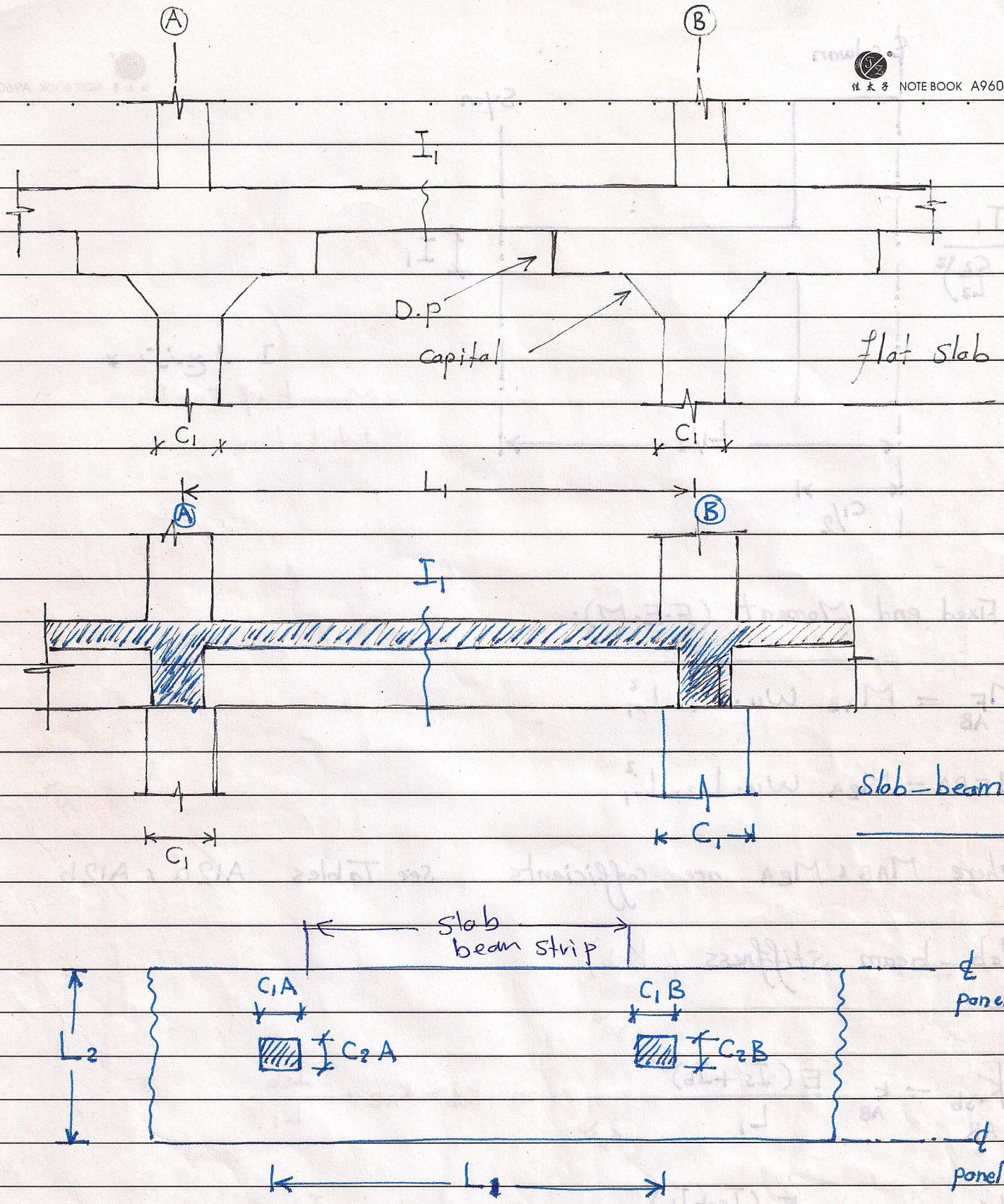
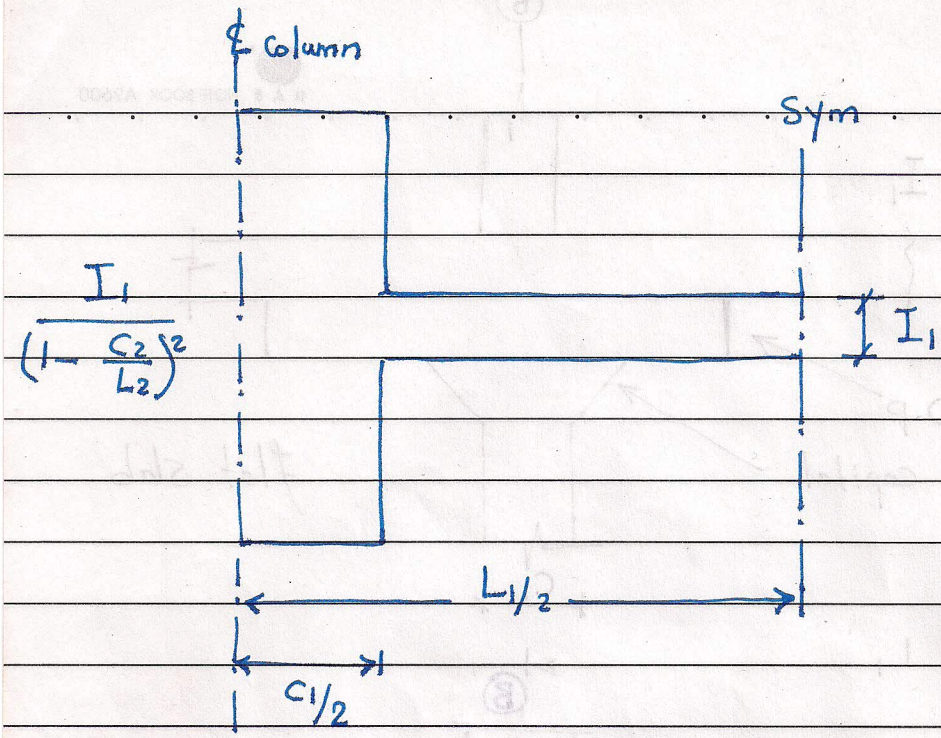




* توزيع I
* Moment of Inertia distribution

Fixed end Moment (F.E.M).

$$M_{F_{AB}} = M_{AB}\ Wu \cdot L_2 \cdot L_1^2$$

$$M_{FBA} = M_{BA}\ Wu \cdot L_2 \cdot L_1^2$$

where M_{AB} ، M_{BA} are coefficients see Tables A12a ، A12b (Table A, Table B)

Slab_beam stiffness (K_{sb})

$$K_{sb_{AB}} = k_{AB}\ \frac{E(I_s + I_b)}{L_1}$$ ($I_{s,b}$) or $K_{sb} = K_{AB} * \frac{I_{sb}}{L_1}$

$$K_{sb_{BA}} = K_{BA}\ \frac{E(I_s + I_b)}{L_1}$$ ($I_{s,b}$) or $K_{sb} = K_{BA} * \frac{I_{sb}}{L_1}$

where K_{AB} ، K_{BA} are stiffess factors ، see Tables A12a ، A12b

Carry Over Factor (C.O.F).

There are $C.O.F_{AB}$ & $C.O.F_{BA}$ (see Tables)

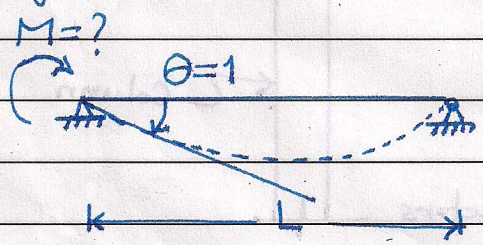
* The stiffness factor (k), Carry over factor (C.O.F) & fixed end Moment coefficient (M) can be determined from

1- Table A 12a: For flat plate, slab-beam floor, Flat slab without drop panels.

2- Table A 12b: For flat slab with drop panels of depth $= 1.25 h_{slab}$ and length $L/3$

Note/ Theory of structures

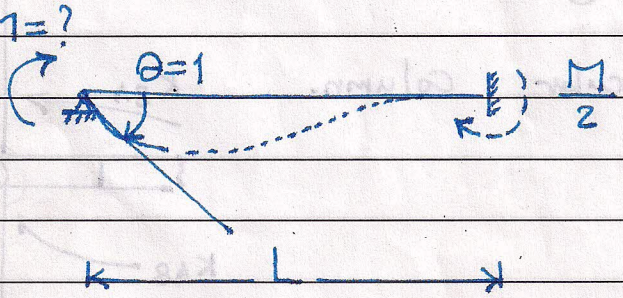
case (I)



EI = Constant (prismatic member).

$$K = \frac{M}{\theta} = \frac{3EI}{L} \quad (KN/m)$$

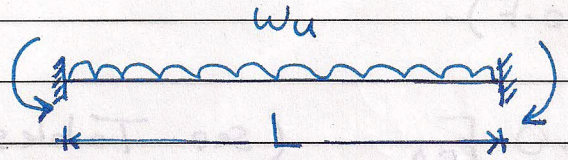
case (II)



EI = Constant

$$K = \frac{M}{\theta} = \frac{4EI}{L}$$

C.O.F = 1/2

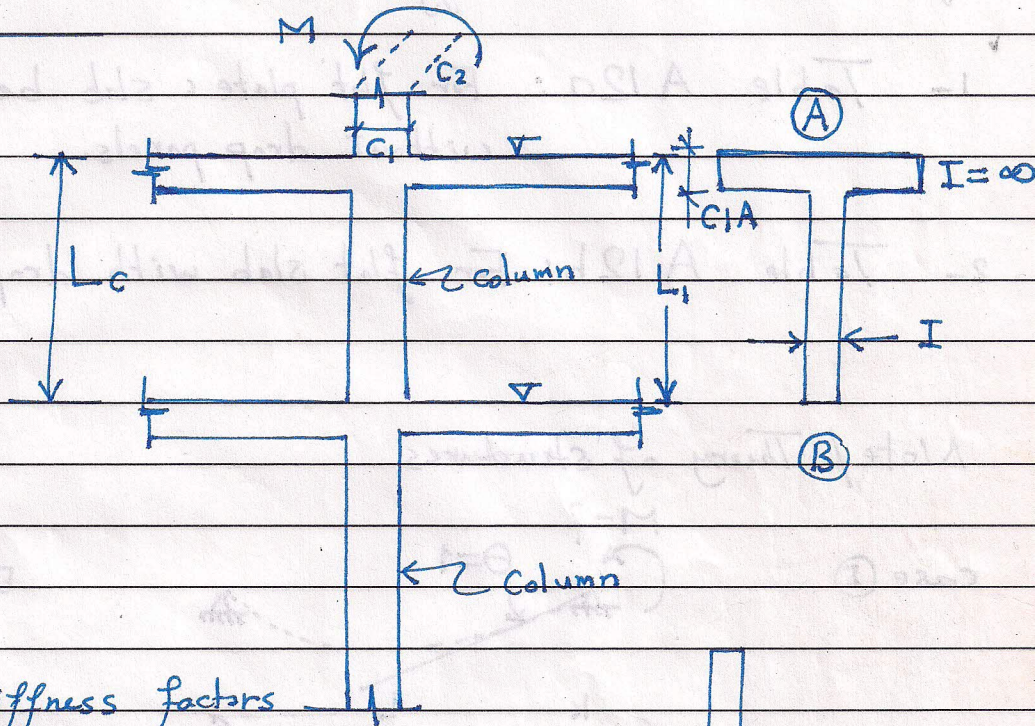


EI = constant

$$M_{FAB} = M_{FBA} = \frac{wu\,L^2}{12} = 0.083\,Wu.L^2$$

9- Column stiffness K_c

@ For flat plate



$$K_{c_{AB}} = k_{AB}\frac{EI_c}{L_c}$$

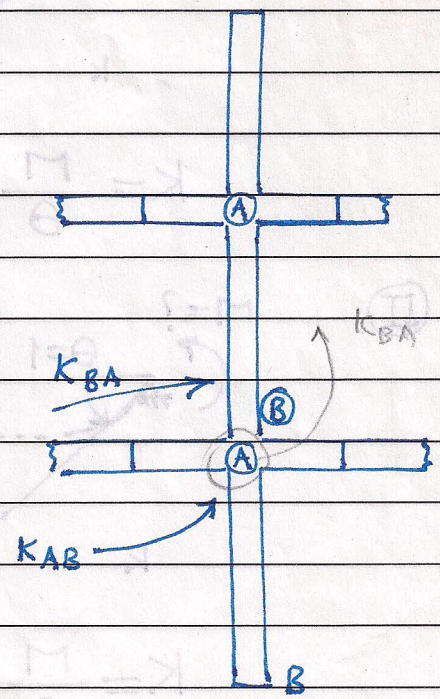
$$K_{c_{BA}} = K_{BA}\frac{EI_c}{L_c}$$

where

(K_{AB} & K_{BA} are stiffness factors From Table A12C of column).

$$I_c = \frac{C_1^3 C_2}{12}$$ For rectangular Column.

$$= \frac{\pi}{64} D^4$$ " Circular Column.



Example

If slab thickness = 200mm . L_c = 4m

use Table of column

Since $\frac{C_1A}{L_1} = \frac{0.2}{4} = 0.05$ $\xrightarrow{\text{Tables}}$ $K_{AB} = 4.91$ & $K_{BA} = 4.21$

& C.O.F_{AB} = 0.496

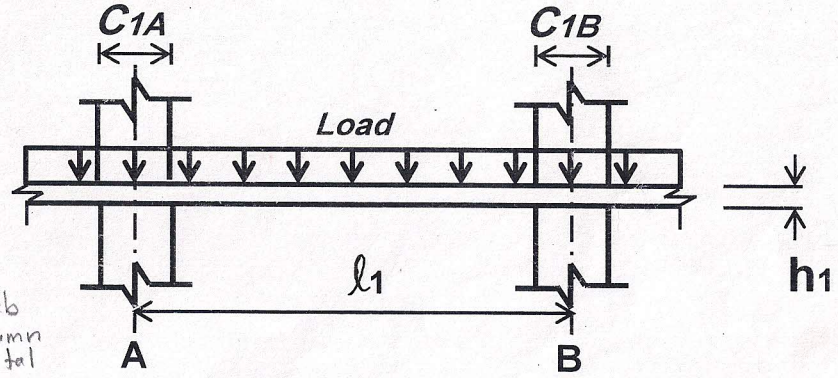
C.O.F_{BA} = 0.579

Table (A)

Coefficients for slabs (without drop panel) or with column capital and slab with beams.

Ref.[1]

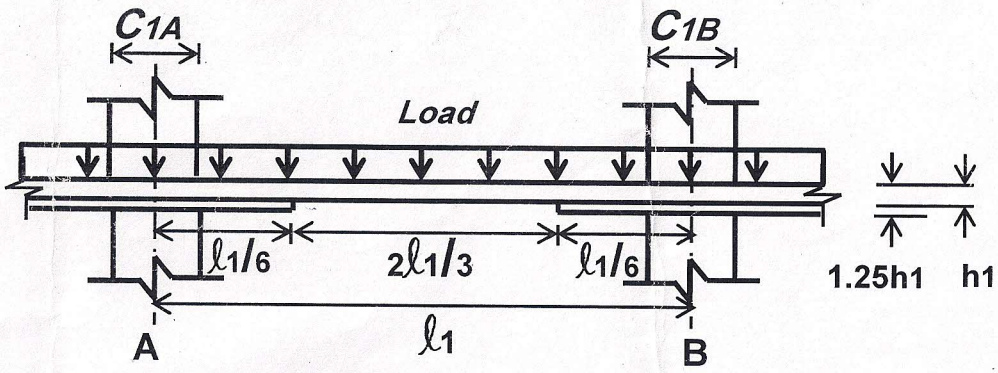
Flat plate + Slab-beam + Flat slab with column capital



Column Dimension		Uniform Load FEM=Coeff.($wl_2l_1^2$)		Stiffness Factor		Carry Over Factor	
C_{1A}/l_1	C_{1B}/l_1	M_{AB}	M_{BA}	K_{AB}	K_{BA}	COF_{AB}	COF_{BA}
0.00	0.00	0.083	0.083	4.00	4.00	0.500	0.500
	0.05	0.083	0.084	4.01	4.04	0.504	0.500
	0.10	0.082	0.086	4.03	4.15	0.513	0.499
	0.15	0.081	0.089	4.07	4.32	0.528	0.498
	0.20	0.079	0.093	4.12	4.56	0.548	0.495
	0.25	0.077	0.097	4.18	4.88	0.573	0.491
0.05	0.05	0.084	0.084	4.05	4.05	0.503	0.503
	0.10	0.083	0.086	4.07	4.15	0.513	0.503
	0.15	0.081	0.089	4.11	4.33	0.528	0.501
	0.20	0.080	0.092	4.16	4.58	0.548	0.499
	0.25	0.078	0.096	4.22	4.89	0.573	0.494
0.10	0.10	0.085	0.085	4.18	4.18	0.513	0.513
	0.15 *	0.083	0.088	4.22	4.36	0.528	0.511
	0.20	0.082	0.091	4.27	4.61	0.548	0.508
	0.25	0.080	0.095	4.34	4.93	0.573	0.504
0.15	0.15 *	0.086	0.086	4.40	4.40	0.526	0.526
	0.20	0.084	0.090	4.46	4.65	0.546	0.523
	0.25	0.083	0.094	4.53	4.98	0.571	0.519
0.20	0.20	0.088	0.088	4.72	4.72	0.543	0.543
	0.25	0.086	0.092	4.79	5.05	0.568	0.539
0.25	0.25	0.090	0.090	5.14	5.14	0.563	0.563

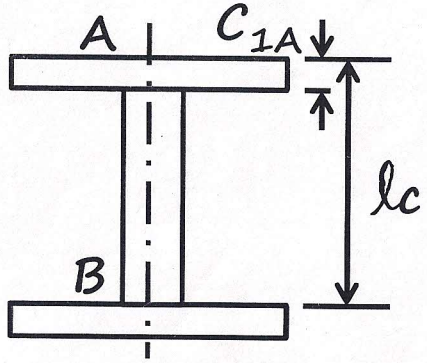
Table (B)
Coefficients for slabs (with drop panel). Ref.[1]

Flat slab with drop panel



Column Dimension		Uniform Load FEM=Coeff.($wl_2l_1^2$)		Stiffness Factor		Carry Over Factor	
C_{1A}/l_1	C_{1B}/l_1	M_{AB}	M_{BA}	K_{AB}	K_{BA}	COF_{AB}	COF_{BA}
0.00	0.00	0.088	0.088	4.78	4.78	0.541	0.541
	0.05	0.087	0.089	4.80	4.82	0.545	0.541
	0.10	0.087	0.090	4.83	4.94	0.553	0.541
	0.15	0.085	0.093	4.87	5.12	0.567	0.540
	0.20	0.084	0.096	4.93	5.36	0.585	0.537
	0.25	0.082	0.100	5.00	5.68	0.606	0.534
0.05	0.05	0.088	0.088	4.84	4.84	0.545	0.545
	0.10	0.087	0.090	4.87	4.95	0.553	0.544
	0.15	0.085	0.093	4.91	5.13	0.567	0.543
	0.20	0.084	0.096	4.97	5.38	0.584	0.541
	0.25	0.082	0.100	5.05	5.70	0.606	0.537
0.10	0.10	0.089	0.089	4.98	4.98	0.553	0.533
	0.15	0.088	0.092	5.03	5.16	0.566	0.551
	0.20	0.086	0.094	5.09	5.42	0.584	0.549
	0.25	0.084	0.099	5.17	5.74	0.606	0.546
0.15	0.15	0.090	0.090	5.22	5.22	0.565	0.565
	0.20	0.089	0.094	5.28	5.47	0.583	0.563
	0.25	0.087	0.097	5.37	5.80	0.604	0.559
0.20	0.20	0.092	0.092	5.55	5.55	0.580	0.580
	0.25	0.090	0.096	5.64	5.88	0.602	0.577
0.25	0.25	0.094	0.094	5.98	5.98	0.598	0.598

Table (C)
Coefficients for column stiffness. Ref.[1]



Slab* depth	Uniform load FEM=Coeff.($wl_2l_1^2$)		Stiffness factor		Carry over factor	
			Bottom	Top		
C_{1A}/ℓ_c	M_{AB}	M_{BA}	k_{AB}	k_{BA}	COF_{AB}	COF_{BA}
0.00	0.083	0.083	4.00	4.00	0.500	0.500
0.05	0.100	0.075	4.91	4.21	0.496	0.579
0.10	0.118	0.068	6.09	4.44	0.486	0.667
0.15	0.135	0.060	7.64	4.71	0.471	0.765
0.20	0.153	0.053	9.69	5.00	0.452	0.875
0.25	0.172	0.047	12.44	5.33	0.429	1.000

* Thickness of the slab with drop panel or column capital or beam above the column in direction of ℓ_1.