\frac{\phi Pn}{Ag}$ For each case Of loading 2 – Calculate $\frac{\phi Mn}{A_g h}$ For each case Of loading Where Φ=0.75 3 –Calculate γ where: $\gamma = \frac{h - 2.cv - 2.st - \phi bar}{h}$ 3-Read ρg from Column Graph of the interaction diagram	Column from (1 to 20)