UNIVERSIDAD DE CHILE FACULTAD DE ARQUITECTURA Y URBANISMO DEPTO. CIENCIAS DE LA CONSTRUCCION

GUIA 3 - Desarrollo

GUIA Nº 3

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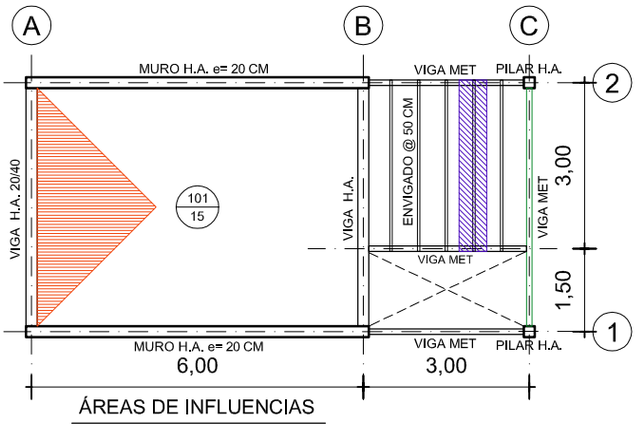
Alumno: 9 abril 2010



ÁREAS DE INFLUENCIAS

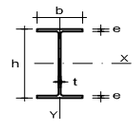
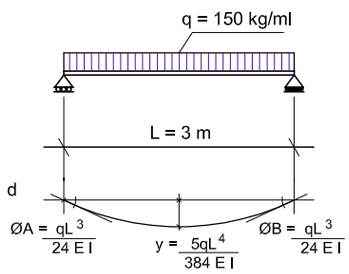


TABLA DE PERFILES SOLDADOS COPROMET

	h	b	t	e	A	P	Ix	Wx	ix	Iy	Wy	iy
	mm	mm	mm	mm	cm²	kg/m	cm⁴	cm³	cm	cm⁴	cm³	cm
IPE 100	100	55	4,1	5,7	10,30	8,10	171	34,20	4,07	15,9	5,79	1,24
IPE 140	140	73	4,7	6,9	19,40	12,90	541	77,30	5,74	44,9	12,30	1,65
IPE 180	180	91	5,3	8,0	23,90	18,80	1.320	146,00	7,43	101	22,20	2,05
IPE 200	200	100	5,6	8,5	28,50	22,40	1.940	194,00	8,25	142	28,50	2,24
IPE 240	240	120	6,2	9,8	39,10	30,70	3.890	324,00	9,97	284	47,30	2,70
IPE 270	270	135	6,6	10,2	45,90	36,10	5.790	429,00	11,23	420	62,20	3,02
IPE 300	300	150	7,1	10,7	53,80	42,20	8.360	557,00	12,47	604	80,50	3,35
IPE 360	360	170	8,0	12,7	72,70	57,10	16.270	904,00	14,96	1.040	123,00	3,78

1) VIGA 2"x 6"



$q = (100\ kg/m^2 + 200\ kg/m^2) * 0{,}5\ m = 150\ kg/ml$

(Peso envigado; Sobrecarga de uso)

Diseño por deformación

$y_{adm} = \frac{300}{300} = 1{,}0\ cm$

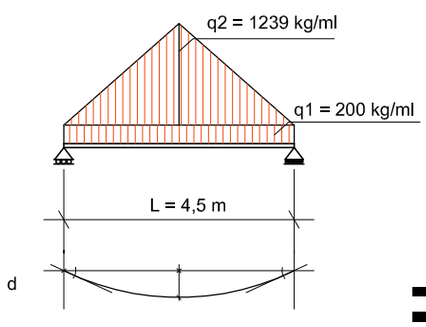
13,8 cm; 4,1 cm

$I = \frac{b*h^3}{12} = \frac{4{,}1 * (13{,}18)^3}{12} = 782{,}25\ cm^4$

$y = \frac{5 \times 1{,}50 \times 300^4}{384 \times 46900 \times 782{,}25} = 4{,}3\ cm$

y = 4,3cm >1cm →Supera deformación maxima admitida

2) VIGA H.A 20/40



$y = \frac{5qL^4}{384\ EI} + \frac{q\ L^4}{120\ EI}$

$y_{adm} = \frac{450}{300} = 1{,}5\ cm$

$I = \frac{b*h^3}{12} = \frac{20 * 40^3}{12} = 106666.67\ cm^4$

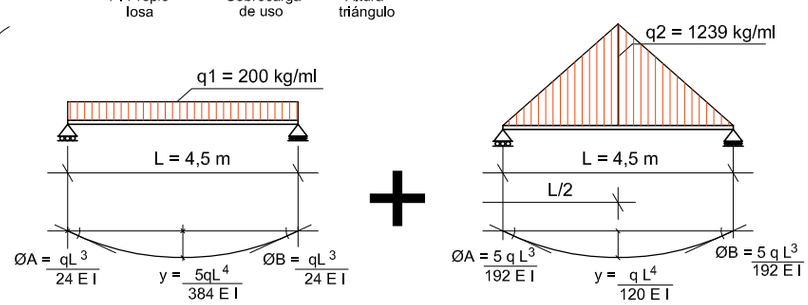
=

$q1 = 0{,}2*0{,}4*2500\ kg/m^3 = 200\ kg/ml$

(P. Propio losa)

$q2 = ((0{,}15*2500\ kg/m^3) + 200\ kg/m^2) * 2{,}25 = 1239\ kg/ml$

(P. Propio losa; Sobrecarga de uso; Altura triángulo)



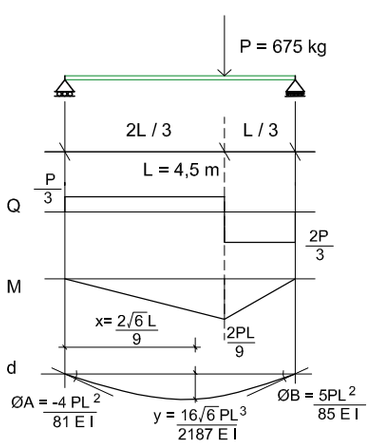
$y = \frac{5 \times 2{,}0 \times 450^4}{384 \times 220000 \times 106666{,}67} = 0{,}04\ cm$

$y = \frac{12{,}39 \times 450^4}{48 \times 220000 \times 106666{,}67} = 0{,}45\ cm$

$y_{max\ total} = 0{,}04 + 0{,}45 = 0{,}49\ cm$

y = 0,49 cm → no supera deformación maxima admitida

3) VIGA METÁLICA



$P = (100\ kg/m^2 + 200\ kg/m^2) * 1{,}5\ m * 1{,}5\ m = 675\ kg$

(Peso envigado; Sobrecarga de uso)

Diseño por resistencia

$M_{máx} = \frac{2PL}{9} = \frac{2* 675 * 4{,}5}{9} = 675\ kg*m = 67500\ kg*cm$

$f_{adm} = \frac{M}{W} \rightarrow W = \frac{M}{f_{adm}} = \frac{67500\ kg*cm}{1440\ kg/cm^2} = 46{,}875\ cm^3$

W = 46,875 cm³ → Aplicando tabla nos da Perfil IPE 140

Diseño por deformación

$y_{adm} = \frac{450}{300} = 1{,}5\ cm$

$y = 1{,}5\ cm = \frac{16\sqrt{6} \times 675 \times 450^3}{2187 \times 2100000 \times I} = 349{,}92\ cm^4$

I = 349,92 cm⁴ → Aplicando tabla nos da Perfil IPE 140