د افغانستان اسلامی جمهوریت

د لوړو زده کړو وزارت

لغمان پوهنتون

انجنیری پوهنځی

Steel Design

Ketabton.com

نوم : عبدالرحیم

د پلار نوم : مستو خان

صنف : دریم

سکشن: B

حاضري شمیره : 37

استاد : پوهیالي خیبر (خپلواک)

کال.....۱۳۹۹ ه ش

(c) ketabton.com: The Digital Library

بسم الله الرحمن الرحيم

سریزه

له کله نه چی انسان د ځمکی په مخ قدم ایښی نو له همغه پیل نه یی د اوسیدو لپاره ځان ته دیوه سرپناه د پیداکولو هڅه کړی . دا ځکه چی هر انسان له هوا او اوبو وروسته ترټولو لمړی اړین عنصر چی د هوسا ژوند تیرولو لپاره ورته اړتیا لری هغه هم سرپنا ده نه یواځی انسانان بلکی الوتونکی هم چی کله په یوه سیمه کی وغواړی ددیر وخت لپاره ووسیږی نو لومړی ځان ته له ونو ، بوټو او خاښاکو څخه د اوسیدو لپاره ځای برابروی .

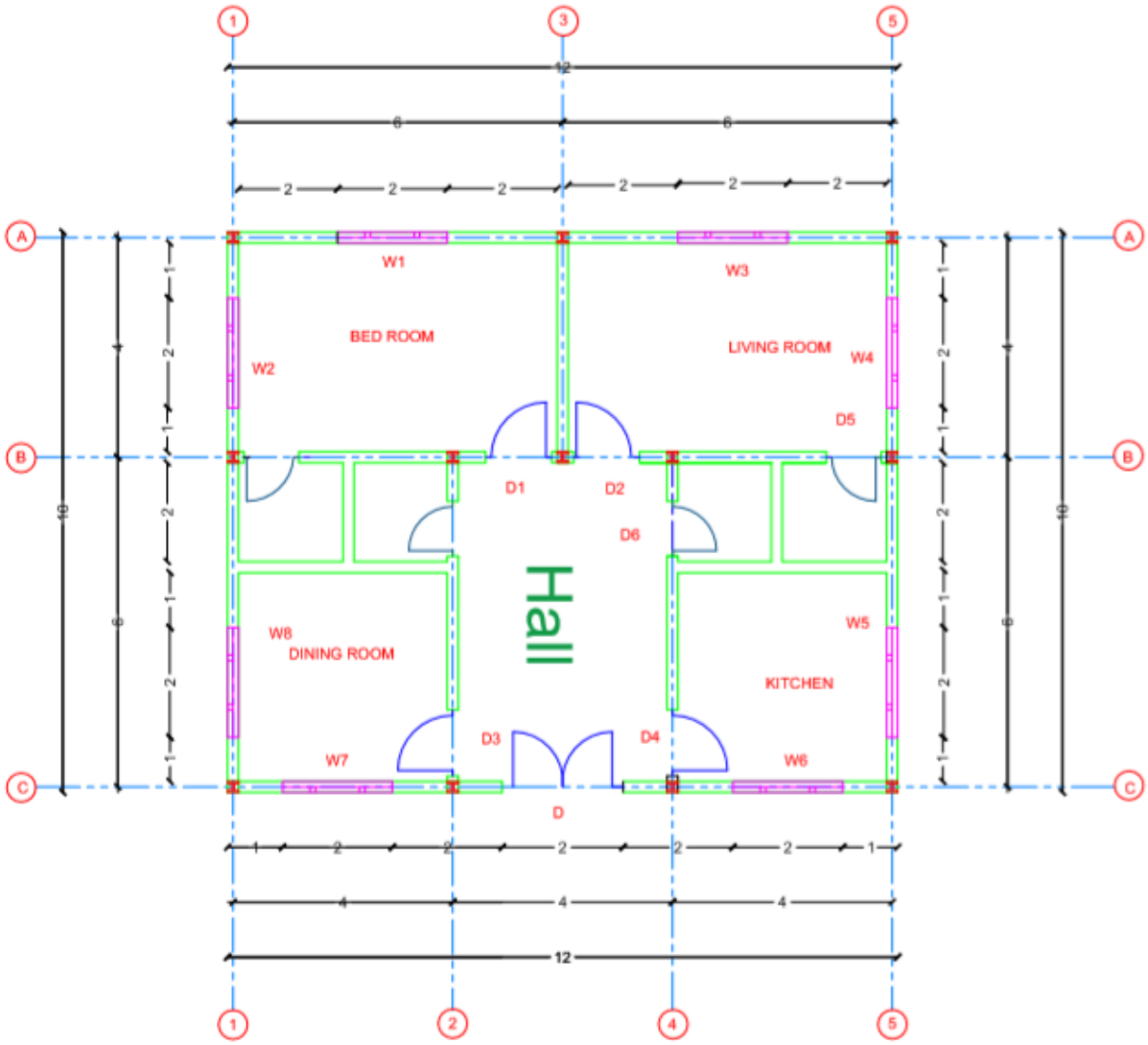
په پخوانی وختونوکی کله چی د انسانانو ژوند په مشترک ډول نه و نو په هغه وخت کی خلکوپه غارونو او د لویو ډبرو په اړه خونو او کنجونو کی ژوند تیراوه نو دوی دې ته اړ و چی خپل ځانونه د طبیعت د نا مؤزنه شرایطو او همدارنګه د ځنګلونو ،غرونو او دشتو وحشی حیواناتو څخه ځان په امن وساتی .

نو له دی څخه څرګندیږی چی انسانانو له همغه پیله ځان ته سرپناه جوړه وی چی د انسان په متمدن کیدو سره د سرپناه په جوړولوکی مختلف بدلونونه راغلل چی اوس وخت عموما چی کوم ساختمانونه جوړیږی هغه د اوسپنیزکانکریت ، لرګیو،او فولادی ساختمانونو څخه عبارت دی چی نظر دې ټولو ته فولادی ساختمانونه ډیر کارول کیږی . او فولاد یو ډیره مهمه ساختمانی ماده ده چی نن سبا په ساختمانی چاروکی په پراخه اندازه ورڅخه استفاده کیږی . لکه په مسکونی ودانیو ، سرکونو ، پلونو،هایدرولیکی ساختمانونو اوداسی نور....

موږ چي کوم فولادي ساختمان ډیزاین کوو د هغه پلان په لاندي ډول دی

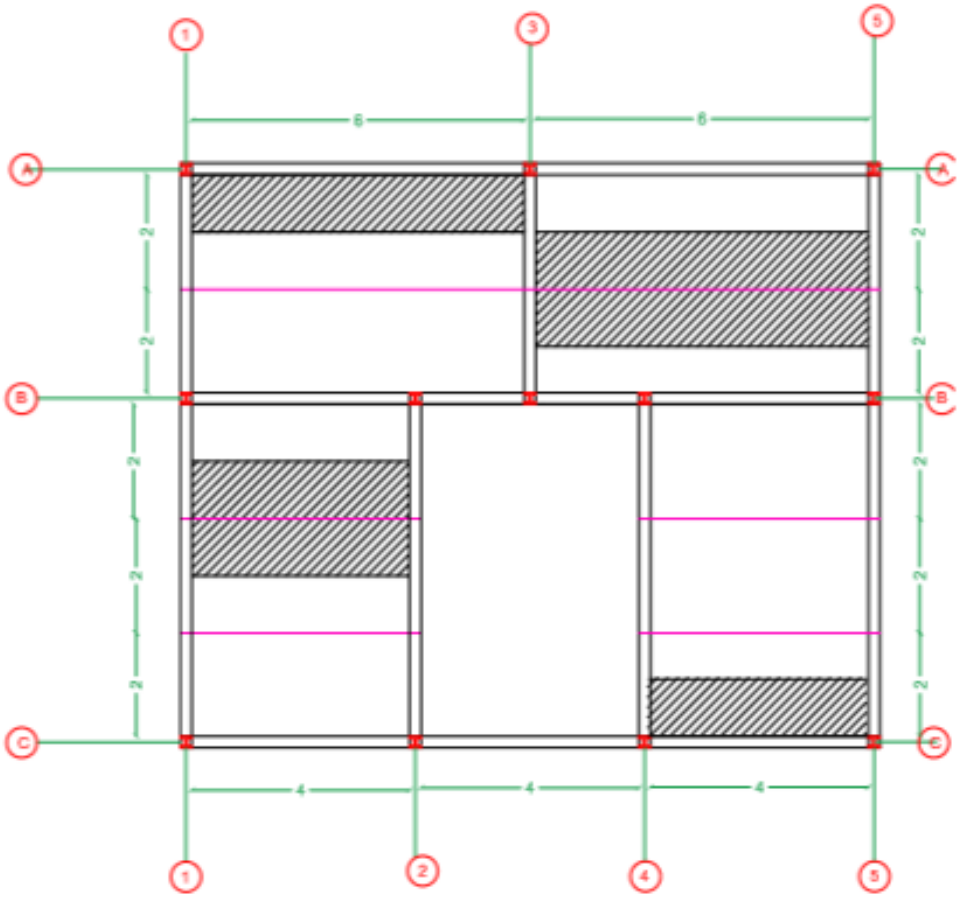
(c) ketabton.com: The Digital Library

پلان



(c) ketabton.com: The Digital Library

د بیمونو اوکاډرو چوکاټ



لومړی برخه

د ټولو نه وړومبي ددغي ساختمان Roof deck ډیزاین کوو

د Roof د ډیزاین دپاره یوازي live load په نظر کي نیسو.

د مسکوني ودانیو دپاره live load = 192 kg/m²

Wu = 1.4 *192 kg/m² =268.8 kg/m²

د نهایی بار واحد د SI څخه PSF ته اړوو

(c) ketabton.com: The Digital Library

Wu = 268.8*2.204/3,28^2 = 55.06 PS

اوس VULCRAFT MENUAL ته مراجعه کوو او دهغه د جدولونو څخه Roof deck انتخابوو . مونږ چي کوم Roof deck انتخاب کړي دي د هغه وايه 2m ده اوس موږ دغه واحد په Ft بدلوو

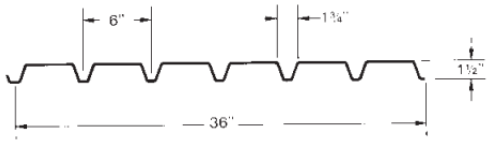
2m = 2*3,28 Ft = 6.56 Ft

د VULCRAFT MENUAL په لومړي برخه څلورمه صفحه کي DECK F20 1.5F انتخابوو

کوم چي 6 Ft – 6in وايه لري او همدارنگه 58 PSF بار د زغملو وړتيا لري او طول يي 6 Ft -6 in دي

1.5 F

Maximum Sheet Length 42'-0
Extra Charge for Lengths Under 6'-0
ICBO Approved (No.3415)
Factory Mutual Approved
Deck type & gauge — Max. deck span
1.5F22..... 4'-11"
1.5F20..... 5'-5"
1.5F18..... 6'-3"
FM Approvals No. 0C8A7.AM

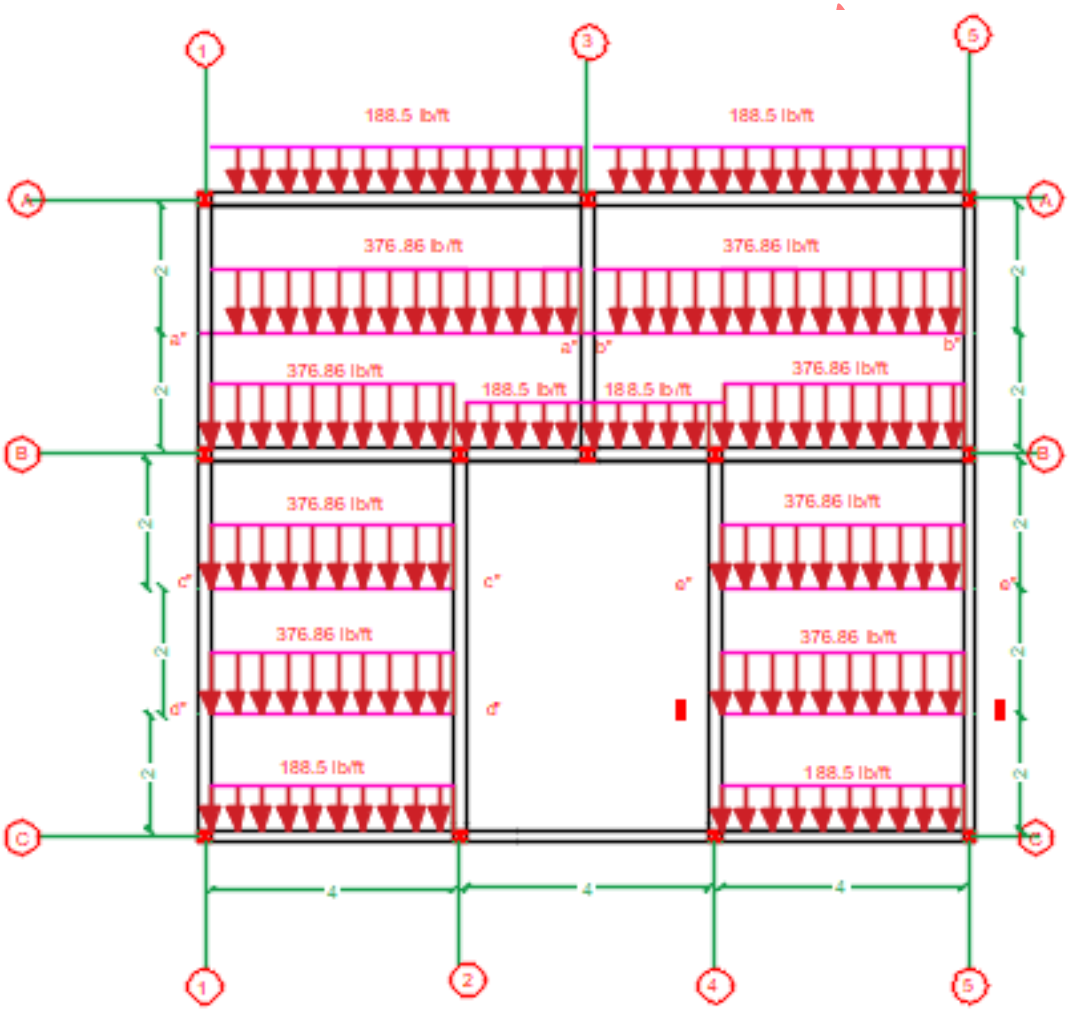


VERTICAL LOADS FOR TYPE 1.5F

No. of Spans	Deck Type	Max. SDI Const. Span	Allowable Total (Dead + Live) Uniform Load (PSF) Span (ft.-in.) C. to C. of Support 4'-0	4'-6	5'-0	5'-6	6'-0	6'-6	7'-0	7'-6	8'-0	8'-6	9'-0
1	F22	4'-9	93	74	60	49	41	35	30	27	23	21	
	F21	5'-1	106	84	68	56	47	40	35	30	26	23	21
	F20	5'-5	116	92	74	61	51	44	38	33	29	25	23
	F19	6'-0	138	109	89	73	61	52	44	38	33	29	26
	F18	6'-5	158	125	101	84	70	59	49	42	36	32	29
2	F22	5'-10	101	80	65	53	45	38	33	29	25	22	20
	F21	6'-2	113	89	72	60	50	43	37	32	28	25	22
	F20	6'-6	123	97	79	65	55	47	40	35	31	27	24
	F19	7'-1	143	113	92	76	64	54	47	41	36	32	28
	F18	7'-8	163	128	104	86	72	62	53	46	41	36	32
3	F22	5'-10	126	100	81	67	56	48	41	36	32	28	25
	F21	6'-2	141	111	90	74	63	53	46	40	35	31	28
	F20	6'-6	154	122	99	82	69	58	50	44	39	34	30
	F19	7'-1	179	142	115	95	80	68	59	51	45	40	35
	F18	7'-8	203	160	130	107	90	77	66	58	51	45	40

(c) ketabton.com: The Digital Library

په لاندي چوکاټ کي هربيم ته لوډ په خطي ډول ښودل شوي



په پورته چوکاټ کِی ځيني بيمونه د اوږدوالي او پر هغوي د وارده بار له مخي يو ډول دي

$A_{1-3} = A_{3-5}$ $C_{1-2} = C_{4-5}$

$B_{1-2} = B_{4-5}$

$B_{2-3} = B_{3-4}$

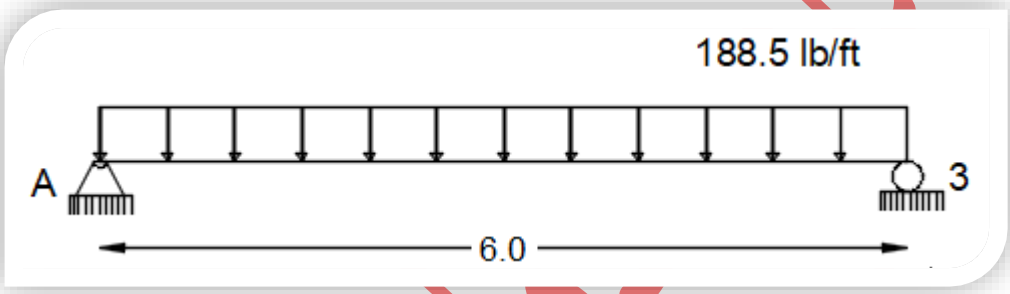
a”-a” = b”-b” , c”-c”= d”-d”=e”-e”=f”-f”

(c) ketabton.com: The Digital Library

اوس نو لومړي A_{1-3} بيم ډيزاين کوو

په هر بيم د ROOF DECK 1.99 PSF وزن په نظر کي نيول کيږي

نوټ : د بيمونو او ګاډرو اندازه ګذاري په متر ده چي په محاسبه کي په فوټ اړول کيږي



Wu=188.5 lb/ft

$M_{max} = W*L^2/8$

M max = $\frac{188.5\ \text{lb/ft} * (19.7\ ft)2}{8} = 9144.4\ \text{lb} * \text{ft}$

S required= $\frac{M}{\delta\ Alowable}$

$\delta\ Alowable\ for\ steel = 29\ ksi$

ft=12 in

$S_{req} =$ $\frac{9144.4 * 12\ \text{lb} * in}{29000\ psi}$ **= 3.78 in^3**

اوس(28, 29) صفحو ته ځو او د $4.9\ in^3$ ، $M_{8*6.2}$ بيم مقطع انتخابوو

(c) ketabton.com: The Digital Library

Table 1–2 (continued)
M Shapes
Properties

M SHAPES

Nominal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	$\frac{J}{S_x h_o}$	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z				J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.		in.^{4}	in.^{6}
12.4	8.22	74.8	89.3	14.2	4.96	16.5	2.01	1.07	0.744	1.68	0.100	12.3	0.000283	0.0493	76.0
11.6	8.29	74.8	80.3	12.8	4.86	15.0	1.51	0.864	0.667	1.37	0.099	12.3	0.000263	0.0414	57.1
11.8	6.81	62.5	72.2	12.0	4.56	14.3	1.09	0.709	0.559	1.15	0.108	11.8	0.000355	0.0500	37.7
10.8	7.30	69.2	66.7	11.1	4.58	13.2	1.01	0.661	0.564	1.07	0.104	11.8	0.000300	0.0393	35.0
10	9.03	74.7	61.7	10.3	4.57	12.2	1.03	0.636	0.592	1.02	0.098	11.8	0.000240	0.0292	35.9
9	6.53	58.4	39	[illegible]	[illegible].83	9.22	0.672	0.500	0.503	0.809	0.117	9.81	0.000411	0.0314	16.1
8	7.39	65.0	34.6	6.95	3.82	8.20	0.593	0.441	0.500	0.711	0.111	9.81	0.000328	0.0224	14.2
7.5	7.77	71.0	33.0	6.60	3.85	7.77	0.562	0.418	0.503	0.670	0.107	9.81	0.000289	0.0187	13.5
6.5	6.03	53.8	18.5	4.63	3.11	5.43	0.376	0.329	0.443	0.529	0.131	7.81	0.000509	0.0184	5.73
6.2	6.44	56.5	17.6	4.39	3.10	5.15	0.352	0.308	0.439	0.495	0.127	7.81	0.000455	0.0156	5.38
4.4	5.39	47.0	7.23	2.41	2.36	2.80	0.180	0.195	0.372	0.311	0.152	5.81	0.000707	0.00990	1.53
3.7	7.75	54.7	5.96	2.01	2.34	2.33	0.173	0.173	0.398	0.273	0.137	5.75	0.000459	0.00530	1.45

مونږ د AISC MENUAL په 28 صفحه کی M8*6.2 ډوله مقطع انتخابوو

اوس یاده مقطع د عرضي تشنج دپاره چیک کوو V= 1854.15 V=w*L / 2

A=tw*d , A=0.129*8 , A= 1.032 in ^{2} ,

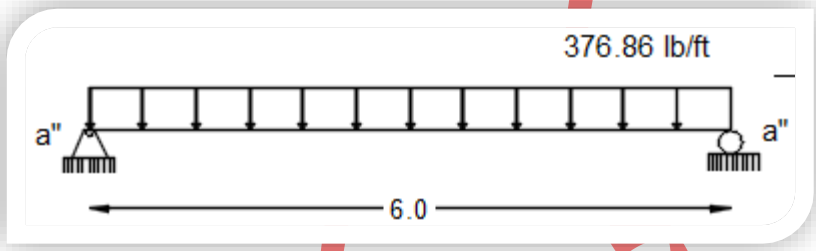
Ʈ=V/A

Ʈ=1854.15 /1.032=1.79665 Ksi

Ʈ allowable =12ksi Ʈ allowable > Ʈ ..... ok

(c) ketabton.com: The Digital Library

اوس a”-a” بيم ډيزاين كوو



Wu=376.86 lb/ft

M_{max} =W*L^2/8

Mmax = (376.86 *19.68^2)/8 =18244.8 lb*ft

S required=$\frac{M}{\delta\ Alowable}$

ft=12 in

S_{req}=(18244.8 *12)lb*in/29000 psi=7.55 in^3

اوس (28, 29)صفحو ته ځو او د $s=7.79in^3$ M_{10*9} بيم مقطع انتخابوو

(c) ketabton.com: The Digital Library

Table 1–2 (continued)
M Shapes
Properties

M SHAPES

Nominal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	$\frac{J}{S_x h_o}$	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z				J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.		in.^{4}	in.^{6}
12.4	8.22	74.8	89.3	14.2	4.96	16.5	2.01	1.07	0.744	1.68	0.100	12.3	0.000283	0.0493	76.0
11.6	8.29	74.8	80.3	12.8	4.86	15.0	1.51	0.864	0.667	1.37	0.099	12.3	0.000263	0.0414	57.1
11.8	6.81	62.5	72.2	12.0	4.56	14.3	1.09	0.709	0.559	1.15	0.108	11.8	0.000355	0.0500	37.7
10.8	7.30	69.2	66.7	11.1	4.58	13.2	1.01	0.661	0.564	1.07	0.104	11.8	0.000300	0.0393	35.0
10	9.03	74.7	61.7	10.3	4.57	12.2	1.03	0.636	0.592	1.02	0.098	11.8	0.000240	0.0292	35.9
9	6.53	58.4	39.0	7.79	3.83	9.22	0.672	0.500	0.503	0.809	0.117	9.81	0.000411	0.0314	16.1
8	7.39	65.0	34.6	6.95	3.82	8.20	0.593	0.441	0.500	0.711	0.111	9.81	0.000328	0.0224	14.2

اوس یی د عرضي تشنج دپاره محاسبه کوو

τ=V/A , v=3708.3 lb

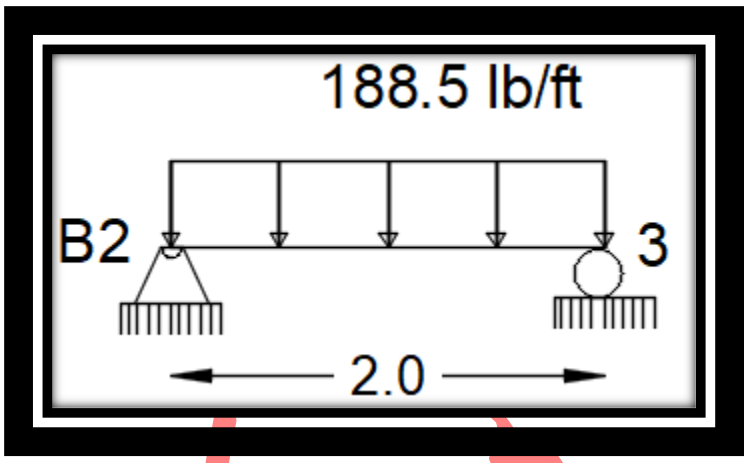
A=tw*d , A=0.157*10 , A= 1.57 in ^{2}

τ=3708.3/1.57 =2.362 ksi

τ allowable=12ksi τ allowable > τ ..... ok

(c) ketabton.com: The Digital Library

اوس B_{2-3} ډیزاین کوو



Wu=188.5 lb/ft

M max=(188.5*6.56^2)/8 =1014 lb*ft

S required=$\frac{M}{\delta\ Alowable}$

ft=12 in

S $_{req}$=(1014 lb*ft *12)/29000psi =0.42 in^3

اوس په (28,29)صفحو کي s=1 in^3 $M_{3*2.9}$ بیم مقطع انتخابوو

(c) ketabton.com: The Digital Library

Table 1–2 (continued)
M Shapes
Properties

M SHAPES

Nominal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	$\frac{J}{S_x h_o}$	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z				J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.		in.^{4}	in.^{6}
12.4	8.22	74.8	89.3	14.2	4.96	16.5	2.01	1.07	0.744	1.68	0.100	12.3	0.000283	0.0493	76.0
11.6	8.29	74.8	80.3	12.8	4.86	15.0	1.51	0.864	0.667	1.37	0.099	12.3	0.000263	0.0414	57.1
11.8	6.81	62.5	72.2	12.0	4.56	14.3	1.09	0.709	0.559	1.15	0.108	11.8	0.000355	0.0500	37.7
10.8	7.30	69.2	66.7	11.1	4.58	13.2	1.01	0.661	0.564	1.07	0.104	11.8	0.000300	0.0393	35.0
10	9.03	74.7	61.7	10.3	4.57	12.2	1.03	0.636	0.592	1.02	0.098	11.8	0.000240	0.0292	35.9
9	6.53	58.4	39.[illegible]	[illegible]	[illegible]	9.22	0.672	0.500	0.503	0.809	0.117	9.81	0.000411	0.0314	16.1
8	7.39	65.0	34.6	[illegible]	3.82	8.20	0.593	0.441	0.500	0.711	0.111	9.81	0.000328	0.0224	14.2
7.5	7.77	71.0	33.0	6.60	3.85	7.77	0.562	0.418	0.503	0.670	0.107	9.81	0.000289	0.0187	13.5
6.5	6.03	53.8	18.5	4.63	3.11	5.43	0.376	0.329	0.443	0.529	0.131	7.81	0.000509	0.0184	5.73
6.2	6.44	56.5	1[illegible]	[illegible]	3.[illegible]	5.15	0.352	0.308	0.439	0.495	0.127	7.81	0.000455	0.0156	5.38
4.4	5.39	47.0	7.23	2.41	2.36	2.80	0.180	0.195	0.372	0.311	0.152	5.81	0.000707	0.00990	1.53
3.7	7.75	54.7	5.96	2.01	2.34	2.33	0.173	0.173	0.398	0.273	0.137	5.75	0.000459	0.00530	1.45
18.9	6.01	11.2	24.2	9.67	2.08	11.1	8.70	3.48	1.25	5.33	0.28	4.56	0.00709	0.313	45.7
6	11.9	22.0	4.72	2.48	1.64	2.74	1.47	0.771	0.915	1.18	0.22	3.56	0.00208	0.0184	4.85
4.08	6.62	26.4	3.53	1.77	1.67	2.00	0.325	0.289	0.506	0.453	0.220	3.81	0.00218	0.0147	1.19
3.45	8.65	33.9	2.86	1.43	1.68	1.60	0.248	0.221	0.496	0.346	0.200	3.88	0.00148	0.00820	0.930
3.2	8.65	33.9	2.86	1.43	1.68	1.60	0.248	0.221	0.496	0.346	0.200	3.88	0.00148	0.00820	0.930
2.9	8.65	23.6	1.50	1.00	1.28	1.12	0.248	0.221	0.521	0.344	0.250	2.88	0.00275	0.00790	0.511

اوس یی عرضي تشنج ته محاسبه کوو

τ=V/A

V=618.05

A=tw*d , A=0.09*3 , A= 0.27 in ^{2}

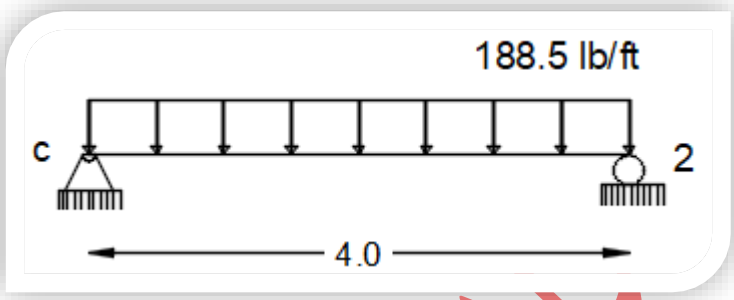
τ= (618.05)/(0.27)=2289.07psi , τ allowable=12ksi

τ= 2.28907Ksi

τ allowable > τ ..... ok

(c) ketabton.com: The Digital Library

اوس C_{1-2} بیم ډیزاین کوو



Wu = 188.5 lb/ft

$M_{max} = W*L^2/8$

M max=(188.5 *13.12²)/8 =4056 lb*ft

ft=12 in

S required=$\frac{M}{\delta\ Alowable}$

S_{req}=(4056*12)/29000 psi =1.67 in³

اوس په 31,32 صفحو کي د $S_{3*5.7}$, s=1.67in³ مقطع انتخابوو

Table 1–3 (continued)
S Shapes
Properties

S SHAPES

Nominal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z			J	C_w
lb/ft			in.⁴	in.³	in.	in.³	in.⁴	in.³	in.	in.³	in.	in.	in.⁴	in.⁶
121	3.69	25.9	3160	258	9.43	306	83.0	20.6	1.53	36.3	1.94	23.4	12.8	11400
5.7	4.48	11.0	2.50	1.67	1.23	1.94	0.447	0.383	0.518	0.656	0.605	2.74	0.0433	0.838

(c) ketabton.com: The Digital Library

اوس یی عرضي تشنج ته محاسبه کوو

Ʈ=V/A

V = 1236.1 lb

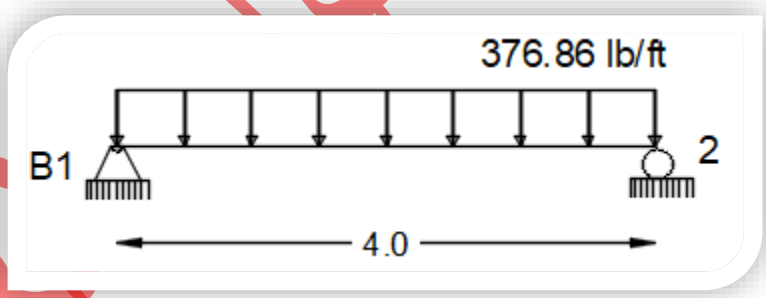
A=tw*d , A=0.17*3 = 0.51 in^2

Ʈ=1236.1 lb /0.51 in^2=2423.7 psi , Ʈ allowable=12ksi

Ʈ= 2.4237 Ksi

Ʈ allowable > Ʈ ..... ok

اوس د B_{1-2} بیم ډیزاین کوو



Wu=376.86 lb/ft

M_{max} =W*L^2/8

M_{max}=(376.86 lb/ft*13.12^{2}ft^2)/8=8108.8 lb*ft

Ft =12 in

S required=$\frac{M}{\delta\ Alowable}$

S_{req} =(8108.8 *12)/29000 psi =3.365 in^3

(c) ketabton.com: The Digital Library

اوس د مینول په (31,30)صفحه کِي S 4*9.5, , S=38in³ بیم مقطع انتخابوو

S SHAPES

Nominal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z			J	C_w
lb/ft			in.⁴	in.³	in.	in.³	in.⁴	in.³	in.	in.³	in.	in.	in.⁴	in.⁶
121	3.69	25.9	3160	258	9.43	306	83.0	20.6	1.53	36.3	1.94	23.4	12.8	11400
9.5	4.77	8.33	6.76	3.38	1.56	4.04	0.887	0.635	0.564	1.13	0.698	3.71	0.120	3.05

اوس یی عرضي تشنج ته محاسبه کوو

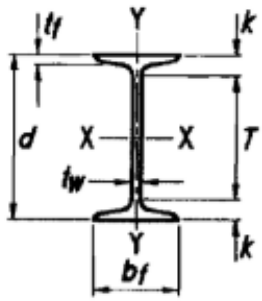


Table 1–3
S Shapes
Dimensions

Shape	Area, A	Depth, d		Web Thickness, t_w		$\frac{t_w}{2}$	Flange Width, b_f		Flange Thickness, t_f		Distance k	Distance T	Workable Gage
	in.²	in.		in.		in.	in.		in.		in.	in.	in.
S24×121	35.5	24.5	24½	0.800	13/16	7/16	8.05	8	1.09	1 1/16	2	20½	4
S4×9.5	2.79	4.00	4	0.326	5/16	3/16	2.80	2¾	0.293	5/16	¾	2½	—

Ʈ=V/A

V= 2472.2 lb

A=tw*d , A=0.326*4 = 1.304 in²

Ʈ=2472.2 lb /1.304 in²= 1895.86 psi , Ʈ allowable=12ksi

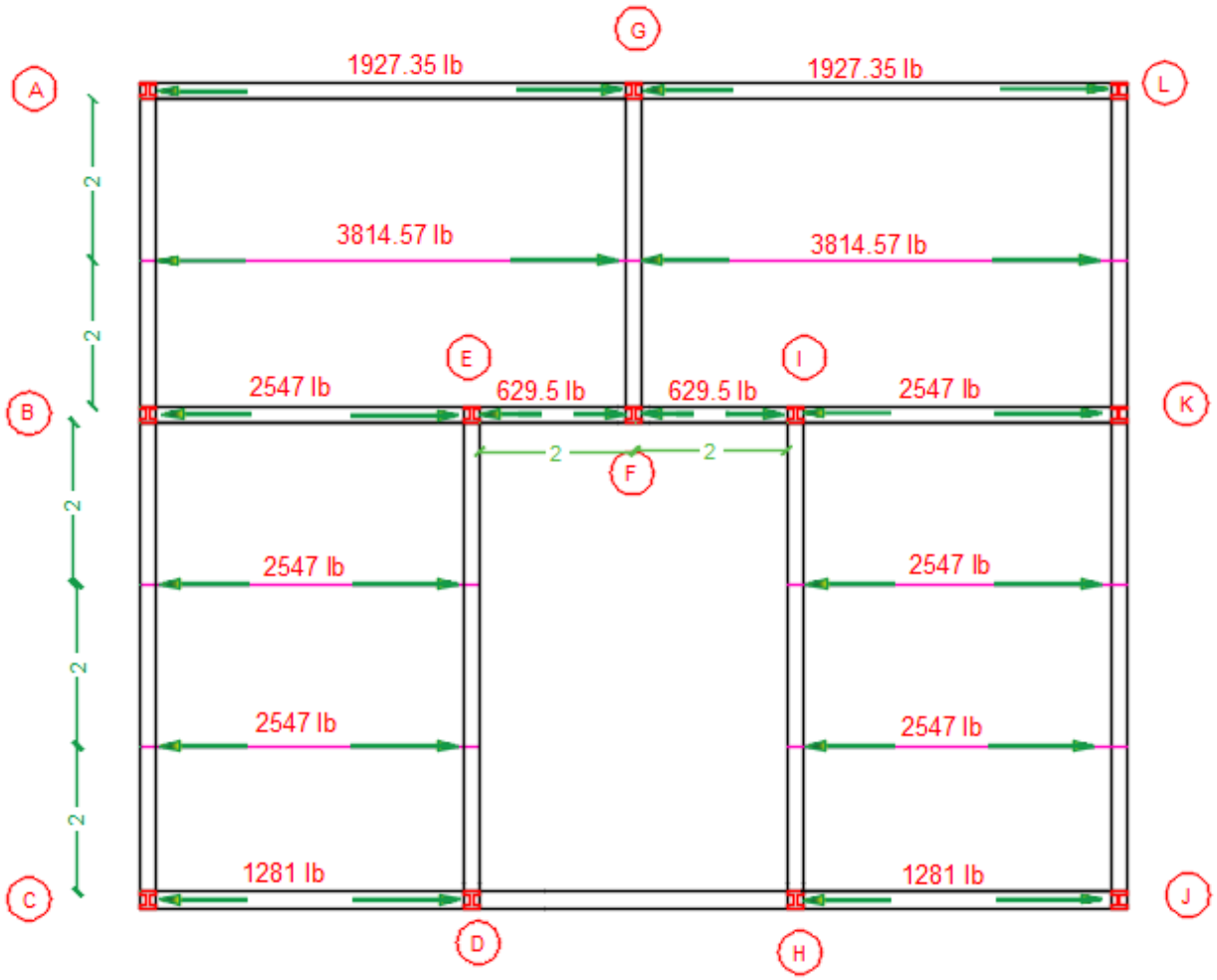
Ʈ= 1.89586 Ksi

Ʈ allowable > Ʈ ..... ok

(c) ketabton.com: The Digital Library

د ګاډرو ډیزاین محاسبه

په لاندي چوکاټ کي مجموعي لوډ د بیمونو څخه ګاډروته د انتقال په حالت کي ښودل شوي.کوم چی د بیمونو او Roof د ډیډلوډ اولایف لوډڅخه ترلاسه شوي.



په پورته چوکاټ کِی ځیني ګاډرونه د اوږدوالي او پر هغوي د وارده بار له مخي یو ډول دي. لکه :

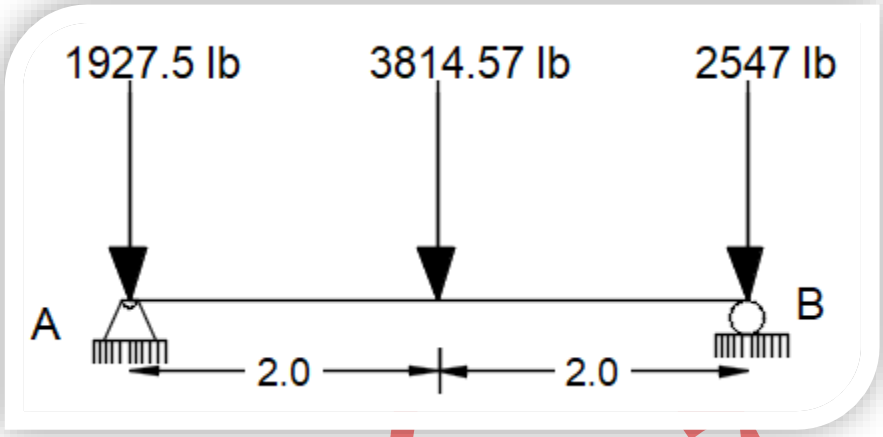
A-B = L-K

B-C = K-J , E-D = I-H

G-F

(c) ketabton.com: The Digital Library

د A-B ګاډر ډیزاین



W=3814.57 lb , L=4m

Mmax=w*l/4

Mmax = 12511.79 lb*ft

S required= $\frac{M}{\delta\ Alowable}$

S_{req} =12511.79 lb *12 in /29000 psi =5.18 in^3

اوس په 27 صفحه کي w_{6*9} مقطع دګاډرلپاره انتخابوو $S=5.56\ in^3$.

Nominal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z			J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
67	4.43	11.1	272	60.4	3.72	70.1	88.6	21.4	2.12	32.7	2.43	8.07	5.05	1440
9	9.16	29.2	16.4	5.56	2.47	6.23	2.20	1.11	0.905	1.72	1.06	5.69	0.0405	17.7

(c) ketabton.com: The Digital Library

اوس یی عرضي تشنج ته محاسبه کوو

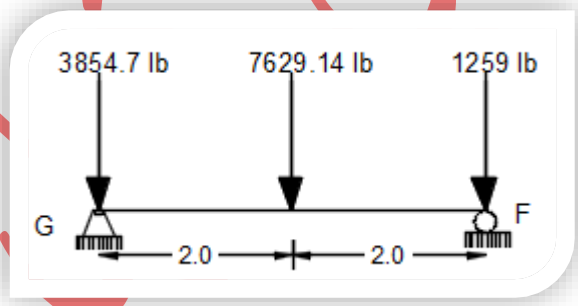
Ʈ=V/A , v=1907.28 lb ,

A=tw*d A=0.17*5.9 , A=1.003 in^2

Ʈ=1907.28 lb / 1.003 in^2 = 1796.6psi , Ʈ allowable=12ksi

1.7966ksi < Ʈalowable ..... ok

اوس دG-Fد ګاډر ډیزاین کوو



,W =7629.14lb , L=4m Mmax=w*l/4 = 25023.58 lb*ft

S required=$\frac{M}{\delta\ Alowable}$, 1m=3.28ft , 1ft=12in

S_{req} =25023.58 *12 /29000 psi =10.35in^3

اوس په25 صفحه کي W_{10*12} د بیم مقطع انتخابوو چي عبارت ده له :S=10.9

W12 – W10

Nominal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z			J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
58	7.82	27.0	475	78.0	5.28	86.4	107	21.4	2.51	32.5	2.82	11.6	2.10	3570
15	7.41	36.5	66.9	13.6	3.95	16.0	2.89	1.45	0.810	2.30	1.01	9.72	0.104	66.3
12	9.43	46.6	53.8	10.9	3.90	12.6	2.18	1.10	0.785	1.74	0.983	9.66	0.0547	50.9

(c) ketabton.com: The Digital Library

اوس یی عرضي تشنج ته محاسبه کوو

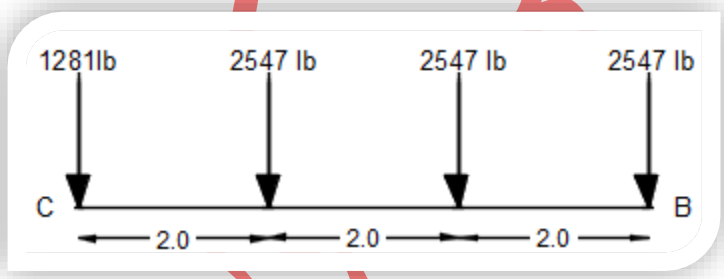
τ=V/A , v=3814.57lb , A=1.87in^2

τ=3814.57lb /1.87in^2=2039 psi , τ alowable=12ksi

τ=2.039 ksi

τ < τ allowable …… .. ok

اوس C-B کادر دیزاین کوو



Ay=3828 lb , By=5094 lb

Mmax =16708.32 lb* ft

S required=$\frac{M}{\delta\ Alowable}$

S_{req} = 16708.32*12 in /29000 psi =6.91 in^3

اوس په27 صفحه کي w_{6*12} د بیم مقطع انتخابوو چي عبارت ده له:

S=7.31 in^3

Nominal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z			J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
67	4.43	11.1	272	60.4	3.72	70.1	88.6	21.4	2.12	32.7	2.43	8.07	5.05	1440
12	7.14	21.6	22.1	7.31	2.49	8.30	2.99	1.50	0.918	2.32	1.08	5.75	0.0903	24.7

(c) ketabton.com: The Digital Library

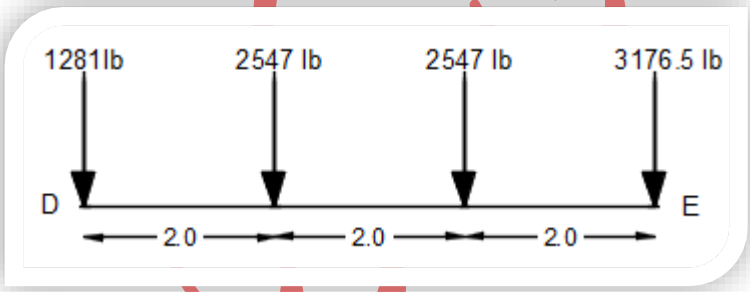
اوس یی عرضي تشنج ته محاسبه کوو

τ=V/A , V=2547 lb , A=1.4 in^2

τ=2547/1.4=1819.3 psi , τalowable =12 ksi

1.8193 ksi < 12 ksi .... ok

E-D کادر دیزاین



Dy =3828 lb , Ey = 5723.5 lb , 1 ft = 12in

S required=$\frac{M}{\delta\ Alowable}$

M $_{max}$= 16708.32 lb*ft

S$_{req}$ =16708.32 lb *12 /29000 psi =6.91 in^3

د مینول په۲۷ صفحه کي w $_{6*12}$ د بیم مقطع انتخابووکمه چي د C-Bکادر لپاره انتخاب شوي چي عبارت له: S=7.31 in^3

اوس یی عرضي تشنج ته محاسبه کوو

τ=V/A , V=2547 lb , A=Tw*d =0.23*6.03 = 1.4 in^2 ، A = 1.4 in^2

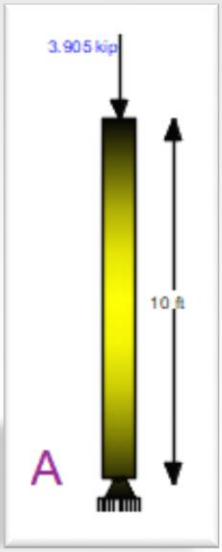
τ=2547/1.4=1819.3 psi , τalowable =12 ksi , 1.8193 ksi < 12 ksi..... ok

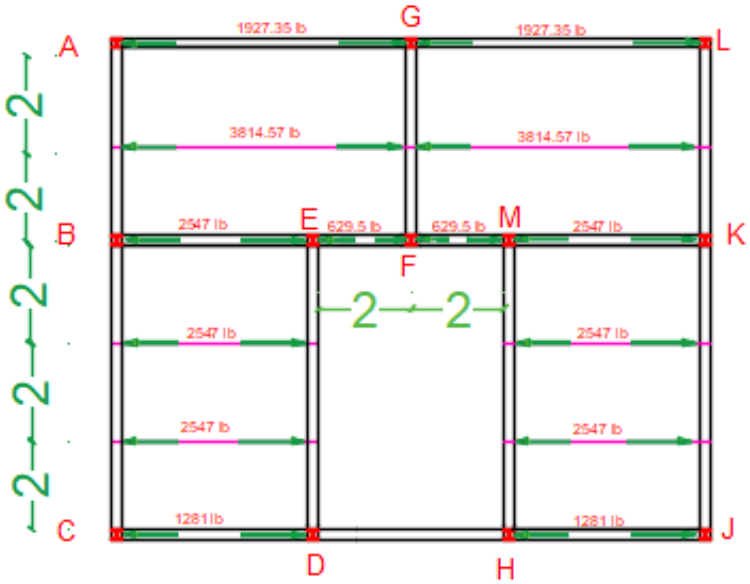
(c) ketabton.com: The Digital Library

A =L پایی ډیزاین

د پایو ډیزاین

Wu =3.905
kip





د هري پایی اوږدوالي 10 ft دي

د ټولو پایو اتکاوي په دواړو خواوو کي PIN دي

په دي پلان کي ځینی پاي پر هغوي د واردیدو قوو له مخي یو ډول دي

A =L , B = K , E = M , C=D=H=J , F , G

اوس د menual په 468 صفحه کي د HSS2*2*1/8مقطع انتخابوو

R= 0.761 in

SR= AL/R≤ 200

A=10 ft کالم ارتفاع

SR=(10*12) in/0.76in
SR=157.7

157.7< 200 .... ok

Shape		HSS2¼×2¼×				HSS2×2×					
		3/16		1/8		1/4		3/16		1/8	
t_{design}, in.		0.174		0.116		0.233		0.174		0.116	
Wt/ft		4.94		3.47		5.38		4.30		3.04	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
r, radius of gyration r_y	0	37.7	56.6	26.3	39.6	41.5	62.4	32.9	49.4	23.1	34.8
	1	37.1	55.8	26.0	39.0	40.7	61.2	32.3	48.5	22.7	34.2
	2	35.6	53.5	25.0	37.6	38.4	57.7	30.6	45.9	21.6	32.5
	3	33.2	49.9	23.4	35.2	34.8	52.3	27.9	42.0	19.9	29.9
	4	30.1	45.3	21.4	32.1	30.4	45.6	24.6	37.0	17.7	26.6
	5	26.6	40.0	19.0	28.6	25.5	38.3	20.9	31.5	15.2	22.9
	6	22.8	34.3	16.5	24.8	20.5	30.9	17.2	25.8	12.7	19.0
	7	19.1	28.6	13.9	20.9	15.9	23.9	13.6	20.4	10.2	15.3
	8	15.5	23.3	11.5	17.2	12.2	18.3	10.4	15.7	7.93	11.9
	9	12.3	18.5	9.17	13.8	9.63	14.5	8.26	12.4	6.26	9.42
	10	9.95	15.0	7.43	11.2	7.80	11.7	6.69	10.1	5.07	7.63

نوموړي ډیزاین د C=D=H=J لپاره هم کفایت کوی ځکه چي 4.08 kip/ft ظرفیت لرونکي دي او په C,D,H,J کالمونو باندي لدي کمه قوه موجوده ده.

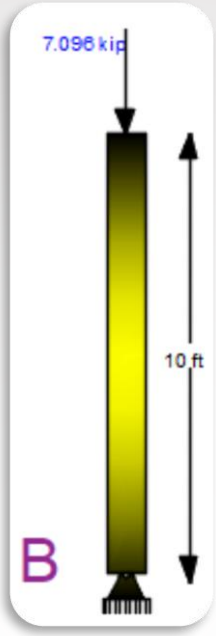
(c) ketabton.com: The Digital Library

Shape		HSS2 1/4×2 1/4×				HSS2×2×					
		3/16		1/8		1/4		3/16		1/8	
t_{design}, in.		0.174		0.116		0.233		0.174		0.116	
Wt/ft		4.94		3.47		5.38		4.30		3.04	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
t radius of gyration r_y	0	37.7	56.6	26.3	39.6	41.5	62.4	32.9	49.4	23.1	34.8
	1	37.1	55.8	26.0	39.0	40.7	61.2	32.3	48.5	22.7	34.2
	2	35.6	53.5	25.0	37.6	38.4	57.7	30.6	45.9	21.6	32.5
	3	33.2	49.9	23.4	35.2	34.8	52.3	27.9	42.0	19.9	29.9
	4	30.1	45.3	21.4	32.1	30.4	45.6	24.6	37.0	17.7	26.6
	5	26.6	40.0	19.0	28.6	25.5	38.3	20.9	31.5	15.2	22.9
	6	22.8	34.3	16.5	24.8	20.5	30.9	17.2	25.8	12.7	19.0
	7	19.1	28.6	13.9	20.9	15.9	23.9	13.6	20.4	10.2	15.3
	8	15.5	23.3	11.5	17.2	12.2	18.3	10.4	15.7	7.93	11.9
	9	12.3	18.5	9.17	13.8	9.63	14.5	8.26	12.4	6.26	9.42
	10	9.95	15.0	7.43	11.2	7.80	11.7	6.69	10.1	5.07	7.63

کول منع دي!

B=K پایی دیزاین

Wu =7.096 kip



اوس د menual په 468 صفحه کي د HSS2*2*1/8مقطع انتخابوو

R=0.761 in

SR= AL/R≤ 200

B=10 ftکالم ارتفاع

SR=(10*12) in/0.761in

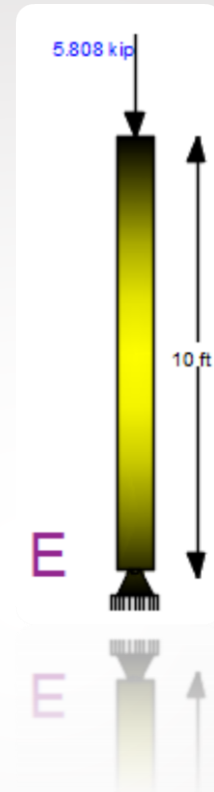
SR=157.69

157.69< 200 .... ok

(c) ketabton.com: The Digital Library

E=M پایی ډیزاین

Wu =5.808 kip



اوس د menual په 468 صفحه کي د HSS2*2*1/8مقطع انتخابوو

R=0.761 in

SR= AL/R≤ 200

B=10 ftکالم ارتفاع

SR=(10*12) in/0.761in

SR=157.69

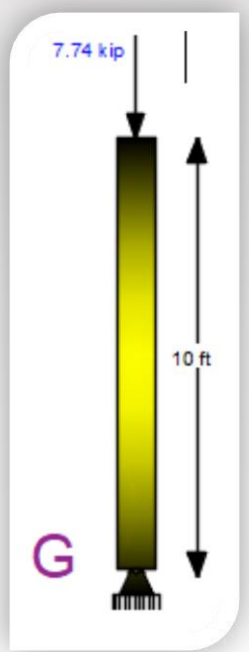
Shape		HSS2¼×2¼×				HSS2×2×					
		3/16		1/8		1/4		3/16		1/8	
t_{design}, in.		0.174		0.116		0.233		0.174		0.116	
Wt/ft		4.94		3.47		5.38		4.30		3.04	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
t radius of gyration r_y	0	37.7	56.6	26.3	39.6	41.5	62.4	32.9	49.4	23.1	34.8
	1	37.1	55.8	26.0	39.0	40.7	61.2	32.3	48.5	22.7	34.2
	2	35.6	53.5	25.0	37.6	38.4	57.7	30.6	45.9	21.6	32.5
	3	33.2	49.9	23.4	35.2	34.8	52.3	27.9	42.0	19.9	29.9
	4	30.1	45.3	21.4	32.1	30.4	45.6	24.6	37.0	17.7	26.6
	5	26.6	40.0	19.0	28.6	25.5	38.3	20.9	31.5	15.2	22.9
	6	22.8	34.3	16.5	24.8	20.5	30.9	17.2	25.8	12.7	19.0
	7	19.1	28.6	13.9	20.9	15.9	23.9	13.6	20.4	10.2	15.3
	8	15.5	23.3	11.5	17.2	12.2	18.3	10.4	15.7	7.93	11.9
	9	12.3	18.5	9.17	13.8	9.63	14.5	8.26	12.4	6.26	9.42
	10	9.95	15.0	7.43	11.2	7.80	11.7	6.69	10.1	5.07	7.63

دوو منع دي!

(c) ketabton.com: The Digital Library

G پایی دیزاین

Wu = 7.7 4 kip



Shape		HSS2¼×2¼×				HSS2×2×					
		3/16		1/8		1/4		3/16		1/8	
t_{design}, in.		0.174		0.116		0.233		0.174		0.116	
Wt/ft		4.94		3.47		5.38		4.30		3.04	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
respect to least radius of gyration r_y	0	37.7	56.6	26.3	39.6	41.5	62.4	32.9	49.4	23.1	34.8
	1	37.1	55.8	26.0	39.0	40.7	61.2	32.3	48.5	22.7	34.2
	2	35.6	53.5	25.0	37.6	38.4	57.7	30.6	45.9	21.6	32.5
	3	33.2	49.9	23.4	35.2	34.8	52.3	27.9	42.0	19.9	29.9
	4	30.1	45.3	21.4	32.1	30.4	45.6	24.6	37.0	17.7	26.6
	5	26.6	40.0	19.0	28.6	25.5	38.3	20.9	31.5	15.2	22.9
	6	22.8	34.3	16.5	24.8	20.5	30.9	17.2	25.8	12.7	19.0
	7	19.1	28.6	13.9	20.9	15.9	23.9	13.6	20.4	10.2	15.3
	8	15.5	23.3	11.5	17.2	12.2	18.3	10.4	15.7	7.93	11.9
	9	12.3	18.5	9.17	13.8	9.63	14.5	8.26	12.4	6.26	9.42
	10	9.95	15.0	7.43	11.2	7.80	11.7	6.69	10.1	5.07	7.63
	11	8.22	12.4	6.14	9.23	6.44	9.68	5.53	8.31	4.19	6.30
	12	6.91	10.4	5.16	7.75			4.64	6.98	3.52	5.30
	13	5.89	8.85	4.40	6.61						
	14			3.79	5.70						

اوس د menual په 468 صفحه کي د HSS2*2*3/16مقطع انتخابوو

R=0.733in

SR= AL/R≤ 200

B=10 ftکالم ارتفاع

SR=(10*12) in/0.733in

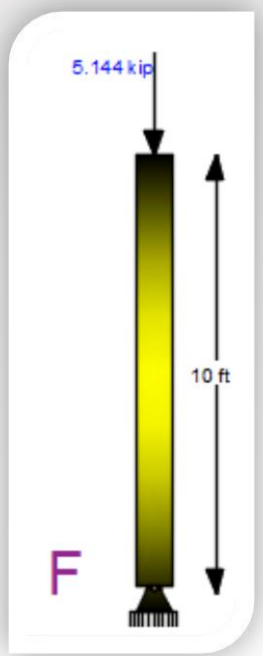
SR=163.7

163.7< 200 .... ok

(c) ketabton.com: The Digital Library

F پایی ډیزاین

Wu =5.1445 kip



اوس د menual په 468 صفحه کي د W_{8*58} مقطع انتخابوو

R=0.761 in

SR= AL/R≤ 200

B=10 ft کالم ارتفاع

SR=(10*12) in/0.761in

SR=157.69

157.69< 200 .... ok

Table 4–4 (continued)

Available Strength in Axial Compression, kips

Square HSS

F_y = 46 ksi

HSS2¼–HSS2

Shape		HSS2¼×2¼×				HSS2×2×					
		3/16		1/8		1/4		3/16		1/8	
t_{design}, in.		0.174		0.116		0.233		0.174		0.116	
Wt/ft		4.94		3.47		5.38		4.30		3.04	
Design		P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD
Effect to least radius of gyration r_y	0	37.7	56.6	26.3	39.6	41.5	62.4	32.9	49.4	23.1	34.8
	1	37.1	55.8	26.0	39.0	40.7	61.2	32.3	48.5	22.7	34.2
	2	35.6	53.5	25.0	37.6	38.4	57.7	30.6	45.9	21.6	32.5
	3	33.2	49.9	23.4	35.2	34.8	52.3	27.9	42.0	19.9	29.9
	4	30.1	45.3	21.4	32.1	30.4	45.6	24.6	37.0	17.7	26.6
	5	26.6	40.0	19.0	28.6	25.5	38.3	20.9	31.5	15.2	22.9
	6	22.8	34.3	16.5	24.8	20.5	30.9	17.2	25.8	12.7	19.0
	7	19.1	28.6	13.9	20.9	15.9	23.9	13.6	20.4	10.2	15.3
	8	15.5	23.3	11.5	17.2	12.2	18.3	10.4	15.7	7.93	11.9
	9	12.3	18.5	9.17	13.8	9.63	14.5	8.2[illegible]	[illegible]	6.26	9.42
	10	9.95	15.0	7.43	11.2	7.80	11.7	6[illegible]	[illegible]	5.07	7.63
	11	8.22	12.4	6.14	9.23	6.44	9.68	5.53	8.31	4.19	6.30
	12	6.91	10.4	5.16	7.75			4.64	6.98	3.52	5.30
	13	5.89	8.85	4.40	6.61						
	14			3.79	5.70						

ومن الله توفیق

اختتام

(c) ketabton.com: The Digital Library

کاپي کول منع دي!

Get more e-books from www.ketabton.com
Ketabton.com: The Digital Library