

د افغانستان اسلامي جمهوریت

د لویو زده کړو وزارت

لنډ پوهنتون

انجنیرۍ پوهنځی



Steel Design

Ketabton.com

نوم : عبدالرحیم

د پلار نوم : مستو خان

صنف : دریم

سکشن: B

حاضري شمیره : 37

استاد : پوهنځي ځيیر (خپلواک)

کال ۱۳۹۹ هـ ش

# بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

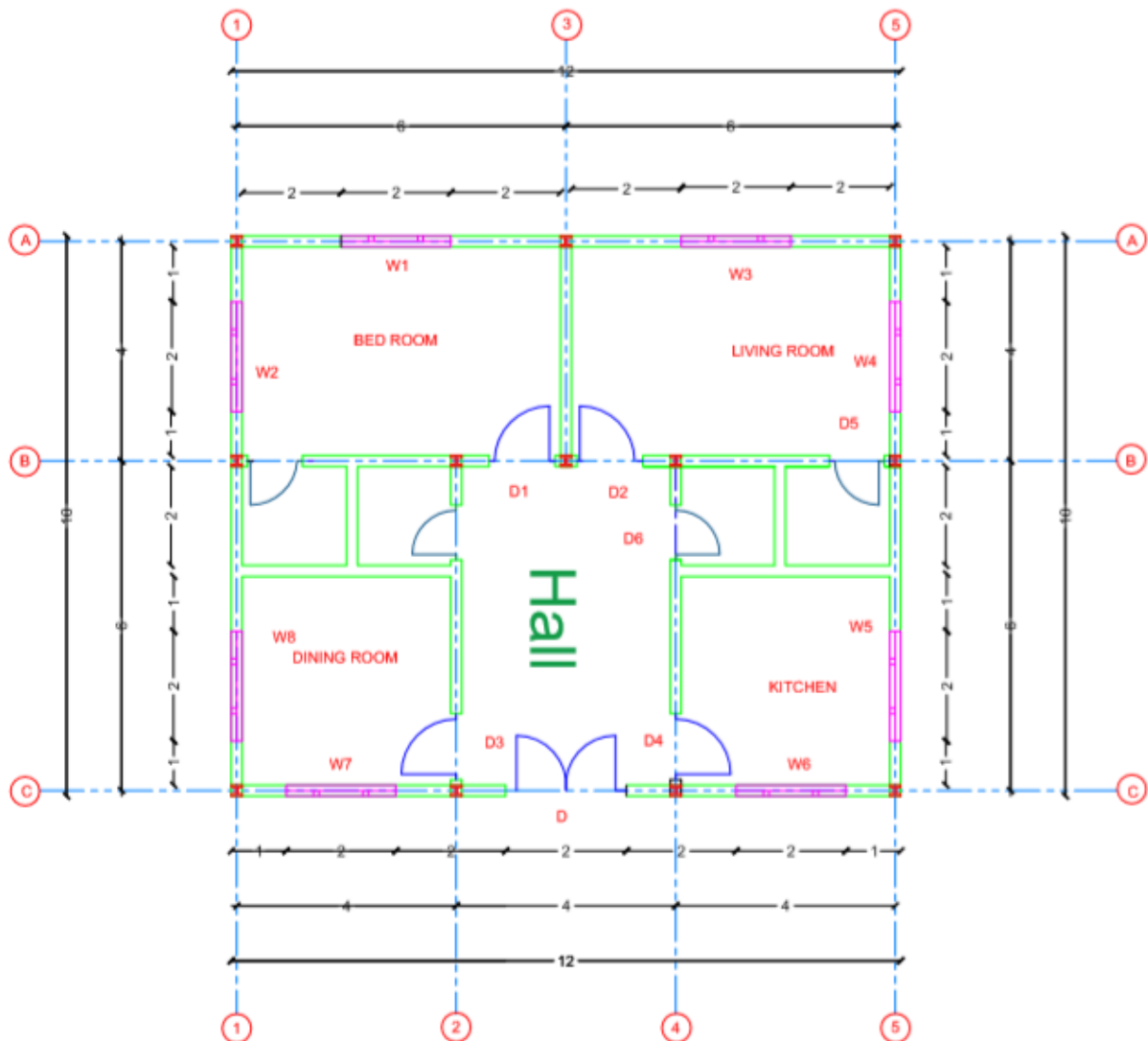
## سریزه

له کله نه چی انسان د ځمکې په مخ قدم ایښی نو له هغه 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 دپیر وخت لپاره ووسیږی نو لومړی ځان ته له ونو ، بوټو او خابښاکو څخه د اوسیدو لپاره ځای برابروی .

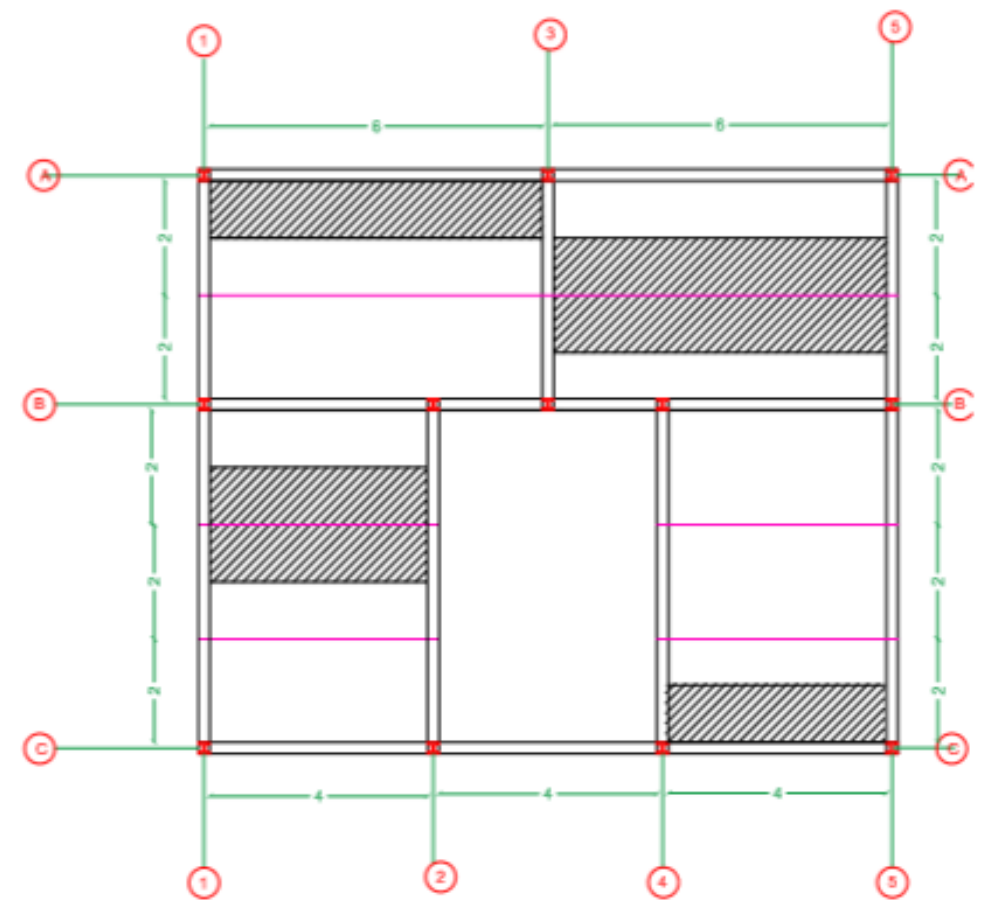
په پخوانی وختونوکی کله چی د انسانانو ژوند په مشترک ډول نه و نو په هغه وخت کی خلکو په غارونو او د لویو ډبرو په اړه خونو او کنجونو کی ژوند تیراوه نو دوی دې ته اړ و چی خپل خانونه د طبیعت د نا مؤزنه شرایطو او همدارنگه د ځنگلونو ، غرونو او دشتو وحشی حیواناتو څخه ځان په امن وساتی .

نو له دی څخه څرگندیږی چی انسانانو له هغه 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 ، لرگیو، او فولادی ساختمانونو څخه عبارت دی چی نظر دی 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 چی کوم فولادی ساختمان ډیزاین کوو د هغه پلان په لاندی ډول دی



## د بيمونو او ګاډرو چوکاټ



لومړۍ برخه

د ټولو نه ورومې ددغي ساختمان Roof deck ډيزاين کوو

د Roof ډ ډيزاين دپاره يوازي live load په نظر کې نيسو.

د مسكوني ودانيو دپاره  $\text{live load} = 192 \text{ kg/m}^2$

$$W_u = 1.4 * 192 \text{ kg/m}^2 = 268.8 \text{ kg/m}^2$$

د نهايي بار واحد د SI څخه PSF ته اړوو

$$W_u = 268.8 * 2.204 / 3,28^2 = 55.06 \text{ PS}$$

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

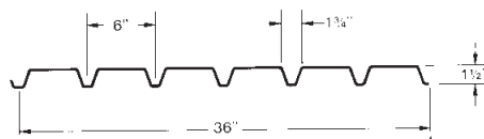
$$2\text{m} = 2 * 3,28 \text{ Ft} = 6.56 \text{ Ft}$$

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

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

## 1.5 F

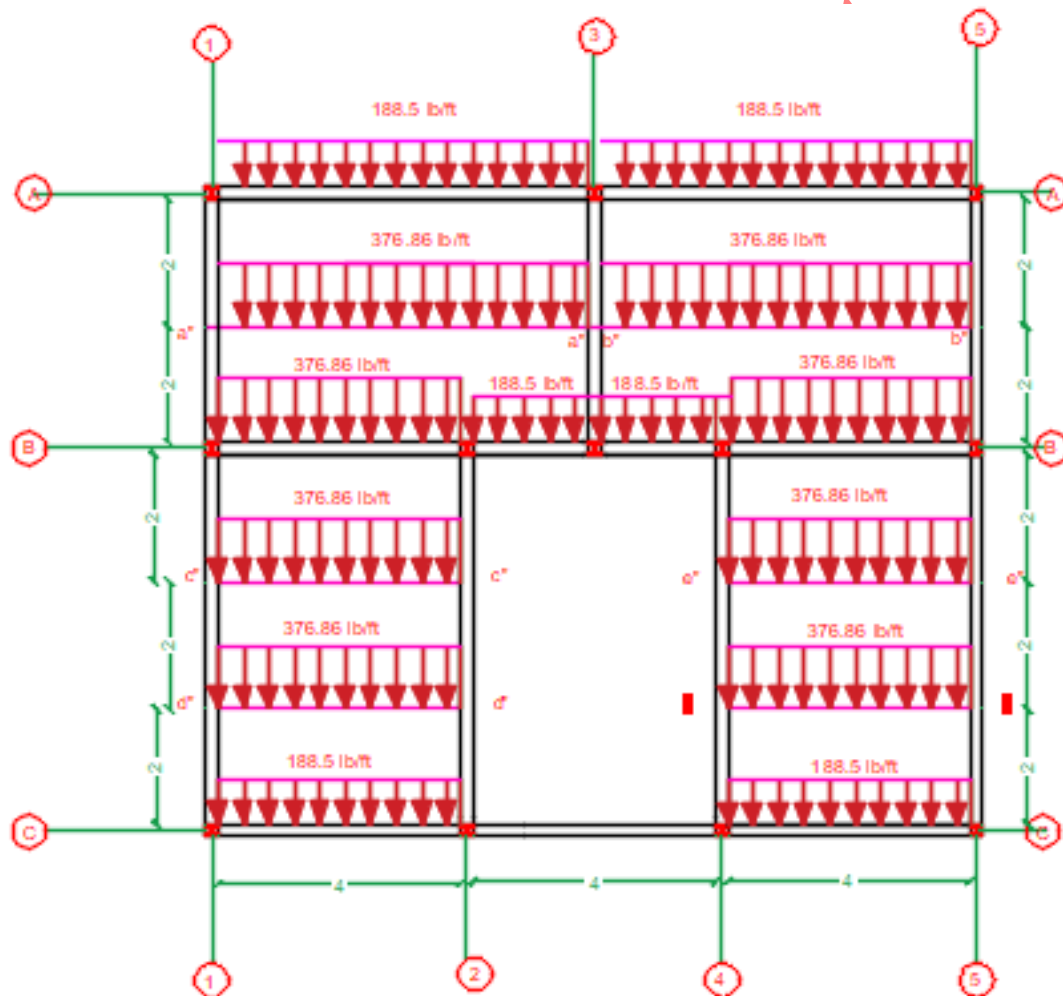
Maximum Sheet Length 42'-0"  
Extra Charge for Lengths Under 6'-0"  
ICBO Approved (No.3415)  
Factory Mutual Approved  
Deck type & gauge — Max. deck span  
1.5F22..... 4'-11"  
1.5F20..... 5'-5"  
1.5F18..... 6'-3"  
FM Approvals No. 0C8A7.AM



### 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               |     |     |     |    |    |    |    |    |    |    |
| 1            | F22       | 4'-9"                | 93                                               | 74  | 60  | 49  | 41 | 35 | 30 | 27 | 23 | 21 | 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 |

په لاندې چوکاټ کې هرېم ته لور په خطي ډول بنودل شوي



په پورته چوکاټ کې ځینې بېمونه د اوږدوالي او پر هغوي د وارده بار له مخې یو ډول دي

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

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

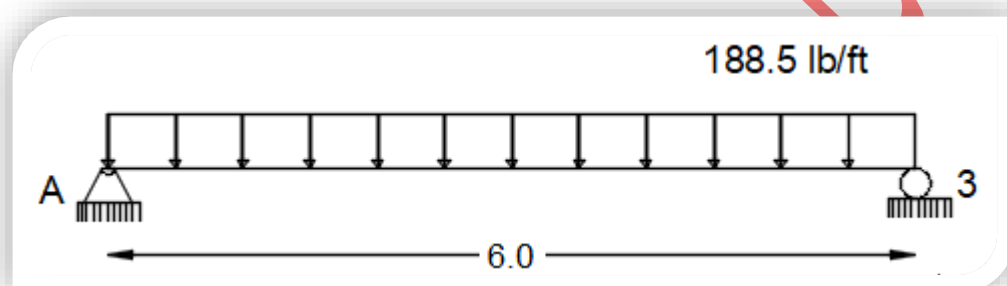
$$B_{2-3} = B_{3-4}$$

$$a'' - a'' = b'' - b'' \quad , \quad c'' - c'' = d'' - d'' = e'' - e'' = f'' - f''$$

## اوس نو لومړي $A_{1-3}$ بيم ډيزاين کوو

په هر بيم د ROOF DECK 1.99 PSF وزن په نظر کې نيول کېږي

نوبت: د بيمونو او ګاډرو اندازه گذاري په متر ده چې په محاسبه کې په فوټ اړول کېږي



$$W_u = 188.5 \text{ lb/ft}$$

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

$$M_{\max} = \frac{188.5 \text{ lb/ft} \cdot (19.7 \text{ ft})^2}{8} = 9144.4 \text{ lb} \cdot \text{ft}$$

$$S_{\text{required}} = \frac{M}{\delta_{\text{Allowable}}}$$

$$\delta_{\text{Allowable for steel}} = 29 \text{ ksi}$$

$$ft = 12 \text{ in}$$

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

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

**Table 1-2 (continued)**  
**M Shapes**  
**Properties**



| Nom-<br>inal<br>Wt. | Compact<br>Section<br>Criteria |                 | Axis X-X         |                  |      |                  | Axis Y-Y         |                  |       |                  | $r_{ts}$ | $h_o$ | $\frac{J}{S_x h_o}$ | Torsional<br>Properties |                  |
|---------------------|--------------------------------|-----------------|------------------|------------------|------|------------------|------------------|------------------|-------|------------------|----------|-------|---------------------|-------------------------|------------------|
|                     |                                |                 | $I$              | $S$              | $r$  | $Z$              | $I$              | $S$              | $r$   | $Z$              |          |       |                     | $J$                     | $C_w$            |
|                     | $\frac{b_f}{2t_f}$             | $\frac{h}{t_w}$ | in. <sup>4</sup> | in. <sup>3</sup> | in.  | in. <sup>3</sup> | in. <sup>4</sup> | in. <sup>3</sup> | in.   | in. <sup>3</sup> | in.      | in.   |                     | in. <sup>4</sup>        | in. <sup>6</sup> |
| 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             | 8.83             | 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            | 34.0             | 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             |

مونڊر د AISC MANUAL په 28 صفحہ کی M8\*6.2 ډوله مقطع انتخابوو

اوس ياده مقطع د عرضي تنشج دپاره چيک کوو  $V = w * L / 2$   $V = 1854.15$

$A = t_w * d$  ,  $A = 0.129 * 8$  ,  $A = 1.032 \text{ in}^2$  ,

$\tau = V / A$

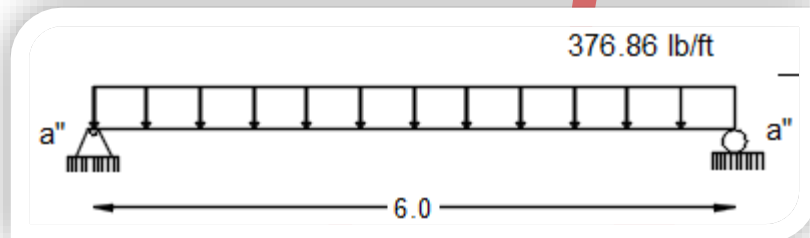
$\tau = 1854.15 / 1.032 = 1.79665 \text{ Ksi}$

$\tau_{\text{allowable}} = 12 \text{ ksi}$

$\tau_{\text{allowable}} > \tau$  ..... ok



## اوس a"-a" بيم ڊيزاين ڪوو



$$W_u = 376.86 \text{ lb/ft}$$

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

$$M_{\max} = (376.86 \cdot 19.68^2) / 8 = 18244.8 \text{ lb} \cdot \text{ft}$$

$$S_{\text{required}} = \frac{M}{\delta_{\text{Allowable}}}$$

$$ft = 12 \text{ in}$$

$$S_{\text{req}} = (18244.8 \cdot 12) \text{ lb} \cdot \text{in} / 29000 \text{ psi} = 7.55 \text{ in}^3$$

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

## DIMENSIONS AND PROPERTIES

1-29

Table 1-2 (continued)  
**M Shapes**  
**Properties**



| Nom-<br>inal<br>Wt.<br><br>lb/ft | Compact<br>Section<br>Criteria |                 | Axis X-X         |                  |      |                  | Axis Y-Y         |                  |       |                  | $r_{ts}$ | $h_o$ | $\frac{J}{S_x h_o}$ | Torsional<br>Properties |                  |
|----------------------------------|--------------------------------|-----------------|------------------|------------------|------|------------------|------------------|------------------|-------|------------------|----------|-------|---------------------|-------------------------|------------------|
|                                  |                                |                 | $I$              | $S$              | $r$  | $Z$              | $I$              | $S$              | $r$   | $Z$              |          |       |                     | $J$                     | $C_w$            |
|                                  | $\frac{b_f}{2t_f}$             | $\frac{h}{t_w}$ | in. <sup>4</sup> | in. <sup>3</sup> | in.  | in. <sup>3</sup> | in. <sup>4</sup> | in. <sup>3</sup> | in.   | in. <sup>3</sup> | in.      | in.   |                     | in. <sup>4</sup>        | in. <sup>6</sup> |
| 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 عرضی تشنج دپاره محاسبه کوو

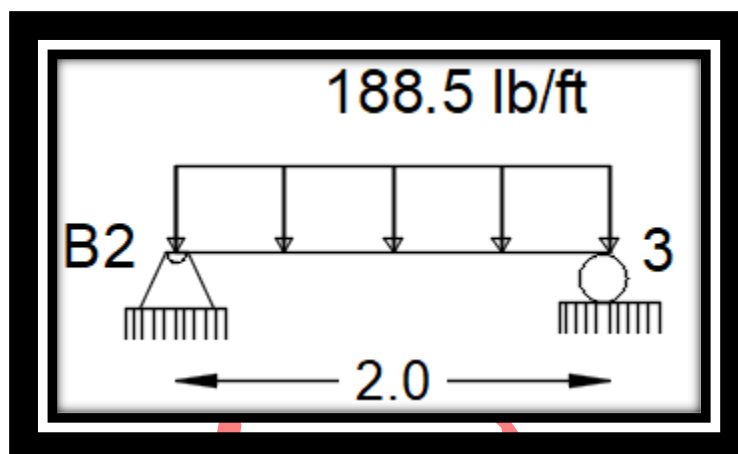
$$\tau = V/A, \quad v = 3708.3 \text{ lb}$$

$$A = t_w \cdot d, \quad A = 0.157 \cdot 10, \quad A = 1.57 \text{ in}^2$$

$$\tau = 3708.3 / 1.57 = 2.362 \text{ ksi}$$

$$\tau_{\text{allowable}} = 12 \text{ ksi} \quad \tau_{\text{allowable}} > \tau \quad \text{..... ok}$$

## اوس B<sub>2-3</sub> ڊيزاين ڪو



$$W_u = 188.5 \text{ lb/ft}$$

$$M_{\max} = (188.5 \times 6.56^2) / 8 = 1014 \text{ lb}\cdot\text{ft}$$

$$S_{\text{required}} = \frac{M}{\delta_{\text{Allowable}}}$$

$$\text{ft} = 12 \text{ in}$$

$$S_{\text{req}} = (1014 \text{ lb}\cdot\text{ft} \times 12) / 29000 \text{ psi} = 0.42 \text{ in}^3$$

اوس په (28,29) صفحو ڪي  $s = 1 \text{ in}^3$   $M_{3 \times 2.9}$  بيم مقطع انتخابو

| Table 1-2 (continued)<br>M Shapes<br>Properties |                                |                 |                  |                  |      |                  |                  |                  |       |                  |       |       |                     | <br>M SHAPES |                  |
|-------------------------------------------------|--------------------------------|-----------------|------------------|------------------|------|------------------|------------------|------------------|-------|------------------|-------|-------|---------------------|-------------------------------------------------------------------------------------------------|------------------|
| Nom-<br>inal<br>WL                              | Compact<br>Section<br>Criteria |                 | Axis X-X         |                  |      |                  | Axis Y-Y         |                  |       |                  | $r_x$ | $r_y$ | $\frac{J}{S_x h_y}$ | Torsional<br>Properties                                                                         |                  |
|                                                 |                                |                 | $I$              | $S$              | $r$  | $Z$              | $I$              | $S$              | $r$   | $Z$              |       |       |                     | $J$                                                                                             | $C_w$            |
| lb/ft                                           | $\frac{b_f}{2t_f}$             | $\frac{h}{t_w}$ | in. <sup>4</sup> | in. <sup>3</sup> | in.  | in. <sup>3</sup> | in. <sup>4</sup> | in. <sup>3</sup> | in.   | in. <sup>3</sup> | in.   | in.   |                     | in. <sup>4</sup>                                                                                | in. <sup>6</sup> |
| 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             | 9.2              | 4.22 | 10.2             | 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             | 8.2              | 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            | 17.0             | 4.30             | 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             |
| 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 عرضی تشنج ته محاسبه کوو

$$\tau = V/A$$

$$V = 618.05$$

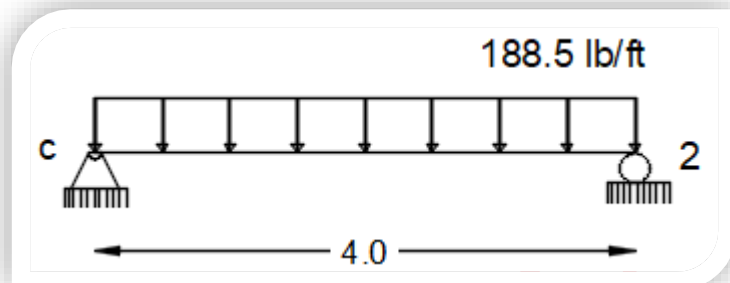
$$A = t_w \cdot d, \quad A = 0.09 \cdot 3, \quad A = 0.27 \text{ in}^2$$

$$\tau = (618.05)/(0.27) = 2289.07 \text{ psi}, \quad \tau_{\text{allowable}} = 12 \text{ ksi}$$

$$\tau = 2.28907 \text{ Ksi}$$

$$\tau_{\text{allowable}} > \tau \quad \text{..... ok}$$

## اوس C<sub>1-2</sub> بيم ڊيزاين ڪوو



$$W_u = 188.5 \text{ lb/ft}$$

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

$$M_{\max} = (188.5 \cdot 13.12^2) / 8 = 4056 \text{ lb} \cdot \text{ft}$$

$$\text{ft} = 12 \text{ in}$$

$$S_{\text{required}} = \frac{M}{\sigma_{\text{allowable}}}$$

$$S_{\text{req}} = (4056 \cdot 12) / 29000 \text{ psi} = 1.67 \text{ in}^3$$

اوس په 31,32 صفحو ڪي د  $S_3 \cdot 5.7$  ,  $S = 1.67 \text{ in}^3$  مقطع انتخابوو

Table 1-3 (continued)

S Shapes

Properties



S SHAPES

| Nom-<br>inal<br>Wt. | Compact<br>Section<br>Criteria |                 | Axis X-X         |                  |      |                  | Axis Y-Y         |                  |       |                  | $r_{ts}$ | $h_o$ | Torsional<br>Properties |                  |
|---------------------|--------------------------------|-----------------|------------------|------------------|------|------------------|------------------|------------------|-------|------------------|----------|-------|-------------------------|------------------|
|                     | $\frac{b_f}{2t_f}$             | $\frac{h}{t_w}$ | $I$              | $S$              | $r$  | $Z$              | $I$              | $S$              | $r$   | $Z$              |          |       | $J$                     | $C_w$            |
| lb/ft               |                                |                 | in. <sup>4</sup> | in. <sup>3</sup> | in.  | in. <sup>3</sup> | in. <sup>4</sup> | in. <sup>3</sup> | in.   | in. <sup>3</sup> | in.      | in.   | in. <sup>4</sup>        | in. <sup>6</sup> |
| 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            |

اوس یی عرضی تشنج ته محاسبه کوو

$$\tau = V/A$$

$$V = 1236.1 \text{ lb}$$

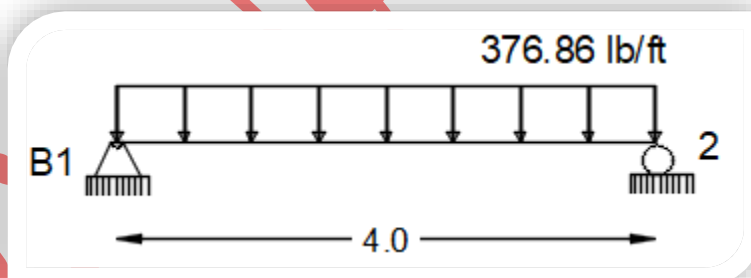
$$A = tw * d, \quad A = 0.17 * 3 = 0.51 \text{ in}^2$$

$$\tau = 1236.1 \text{ lb} / 0.51 \text{ in}^2 = 2423.7 \text{ psi}, \quad \tau_{\text{allowable}} = 12 \text{ ksi}$$

$$\tau = 2.4237 \text{ Ksi}$$

$$\tau_{\text{allowable}} > \tau \quad \text{..... ok}$$

اوس د B<sub>1-2</sub> بیم ډیزاین کوو



$$W_u = 376.86 \text{ lb/ft}$$

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

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

$$F_t = 12 \text{ in}$$

$$S_{\text{required}} = \frac{M}{\sigma_{\text{Allowable}}}$$

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

اوس د مينول په (31,30) صفحه كي  $S_{4 \times 9.5}$  ,  $S = 38 \text{ in}^3$  بيم مقطع انتخابوو

| S SHAPES           |                                |                    |                 |                  |                  |      |                  |                  |                  |      |                  |       |                         |                  |
|--------------------|--------------------------------|--------------------|-----------------|------------------|------------------|------|------------------|------------------|------------------|------|------------------|-------|-------------------------|------------------|
| Nom-<br>inal<br>WL | Compact<br>Section<br>Criteria |                    | Axis X-X        |                  |                  |      | Axis Y-Y         |                  |                  |      | $r_{ts}$         | $h_o$ | Torsional<br>Properties |                  |
|                    |                                |                    | $I$             | $S$              | $r$              | $Z$  | $I$              | $S$              | $r$              | $Z$  |                  |       | $J$                     | $C_w$            |
|                    | lb/ft                          | $\frac{b_f}{2t_f}$ | $\frac{h}{t_w}$ | in. <sup>4</sup> | in. <sup>3</sup> | in.  | in. <sup>3</sup> | in. <sup>4</sup> | in. <sup>3</sup> | in.  | in. <sup>3</sup> | in.   | in.                     | in. <sup>4</sup> |
| 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 يی عرضي تشنج ته محاسبه کوو

The diagram illustrates the cross-section of an S-shape. Key dimensions are labeled:  $t_f$  is the flange thickness,  $b_f$  is the flange width,  $t_w$  is the web thickness,  $d$  is the overall depth, and  $k$  is the fillet radius. The X-X and Y-Y axes are also indicated.

**Table 1-3**  
**S Shapes**  
**Dimensions**

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

$$\tau = V/A$$

$$V = 2472.2 \text{ lb}$$

$$A = t_w \cdot d, \quad A = 0.326 \cdot 4 = 1.304 \text{ in}^2$$

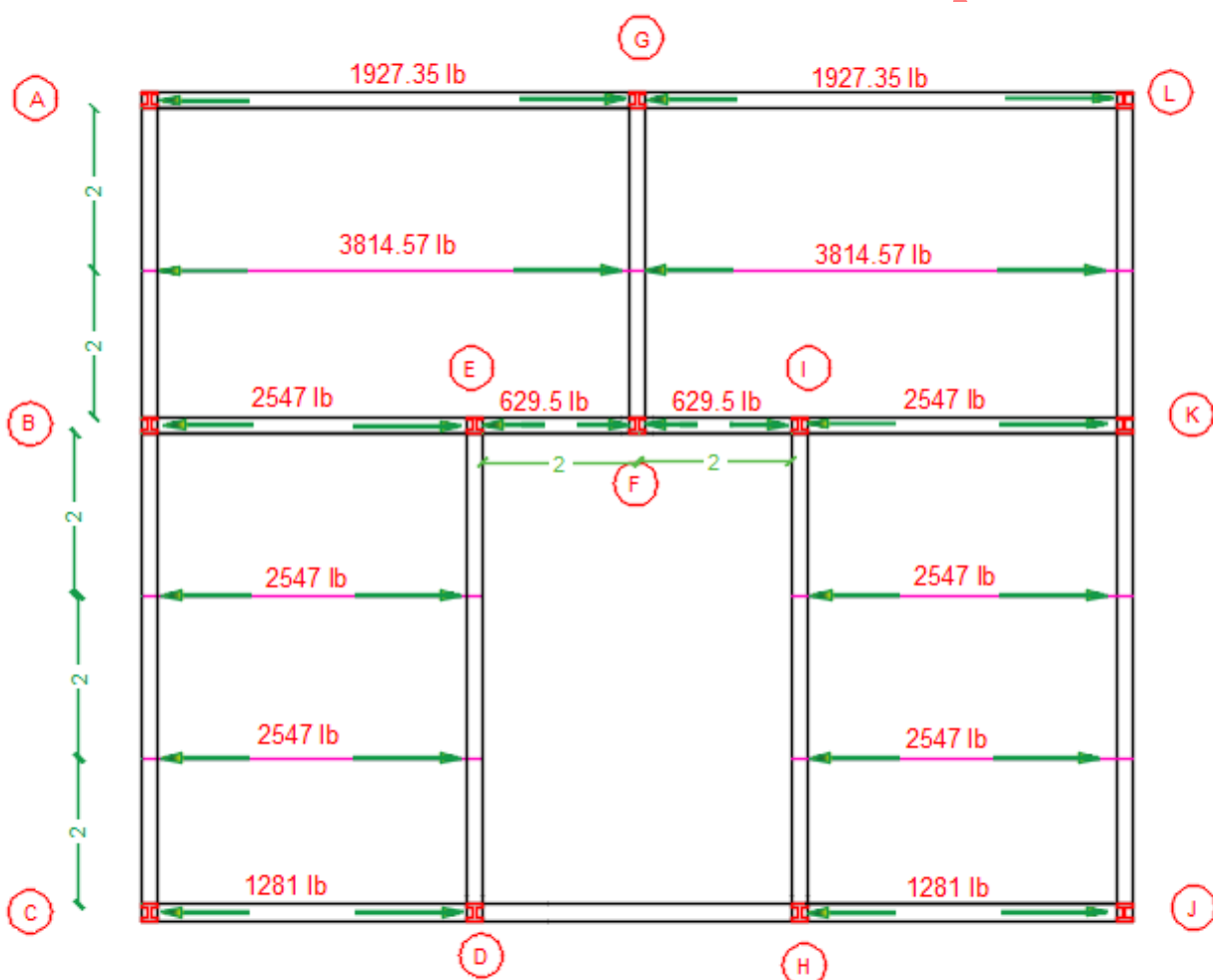
$$\tau = 2472.2 \text{ lb} / 1.304 \text{ in}^2 = 1895.86 \text{ psi}, \quad \tau_{\text{allowable}} = 12 \text{ ksi}$$

$$\tau = 1.89586 \text{ Ksi}$$

$$\tau_{\text{allowable}} > \tau \quad \text{..... ok}$$

## د ګاډرو ډیزاین محاسبه

په لاندې چوکاټ کې مجموعي لوډ د بیمونو څخه ګاډروته د انتقال په حالت کې بنودل شوي. کوم چې د بیمونو او Roof د ډیډلوډ اولایف لوپڅخه ترلاسه شوي.



په پورته چوکاټ کې ځینې ګاډرونه د اوږدوالي او پر هغوي د وارده بار له مخې یو ډول دي. لکه :

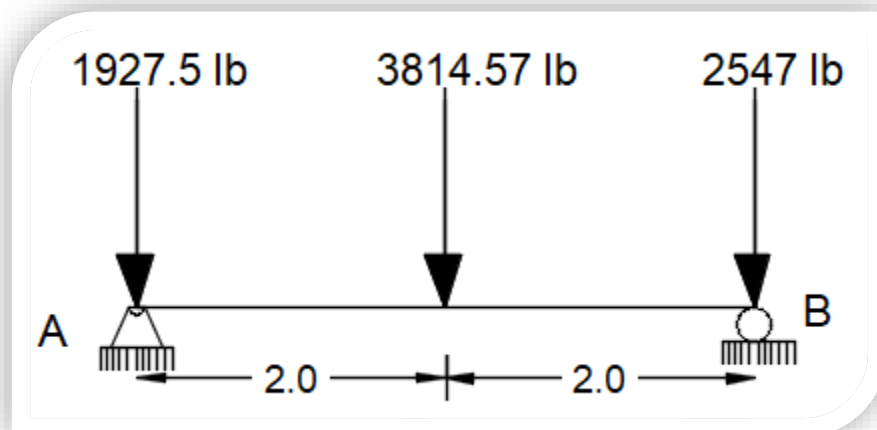
$$A-B = L-K$$

$$B-C = K-J, \quad E-D = I-H$$

$$G-F$$



## د A-B گادر ډیزاین



$$W=3814.57 \text{ lb} , L=4\text{m}$$

$$M_{\max}=w \cdot l/4$$

$$M_{\max} = 12511.79 \text{ lb} \cdot \text{ft}$$

$$S_{\text{required}} = \frac{M}{\delta_{\text{Allowable}}}$$

$$S_{\text{req}} = 12511.79 \text{ lb} \cdot 12 \text{ in} / 29000 \text{ psi} = 5.18 \text{ in}^3$$

اوس په 27 صفحه كي  $w_6$  مقطع د گادر لپاره انتخابوو  $S=5.56 \text{ in}^3$ .

| Nom-<br>inal<br>Wt. | Compact<br>Section<br>Criteria |                 | Axis X-X         |                  |      |                  | Axis Y-Y         |                  |       |                  | $r_{ts}$ | $h_o$ | Torsional<br>Properties |                  |
|---------------------|--------------------------------|-----------------|------------------|------------------|------|------------------|------------------|------------------|-------|------------------|----------|-------|-------------------------|------------------|
|                     |                                |                 | $I$              | $S$              | $r$  | $Z$              | $I$              | $S$              | $r$   | $Z$              |          |       | $J$                     | $C_w$            |
|                     | $\frac{b_f}{2t_f}$             | $\frac{h}{t_w}$ | in. <sup>4</sup> | in. <sup>3</sup> | in.  | in. <sup>3</sup> | in. <sup>4</sup> | in. <sup>3</sup> | in.   | in. <sup>3</sup> | in.      | in.   | in. <sup>4</sup>        | in. <sup>6</sup> |
| 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             |

اوس يی عرضي تشنج ته محاسبه کوو

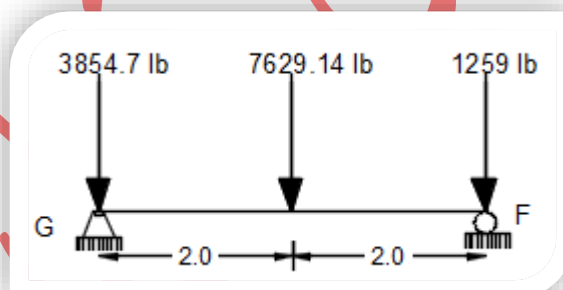
$$\tau = V/A, \quad v = 1907.28 \text{ lb},$$

$$A = tw * d \quad A = 0.17 * 5.9, \quad A = 1.003 \text{ in}^2$$

$$\tau = 1907.28 \text{ lb} / 1.003 \text{ in}^2 = 1796.6 \text{ psi}, \quad \tau_{\text{allowable}} = 12 \text{ ksi}$$

$$1.7966 \text{ ksi} < \tau_{\text{allowable}} \dots\dots\dots \text{ok}$$

اوس د G-F د ګادر ډیزاین کوو



$$W = 7629.14 \text{ lb}, \quad L = 4 \text{ m}$$

$$M_{\text{max}} = w * l / 4 = 25023.58 \text{ lb} * \text{ft}$$

$$S_{\text{required}} = \frac{M}{\sigma_{\text{allowable}}},$$

$$1 \text{ m} = 3.28 \text{ ft}, \quad 1 \text{ ft} = 12 \text{ in}$$

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

اوس په 25 صفحه کې  $W_{10*12}$  د بيم مقطع انتخابوو چې عبارت ده له:  $S = 10.9$

| W12 – W10           |                                |                 |                         |                         |            |                         |                         |                         |            |                         |          |       |                         |       |
|---------------------|--------------------------------|-----------------|-------------------------|-------------------------|------------|-------------------------|-------------------------|-------------------------|------------|-------------------------|----------|-------|-------------------------|-------|
| Nom-<br>inal<br>Wt. | Compact<br>Section<br>Criteria |                 | Axis X-X                |                         |            |                         | Axis Y-Y                |                         |            |                         | $r_{ts}$ | $h_o$ | Torsional<br>Properties |       |
|                     |                                |                 |                         |                         |            |                         |                         |                         |            |                         |          |       | $J$                     | $C_w$ |
|                     | $\frac{b_f}{2t_f}$             | $\frac{h}{t_w}$ | $I$<br>in. <sup>4</sup> | $S$<br>in. <sup>3</sup> | $r$<br>in. | $Z$<br>in. <sup>3</sup> | $I$<br>in. <sup>4</sup> | $S$<br>in. <sup>3</sup> | $r$<br>in. | $Z$<br>in. <sup>3</sup> |          |       | in.                     | in.   |
| 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  |
| 10                  | 7.41                           | 30.5            | 66.9                    | 13.6                    | 3.90       | 10.0                    | 2.69                    | 1.40                    | 0.610      | 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  |

اوس يی عرضي تشنج ته محاسبه کوو

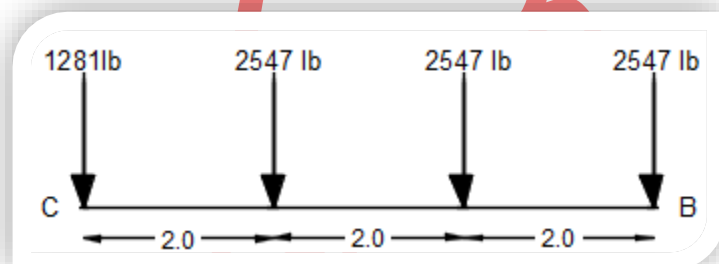
$$\tau = V/A, v = 3814.57 \text{ lb}, A = 1.87 \text{ in}^2$$

$$\tau = 3814.57 \text{ lb} / 1.87 \text{ in}^2 = 2039 \text{ psi}, \tau_{\text{allowable}} = 12 \text{ ksi}$$

$$\tau = 2.039 \text{ ksi}$$

$$\tau < \tau_{\text{allowable}} \dots \dots \text{ok}$$

اوس C-B گادر ډیزاین کوو



$$A_y = 3828 \text{ lb}, B_y = 5094 \text{ lb}$$

$$M_{\text{max}} = 16708.32 \text{ lb} \cdot \text{ft}$$

$$S_{\text{required}} = \frac{M}{\sigma_{\text{allowable}}}$$

$$S_{\text{req}} = 16708.32 \cdot 12 \text{ in} / 29000 \text{ psi} = 6.91 \text{ in}^3$$

اوس په 27 صفحه كي  $W_{6 \times 12}$  د بيم مقطع انتخابوو چي عبارت ده له:

$$S = 7.31 \text{ in}^3$$

| Nom-<br>inal<br>Wt. | Compact<br>Section<br>Criteria |                 | Axis X-X         |                  |      |                  | Axis Y-Y         |                  |      |                  | $r_{ts}$ | $h_o$ | Torsional<br>Properties |                  |
|---------------------|--------------------------------|-----------------|------------------|------------------|------|------------------|------------------|------------------|------|------------------|----------|-------|-------------------------|------------------|
|                     |                                |                 | $I$              | $S$              | $r$  | $Z$              | $I$              | $S$              | $r$  | $Z$              |          |       | $J$                     | $C_w$            |
| lb/ft               | $\frac{b_f}{2t_f}$             | $\frac{h}{t_w}$ | in. <sup>4</sup> | in. <sup>3</sup> | in.  | in. <sup>3</sup> | in. <sup>4</sup> | in. <sup>3</sup> | in.  | in. <sup>3</sup> | in.      | in.   | in. <sup>4</sup>        | in. <sup>6</sup> |
| 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 |
|----|------|------|------|------|------|------|------|------|-------|------|------|------|--------|------|

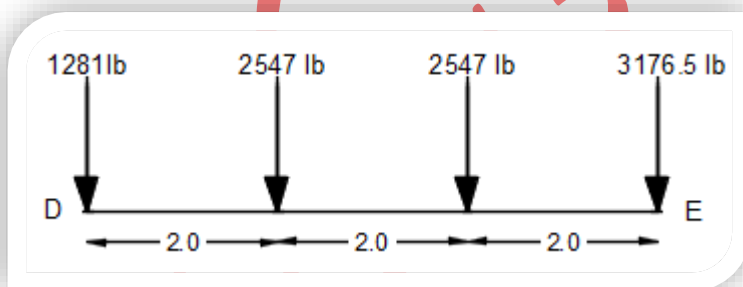
اوس يی عرضي تشنج ته محاسبه کوو

$$\tau = V/A \quad , \quad V = 2547 \text{ lb} \quad , \quad A = 1.4 \text{ in}^2$$

$$\tau = 2547/1.4 = 1819.3 \text{ psi} \quad , \quad \tau_{\text{allowable}} = 12 \text{ ksi}$$

$$1.8193 \text{ ksi} < 12 \text{ ksi} \quad \dots\dots\dots \text{ok}$$

## E-D گادر ډيزاين



$$D_y = 3828 \text{ lb} \quad , \quad E_y = 5723.5 \text{ lb} \quad , \quad 1 \text{ ft} = 12 \text{ in}$$

$$S_{\text{required}} = \frac{M}{\delta_{\text{Allowable}}}$$

$$M_{\text{max}} = 16708.32 \text{ lb} \cdot \text{ft}$$

$$S_{\text{req}} = 16708.32 \text{ lb} \cdot 12 / 29000 \text{ psi} = 6.91 \text{ in}^3$$

د مینول په ۲۷ صفحه کې  $w_{6 \times 12}$  د بیم مقطع انتخاب وکړه چې د C-B گادر لپاره  
انتخاب شوي چې عبارت له:  $S = 7.31 \text{ in}^3$

اوس يی عرضي تشنج ته محاسبه کوو

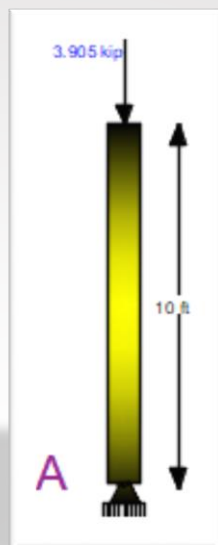
$$\tau = V/A \quad , \quad V = 2547 \text{ lb} \quad , \quad A = t_w \cdot d = 0.23 \cdot 6.03 = 1.4 \text{ in}^2 \quad , \quad A = 1.4 \text{ in}^2$$

$$\tau = 2547/1.4 = 1819.3 \text{ psi} \quad , \quad \tau_{\text{allowable}} = 12 \text{ ksi} \quad , \quad 1.8193 \text{ ksi} < 12 \text{ ksi} \dots\dots \text{ok}$$

## A=L پای دیزاین

$$W_u = 3.905$$

kip



اوس د manual په 468  
صفحه كي د  
HSS2\*2\*1/8 مقطع  
انتخابوو

$$R = 0.761 \text{ in}$$

$$SR = AL/R \leq 200$$

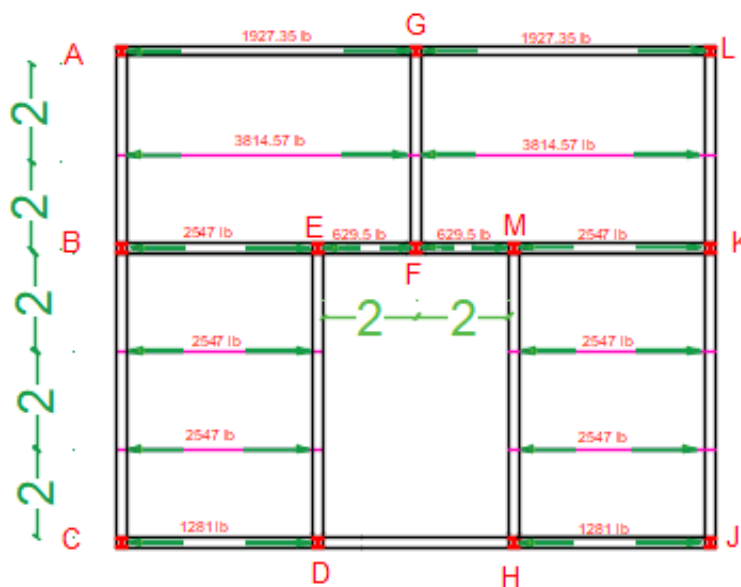
کالم ارتفاع A=10 ft

$$SR = (10 \times 12) \text{ in} / 0.761 \text{ in}$$

$$SR = 157.7$$

$$157.7 < 200 \text{ .... ok}$$

## د پایو دیزاین



د هري پایو اوږدوالي 10 ft دي

د ټولو پایو اتکايي په دواړو خواوو كي PIN دي  
په دي پلان كي ځینی پایي پر هغوي د وارديدو قوو له  
مخي یو ډول دي

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

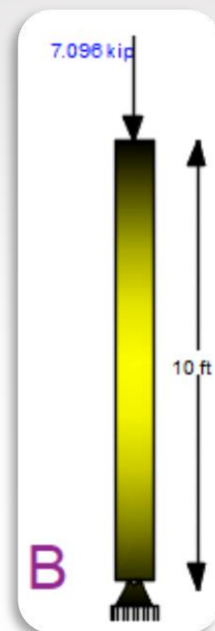
| Shape  | HSS2 1/4 x 2 1/4 x             |      |                                |      |                                |      | HSS2 x 2 x                     |      |                                |      |                                |      |
|--------|--------------------------------|------|--------------------------------|------|--------------------------------|------|--------------------------------|------|--------------------------------|------|--------------------------------|------|
|        | 3/16                           |      | 1/8                            |      | 1/4                            |      | 3/16                           |      | 1/2                            |      | 3/4                            |      |
|        | 0.174                          |      | 0.116                          |      | 0.233                          |      | 0.174                          |      | 0.116                          |      | 0.116                          |      |
| Wu/R   | 4.94                           |      | 3.47                           |      | 5.38                           |      | 4.30                           |      | 3.04                           |      | 3.04                           |      |
| Design | P <sub>u</sub> /Ω <sub>c</sub> |      | P <sub>u</sub> /P <sub>n</sub> |      | P <sub>u</sub> /Ω <sub>c</sub> |      | P <sub>u</sub> /P <sub>n</sub> |      | P <sub>u</sub> /Ω <sub>c</sub> |      | P <sub>u</sub> /P <sub>n</sub> |      |
|        | ASD                            | LRFD | ASD                            | LRFD | ASD                            | LRFD | ASD                            | LRFD | ASD                            | LRFD | ASD                            | LRFD |
| 0      | 37.7                           | 56.6 | 26.3                           | 39.6 | 41.5                           | 62.4 | 32.9                           | 49.4 | 23.1                           | 34.8 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 6.26                           | 9.42 |
| 10     | 9.95                           | 15.0 | 7.43                           | 11.2 | 7.80                           | 11.7 | 6.68                           | 10.1 | 5.07                           | 7.63 | 5.07                           | 7.63 |

نوموړي دیزاین 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 باندې لږ کچه قوه موجوده ده.

## B=K پای دیزاین

| Shape                             |                                | HSS2 1/4×2 1/4× |                               |       |                                | HSS2 1/2×2 |                               |      |      |      |      |
|-----------------------------------|--------------------------------|-----------------|-------------------------------|-------|--------------------------------|------------|-------------------------------|------|------|------|------|
|                                   |                                | 3/16            | 1/8                           | 1/4   | 3/16                           | 1/8        |                               |      |      |      |      |
| t <sub>design</sub> 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 <sub>n</sub> /Ω <sub>c</sub> |                 | φ <sub>c</sub> P <sub>n</sub> |       | P <sub>n</sub> /Ω <sub>c</sub> |            | φ <sub>c</sub> P <sub>n</sub> |      |      |      |      |
|                                   | ASD                            | LRFD            | ASD                           | LRFD  | ASD                            | LRFD       | ASD                           | LRFD |      |      |      |
| radius of gyration r <sub>y</sub> | 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       | 6.66                          | 10.1 | 5.07 | 7.63 |      |

$W_u = 7.096$   
kip



اوس د manual په 468  
صفحه كي د  
HSS2\*2\*1/8 مقطع  
انتخابوو

$R = 0.761$  in

$SR = AL/R \leq 200$

$B = 10$  ft کالم ارتفاع

$SR = (10 \times 12) \text{ in} / 0.761 \text{ in}$

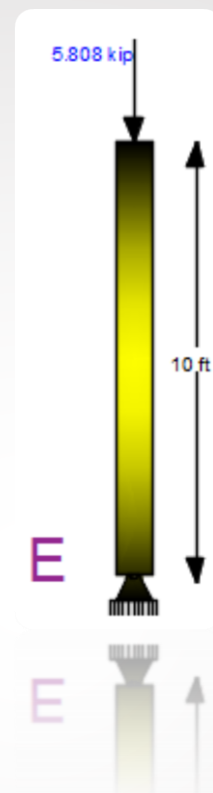
$SR = 157.69$

$157.69 < 200 \dots \text{ok}$

## E=M پای دیزاین

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

$W_u = 5.808$   
kip



اوس د manual په 468  
صفحه كي د  
HSS2\*2\*1/8 مقطع  
انتخابوو

$R = 0.761$  in

$SR = AL/R \leq 200$

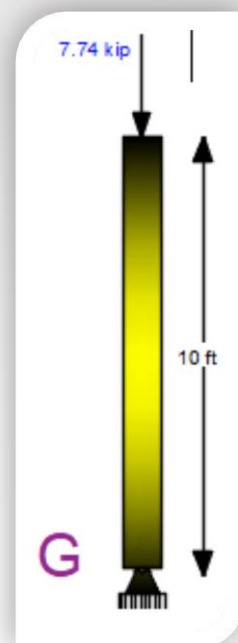
$B = 10$  ft کالم ارتفاع

$SR = (10 \times 12) \text{ in} / 0.761 \text{ in}$

$SR = 157.69$

## G پای دیزاین

$$W_u = 7.74 \text{ kip}$$



| Shape  | HSS2 1/4 x 2 1/4 x |      |              |      | HSS2 x 2 x     |      |              |      |
|--------|--------------------|------|--------------|------|----------------|------|--------------|------|
|        | 3/16               |      | 1/8          |      | 1/4            |      | 3/16         |      |
|        | 0.174              |      | 0.116        |      | 0.233          |      | 0.174        |      |
|        | 4.94               |      | 3.47         |      | 5.38           |      | 4.30         |      |
| Wt/lb  | 4.94               |      | 3.47         |      | 5.38           |      | 4.30         |      |
| Design | $P_n/\Omega_c$     |      | $\phi_c P_n$ |      | $P_n/\Omega_c$ |      | $\phi_c P_n$ |      |
|        | ASD                | LRFD | ASD          | LRFD | ASD            | LRFD | ASD          | LRFD |
| 0      | 37.7               | 56.6 | 26.3         | 39.6 | 41.5           | 62.4 | 32.9         | 49.4 |
| 1      | 37.1               | 55.8 | 26.0         | 39.0 | 40.7           | 61.2 | 32.3         | 48.5 |
| 2      | 35.6               | 53.5 | 25.0         | 37.6 | 38.4           | 57.7 | 30.6         | 45.9 |
| 3      | 33.2               | 49.9 | 23.4         | 35.2 | 34.8           | 52.3 | 27.9         | 42.0 |
| 4      | 30.1               | 45.3 | 21.4         | 32.1 | 30.4           | 45.6 | 24.6         | 37.0 |
| 5      | 26.6               | 40.0 | 19.0         | 28.6 | 25.5           | 38.3 | 20.9         | 31.5 |
| 6      | 22.8               | 34.3 | 16.5         | 24.8 | 20.5           | 30.9 | 17.2         | 25.8 |
| 7      | 19.1               | 28.6 | 13.9         | 20.9 | 15.9           | 23.9 | 13.6         | 20.4 |
| 8      | 15.5               | 23.3 | 11.5         | 17.2 | 12.2           | 18.3 | 10.4         | 15.7 |
| 9      | 12.3               | 18.5 | 9.17         | 13.8 | 9.63           | 14.5 | 8.26         | 12.4 |
| 10     | 9.95               | 15.0 | 7.43         | 11.2 | 7.80           | 11.7 | 6.69         | 10.1 |
| 11     | 8.22               | 12.4 | 6.14         | 9.23 | 6.44           | 9.68 | 5.53         | 8.31 |
| 12     | 6.91               | 10.4 | 5.16         | 7.75 |                |      | 4.64         | 6.98 |
| 13     | 5.89               | 8.85 | 4.40         | 6.61 |                |      |              | 5.30 |
| 14     |                    |      | 3.79         | 5.70 |                |      |              |      |

اوس د manual په 468  
صفحه كي د  
HSS2\*2\*3/16 مقطع  
انتخابوو

$$R=0.733\text{in}$$

$$SR= AL/R \leq 200$$

$$B=10 \text{ ft كالم ارتفاع}$$

$$SR=(10*12) \text{ in}/0.733\text{in}$$

$$SR=163.7$$

$$163.7 < 200 \dots \text{ok}$$



## F پای دیزاین

$$W_u = 5.1445$$

kip

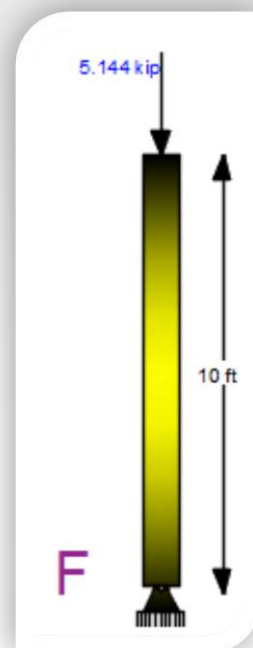


Table 4-4 (continued)  
Available Strength in  
Axial Compression, kips  
Square HSS

$F_y = 46 \text{ ksi}$

HSS2 1/4-HSS2

| Shape            | HSS2 1/4 x 2 1/4 x |      |              |      | HSS2 x 2 x   |      |              |      | HSS2 1/4 x 2 1/4 x |      |              |      |
|------------------|--------------------|------|--------------|------|--------------|------|--------------|------|--------------------|------|--------------|------|
|                  | 3/16               |      | 1/8          |      | 1/4          |      | 3/16         |      | 1/8                |      | 1/4          |      |
| $t_{design}$ in. | 0.174              |      | 0.116        |      | 0.233        |      | 0.174        |      | 0.116              |      | 0.174        |      |
| WU/R             | 4.94               |      | 3.47         |      | 5.38         |      | 4.30         |      | 3.04               |      | 4.30         |      |
| Design           | $P_u/\phi_c$       |      | $P_u/\phi_c$ |      | $P_u/\phi_c$ |      | $P_u/\phi_c$ |      | $P_u/\phi_c$       |      | $P_u/\phi_c$ |      |
|                  | ASD                | LRFD | ASD          | LRFD | ASD          | LRFD | ASD          | LRFD | ASD                | LRFD | ASD          | LRFD |
| 0                | 37.7               | 56.6 | 26.3         | 39.6 | 41.5         | 62.4 | 32.9         | 49.4 | 23.1               | 34.8 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 7.93         | 11.9 |
| 9                | 12.3               | 18.5 | 9.17         | 13.8 | 9.63         | 14.5 | 8.24         | 12.4 | 6.26               | 9.42 | 6.26         | 9.42 |
| 10               | 9.95               | 15.0 | 7.43         | 11.2 | 7.80         | 11.7 | 6.44         | 9.68 | 5.07               | 7.63 | 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 | 4.19         | 6.30 |
| 12               | 6.91               | 10.4 | 5.16         | 7.75 |              |      | 4.64         | 6.98 | 3.52               | 5.30 | 3.52         | 5.30 |
| 13               | 5.69               | 8.85 | 4.40         | 6.61 |              |      |              |      |                    |      |              |      |
| 14               |                    |      | 3.79         | 5.70 |              |      |              |      |                    |      |              |      |

اوس د manual په

468 صفحه كي د W8\*58

مقطع انتخابوو

$$R=0.761$$

in

$$SR = AL/R \leq 200$$

B=10 ft كالم ارتفاع

$$SR = (10 \times 12)$$

$$in/0.761in$$

$$SR = 157.69$$

$$157.69 < 200 \text{ .... ok}$$

ومن الله توفيق

اختتام

کاپی کوں منع دیا!

**Get more e-books from [www.ketabton.com](http://www.ketabton.com)**  
**Ketabton.com: The Digital Library**