```
347.7783   1.54E+07       0.00
    1.9500  -8.79E-05     63140.    -11610.  -1.88E-05       0.00   7.65E+09
794.1936   1.63E+07       0.00
    2.1000  -1.08E-04     43530.     -9967.  -6.25E-06       0.00   7.65E+09
1031.   1.71E+07       0.00
    2.2500  -1.10E-04     27259.     -8046.   2.08E-06       0.00   7.65E+09
1104.   1.80E+07       0.00
    2.4000  -1.01E-04     14564.     -6101.   7.00E-06       0.00   7.65E+09
1057.   1.89E+07       0.00
    2.5500  -8.52E-05      5292.     -4310.   9.33E-06       0.00   7.65E+09
933.4599   1.97E+07       0.00
    2.7000  -6.72E-05   -955.617     -2778.   9.84E-06       0.00   7.65E+09
769.3224   2.06E+07       0.00
    2.8500  -4.97E-05     -4711.     -1552.   9.18E-06       0.00   7.65E+09
592.8041   2.15E+07       0.00
    3.0000  -3.42E-05     -6545.   -636.360   7.85E-06       0.00   7.65E+09
424.2039   2.23E+07       0.00
    3.1500  -2.15E-05     -7004.     -5.819   6.26E-06       0.00   7.65E+09
276.3974   2.32E+07       0.00
    3.3000  -1.17E-05     -6568.   383.3154   4.66E-06       0.00   7.65E+09
155.9740   2.40E+07       0.00
    3.4500  -4.67E-06     -5626.   581.8745   3.23E-06       0.00   7.65E+09
64.6472   2.49E+07       0.00
    3.6000  -4.95E-08     -4474.   640.6811   2.04E-06       0.00   7.65E+09
0.6934   2.52E+07       0.00
    3.7500   2.68E-06     -3320.   607.5685   1.12E-06       0.00   7.65E+09
-37.485   2.52E+07       0.00
    3.9000   4.00E-06     -2287.   523.4473   4.65E-07       0.00   7.65E+09
-55.983   2.52E+07       0.00
    4.0500   4.35E-06     -1436.   418.2323   2.72E-08       0.00   7.65E+09
-60.923   2.52E+07       0.00
    4.2000   4.10E-06   -781.369   311.7849  -2.34E-07       0.00   7.65E+09
-57.352   2.52E+07       0.00
    4.3500   3.51E-06   -313.014   215.9333  -3.62E-07       0.00   7.65E+09
-49.150   2.52E+07       0.00
    4.5000   2.79E-06     -3.891   136.5166  -4.00E-07       0.00   7.65E+09
-39.091   2.52E+07       0.00
    4.6500   2.07E-06   178.5756    75.2256  -3.79E-07       0.00   7.65E+09
-29.010   2.52E+07       0.00
    4.8000   1.43E-06   267.0437    31.1283  -3.27E-07       0.00   7.65E+09
-19.987   2.52E+07       0.00
    4.9500   8.96E-07   290.7434     1.8471  -2.61E-07       0.00   7.65E+09
-12.548   2.52E+07       0.00
    5.1000   4.88E-07   273.7779    -15.594  -1.95E-07       0.00   7.65E+09
-6.832   2.52E+07       0.00
    5.2500   1.96E-07   234.6677    -24.207  -1.35E-07       0.00   7.65E+09
-2.739   2.52E+07       0.00
    5.4000   2.63E-09   186.6754    -26.705  -8.53E-08       0.00   7.65E+09
-0.03687   2.52E+07       0.00
    5.5500  -1.11E-07   138.5565    -25.336  -4.70E-08       0.00   7.65E+09
```

1.5582 2.52E+07 0.00
5.7000 -1.67E-07 95.4810 -21.835 -1.95E-08 0.00 7.65E+09
2.3319 2.52E+07 0.00
5.8500 -1.81E-07 59.9571 -17.451 -1.19E-09 0.00 7.65E+09
2.5395 2.52E+07 0.00
6.0000 -1.71E-07 32.6588 -13.013 9.71E-09 0.00 7.65E+09
2.3917 2.52E+07 0.00
6.1500 -1.46E-07 13.1084 -9.015 1.51E-08 0.00 7.65E+09
2.0502 2.52E+07 0.00
6.3000 -1.17E-07 0.2003 -5.702 1.67E-08 0.00 7.65E+09
1.6311 2.52E+07 0.00
6.4500 -8.65E-08 -7.423 -3.144 1.58E-08 0.00 7.65E+09
1.2108 2.52E+07 0.00
6.6000 -5.96E-08 -11.123 -1.303 1.36E-08 0.00 7.65E+09
0.8345 2.52E+07 0.00
6.7500 -3.74E-08 -12.119 -0.08061 1.09E-08 0.00 7.65E+09
0.5241 2.52E+07 0.00
6.9000 -2.04E-08 -11.417 0.6480 8.12E-09 0.00 7.65E+09
0.2855 2.52E+07 0.00
7.0500 -8.19E-09 -9.789 1.0082 5.63E-09 0.00 7.65E+09
0.1147 2.52E+07 0.00
7.2000 -1.34E-10 -7.789 1.1131 3.56E-09 0.00 7.65E+09
0.00187 2.52E+07 0.00
7.3500 4.63E-09 -5.783 1.0565 1.96E-09 0.00 7.65E+09
-0.06477 2.52E+07 0.00
7.5000 6.94E-09 -3.986 0.9108 8.15E-10 0.00 7.65E+09
-0.09713 2.52E+07 0.00
7.6500 7.56E-09 -2.504 0.7281 5.17E-11 0.00 7.65E+09
-0.106 2.52E+07 0.00
7.8000 7.12E-09 -1.365 0.5431 -4.03E-10 0.00 7.65E+09
-0.09974 2.52E+07 0.00
7.9500 6.11E-09 -0.549 0.3764 -6.29E-10 0.00 7.65E+09
-0.08553 2.52E+07 0.00
8.1000 4.86E-09 -0.00994 0.2381 -6.94E-10 0.00 7.65E+09
-0.06806 2.52E+07 0.00
8.2500 3.61E-09 0.3086 0.1314 -6.59E-10 0.00 7.65E+09
-0.05053 2.52E+07 0.00
8.4000 2.49E-09 0.4633 0.05457 -5.68E-10 0.00 7.65E+09
-0.03484 2.52E+07 0.00
8.5500 1.56E-09 0.5052 0.00351 -4.54E-10 0.00 7.65E+09
-0.02189 2.52E+07 0.00
8.7000 8.52E-10 0.4761 -0.02693 -3.39E-10 0.00 7.65E+09
-0.01193 2.52E+07 0.00
8.8500 3.43E-10 0.4083 -0.04199 -2.35E-10 0.00 7.65E+09
-0.00480 2.52E+07 0.00
9.0000 6.56E-12 0.3250 -0.04640 -1.49E-10 0.00 7.65E+09
-9.18E-05 2.52E+07 0.00
9.1500 -1.92E-10 0.2414 -0.04406 -8.21E-11 0.00 7.65E+09
0.00269 2.52E+07 0.00
9.3000 -2.89E-10 0.1664 -0.03799 -3.41E-11 0.00 7.65E+09

0.00405 2.52E+07 0.00
9.4500 -3.15E-10 0.1046 -0.03038 -2.25E-12 0.00 7.65E+09
0.00441 2.52E+07 0.00
9.6000 -2.97E-10 0.05705 -0.02267 1.68E-11 0.00 7.65E+09
0.00416 2.52E+07 0.00
9.7500 -2.55E-10 0.02299 -0.01571 2.62E-11 0.00 7.65E+09
0.00357 2.52E+07 0.00
9.9000 -2.03E-10 4.81E-04 -0.00995 2.89E-11 0.00 7.65E+09
0.00284 2.52E+07 0.00
10.0500 -1.51E-10 -0.01283 -0.00549 2.75E-11 0.00 7.65E+09
0.00211 2.52E+07 0.00
10.2000 -1.04E-10 -0.01930 -0.00228 2.37E-11 0.00 7.65E+09
0.00145 2.52E+07 0.00
10.3500 -6.53E-11 -0.02106 -1.53E-04 1.90E-11 0.00 7.65E+09
9.14E-04 2.52E+07 0.00
10.5000 -3.56E-11 -0.01985 0.00112 1.41E-11 0.00 7.65E+09
4.99E-04 2.52E+07 0.00
10.6500 -1.44E-11 -0.01703 0.00175 9.81E-12 0.00 7.65E+09
2.01E-04 2.52E+07 0.00
10.8000 0.00 -0.01356 0.00193 6.21E-12 0.00 7.65E+09
4.41E-06 2.52E+07 0.00
10.9500 7.99E-12 -0.01007 0.00184 3.43E-12 0.00 7.65E+09
-1.12E-04 2.52E+07 0.00
11.1000 1.20E-11 -0.00695 0.00158 1.43E-12 0.00 7.65E+09
-1.69E-04 2.52E+07 0.00
11.2500 1.31E-11 -0.00437 0.00127 0.00 0.00 7.65E+09
-1.84E-04 2.52E+07 0.00
11.4000 1.24E-11 -0.00238 9.46E-04 0.00 0.00 7.65E+09
-1.73E-04 2.52E+07 0.00
11.5500 1.06E-11 -9.63E-04 6.56E-04 -1.09E-12 0.00 7.65E+09
-1.49E-04 2.52E+07 0.00
11.7000 8.46E-12 -2.28E-05 4.15E-04 -1.21E-12 0.00 7.65E+09
-1.18E-04 2.52E+07 0.00
11.8500 6.29E-12 5.33E-04 2.30E-04 -1.15E-12 0.00 7.65E+09
-8.80E-05 2.52E+07 0.00
12.0000 4.34E-12 8.04E-04 9.56E-05 0.00 0.00 7.65E+09
-6.07E-05 2.52E+07 0.00
12.1500 2.73E-12 8.78E-04 6.61E-06 0.00 0.00 7.65E+09
-3.82E-05 2.52E+07 0.00
12.3000 1.49E-12 8.28E-04 -4.65E-05 0.00 0.00 7.65E+09
-2.09E-05 2.52E+07 0.00
12.4500 0.00 7.10E-04 -7.29E-05 0.00 0.00 7.65E+09
-8.42E-06 2.52E+07 0.00
12.6000 0.00 5.66E-04 -8.06E-05 0.00 0.00 7.65E+09
-2.06E-07 2.52E+07 0.00
12.7500 0.00 4.20E-04 -7.66E-05 0.00 0.00 7.65E+09
4.66E-06 2.52E+07 0.00
12.9000 0.00 2.90E-04 -6.61E-05 0.00 0.00 7.65E+09
7.03E-06 2.52E+07 0.00
13.0500 0.00 1.82E-04 -5.29E-05 0.00 0.00 7.65E+09

```
7.69E-06   2.52E+07       0.00
   13.2000       0.00   9.95E-05  -3.94E-05       0.00       0.00   7.65E+09
7.26E-06   2.52E+07       0.00
   13.3500       0.00   4.03E-05  -2.73E-05       0.00       0.00   7.65E+09
6.24E-06   2.52E+07       0.00
   13.5000       0.00   1.35E-06  -1.71E-05       0.00       0.00   7.65E+09
4.99E-06   2.52E+07       0.00
   13.6500       0.00  -2.14E-05  -9.30E-06       0.00       0.00   7.65E+09
3.73E-06   2.52E+07       0.00
   13.8000       0.00  -3.22E-05  -3.61E-06       0.00       0.00   7.65E+09
2.59E-06   2.52E+07       0.00
   13.9500       0.00  -3.45E-05   2.02E-07       0.00       0.00   7.65E+09
1.65E-06   2.52E+07       0.00
   14.1000       0.00  -3.14E-05   2.50E-06       0.00       0.00   7.65E+09
9.08E-07   2.52E+07       0.00
   14.2500       0.00  -2.55E-05   3.64E-06       0.00       0.00   7.65E+09
3.54E-07   2.52E+07       0.00
   14.4000       0.00  -1.84E-05   3.91E-06       0.00       0.00   7.65E+09
-4.89E-08   2.52E+07       0.00
   14.5500       0.00  -1.14E-05   3.56E-06       0.00       0.00   7.65E+09
-3.43E-07   2.52E+07       0.00
   14.7000       0.00  -5.54E-06   2.74E-06       0.00       0.00   7.65E+09
-5.69E-07   2.52E+07       0.00
   14.8500       0.00  -1.53E-06   1.54E-06       0.00       0.00   7.65E+09
-7.63E-07   2.52E+07       0.00
   15.0000       0.00       0.00       0.00       0.00       0.00   7.65E+09
-9.48E-07   1.26E+07       0.00

* This analysis computed pile response using nonlinear moment-curvature rela-
  tionships. Values of total stress due to combined axial and bending stresses
  are computed only for elastic sections only and do not equal the actual
  stresses in concrete and steel. Stresses in concrete and steel may be inter-
  polated from the output for nonlinear bending properties relative to the
  magnitude of bending moment developed in the pile.


Output Summary for Load Case No. 1:

Pile-head deflection             =     0.00480173 inches
Computed slope at pile head      =     -0.0003737 radians
Maximum bending moment           =        164364. inch-lbs
Maximum shear force              =         24780. lbs
Depth of maximum bending moment  =     1.05000000 feet below pile head
Depth of maximum shear force     =       0.000000 feet below pile head
Number of iterations             =             13
Number of zero deflection points =              8

 i_LRFD_Load           1  0.000000000000000E+000
  0.000000000000000E+000  0.000000000000000E+000
 i_LRFD_Load           2  0.000000000000000E+000
```

```
  0.000000000000000E+000  0.000000000000000E+000
 i_LRFD_Load           4  0.000000000000000E+000
  0.000000000000000E+000  0.000000000000000E+000
 i_LRFD_Load           5  0.000000000000000E+000
  0.000000000000000E+000  0.000000000000000E+000
 i_LRFD_Load           3  0.000000000000000E+000
  0.000000000000000E+000  0.000000000000000E+000


--------------------------------------------------------------------------------
                 Computed Values of Pile Loading and Deflection
                 for Lateral Loading for LRFD Load Case Number 2
--------------------------------------------------------------------------------


Load Case No. 2:




   Depth    Deflect.    Bending     Shear      Slope      Total     Bending   Soil
Res.  Soil Spr.  Distrib.
     X          y       Moment      Force        S       Stress    Stiffness      p
      Es*H     Lat. Load
   feet      inches     in-lbs       lbs      radians     psi*      lb-in^2
lb/inch    lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ---------- ----------
      0.00    0.04176   2.65E-07     62400.   -0.00249       0.00   7.28E+09
-2553.     55023.       0.00
    0.1500    0.03727    108840.     57467.   -0.00248       0.00   7.28E+09
-2928.    141413.       0.00
    0.3000    0.03283    208186.     51889.   -0.00244       0.00   7.26E+09
-3270.    179247.       0.00
    0.4500    0.02849    296925.     45731.   -0.00238       0.00   7.25E+09
-3573.    225781.       0.00
    0.6000    0.02427    374067.     39064.   -0.00229       0.00   6.40E+09
-3834.    284336.       0.00
    0.7500    0.02025    438759.     31970.   -0.00216       0.00   5.57E+09
-4048.    359831.       0.00
    0.9000    0.01648    490298.     24539.   -0.00200       0.00   4.87E+09
-4209.    459717.       0.00
    1.0500    0.01304    528152.     16869.   -0.00180       0.00   4.37E+09
-4313.    595468.       0.00
    1.2000    0.00999    551975.      9066.   -0.00157       0.00   4.08E+09
-4356.    785197.       0.00
    1.3500    0.00737    561618.      1243.   -0.00132       0.00   3.96E+09
-4336.   1058456.       0.00
    1.5000    0.00522    557145.     -6486.   -0.00107       0.00   4.02E+09
```

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-4251.   1465601.       0.00
    1.6500    0.00352    538834.    -14000.  -8.32E-04       0.00   4.24E+09
-4099.   2097842.       0.00
    1.8000    0.00222    507184.    -21177.  -6.20E-04       0.00   4.65E+09
-3876.   3136361.       0.00
    1.9500    0.00129    462924.    -27880.  -4.42E-04       0.00   5.24E+09
-3572.   5000220.       0.00
    2.1000   6.34E-04    407047.    -33934.  -3.01E-04       0.00   5.99E+09
-3154.   8961639.       0.00
    2.2500   2.01E-04    340919.    -38585.  -1.98E-04       0.00   7.23E+09
-2014.   1.80E+07       0.00
    2.4000  -7.81E-05    268244.    -39661.  -1.22E-04       0.00   7.26E+09
818.9103   1.89E+07       0.00
    2.5500  -2.38E-04    198205.    -36577.  -6.42E-05       0.00   7.27E+09
2607.   1.97E+07       0.00
    2.7000  -3.09E-04    136600.    -31374.  -2.27E-05       0.00   7.27E+09
3175.   1.85E+07       0.00
    2.8500  -3.20E-04     85272.    -25513.   4.73E-06       0.00   7.27E+09
3337.   1.88E+07       0.00
    3.0000  -2.92E-04     44752.    -19453.   2.08E-05       0.00   7.28E+09
3396.   2.09E+07       0.00
    3.1500  -2.45E-04     15232.    -13559.   2.82E-05       0.00   7.28E+09
3152.   2.32E+07       0.00
    3.3000  -1.91E-04     -4076.     -8432.   2.96E-05       0.00   7.28E+09
2545.   2.40E+07       0.00
    3.4500  -1.38E-04    -15138.     -4421.   2.72E-05       0.00   7.28E+09
1911.   2.49E+07       0.00
    3.6000  -9.24E-05    -20005.     -1536.   2.29E-05       0.00   7.28E+09
1294.   2.52E+07       0.00
    3.7500  -5.57E-05    -20679.   330.2995   1.79E-05       0.00   7.28E+09
779.4543   2.52E+07       0.00
    3.9000  -2.81E-05    -18826.      1386.   1.30E-05       0.00   7.28E+09
393.6777   2.52E+07       0.00
    4.0500  -8.94E-06    -15696.      1853.   8.71E-06       0.00   7.28E+09
125.2227   2.52E+07       0.00
    4.2000   3.24E-06    -12159.      1925.   5.27E-06       0.00   7.28E+09
-45.424   2.52E+07       0.00
    4.3500   1.00E-05     -8769.      1758.   2.68E-06       0.00   7.28E+09
-140.314   2.52E+07       0.00
    4.5000   1.29E-05     -5832.      1469.   8.77E-07       0.00   7.28E+09
-180.580   2.52E+07       0.00
    4.6500   1.32E-05     -3481.      1140.  -2.74E-07       0.00   7.28E+09
-184.514   2.52E+07       0.00
    4.8000   1.19E-05     -1727.   824.2418  -9.18E-07       0.00   7.28E+09
-166.766   2.52E+07       0.00
    4.9500   9.88E-06   -512.973   549.7170  -1.19E-06       0.00   7.28E+09
-138.261   2.52E+07       0.00
    5.1000   7.61E-06   252.8652   329.3765  -1.23E-06       0.00   7.28E+09
-106.561   2.52E+07       0.00
    5.2500   5.46E-06   673.4284   164.6788  -1.11E-06       0.00   7.28E+09
```

-76.436 2.52E+07 0.00
5.4000 3.61E-06 846.2944 50.4306 -9.24E-07 0.00 7.28E+09
-50.506 2.52E+07 0.00
5.5500 2.13E-06 855.4652 -21.888 -7.14E-07 0.00 7.28E+09
-29.848 2.52E+07 0.00
5.7000 1.04E-06 767.8722 -61.819 -5.13E-07 0.00 7.28E+09
-14.519 2.52E+07 0.00
5.8500 2.84E-07 633.1876 -78.462 -3.40E-07 0.00 7.28E+09
-3.973 2.52E+07 0.00
6.0000 -1.88E-07 485.5880 -79.673 -2.02E-07 0.00 7.28E+09
2.6280 2.52E+07 0.00
6.1500 -4.43E-07 346.4716 -71.724 -9.91E-08 0.00 7.28E+09
6.2044 2.52E+07 0.00
6.3000 -5.44E-07 227.4350 -59.279 -2.82E-08 0.00 7.28E+09
7.6226 2.52E+07 0.00
6.4500 -5.45E-07 133.0807 -45.558 1.64E-08 0.00 7.28E+09
7.6239 2.52E+07 0.00
6.6000 -4.85E-07 63.4192 -32.579 4.07E-08 0.00 7.28E+09
6.7963 2.52E+07 0.00
6.7500 -3.98E-07 15.7736 -21.446 5.05E-08 0.00 7.28E+09
5.5736 2.52E+07 0.00
6.9000 -3.04E-07 -13.815 -12.603 5.07E-08 0.00 7.28E+09
4.2526 2.52E+07 0.00
7.0500 -2.16E-07 -29.624 -6.060 4.53E-08 0.00 7.28E+09
3.0177 2.52E+07 0.00
7.2000 -1.41E-07 -35.653 -1.573 3.73E-08 0.00 7.28E+09
1.9673 2.52E+07 0.00
7.3500 -8.14E-08 -35.307 1.2225 2.85E-08 0.00 7.28E+09
1.1390 2.52E+07 0.00
7.5000 -3.79E-08 -31.267 2.7252 2.03E-08 0.00 7.28E+09
0.5307 2.52E+07 0.00
7.6500 -8.37E-09 -25.507 3.3082 1.33E-08 0.00 7.28E+09
0.1171 2.52E+07 0.00
7.8000 9.83E-09 -19.365 3.2898 7.71E-09 0.00 7.28E+09
-0.138 2.52E+07 0.00
7.9500 1.94E-08 -13.667 2.9216 3.63E-09 0.00 7.28E+09
-0.272 2.52E+07 0.00
8.1000 2.29E-08 -8.849 2.3887 8.47E-10 0.00 7.28E+09
-0.321 2.52E+07 0.00
8.2500 2.24E-08 -5.068 1.8173 -8.73E-10 0.00 7.28E+09
-0.314 2.52E+07 0.00
8.4000 1.98E-08 -2.306 1.2856 -1.78E-09 0.00 7.28E+09
-0.277 2.52E+07 0.00
8.5500 1.60E-08 -0.439 0.8348 -2.12E-09 0.00 7.28E+09
-0.224 2.52E+07 0.00
8.7000 1.21E-08 0.7005 0.4804 -2.09E-09 0.00 7.28E+09
-0.169 2.52E+07 0.00
8.8500 8.50E-09 1.2912 0.2208 -1.85E-09 0.00 7.28E+09
-0.119 2.52E+07 0.00
9.0000 5.46E-09 1.4965 0.04499 -1.50E-09 0.00 7.28E+09

-0.07645 2.52E+07 0.00
9.1500 3.09E-09 1.4540 -0.06277 -1.14E-09 0.00 7.28E+09
-0.04329 2.52E+07 0.00
9.3000 1.37E-09 1.2711 -0.119 -7.99E-10 0.00 7.28E+09
-0.01918 2.52E+07 0.00
9.4500 2.14E-10 1.0260 -0.139 -5.16E-10 0.00 7.28E+09
-0.00300 2.52E+07 0.00
9.6000 -4.86E-10 0.7711 -0.136 -2.93E-10 0.00 7.28E+09
0.00680 2.52E+07 0.00
9.7500 -8.42E-10 0.5382 -0.119 -1.32E-10 0.00 7.28E+09
0.01179 2.52E+07 0.00
9.9000 -9.59E-10 0.3435 -0.09611 -2.26E-11 0.00 7.28E+09
0.01343 2.52E+07 0.00
10.0500 -9.24E-10 0.1922 -0.07239 4.36E-11 0.00 7.28E+09
0.01293 2.52E+07 0.00
10.2000 -8.02E-10 0.08284 -0.05064 7.76E-11 0.00 7.28E+09
0.01123 2.52E+07 0.00
10.3500 -6.44E-10 0.00985 -0.03242 8.91E-11 0.00 7.28E+09
0.00902 2.52E+07 0.00
10.5000 -4.82E-10 -0.03392 -0.01824 8.61E-11 0.00 7.28E+09
0.00674 2.52E+07 0.00
10.6500 -3.34E-10 -0.05584 -0.00795 7.50E-11 0.00 7.28E+09
0.00468 2.52E+07 0.00
10.8000 -2.12E-10 -0.06260 -0.00108 6.03E-11 0.00 7.28E+09
0.00296 2.52E+07 0.00
10.9500 -1.17E-10 -0.05975 0.00306 4.52E-11 0.00 7.28E+09
0.00164 2.52E+07 0.00
11.1000 -4.89E-11 -0.05159 0.00515 3.15E-11 0.00 7.28E+09
6.84E-04 2.52E+07 0.00
11.2500 -3.71E-12 -0.04121 0.00582 2.00E-11 0.00 7.28E+09
5.19E-05 2.52E+07 0.00
11.4000 2.31E-11 -0.03066 0.00557 1.11E-11 0.00 7.28E+09
-3.24E-04 2.52E+07 0.00
11.5500 3.63E-11 -0.02116 0.00482 4.71E-12 0.00 7.28E+09
-5.08E-04 2.52E+07 0.00
11.7000 4.01E-11 -0.01330 0.00386 0.00 0.00 7.28E+09
-5.61E-04 2.52E+07 0.00
11.8500 3.79E-11 -0.00725 0.00288 -2.09E-12 0.00 7.28E+09
-5.31E-04 2.52E+07 0.00
12.0000 3.25E-11 -0.00293 0.00199 -3.35E-12 0.00 7.28E+09
-4.56E-04 2.52E+07 0.00
12.1500 2.59E-11 -8.34E-05 0.00126 -3.72E-12 0.00 7.28E+09
-3.62E-04 2.52E+07 0.00
12.3000 1.91E-11 0.00159 6.89E-04 -3.54E-12 0.00 7.28E+09
-2.68E-04 2.52E+07 0.00
12.4500 1.31E-11 0.00240 2.82E-04 -3.04E-12 0.00 7.28E+09
-1.84E-04 2.52E+07 0.00
12.6000 8.18E-12 0.00261 1.37E-05 -2.42E-12 0.00 7.28E+09
-1.15E-04 2.52E+07 0.00
12.7500 4.40E-12 0.00245 -1.45E-04 -1.80E-12 0.00 7.28E+09

```
-6.16E-05   2.52E+07       0.00
   12.9000   1.71E-12    0.00209  -2.22E-04  -1.24E-12       0.00   7.28E+09
-2.39E-05   2.52E+07       0.00
   13.0500       0.00    0.00165  -2.43E-04       0.00       0.00   7.28E+09
7.80E-07   2.52E+07       0.00
   13.2000  -1.09E-12    0.00122  -2.28E-04       0.00       0.00   7.28E+09
1.52E-05   2.52E+07       0.00
   13.3500  -1.57E-12   8.29E-04  -1.95E-04       0.00       0.00   7.28E+09
2.20E-05   2.52E+07       0.00
   13.5000  -1.69E-12   5.14E-04  -1.54E-04       0.00       0.00   7.28E+09
2.37E-05   2.52E+07       0.00
   13.6500  -1.58E-12   2.76E-04  -1.12E-04       0.00       0.00   7.28E+09
2.22E-05   2.52E+07       0.00
   13.8000  -1.35E-12   1.10E-04  -7.53E-05       0.00       0.00   7.28E+09
1.89E-05   2.52E+07       0.00
   13.9500  -1.07E-12   4.73E-06  -4.47E-05       0.00       0.00   7.28E+09
1.50E-05   2.52E+07       0.00
   14.1000       0.00  -5.15E-05  -2.12E-05       0.00       0.00   7.28E+09
1.11E-05   2.52E+07       0.00
   14.2500       0.00  -7.18E-05  -4.58E-06       0.00       0.00   7.28E+09
7.44E-06   2.52E+07       0.00
   14.4000       0.00  -6.80E-05   5.94E-06       0.00       0.00   7.28E+09
4.25E-06   2.52E+07       0.00
   14.5500       0.00  -5.05E-05   1.11E-05       0.00       0.00   7.28E+09
1.49E-06   2.52E+07       0.00
   14.7000       0.00  -2.81E-05   1.16E-05       0.00       0.00   7.28E+09
-9.59E-07   2.52E+07       0.00
   14.8500       0.00  -8.81E-06   7.81E-06       0.00       0.00   7.28E+09
-3.23E-06   2.52E+07       0.00
   15.0000       0.00       0.00       0.00       0.00       0.00   7.28E+09
-5.45E-06   1.26E+07       0.00

* This analysis computed pile response using nonlinear moment-curvature rela-
  tionships. Values of total stress due to combined axial and bending stresses
  are computed only for elastic sections only and do not equal the actual
  stresses in concrete and steel. Stresses in concrete and steel may be inter-
  polated from the output for nonlinear bending properties relative to the
  magnitude of bending moment developed in the pile.


Output Summary for Load Case No. 2:

Pile-head deflection             =     0.04175917 inches
Computed slope at pile head      =     -0.0024930 radians
Maximum bending moment           =        561618. inch-lbs
Maximum shear force              =         62400. lbs
Depth of maximum bending moment  =     1.35000000 feet below pile head
Depth of maximum shear force     =       0.000000 feet below pile head
Number of iterations             =             23
Number of zero deflection points =              8
```

```
 i_LRFD_Load           1  0.000000000000000E+000
  0.000000000000000E+000  0.000000000000000E+000
 i_LRFD_Load           2  0.000000000000000E+000
  0.000000000000000E+000  0.000000000000000E+000
 i_LRFD_Load           4  0.000000000000000E+000
  0.000000000000000E+000  0.000000000000000E+000
 i_LRFD_Load           5  0.000000000000000E+000
  0.000000000000000E+000  0.000000000000000E+000
 i_LRFD_Load           3  0.000000000000000E+000
  0.000000000000000E+000  0.000000000000000E+000


--------------------------------------------------------------------------------
                 Computed Values of Pile Loading and Deflection
                 for Lateral Loading for LRFD Load Case Number 3
--------------------------------------------------------------------------------


Load Case No. 3:




   Depth    Deflect.    Bending     Shear      Slope      Total     Bending   Soil
Res.  Soil Spr.  Distrib.
     X          y       Moment      Force        S       Stress    Stiffness      p
      Es*H     Lat. Load
   feet      inches     in-lbs       lbs      radians     psi*      lb-in^2
lb/inch    lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ---------- ----------
      0.00    0.06020   6.07E-08     72360.   -0.00345       0.00   7.09E+09
-2797.     41821.       0.00
    0.1500    0.05399    126798.     66951.   -0.00343       0.00   7.09E+09
-3212.    107088.       0.00
    0.3000    0.04785    243178.     60828.   -0.00338       0.00   7.07E+09
-3592.    135136.       0.00
    0.4500    0.04181    347901.     54055.   -0.00331       0.00   7.04E+09
-3933.    169308.       0.00
    0.6000    0.03593    439854.     46710.   -0.00320       0.00   6.20E+09
-4229.    211846.       0.00
    0.7500    0.03029    518065.     38875.   -0.00305       0.00   5.35E+09
-4476.    266027.       0.00
    0.9000    0.02495    581718.     30645.   -0.00285       0.00   4.61E+09
-4669.    336760.       0.00
    1.0500    0.02003    630174.     22122.   -0.00260       0.00   4.07E+09
-4801.    431483.       0.00
    1.2000    0.01561    662985.     13417.   -0.00230       0.00   3.72E+09
```

```
-4871.    561689.       0.00
    1.3500    0.01176    679915.      4648.   -0.00196       0.00   3.55E+09
-4873.    745618.       0.00
    1.5000    0.00854    680948.     -4064.   -0.00162       0.00   3.54E+09
-4807.   1013200.       0.00
    1.6500    0.00594    666299.    -12595.   -0.00128       0.00   3.69E+09
-4672.   1415912.       0.00
    1.8000    0.00392    636411.    -20820.  -9.76E-04       0.00   4.00E+09
-4467.   2048669.       0.00
    1.9500    0.00243    591960.    -28607.  -7.14E-04       0.00   4.50E+09
-4186.   3106836.       0.00
    2.1000    0.00135    533874.    -35805.  -5.03E-04       0.00   5.17E+09
-3812.   5074000.       0.00
    2.2500   6.14E-04    463377.    -42197.  -3.40E-04       0.00   5.96E+09
-3290.   9642035.       0.00
    2.4000   1.28E-04    382178.    -46362.  -2.19E-04       0.00   6.69E+09
-1338.   1.89E+07       0.00
    2.5500  -1.74E-04    296611.    -45853.  -1.30E-04       0.00   7.06E+09
1904.   1.97E+07       0.00
    2.7000  -3.39E-04    217188.    -41216.  -6.41E-05       0.00   7.07E+09
3248.   1.73E+07       0.00
    2.8500  -4.05E-04    148273.    -35107.  -1.76E-05       0.00   7.08E+09
3539.   1.58E+07       0.00
    3.0000  -4.02E-04     90813.    -28611.   1.28E-05       0.00   7.08E+09
3679.   1.65E+07       0.00
    3.1500  -3.58E-04     45265.    -21958.   3.01E-05       0.00   7.08E+09
3714.   1.87E+07       0.00
    3.3000  -2.94E-04     11746.    -15315.   3.73E-05       0.00   7.09E+09
3667.   2.25E+07       0.00
    3.4500  -2.24E-04     -9892.     -9224.   3.76E-05       0.00   7.09E+09
3100.   2.49E+07       0.00
    3.6000  -1.59E-04    -21484.     -4435.   3.36E-05       0.00   7.09E+09
2221.   2.52E+07       0.00
    3.7500  -1.03E-04    -25878.     -1137.   2.76E-05       0.00   7.08E+09
1443.   2.52E+07       0.00
    3.9000  -5.94E-05    -25594.   910.1793   2.10E-05       0.00   7.08E+09
831.3292   2.52E+07       0.00
    4.0500  -2.74E-05    -22615.      2003.   1.49E-05       0.00   7.08E+09
383.2426   2.52E+07       0.00
    4.2000  -5.71E-06    -18392.      2420.   9.70E-06       0.00   7.09E+09
79.9435   2.52E+07       0.00
    4.3500   7.54E-06    -13908.      2397.   5.60E-06       0.00   7.09E+09
-105.617   2.52E+07       0.00
    4.5000   1.44E-05     -9766.      2120.   2.59E-06       0.00   7.09E+09
-202.155   2.52E+07       0.00
    4.6500   1.69E-05     -6278.      1726.   5.54E-07       0.00   7.09E+09
-236.203   2.52E+07       0.00
    4.8000   1.64E-05     -3554.      1306.  -6.94E-07       0.00   7.09E+09
-230.084   2.52E+07       0.00
    4.9500   1.44E-05     -1576.   917.7034  -1.35E-06       0.00   7.09E+09
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-201.225 2.52E+07 0.00
5.1000 1.16E-05 -249.576 590.5475 -1.58E-06 0.00 7.09E+09
-162.282 2.52E+07 0.00
5.2500 8.70E-06 551.0174 334.9259 -1.54E-06 0.00 7.09E+09
-121.742 2.52E+07 0.00
5.4000 6.05E-06 957.1225 149.1026 -1.35E-06 0.00 7.09E+09
-84.728 2.52E+07 0.00
5.5500 3.85E-06 1089. 24.3929 -1.09E-06 0.00 7.09E+09
-53.838 2.52E+07 0.00
5.7000 2.14E-06 1046. -50.984 -8.17E-07 0.00 7.09E+09
-29.914 2.52E+07 0.00
5.8500 9.06E-07 905.6037 -89.317 -5.69E-07 0.00 7.09E+09
-12.679 2.52E+07 0.00
6.0000 8.85E-08 724.4351 -101.844 -3.62E-07 0.00 7.09E+09
-1.239 2.52E+07 0.00
6.1500 -3.98E-07 539.1935 -97.950 -2.02E-07 0.00 7.09E+09
5.5654 2.52E+07 0.00
6.3000 -6.37E-07 371.9409 -84.913 -8.59E-08 0.00 7.09E+09
8.9202 2.52E+07 0.00
6.4500 -7.07E-07 233.5602 -67.979 -9.04E-09 0.00 7.09E+09
9.8952 2.52E+07 0.00
6.6000 -6.70E-07 127.2212 -50.635 3.68E-08 0.00 7.09E+09
9.3757 2.52E+07 0.00
6.7500 -5.74E-07 51.2496 -34.959 5.94E-08 0.00 7.09E+09
8.0423 2.52E+07 0.00
6.9000 -4.56E-07 1.3308 -21.978 6.61E-08 0.00 7.09E+09
6.3809 2.52E+07 0.00
7.0500 -3.37E-07 -27.914 -11.996 6.27E-08 0.00 7.09E+09
4.7111 2.52E+07 0.00
7.2000 -2.30E-07 -41.892 -4.858 5.39E-08 0.00 7.09E+09
3.2198 2.52E+07 0.00
7.3500 -1.43E-07 -45.436 -0.163 4.28E-08 0.00 7.09E+09
1.9966 2.52E+07 0.00
7.5000 -7.60E-08 -42.506 2.5915 3.16E-08 0.00 7.09E+09
1.0640 2.52E+07 0.00
7.6500 -2.88E-08 -36.126 3.9123 2.16E-08 0.00 7.09E+09
0.4035 2.52E+07 0.00
7.8000 1.85E-09 -28.436 4.2521 1.34E-08 0.00 7.09E+09
-0.02590 2.52E+07 0.00
7.9500 1.95E-08 -20.827 3.9828 7.18E-09 0.00 7.09E+09
-0.273 2.52E+07 0.00
8.1000 2.77E-08 -14.102 3.3879 2.74E-09 0.00 7.09E+09
-0.388 2.52E+07 0.00
8.2500 2.94E-08 -8.632 2.6688 -1.45E-10 0.00 7.09E+09
-0.412 2.52E+07 0.00
8.4000 2.72E-08 -4.495 1.9562 -1.81E-09 0.00 7.09E+09
-0.380 2.52E+07 0.00
8.5500 2.29E-08 -1.589 1.3258 -2.58E-09 0.00 7.09E+09
-0.320 2.52E+07 0.00
8.7000 1.79E-08 0.2799 0.8126 -2.75E-09 0.00 7.09E+09

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-0.250   2.52E+07       0.00
    8.8500   1.30E-08     1.3383     0.4241  -2.54E-09       0.00   7.09E+09
-0.182   2.52E+07       0.00
    9.0000   8.70E-09     1.8082     0.1510  -2.14E-09       0.00   7.09E+09
-0.122   2.52E+07       0.00
    9.1500   5.25E-09     1.8833   -0.02477  -1.68E-09       0.00   7.09E+09
-0.07352   2.52E+07       0.00
    9.3000   2.66E-09     1.7200     -0.125  -1.22E-09       0.00   7.09E+09
-0.03730   2.52E+07       0.00
    9.4500   8.64E-10     1.4358     -0.169  -8.18E-10       0.00   7.09E+09
-0.01209   2.52E+07       0.00
    9.6000  -2.81E-10     1.1123     -0.176  -4.95E-10       0.00   7.09E+09
0.00394   2.52E+07       0.00
    9.7500  -9.18E-10     0.8014     -0.161  -2.52E-10       0.00   7.09E+09
0.01285   2.52E+07       0.00
    9.9000  -1.19E-09     0.5321     -0.135  -8.25E-11       0.00   7.09E+09
0.01663   2.52E+07       0.00
   10.0500  -1.21E-09     0.3167     -0.104   2.53E-11       0.00   7.09E+09
0.01700   2.52E+07       0.00
   10.2000  -1.10E-09     0.1562   -0.07529   8.53E-11       0.00   7.09E+09
0.01535   2.52E+07       0.00
   10.3500  -9.07E-10    0.04556   -0.05004   1.11E-10       0.00   7.09E+09
0.01270   2.52E+07       0.00
   10.5000  -6.97E-10   -0.02397   -0.02982   1.14E-10       0.00   7.09E+09
0.00976   2.52E+07       0.00
   10.6500  -4.98E-10   -0.06186   -0.01475   1.03E-10       0.00   7.09E+09
0.00698   2.52E+07       0.00
   10.8000  -3.27E-10   -0.07715   -0.00435   8.51E-11       0.00   7.09E+09
0.00458   2.52E+07       0.00
   10.9500  -1.92E-10   -0.07758    0.00219   6.55E-11       0.00   7.09E+09
0.00269   2.52E+07       0.00
   11.1000  -9.17E-11   -0.06930    0.00576   4.68E-11       0.00   7.09E+09
0.00128   2.52E+07       0.00
   11.2500  -2.33E-11   -0.05686    0.00721   3.08E-11       0.00   7.09E+09
3.26E-04   2.52E+07       0.00
   11.4000   1.92E-11   -0.04336    0.00726   1.81E-11       0.00   7.09E+09
-2.68E-04   2.52E+07       0.00
   11.5500   4.18E-11   -0.03072    0.00650   8.68E-12       0.00   7.09E+09
-5.85E-04   2.52E+07       0.00
   11.7000   5.04E-11   -0.01997    0.00533   2.24E-12       0.00   7.09E+09
-7.06E-04   2.52E+07       0.00
   11.8500   4.99E-11   -0.01152    0.00407  -1.76E-12       0.00   7.09E+09
-6.98E-04   2.52E+07       0.00
   12.0000   4.41E-11   -0.00532    0.00289  -3.89E-12       0.00   7.09E+09
-6.17E-04   2.52E+07       0.00
   12.1500   3.59E-11   -0.00112    0.00188  -4.71E-12       0.00   7.09E+09
-5.02E-04   2.52E+07       0.00
   12.3000   2.71E-11    0.00145    0.00108  -4.67E-12       0.00   7.09E+09
-3.80E-04   2.52E+07       0.00
   12.4500   1.91E-11    0.00278   5.03E-04  -4.13E-12       0.00   7.09E+09
```

```
-2.67E-04   2.52E+07       0.00
   12.6000   1.23E-11    0.00326   1.08E-04  -3.37E-12       0.00   7.09E+09
-1.72E-04   2.52E+07       0.00
   12.7500   6.94E-12    0.00318  -1.34E-04  -2.55E-12       0.00   7.09E+09
-9.72E-05   2.52E+07       0.00
   12.9000   3.08E-12    0.00278  -2.60E-04  -1.79E-12       0.00   7.09E+09
-4.31E-05   2.52E+07       0.00
   13.0500       0.00    0.00224  -3.05E-04  -1.16E-12       0.00   7.09E+09
-6.77E-06   2.52E+07       0.00
   13.2000  -1.09E-12    0.00168  -2.97E-04       0.00       0.00   7.09E+09
1.52E-05   2.52E+07       0.00
   13.3500  -1.89E-12    0.00117  -2.60E-04       0.00       0.00   7.09E+09
2.64E-05   2.52E+07       0.00
   13.5000  -2.15E-12   7.46E-04  -2.09E-04       0.00       0.00   7.09E+09
3.02E-05   2.52E+07       0.00
   13.6500  -2.08E-12   4.19E-04  -1.56E-04       0.00       0.00   7.09E+09
2.91E-05   2.52E+07       0.00
   13.8000  -1.81E-12   1.86E-04  -1.06E-04       0.00       0.00   7.09E+09
2.54E-05   2.52E+07       0.00
   13.9500  -1.46E-12   3.57E-05  -6.52E-05       0.00       0.00   7.09E+09
2.05E-05   2.52E+07       0.00
   14.1000  -1.10E-12  -4.85E-05  -3.29E-05       0.00       0.00   7.09E+09
1.53E-05   2.52E+07       0.00
   14.2500       0.00  -8.30E-05  -9.66E-06       0.00       0.00   7.09E+09
1.05E-05   2.52E+07       0.00
   14.4000       0.00  -8.34E-05   5.38E-06       0.00       0.00   7.09E+09
6.20E-06   2.52E+07       0.00
   14.5500       0.00  -6.37E-05   1.32E-05       0.00       0.00   7.09E+09
2.44E-06   2.52E+07       0.00
   14.7000       0.00  -3.61E-05   1.45E-05       0.00       0.00   7.09E+09
-9.23E-07   2.52E+07       0.00
   14.8500       0.00  -1.15E-05   1.00E-05       0.00       0.00   7.09E+09
-4.05E-06   2.52E+07       0.00
   15.0000       0.00       0.00       0.00       0.00       0.00   7.09E+09
-7.11E-06   1.26E+07       0.00

* This analysis computed pile response using nonlinear moment-curvature rela-
  tionships. Values of total stress due to combined axial and bending stresses
  are computed only for elastic sections only and do not equal the actual
  stresses in concrete and steel. Stresses in concrete and steel may be inter-
  polated from the output for nonlinear bending properties relative to the
  magnitude of bending moment developed in the pile.


Output Summary for Load Case No. 3:

Pile-head deflection             =     0.06019871 inches
Computed slope at pile head      =     -0.0034475 radians
Maximum bending moment           =        680948. inch-lbs
Maximum shear force              =         72360. lbs
```

```
Depth of maximum bending moment  =     1.50000000 feet below pile head
Depth of maximum shear force     =       0.000000 feet below pile head
Number of iterations             =             26
Number of zero deflection points =              8

 i_LRFD_Load           1  0.000000000000000E+000
  0.000000000000000E+000  0.000000000000000E+000
 i_LRFD_Load           2  0.000000000000000E+000
  0.000000000000000E+000  0.000000000000000E+000
 i_LRFD_Load           4  0.000000000000000E+000
  0.000000000000000E+000  0.000000000000000E+000
 i_LRFD_Load           5  0.000000000000000E+000
  0.000000000000000E+000  0.000000000000000E+000
 i_LRFD_Load           3  0.000000000000000E+000
  0.000000000000000E+000  0.000000000000000E+000


--------------------------------------------------------------------------------
                 Computed Values of Pile Loading and Deflection
                 for Lateral Loading for LRFD Load Case Number 4
--------------------------------------------------------------------------------


Load Case No. 4:




   Depth    Deflect.    Bending     Shear      Slope      Total     Bending   Soil
Res.  Soil Spr.  Distrib.
     X          y       Moment      Force        S       Stress    Stiffness      p
      Es*H     Lat. Load
   feet      inches     in-lbs       lbs      radians     psi*      lb-in^2
lb/inch    lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ---------- ----------
      0.00    0.05885   1.25E-07     69010.   -0.00346       0.00   7.32E+09
-2782.     42536.       0.00
    0.1500    0.05262    120587.     63634.   -0.00345       0.00   7.32E+09
-3192.    109179.       0.00
    0.3000    0.04644    230825.     57553.   -0.00341       0.00   7.30E+09
-3565.    138196.       0.00
    0.4500    0.04036    329497.     50836.   -0.00334       0.00   7.28E+09
-3898.    173849.       0.00
    0.6000    0.03443    415519.     43562.   -0.00323       0.00   5.70E+09
-4184.    218753.       0.00
    0.7500    0.02873    487951.     35820.   -0.00307       0.00   4.68E+09
-4418.    276746.       0.00
    0.9000    0.02338    546023.     27710.   -0.00285       0.00   3.94E+09
```

-4593. 353680. 0.00
1.0500 0.01847 589149. 19342. -0.00257 0.00 3.46E+09
-4705. 458595. 0.00
1.2000 0.01411 616955. 10833. -0.00225 0.00 3.19E+09
-4749. 605830. 0.00
1.3500 0.01038 629284. 2308. -0.00189 0.00 3.08E+09
-4723. 818942. 0.00
1.5000 0.00731 626219. -6104. -0.00152 0.00 3.11E+09
-4624. 1138235. 0.00
1.6500 0.00490 608079. -14273. -0.00117 0.00 3.27E+09
-4452. 1636394. 0.00
1.8000 0.00308 575431. -22064. -8.64E-04 0.00 3.60E+09
-4205. 2454835. 0.00
1.9500 0.00179 529084. -29340. -6.05E-04 0.00 4.14E+09
-3879. 3905590. 0.00
2.1000 9.05E-04 470114. -35934. -4.04E-04 0.00 4.93E+09
-3448. 6857368. 0.00
2.2500 3.31E-04 399927. -41575. -2.58E-04 0.00 5.92E+09
-2820. 1.53E+07 0.00
2.4000 -2.32E-05 320573. -43895. -1.57E-04 0.00 7.28E+09
242.7468 1.89E+07 0.00
2.5500 -2.35E-04 241986. -41357. -8.79E-05 0.00 7.30E+09
2577. 1.97E+07 0.00
2.7000 -3.40E-04 171734. -36112. -3.70E-05 0.00 7.31E+09
3250. 1.72E+07 0.00
2.8500 -3.68E-04 112002. -30075. -2.02E-06 0.00 7.31E+09
3457. 1.69E+07 0.00
3.0000 -3.47E-04 63464. -23773. 1.96E-05 0.00 7.32E+09
3545. 1.84E+07 0.00
3.1500 -2.98E-04 26410. -17391. 3.06E-05 0.00 7.32E+09
3546. 2.14E+07 0.00
3.3000 -2.37E-04 841.3468 -11353. 3.40E-05 0.00 7.32E+09
3163. 2.40E+07 0.00
3.4500 -1.75E-04 -14478. -6321. 3.23E-05 0.00 7.32E+09
2428. 2.49E+07 0.00
3.6000 -1.20E-04 -21930. -2617. 2.78E-05 0.00 7.32E+09
1687. 2.52E+07 0.00
3.7500 -7.53E-05 -23915. -150.750 2.22E-05 0.00 7.32E+09
1054. 2.52E+07 0.00
3.9000 -4.06E-05 -22484. 1310. 1.65E-05 0.00 7.32E+09
568.8515 2.52E+07 0.00
4.0500 -1.59E-05 -19208. 2023. 1.14E-05 0.00 7.32E+09
223.2951 2.52E+07 0.00
4.2000 2.29E-07 -15208. 2221. 7.12E-06 0.00 7.32E+09
-3.205 2.52E+07 0.00
4.3500 9.68E-06 -11218. 2096. 3.87E-06 0.00 7.32E+09
-135.450 2.52E+07 0.00
4.5000 1.42E-05 -7665. 1796. 1.55E-06 0.00 7.32E+09
-198.185 2.52E+07 0.00
4.6500 1.52E-05 -4754. 1425. 2.05E-08 0.00 7.32E+09

-213.429 2.52E+07 0.00
4.8000 1.42E-05 -2535. 1054. -8.76E-07 0.00 7.32E+09
-199.216 2.52E+07 0.00
4.9500 1.21E-05 -960.573 722.0688 -1.31E-06 0.00 7.32E+09
-169.298 2.52E+07 0.00
5.1000 9.53E-06 65.2471 449.6141 -1.42E-06 0.00 7.32E+09
-133.429 2.52E+07 0.00
5.2500 7.00E-06 658.7527 241.3600 -1.33E-06 0.00 7.32E+09
-97.964 2.52E+07 0.00
5.4000 4.76E-06 934.8132 93.2696 -1.13E-06 0.00 7.32E+09
-66.581 2.52E+07 0.00
5.5500 2.93E-06 995.0944 -3.543 -8.93E-07 0.00 7.32E+09
-40.989 2.52E+07 0.00
5.7000 1.54E-06 922.5098 -59.839 -6.57E-07 0.00 7.32E+09
-21.562 2.52E+07 0.00
5.8500 5.61E-07 780.0062 -86.311 -4.48E-07 0.00 7.32E+09
-7.851 2.52E+07 0.00
6.0000 -7.34E-08 612.0162 -92.453 -2.77E-07 0.00 7.32E+09
1.0273 2.52E+07 0.00
6.1500 -4.37E-07 447.3166 -86.026 -1.47E-07 0.00 7.32E+09
6.1139 2.52E+07 0.00
6.3000 -6.02E-07 302.3981 -72.937 -5.47E-08 0.00 7.32E+09
8.4291 2.52E+07 0.00
6.4500 -6.34E-07 184.7713 -57.367 5.19E-09 0.00 7.32E+09
8.8708 2.52E+07 0.00
6.6000 -5.83E-07 95.8744 -42.032 3.97E-08 0.00 7.32E+09
8.1677 2.52E+07 0.00
6.7500 -4.91E-07 33.4350 -28.498 5.56E-08 0.00 7.32E+09
6.8707 2.52E+07 0.00
6.9000 -3.83E-07 -6.746 -17.484 5.89E-08 0.00 7.32E+09
5.3664 2.52E+07 0.00
7.0500 -2.79E-07 -29.538 -9.141 5.44E-08 0.00 7.32E+09
3.9040 2.52E+07 0.00
7.2000 -1.87E-07 -39.681 -3.265 4.59E-08 0.00 7.32E+09
2.6246 2.52E+07 0.00
7.3500 -1.14E-07 -41.317 0.5287 3.59E-08 0.00 7.32E+09
1.5910 2.52E+07 0.00
7.5000 -5.81E-08 -37.796 2.6926 2.62E-08 0.00 7.32E+09
0.8134 2.52E+07 0.00
7.6500 -1.93E-08 -31.637 3.6676 1.77E-08 0.00 7.32E+09
0.2699 2.52E+07 0.00
7.8000 5.53E-09 -24.601 3.8408 1.08E-08 0.00 7.32E+09
-0.07748 2.52E+07 0.00
7.9500 1.95E-08 -17.815 3.5259 5.55E-09 0.00 7.32E+09
-0.272 2.52E+07 0.00
8.1000 2.55E-08 -11.911 2.9592 1.89E-09 0.00 7.32E+09
-0.357 2.52E+07 0.00
8.2500 2.63E-08 -7.163 2.3067 -4.51E-10 0.00 7.32E+09
-0.368 2.52E+07 0.00
8.4000 2.39E-08 -3.607 1.6746 -1.77E-09 0.00 7.32E+09

-0.334 2.52E+07 0.00
8.5500 1.99E-08 -1.134 1.1230 -2.36E-09 0.00 7.32E+09
-0.279 2.52E+07 0.00
8.7000 1.54E-08 0.4372 0.6783 -2.44E-09 0.00 7.32E+09
-0.216 2.52E+07 0.00
8.8500 1.11E-08 1.3094 0.3444 -2.23E-09 0.00 7.32E+09
-0.155 2.52E+07 0.00
9.0000 7.38E-09 1.6781 0.1116 -1.86E-09 0.00 7.32E+09
-0.103 2.52E+07 0.00
9.1500 4.40E-09 1.7121 -0.03681 -1.44E-09 0.00 7.32E+09
-0.06159 2.52E+07 0.00
9.3000 2.18E-09 1.5463 -0.120 -1.04E-09 0.00 7.32E+09
-0.03051 2.52E+07 0.00
9.4500 6.43E-10 1.2817 -0.155 -6.96E-10 0.00 7.32E+09
-0.00900 2.52E+07 0.00
9.6000 -3.26E-10 0.9878 -0.159 -4.17E-10 0.00 7.32E+09
0.00457 2.52E+07 0.00
9.7500 -8.58E-10 0.7086 -0.144 -2.08E-10 0.00 7.32E+09
0.01202 2.52E+07 0.00
9.9000 -1.08E-09 0.4684 -0.120 -6.38E-11 0.00 7.32E+09
0.01508 2.52E+07 0.00
10.0500 -1.09E-09 0.2769 -0.09264 2.79E-11 0.00 7.32E+09
0.01523 2.52E+07 0.00
10.2000 -9.77E-10 0.1348 -0.06663 7.85E-11 0.00 7.32E+09
0.01367 2.52E+07 0.00
10.3500 -8.05E-10 0.03703 -0.04418 9.96E-11 0.00 7.32E+09
0.01128 2.52E+07 0.00
10.5000 -6.18E-10 -0.02425 -0.02624 1.01E-10 0.00 7.32E+09
0.00865 2.52E+07 0.00
10.6500 -4.41E-10 -0.05750 -0.01290 9.11E-11 0.00 7.32E+09
0.00618 2.52E+07 0.00
10.8000 -2.90E-10 -0.07073 -0.00369 7.54E-11 0.00 7.32E+09
0.00406 2.52E+07 0.00
10.9500 -1.70E-10 -0.07081 0.00211 5.80E-11 0.00 7.32E+09
0.00238 2.52E+07 0.00
11.1000 -8.12E-11 -0.06318 0.00527 4.15E-11 0.00 7.32E+09
0.00114 2.52E+07 0.00
11.2500 -2.05E-11 -0.05186 0.00655 2.74E-11 0.00 7.32E+09
2.86E-04 2.52E+07 0.00
11.4000 1.73E-11 -0.03962 0.00659 1.61E-11 0.00 7.32E+09
-2.42E-04 2.52E+07 0.00
11.5500 3.75E-11 -0.02815 0.00590 7.78E-12 0.00 7.32E+09
-5.26E-04 2.52E+07 0.00
11.7000 4.53E-11 -0.01839 0.00485 2.06E-12 0.00 7.32E+09
-6.34E-04 2.52E+07 0.00
11.8500 4.50E-11 -0.01068 0.00372 -1.51E-12 0.00 7.32E+09
-6.29E-04 2.52E+07 0.00
12.0000 3.99E-11 -0.00501 0.00265 -3.44E-12 0.00 7.32E+09
-5.58E-04 2.52E+07 0.00
12.1500 3.26E-11 -0.00114 0.00173 -4.20E-12 0.00 7.32E+09

```
-4.56E-04   2.52E+07       0.00
   12.3000   2.48E-11    0.00124    0.00101  -4.18E-12       0.00   7.32E+09
-3.47E-04   2.52E+07       0.00
   12.4500   1.75E-11    0.00250   4.79E-04  -3.72E-12       0.00   7.32E+09
-2.45E-04   2.52E+07       0.00
   12.6000   1.14E-11    0.00297   1.16E-04  -3.05E-12       0.00   7.32E+09
-1.59E-04   2.52E+07       0.00
   12.7500   6.54E-12    0.00292  -1.10E-04  -2.33E-12       0.00   7.32E+09
-9.15E-05   2.52E+07       0.00
   12.9000   2.99E-12    0.00258  -2.30E-04  -1.65E-12       0.00   7.32E+09
-4.19E-05   2.52E+07       0.00
   13.0500       0.00    0.00209  -2.75E-04  -1.08E-12       0.00   7.32E+09
-8.32E-06   2.52E+07       0.00
   13.2000       0.00    0.00158  -2.72E-04       0.00       0.00   7.32E+09
1.23E-05   2.52E+07       0.00
   13.3500  -1.65E-12    0.00112  -2.40E-04       0.00       0.00   7.32E+09
2.32E-05   2.52E+07       0.00
   13.5000  -1.93E-12   7.21E-04  -1.95E-04       0.00       0.00   7.32E+09
2.71E-05   2.52E+07       0.00
   13.6500  -1.89E-12   4.15E-04  -1.46E-04       0.00       0.00   7.32E+09
2.65E-05   2.52E+07       0.00
   13.8000  -1.67E-12   1.94E-04  -1.01E-04       0.00       0.00   7.32E+09
2.34E-05   2.52E+07       0.00
   13.9500  -1.36E-12   4.92E-05  -6.32E-05       0.00       0.00   7.32E+09
1.91E-05   2.52E+07       0.00
   14.1000  -1.03E-12  -3.37E-05  -3.30E-05       0.00       0.00   7.32E+09
1.45E-05   2.52E+07       0.00
   14.2500       0.00  -6.97E-05  -1.10E-05       0.00       0.00   7.32E+09
1.00E-05   2.52E+07       0.00
   14.4000       0.00  -7.33E-05   3.53E-06       0.00       0.00   7.32E+09
6.06E-06   2.52E+07       0.00
   14.5500       0.00  -5.71E-05   1.13E-05       0.00       0.00   7.32E+09
2.53E-06   2.52E+07       0.00
   14.7000       0.00  -3.28E-05   1.30E-05       0.00       0.00   7.32E+09
-6.44E-07   2.52E+07       0.00
   14.8500       0.00  -1.05E-05   9.13E-06       0.00       0.00   7.32E+09
-3.62E-06   2.52E+07       0.00
   15.0000       0.00       0.00       0.00       0.00       0.00   7.32E+09
-6.52E-06   1.26E+07       0.00

* This analysis computed pile response using nonlinear moment-curvature rela-
  tionships. Values of total stress due to combined axial and bending stresses
  are computed only for elastic sections only and do not equal the actual
  stresses in concrete and steel. Stresses in concrete and steel may be inter-
  polated from the output for nonlinear bending properties relative to the
  magnitude of bending moment developed in the pile.


Output Summary for Load Case No. 4:
```

```
Pile-head deflection             =     0.05885289 inches
Computed slope at pile head      =     -0.0034633 radians
Maximum bending moment           =        629284. inch-lbs
Maximum shear force              =         69010. lbs
Depth of maximum bending moment  =     1.35000000 feet below pile head
Depth of maximum shear force     =       0.000000 feet below pile head
Number of iterations             =             26
Number of zero deflection points =              8

 i_LRFD_Load           1  0.000000000000000E+000
  0.000000000000000E+000  0.000000000000000E+000
 i_LRFD_Load           2  0.000000000000000E+000
  0.000000000000000E+000  0.000000000000000E+000
 i_LRFD_Load           4  0.000000000000000E+000
  0.000000000000000E+000  0.000000000000000E+000
 i_LRFD_Load           5  0.000000000000000E+000
  0.000000000000000E+000  0.000000000000000E+000
 i_LRFD_Load           3  0.000000000000000E+000
  0.000000000000000E+000  0.000000000000000E+000


--------------------------------------------------------------------------------
                 Computed Values of Pile Loading and Deflection
                 for Lateral Loading for LRFD Load Case Number 5
--------------------------------------------------------------------------------


Load Case No. 5:




   Depth    Deflect.    Bending     Shear      Slope      Total     Bending   Soil
Res.  Soil Spr.  Distrib.
     X          y       Moment      Force        S       Stress    Stiffness      p
      Es*H     Lat. Load
   feet      inches     in-lbs       lbs      radians     psi*      lb-in^2
lb/inch    lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ---------- ----------
      0.00    0.05981  -2.25E-07     66340.   -0.00362       0.00   7.51E+09
-2793.     42026.       0.00
    0.1500    0.05328    115622.     60945.   -0.00361       0.00   7.51E+09
-3202.    108158.       0.00
    0.3000    0.04681    220865.     54848.   -0.00357       0.00   7.49E+09
-3572.    137378.       0.00
    0.4500    0.04043    314523.     48123.   -0.00350       0.00   6.26E+09
-3900.    173629.       0.00
    0.6000    0.03421    395528.     40854.   -0.00338       0.00   4.87E+09
```

-4178. 219794. 0.00
0.7500 0.02826 462967. 33135. -0.00320 0.00 3.84E+09
-4399. 280229. 0.00
0.9000 0.02270 516109. 25072. -0.00295 0.00 3.22E+09
-4559. 361601. 0.00
1.0500 0.01765 554420. 16781. -0.00263 0.00 2.88E+09
-4652. 474404. 0.00
1.2000 0.01323 577587. 8388. -0.00226 0.00 2.70E+09
-4674. 635800. 0.00
1.3500 0.00950 585535. 24.1869 -0.00187 0.00 2.65E+09
-4620. 875040. 0.00
1.5000 0.00649 578433. -8174. -0.00148 0.00 2.70E+09
-4489. 1244499. 0.00
1.6500 0.00418 556709. -16064. -0.00111 0.00 2.86E+09
-4278. 1843989. 0.00
1.8000 0.00249 521053. -23503. -7.89E-04 0.00 3.18E+09
-3987. 2881253. 0.00
1.9500 0.00134 472419. -30337. -5.27E-04 0.00 3.72E+09
-3607. 4856947. 0.00
2.1000 5.94E-04 412052. -36377. -3.32E-04 0.00 4.60E+09
-3104. 9402125. 0.00
2.2500 1.42E-04 341596. -40451. -1.98E-04 0.00 5.80E+09
-1422. 1.80E+07 0.00
2.4000 -1.19E-04 266510. -40608. -1.13E-04 0.00 7.48E+09
1248. 1.89E+07 0.00
2.5500 -2.65E-04 195454. -36871. -5.75E-05 0.00 7.49E+09
2903. 1.97E+07 0.00
2.7000 -3.26E-04 133796. -31362. -1.80E-05 0.00 7.50E+09
3218. 1.78E+07 0.00
2.8500 -3.30E-04 82557. -25440. 7.97E-06 0.00 7.50E+09
3363. 1.84E+07 0.00
3.0000 -2.98E-04 42210. -19342. 2.29E-05 0.00 7.50E+09
3411. 2.06E+07 0.00
3.1500 -2.47E-04 12915. -13408. 2.96E-05 0.00 7.50E+09
3183. 2.32E+07 0.00
3.3000 -1.91E-04 -6069. -8245. 3.04E-05 0.00 7.51E+09
2553. 2.40E+07 0.00
3.4500 -1.38E-04 -16780. -4232. 2.76E-05 0.00 7.50E+09
1906. 2.49E+07 0.00
3.6000 -9.16E-05 -21314. -1362. 2.31E-05 0.00 7.50E+09
1283. 2.52E+07 0.00
3.7500 -5.47E-05 -21692. 481.9694 1.79E-05 0.00 7.50E+09
765.7678 2.52E+07 0.00
3.9000 -2.71E-05 -19587. 1513. 1.30E-05 0.00 7.50E+09
380.0207 2.52E+07 0.00
4.0500 -8.05E-06 -16249. 1957. 8.66E-06 0.00 7.50E+09
112.6793 2.52E+07 0.00
4.2000 4.03E-06 -12546. 2007. 5.21E-06 0.00 7.50E+09
-56.437 2.52E+07 0.00
4.3500 1.07E-05 -9025. 1822. 2.62E-06 0.00 7.51E+09

-149.720 2.52E+07 0.00
4.5000 1.35E-05 -5989. 1517. 8.19E-07 0.00 7.51E+09
-188.460 2.52E+07 0.00
4.6500 1.36E-05 -3563. 1176. -3.26E-07 0.00 7.51E+09
-191.005 2.52E+07 0.00
4.8000 1.23E-05 -1756. 849.0855 -9.64E-07 0.00 7.51E+09
-172.015 2.52E+07 0.00
4.9500 1.02E-05 -506.296 566.1009 -1.24E-06 0.00 7.51E+09
-142.412 2.52E+07 0.00
5.1000 7.84E-06 282.2404 339.1560 -1.26E-06 0.00 7.51E+09
-109.749 2.52E+07 0.00
5.2500 5.63E-06 715.1767 169.4694 -1.14E-06 0.00 7.51E+09
-78.792 2.52E+07 0.00
5.4000 3.73E-06 892.7932 51.6162 -9.50E-07 0.00 7.51E+09
-52.156 2.52E+07 0.00
5.5500 2.21E-06 901.3799 -23.149 -7.35E-07 0.00 7.51E+09
-30.916 2.52E+07 0.00
5.7000 1.08E-06 809.7533 -64.586 -5.30E-07 0.00 7.51E+09
-15.124 2.52E+07 0.00
5.8500 3.02E-07 669.0856 -82.000 -3.52E-07 0.00 7.51E+09
-4.225 2.52E+07 0.00
6.0000 -1.88E-07 514.6964 -83.435 -2.10E-07 0.00 7.51E+09
2.6304 2.52E+07 0.00
6.1500 -4.55E-07 368.8045 -75.330 -1.04E-07 0.00 7.51E+09
6.3753 2.52E+07 0.00
6.3000 -5.64E-07 243.5508 -62.490 -3.10E-08 0.00 7.51E+09
7.8914 2.52E+07 0.00
6.4500 -5.67E-07 143.8535 -48.245 1.55E-08 0.00 7.51E+09
7.9357 2.52E+07 0.00
6.6000 -5.08E-07 69.8609 -34.704 4.11E-08 0.00 7.51E+09
7.1106 2.52E+07 0.00
6.7500 -4.19E-07 18.9035 -23.027 5.18E-08 0.00 7.51E+09
5.8634 2.52E+07 0.00
6.9000 -3.22E-07 -13.058 -13.698 5.25E-08 0.00 7.51E+09
4.5019 2.52E+07 0.00
7.0500 -2.30E-07 -30.432 -6.749 4.72E-08 0.00 7.51E+09
3.2193 2.52E+07 0.00
7.2000 -1.51E-07 -37.374 -1.943 3.91E-08 0.00 7.51E+09
2.1206 2.52E+07 0.00
7.3500 -8.91E-08 -37.444 1.0881 3.01E-08 0.00 7.51E+09
1.2478 2.52E+07 0.00
7.5000 -4.29E-08 -33.469 2.7522 2.16E-08 0.00 7.51E+09
0.6012 2.52E+07 0.00
7.6500 -1.12E-08 -27.545 3.4346 1.43E-08 0.00 7.51E+09
0.1570 2.52E+07 0.00
7.8000 8.63E-09 -21.111 3.4670 8.49E-09 0.00 7.51E+09
-0.121 2.52E+07 0.00
7.9500 1.94E-08 -15.067 3.1143 4.15E-09 0.00 7.51E+09
-0.271 2.52E+07 0.00
8.1000 2.36E-08 -9.901 2.5731 1.16E-09 0.00 7.51E+09

-0.330 2.52E+07 0.00
8.2500 2.35E-08 -5.804 1.9792 -7.22E-10 0.00 7.51E+09
-0.330 2.52E+07 0.00
8.4000 2.10E-08 -2.775 1.4181 -1.75E-09 0.00 7.51E+09
-0.294 2.52E+07 0.00
8.5500 1.72E-08 -0.699 0.9364 -2.17E-09 0.00 7.51E+09
-0.241 2.52E+07 0.00
8.7000 1.32E-08 0.5964 0.5530 -2.18E-09 0.00 7.51E+09
-0.185 2.52E+07 0.00
8.8500 9.39E-09 1.2931 0.2685 -1.95E-09 0.00 7.51E+09
-0.132 2.52E+07 0.00
9.0000 6.16E-09 1.5637 0.07255 -1.61E-09 0.00 7.51E+09
-0.08619 2.52E+07 0.00
9.1500 3.60E-09 1.5550 -0.05032 -1.24E-09 0.00 7.51E+09
-0.05033 2.52E+07 0.00
9.3000 1.70E-09 1.3831 -0.117 -8.84E-10 0.00 7.51E+09
-0.02387 2.52E+07 0.00
9.4500 4.12E-10 1.1337 -0.144 -5.83E-10 0.00 7.51E+09
-0.00576 2.52E+07 0.00
9.6000 -3.92E-10 0.8657 -0.144 -3.43E-10 0.00 7.51E+09
0.00549 2.52E+07 0.00
9.7500 -8.22E-10 0.6154 -0.129 -1.65E-10 0.00 7.51E+09
0.01151 2.52E+07 0.00
9.9000 -9.87E-10 0.4024 -0.106 -4.31E-11 0.00 7.51E+09
0.01381 2.52E+07 0.00
10.0500 -9.78E-10 0.2341 -0.08118 3.32E-11 0.00 7.51E+09
0.01369 2.52E+07 0.00
10.2000 -8.67E-10 0.1101 -0.05793 7.44E-11 0.00 7.51E+09
0.01214 2.52E+07 0.00
10.3500 -7.10E-10 0.02548 -0.03807 9.07E-11 0.00 7.51E+09
0.00993 2.52E+07 0.00
10.5000 -5.41E-10 -0.02696 -0.02231 9.05E-11 0.00 7.51E+09
0.00757 2.52E+07 0.00
10.6500 -3.84E-10 -0.05488 -0.01067 8.07E-11 0.00 7.51E+09
0.00537 2.52E+07 0.00
10.8000 -2.50E-10 -0.06539 -0.00268 6.63E-11 0.00 7.51E+09
0.00350 2.52E+07 0.00
10.9500 -1.45E-10 -0.06455 0.00230 5.07E-11 0.00 7.51E+09
0.00203 2.52E+07 0.00
11.1000 -6.76E-11 -0.05714 0.00498 3.61E-11 0.00 7.51E+09
9.46E-04 2.52E+07 0.00
11.2500 -1.49E-11 -0.04666 0.00602 2.37E-11 0.00 7.51E+09
2.09E-04 2.52E+07 0.00
11.4000 1.76E-11 -0.03549 0.00598 1.38E-11 0.00 7.51E+09
-2.47E-04 2.52E+07 0.00
11.5500 3.49E-11 -0.02513 0.00532 6.56E-12 0.00 7.51E+09
-4.88E-04 2.52E+07 0.00
11.7000 4.13E-11 -0.01635 0.00436 1.58E-12 0.00 7.51E+09
-5.78E-04 2.52E+07 0.00
11.8500 4.06E-11 -0.00943 0.00333 -1.51E-12 0.00 7.51E+09

```
-5.68E-04   2.52E+07       0.00
   12.0000   3.58E-11   -0.00436    0.00237  -3.16E-12       0.00   7.51E+09
-5.02E-04   2.52E+07       0.00
   12.1500   2.92E-11  -9.15E-04    0.00155  -3.79E-12       0.00   7.51E+09
-4.09E-04   2.52E+07       0.00
   12.3000   2.22E-11    0.00121   9.00E-04  -3.76E-12       0.00   7.51E+09
-3.10E-04   2.52E+07       0.00
   12.4500   1.57E-11    0.00232   4.23E-04  -3.34E-12       0.00   7.51E+09
-2.19E-04   2.52E+07       0.00
   12.6000   1.02E-11    0.00273   9.75E-05  -2.73E-12       0.00   7.51E+09
-1.42E-04   2.52E+07       0.00
   12.7500   5.84E-12    0.00268  -1.04E-04  -2.08E-12       0.00   7.51E+09
-8.17E-05   2.52E+07       0.00
   12.9000   2.67E-12    0.00236  -2.11E-04  -1.48E-12       0.00   7.51E+09
-3.74E-05   2.52E+07       0.00
   13.0500       0.00    0.00192  -2.51E-04       0.00       0.00   7.51E+09
-7.27E-06   2.52E+07       0.00
   13.2000       0.00    0.00145  -2.48E-04       0.00       0.00   7.51E+09
1.13E-05   2.52E+07       0.00
   13.3500  -1.50E-12    0.00102  -2.19E-04       0.00       0.00   7.51E+09
2.10E-05   2.52E+07       0.00
   13.5000  -1.75E-12   6.65E-04  -1.78E-04       0.00       0.00   7.51E+09
2.46E-05   2.52E+07       0.00
   13.6500  -1.72E-12   3.84E-04  -1.34E-04       0.00       0.00   7.51E+09
2.41E-05   2.52E+07       0.00
   13.8000  -1.52E-12   1.82E-04  -9.32E-05       0.00       0.00   7.51E+09
2.13E-05   2.52E+07       0.00
   13.9500  -1.24E-12   4.86E-05  -5.83E-05       0.00       0.00   7.51E+09
1.74E-05   2.52E+07       0.00
   14.1000       0.00  -2.82E-05  -3.07E-05       0.00       0.00   7.51E+09
1.33E-05   2.52E+07       0.00
   14.2500       0.00  -6.21E-05  -1.05E-05       0.00       0.00   7.51E+09
9.24E-06   2.52E+07       0.00
   14.4000       0.00  -6.61E-05   2.88E-06       0.00       0.00   7.51E+09
5.61E-06   2.52E+07       0.00
   14.5500       0.00  -5.18E-05   1.01E-05       0.00       0.00   7.51E+09
2.38E-06   2.52E+07       0.00
   14.7000       0.00  -2.99E-05   1.17E-05       0.00       0.00   7.51E+09
-5.36E-07   2.52E+07       0.00
   14.8500       0.00  -9.62E-06   8.30E-06       0.00       0.00   7.51E+09
-3.27E-06   2.52E+07       0.00
   15.0000       0.00       0.00       0.00       0.00       0.00   7.51E+09
-5.95E-06   1.26E+07       0.00

* This analysis computed pile response using nonlinear moment-curvature rela-
  tionships. Values of total stress due to combined axial and bending stresses
  are computed only for elastic sections only and do not equal the actual
  stresses in concrete and steel. Stresses in concrete and steel may be inter-
  polated from the output for nonlinear bending properties relative to the
  magnitude of bending moment developed in the pile.
```

```
Output Summary for Load Case No. 5:

Pile-head deflection             =     0.05980760 inches
Computed slope at pile head      =     -0.0036249 radians
Maximum bending moment           =        585535. inch-lbs
Maximum shear force              =         66340. lbs
Depth of maximum bending moment  =     1.35000000 feet below pile head
Depth of maximum shear force     =       0.000000 feet below pile head
Number of iterations             =             26
Number of zero deflection points =              8


--------------------------------------------------------------------------------
                    Summary of Pile Responses for LRFD Analyses
--------------------------------------------------------------------------------

                                                                          Maximum
    Maximum
Load     Pile-head       Pile-head        Axial        Pile-head          Moment
     Shear          Pile-Head
Case       Shear           Moment        Loading       Deflection         in Pile
    in Pile         Rotation
 No.        lbs            in-lbs          lbs           inches            in-lbs
      lbs            radians
----  --------------  --------------  --------------  --------------  --------------
 --------------  --------------
  1           24780.        0.000000          90175.      0.00480173         164364.
         24780.      -0.0003737
  2           62400.        0.000000         146204.      0.04175917         561618.
         62400.      -0.0024930
  3           72360.        0.000000         174294.      0.06019871         680948.
         72360.      -0.0034475
  4           69010.        0.000000         140319.      0.05885289         629284.
         69010.      -0.0034633
  5           66340.        0.000000         112554.      0.05980760         585535.
         66340.      -0.0036249


Maximum pile-head deflection = 0.0601987129 inches
Maximum pile-head rotation   = -0.0036249108 radians = -0.207692 deg.

--------------------------------------------------------------------------------
                     LRFD Performance by Load Case Combination
--------------------------------------------------------------------------------

                              Factored      Maximum    Fact. Mom.    Pass/Fail
Maximum
Load          Resistance     Moment       Moment      Fraction     for LRFD
```

```
Shear      Pile-top     Pile-top
Case Section    Factor      Capacity     Developed    Developed     Moment
Developed   Deflection    Rotation
 No.   No.    for Moment   of Section   in Section   in Section   of Section   in
Section    Developed    Developed          Name of Load Case Combination
                             in-lbs       in-lbs
lbs        inches       Radians
---- ------- ------------ ------------ ------------ ------------ ------------
------------ ------------ ------------ ---------------------------------------------
  1     1        0.75          604012.      164364.     0.272121     Pass
24780.     0.004802   -0.0003737
  2     1        0.75          672418.      561618.     0.835222     Pass
62400.     0.041759     -0.00249
  3     1        0.75          689157.      680948.     0.988089     Pass
72360.     0.060199     -0.00345
  4     1        0.75          668176.      629284.     0.941794     Pass
69010.     0.058853     -0.00346
  5     1        0.75          642021.      585535.     0.912018     Pass
66340.     0.059808     -0.00362

All LRFD load combinations have passed for all pile sections.


The load case and pile section with the greatest level of developed moment
capacity:

LRFD Load Case No.                    = 3
Pile Section No.                      = 1

The analysis ended normally.
```

Retaining Wall Design

- Lateral Pressure due to LL surcharge

$P_L = w K_A$ where $K_A = 0.43$
$w_s = 120$ psf
$w_L = 40$ psf

- snow lateral pressure

$P_s = 51.6$ psf $= 0.052$ ksf

- live load lateral pressure (from vehicles on driveway)

$P_L = 17.2$ psf $= 0.0172$ ksf

- Soils Properties (from Geotech Report)

- R walls w/ lateral support:
  - imported, free-draining backfill $\gamma = 45$ pcf
  - on-site & bedrock $\gamma = 60$ pcf ← use for design

- Cantilever R-walls:
  - imported " " $\gamma = 35$ pcf
  - on-site " " $\gamma = 50$ pcf

- MUST DESIGN FOR HYDROSTATIC & SURCHARGE
  ↳ only in site retaining walls
  ↳ per boring log no ground water affects the bldg R walls

- Passive Earth Pressure
  - passive pressure against sides of ftg can be calc'd as eq. fluid press. $\gamma = 250$ pcf

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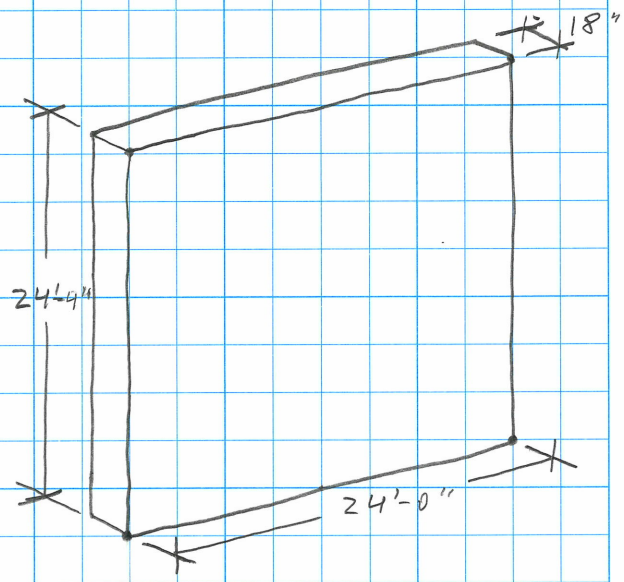
Check R-Walls for LRFD Design

• WP_2.5G-E

$V_u = -13.264$ k/ft (out-of-plane)



$$V_c = \left[8 \lambda_s \lambda (\rho_w)^{1/3} \sqrt{f_c'} + \frac{N_u}{6 A_g} \right] b_w d$$

$$\leq 5 \lambda \sqrt{f_c'}\, b_w d$$

where $d = 16.5$ in

$b_w = 12$ in

$f_c' = 4$ ksi

$$\lambda_s = \sqrt{\frac{2}{1 + (d/10)}} \leq 1.0 \quad \geq 0.869$$

$\lambda = 1.0$

$$\rho_w = \frac{A_s}{b_w d} = 0.001566$$

$A_s = 0.31$ in^2

So: $V_c = 10.1$ kip (for 12" wall segment)

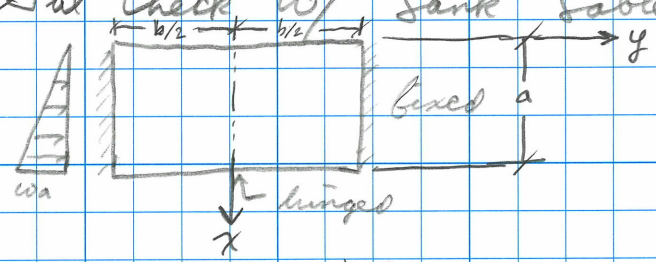
$\phi_{shear} = 0.75$

$\phi V_c = 7.575$ kip

- change composite deck to SOG @ garage
- check retaining walls
- adjust caissons to wall width

* piers allow 1" deflection; $h/30$ = min. pier dia.

• Retaining Walls - But Check w/ Tank Table
- use Table II:



- check Largest/Deepest Span: WP 2.5 G-E

$b = 11.5$ ft
$a = 25.6$ ft

$w = 60$ pcf

$b/a = 0.9$

max. coeff. $= +0.017$ M_y @ $y = 0$, $x/a = 1/2$
min. coeff. $= -0.036$ M_y @ $y = b/2$, $x/a = 3/4$

max. moment $M_y = 17.11$ kip-ft $M_x = 15.1$ kip-ft

min. moment $-M_y = -36.24$ kip-ft $-M_x = -7.05$ kip-ft

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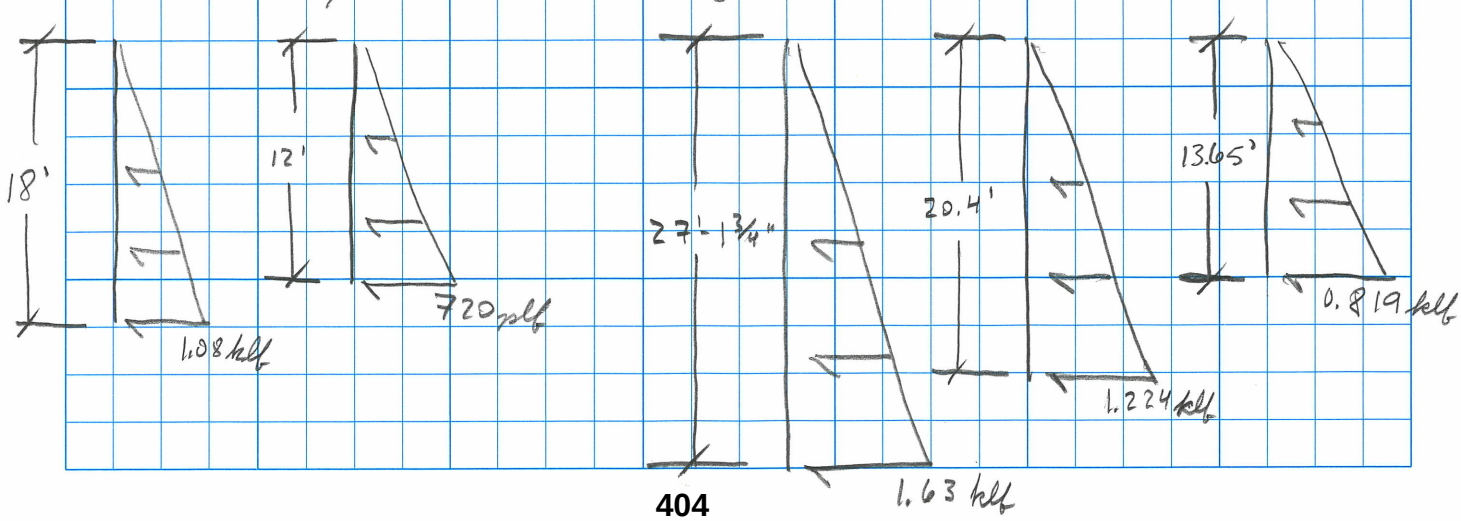
L Pile Analysis

weak rock
- k_{rm} strain factor of 0.005 outside L Pile recommended range of $0.00005 < k_{rm} < 0.0005$
- weak rock compressive strength below 100 psi, unreasonable (uniaxial compressive strength = 28 psi per NWCC email)

sand (Reese, et al.)
- need friction angle for sand
- need k (lb/in^3)

- L Pile Results
  - LRFD Analysis N37 (F.5_3)
    12" dia. w/ (3) #6 bars
    x 15'-0 length works
  - ASD Deflection N37 (F.5_3)
    no good; defl. = 13,133 in = 1094 ft

- Walls
  - ~~step~~ wall ¼ height @ N284
  - R walls w/ lateral support γ = 60 pcf earth pressure



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Astrid L-Pile Huddle Meeting w/ JMT

- missing L Pile parameters from geotech
  ↳ need uniaxial compressive strength
  ↳ need initial modulus of rock mass

- provide steps in foundation
  ↳ how to show change in BOW but TOW stays same?

- more similar to Stiff Clay w/out Free Water; is this appropriate to use in our model?

- fixed or free head?
  ↳ may use fixed heads for in-plane
  ↳ may use free heads for out of plane

- must limit pile head deflection by 1" per Ch. 18 IBC
  ↳ max capacity is ½ load it takes to move 1"
  ↳ check defl. diagram to see soil-pile behavior

too short — fixity in end; need stronger pier

30" max pier diameter
#8 bars max

↳ type. 6 dia. pier spacing for lateral

- cannot use counterforts / soil nails due to setbacks
- may need to use nails on interior walls as tiebacks

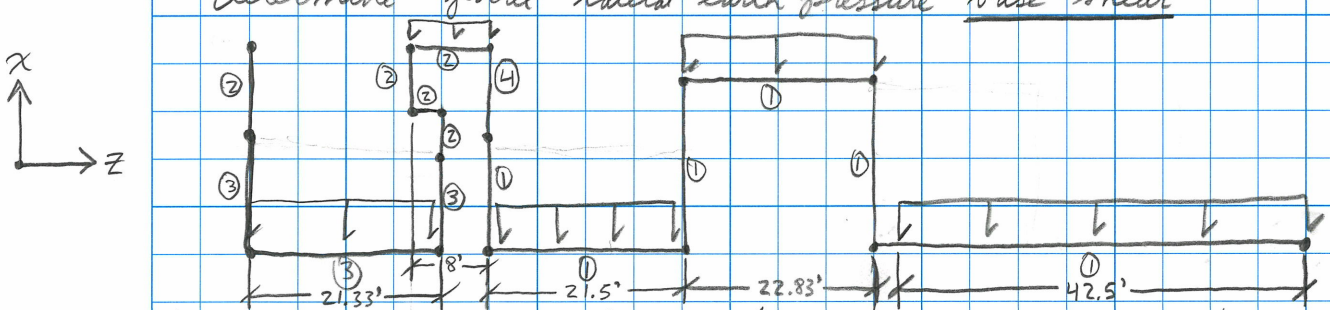
- show bluebeam concepts showing what is possible
  ↳ create simplified FBD
  ↳ show potential load paths

Foundation Design – IBC 2021 Ch. 18 Investigation

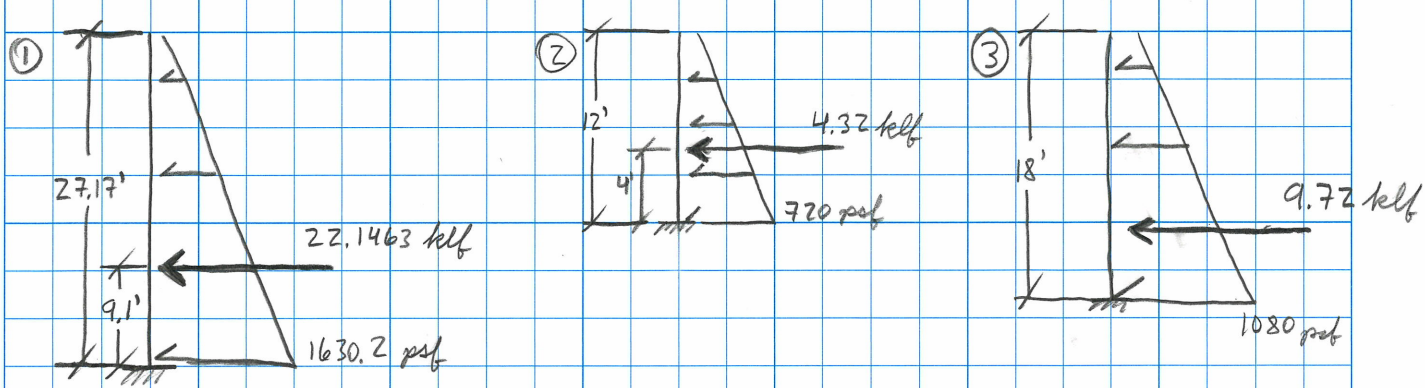
$d = 0.5A\left\{1 + \left[1 + \left(4.36\,h/A\right)\right]^{1/2}\right\}$ eq. 18-1, section 1807.3.2.1 Nonconstrained

where b = dia. pile (ft)
d = depth embed (ft)
h = distance from ground surface to application point "P" (ft)
P = applied lateral force (lbf)
S_1 = allowable lateral soil bearing pressure per Table 1806.2
$A = 2.34\,P/S_1 b$

– determine global lateral earth pressure base shear

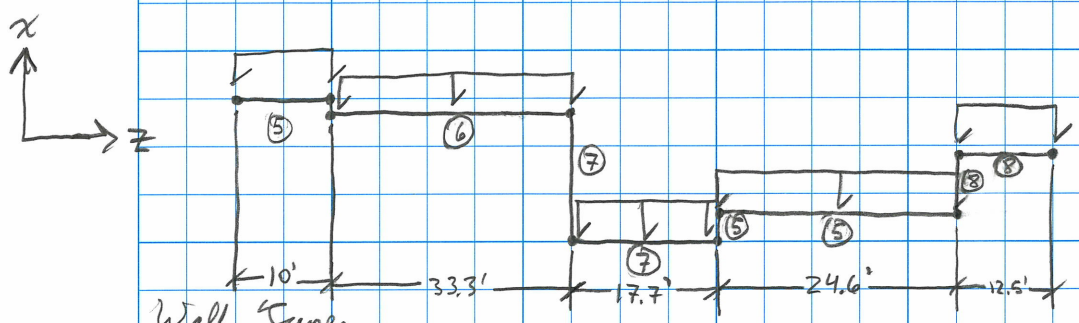


Wall Types EPL = 60 pcf SLL = 52 psf LLL = 17.2 psf

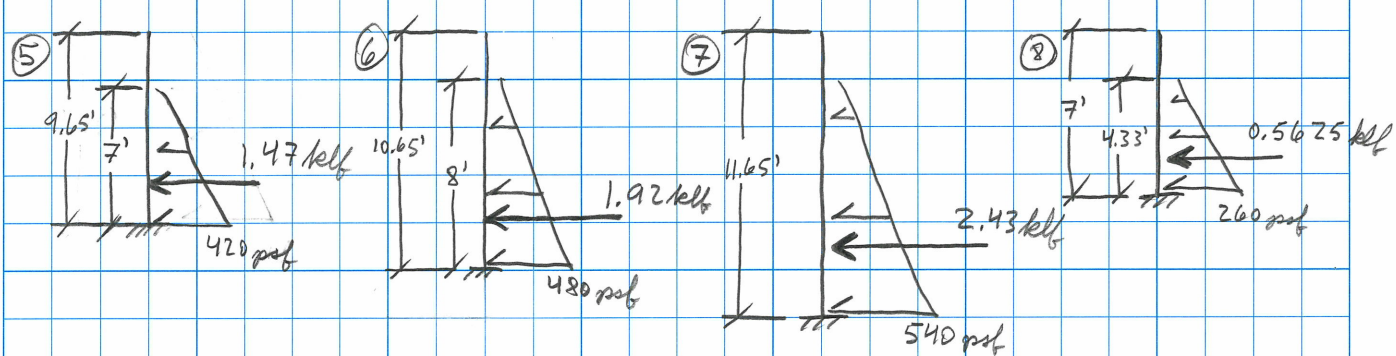


base shear (x) $= 22.1463\text{ klf}(42.5' + 22.83' + 21.5') + 4.32\text{ klf}(8') + 9.72\text{ klf}(21.33')$
$= 1923\text{ k} + 34.56\text{ k} + 207.33\text{ k}$
$= 2164.851\text{ k}$

- Lateral Earth Pressure Base Shear (continued)



Wall Types



base shear (x) = 1.47 klf (10' + 24.6') + 1.92 klf (33.3') + 2.43 (17.7') + 0.5625 klf (12.5')
= 50.862 k + 64 k + 43 k + 7.03 k
= 164.84 k

$\boxed{\text{TOTAL BASE SHEAR (X)} = 2329.7 \text{ kip}}$

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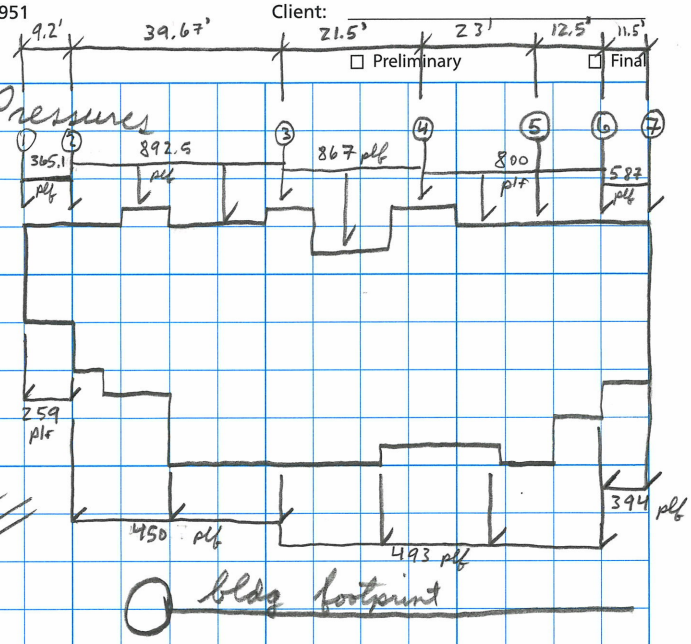
Foundation Design - Wind Pressures



- determine total base shear from wind

  - windward face

    365.1 plf (9.2') + 892.5 plf (39.67')
    + 867 plf (21.5') + 800 plf (23' + 12.5')
    + 587 plf (11.5') = 92.56 kips

  - leeward face

    259 plf (9.2') + 450 plf (39.67')
    + 493 plf (21.5' + 23' + 12.5') + 394 plf (11.5')
    = 52.87 kips

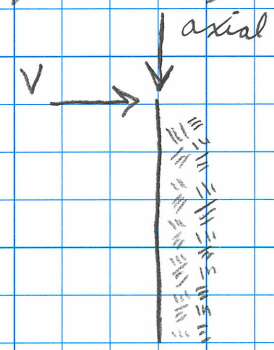
TOTAL BASE SHEAR (x) = 145.422 kip

* Foundation Wall Step
- currently have (2) 6.75' steps @ garage walls
- Can we have (1) 13.5' step ?

Pile Design - IBC Section 1810 Design Limits

1810.2.5 Group Effects Considerations
- lateral behavior: reductions when c-c spacing < 8 ø
- axial behavior: reductions when c-c spacing < 3 ø

Table 1810.3.2.6 Allowable Stresses for Materials in Deep Foundations



- Determine Pile Capacities
- LPile Parameters:
  - Stiff Clay w/out Free Water
  - effective unit weight = 129.6 pcf
  - undrained cohesion = 2016 psf
  - non-default strain factor E50 = 0.005

- Check 30" ø x 25'-0 Pile for max ASD load to create 1" defl. w/ (15) #8 bars, 3" cover (for free head)

FREE head
- loads applied:
  - ↳ axial = 30k
  - ↳ V = 76k
- loads allowed
  - ↳ axial = 40k
  - ↳ V = 38k

FIXED head
- loads applied:
  - ↳ axial = 30k
  - ↳ V = 143k
- loads allowed:
  - ↳ axial = 30k
  - ↳ V = ~~71.5k~~ = 68k (LRFD limited)

- Check 36" ø x 25'-0 Pile for max ASD load to create 1" defl. w/ (19) #8 bars, 3" cover (for free head)

FREE head
- loads applied:
  - ↳ axial = 30 k
  - ↳ V = 103 k
- loads allowed
  - ↳ axial = 30k
  - ↳ V = 51.5k

FIXED head
- loads applied:
  - ↳ axial = 30 k
  - ↳ V = 169 k
- loads allowed:
  - ↳ axial = 30 k
  - ↳ V = 84.5k

- Check 24" ø x 25'-0 Pile for max ASD load to create 1" defl. w/ (11) #8 bars, 3" cover

FREE head
- loads applied:
  - ↳ axial = 30k
  - ↳ V = 53k
- loads allowed:
  - ↳ axial = 30k
  - ↳ V = 26.5k

FIXED head
- loads applied:
  - ↳ axial = 30 k
  - ↳ V = 96 k
- loads allowed:
  - ↳ axial = 30k
  - ↳ V = 46k (LRFD limited)

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Date: 12/21/23 Page: 19 of ____
By: JDC Chkd By: ____
Job No: 22026
Project: Astrid Bldg # 7
Client: ____

☐ Preliminary ☐ Final

Pile Design - REVISED

- Determine Pile Capacities

- Check 24"ø x 15'-0 pile for max ASD load to create 1" defl. w/ (11) #6 bars, 3" cover

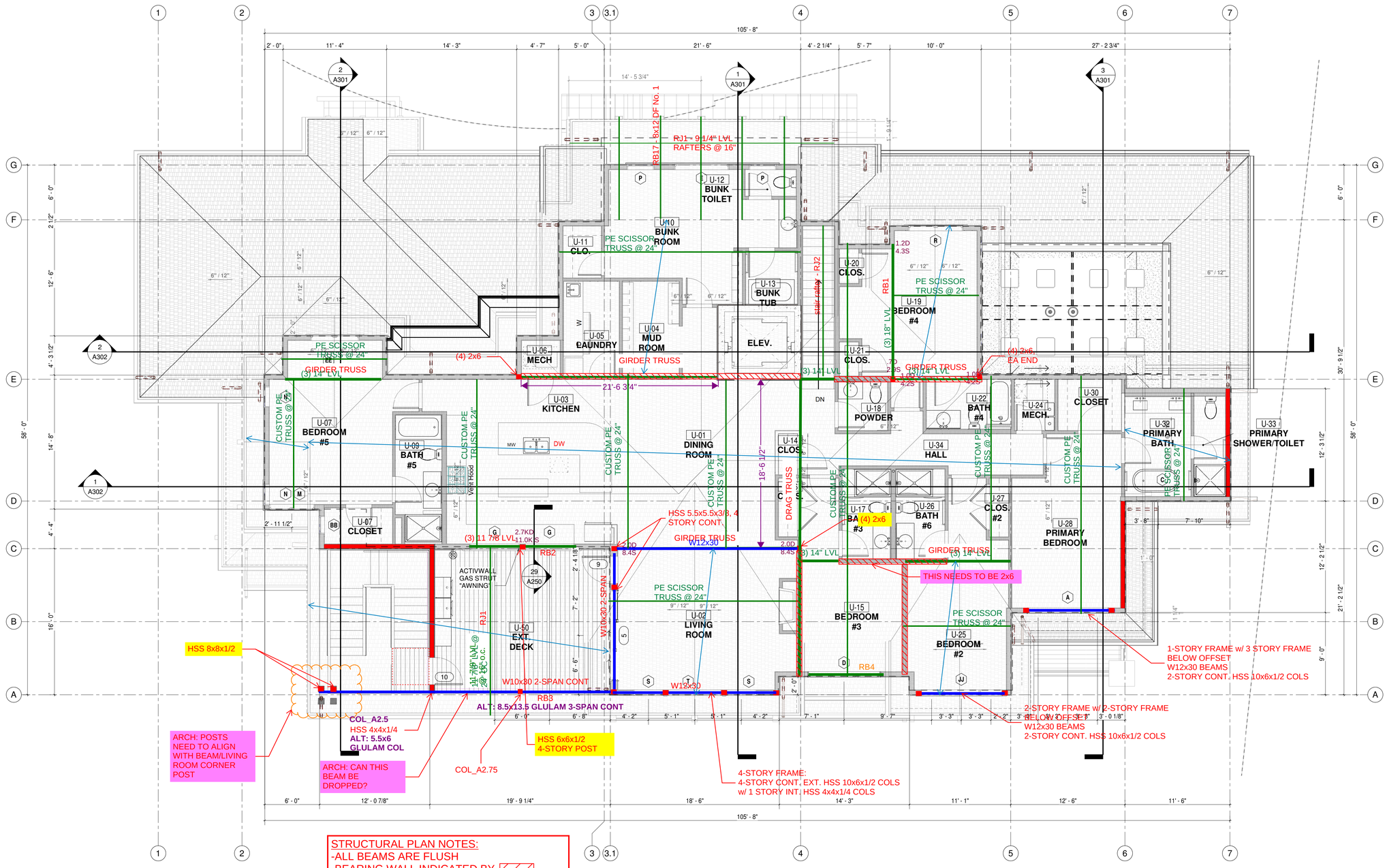
FREE head
- loads applied:
  - ↳ axial =
  - ↳ V =
- loads allowed:
  - ↳ axial =
  - ↳ V =

FIXED head
- loads applied:
  - ↳ axial = 30k
  - ↳ V = 73k
- loads allowed:
  - ↳ axial = 30k
  - ↳ V = 36k

CONSULTING ENGINEERS

JVA JOB NO. 22025

SECTION 3 - FLOOR AND ROOF FRAMING



STRUCTURAL PLAN NOTES:
-ALL BEAMS ARE FLUSH
-BEARING WALL INDICATED BY

1 A104 UPPER LEVEL - B7
3/16" = 1'-0"

Provide and install all products for construction to industry standard including all related ASTM standards and product manufacturer's installation and specification requirements.

PROGRESS SET (NOT FOR CONSTRUCTION)

DATE: 2023-08-01

NOTICE: DUTY OF COOPERATION

Release of these plans contemplates further cooperation among the owner, his contractor and the architect. Design and construction are complex. Although the architect and his consultants have performed their services with due care and diligence, they cannot guarantee perfection. Communication is imperfect and every contingency cannot be anticipated. Any ambiguity or discrepancy discovered by the use of these plans shall be reported immediately to the architect. Failure to notify the architect compounds misunderstanding and increases construction costs. A failure to cooperate by a simple notice to the architect shall relieve the architect from responsibility for the consequences. Changes made from the plans without consent of the architect are unauthorized and shall relieve the architect of responsibility for all consequences arriving out of such changes.

REVISIONS

No.	Description	Date

EDGEMONT/SHERMAN FOURPLEX BUILDING 7
STEAMBOAT SPRINGS COLORADO

ERIC SMITH ASSOCIATES, P.C.
1919 SEVENTH STREET
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(303) 442-5458, (303) 442-4745 FAX

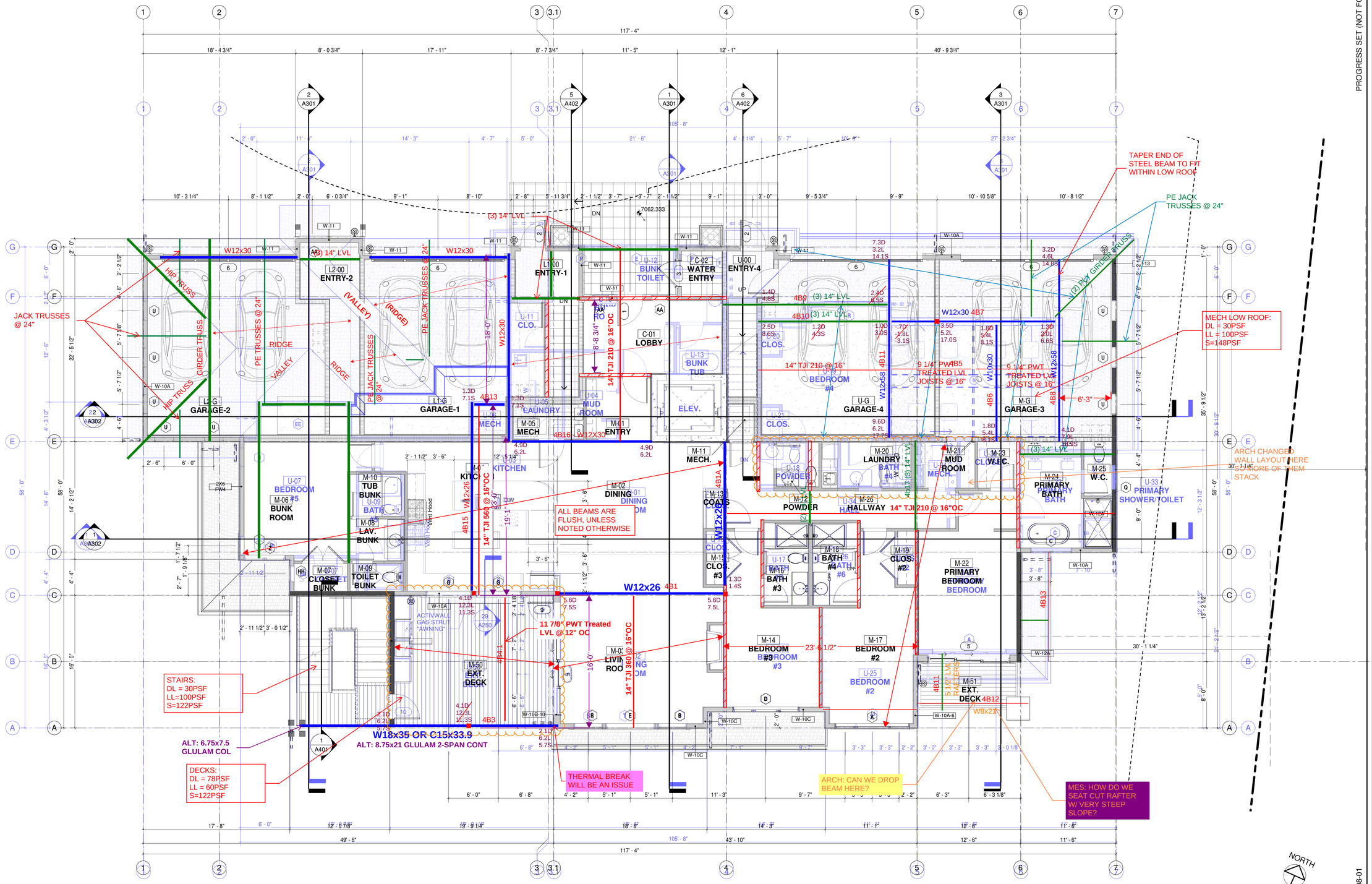
Job Number:	22014
Date:	7/25/2023
Drawn By:	ESA
Checked By:	T.J.

Project Phase: SD

Sheet Title: UPPER LEVEL PLAN

Sheet Number: A104

LEGEND:
BLACK = BELOW
BLUE = ABOVE



2 A103 MAIN LEVEL FLOOR PLAN
3/16" = 1'-0"

SCALE: 3/16" = 1'-0"

Provide and install all products for construction to industry standard including all related ASTM standards and product manufacturer's installation and specification requirements.

PROGRESS SET (NOT FOR CONSTRUCTION)

DATE: 2023-08-01

NOTICE: DUTY OF COOPERATION

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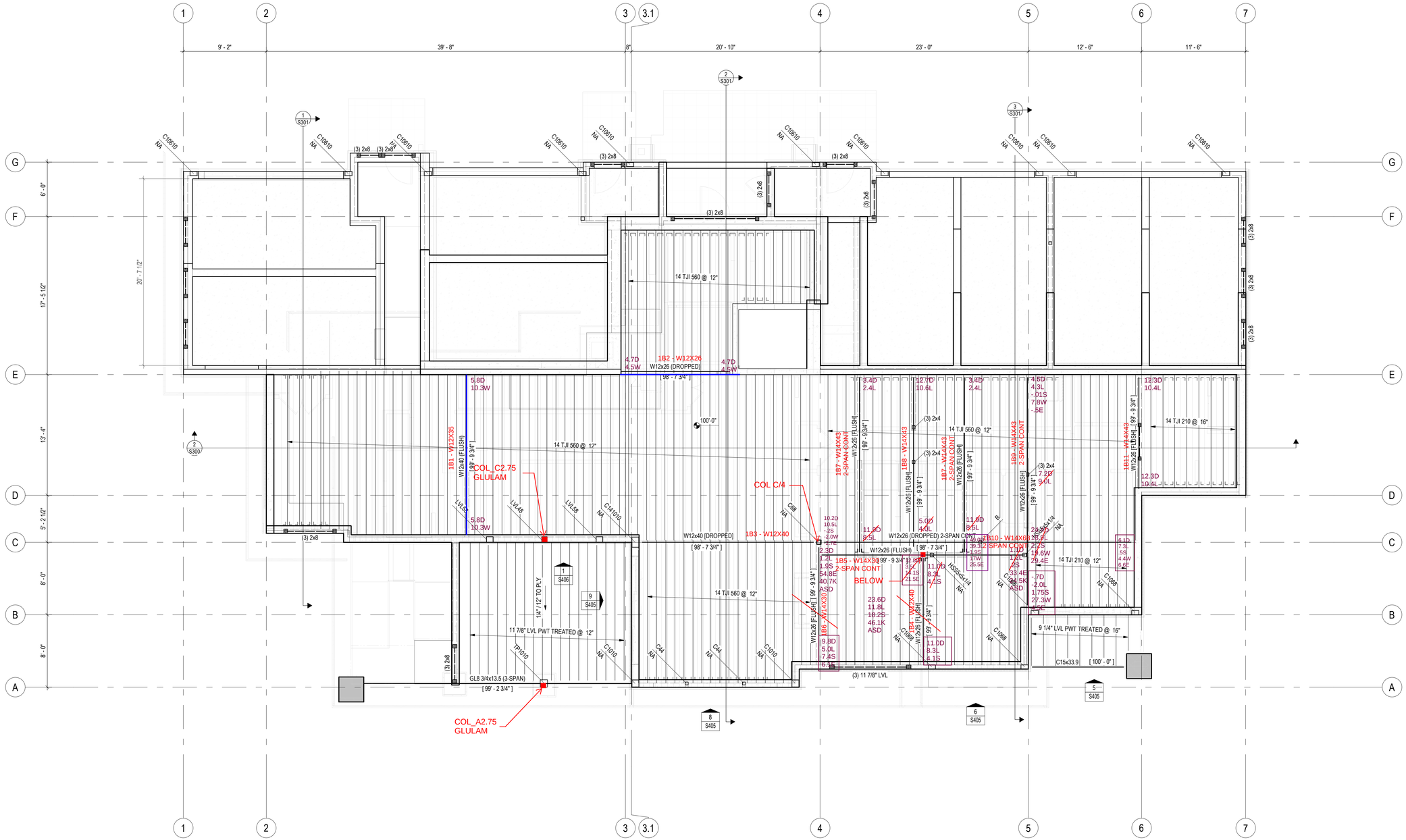
Job Number:	22014
Date:	7/25/2023
Drawn By:	ESA
Checked By:	T.J.

Project Phase
SD

Sheet Title
MAIN LEVEL PLAN

Sheet Number
A103



LOWER LEVEL 1 FLOOR FRAMING PLAN

NORTH

3/16" = 1'-0"

0 2' 4' 8' 12'

- USGS ELEVATION 7038.875' = 100'-0, TOP OF LOWER LEVEL 1 FLOOR SHEATHING
- TOP OF LOWER LEVEL 1 FLOOR SHEATHING = 100'-0 UNLESS NOTED THUS: XXX'-X
- TOP OF PLATE HEIGHT NOTED THUS: TOP PL EL = XXX'-X
- ALL BEAMS ARE FLUSH, UNLESS NOTED OTHERWISE ON PLAN
- ALL HEADERS ARE DROPPED, UNLESS NOTED OTHERWISE ON PLAN
- ALL COLUMNS ON THIS PLAN ARE ABOVE UNLESS MARKED THUS:
- SEE SYMBOLS KEY ON SHEET S001 FOR BUILDING COLUMN DESIGNATIONS

TYPICAL FLOOR SHEATHING:
3/4" STURD-I-FLOOR, APA RATED 24" O.C. TONGUE & GROOVE SHEATHING GLUED AND NAILED WITH 8d NAILS (0.113"Ø x 2 3/8") @ 6" ALONG PANEL EDGES AND @ 12" ALONG INTERMEDIATE FRAMING MEMBERS. LAY PANELS PERPENDICULAR TO FRAMING MEMBERS AND STAGGER PANEL JOINTS.

TYPICAL EXTERIOR WOOD FRAMED WALLS (UNO):
2x6 STUDS @ 16" SHEATHED WITH 7/16" APA 24/16, EXPOSURE 1 ON EXTERIOR FACE; NAIL WALL SHEATHING WITH 8d (0.113"Ø x 2 3/8") @ 6" AT PANEL EDGES AND @ 12" IN FIELD OF PANEL; BLOCK AND NAIL ALL EDGES BETWEEN STUDS. IF GUN NAILS ARE USED FOR NAILING, NAILS MUST BE AT A MINIMUM THE DIAMETER AND LENGTH NOTED ABOVE.

HEADER SCHEDULE				
MARK	TYPE	# OF KINGS	# OF TRIMS	REMARKS

1/30/2024 5:09:01 PM THE ASTRID CONDO B7 v22

PROGRESS SET (NOT FOR CONSTRUCTION)

DATE: 2023-08-01

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Boulder ● Fort Collins ● Winter Park
Glenwood Springs ● Denver
JVA #22025

REVISIONS

No.	Description	Date

EDGEMONT/SHERMAN FOURPLEX BUILDING 7
STEAMBOAT SPRINGS COLORADO

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Job Number:	22025
Date:	12/21/23
Drawn By:	BPK
Checked By:	MES

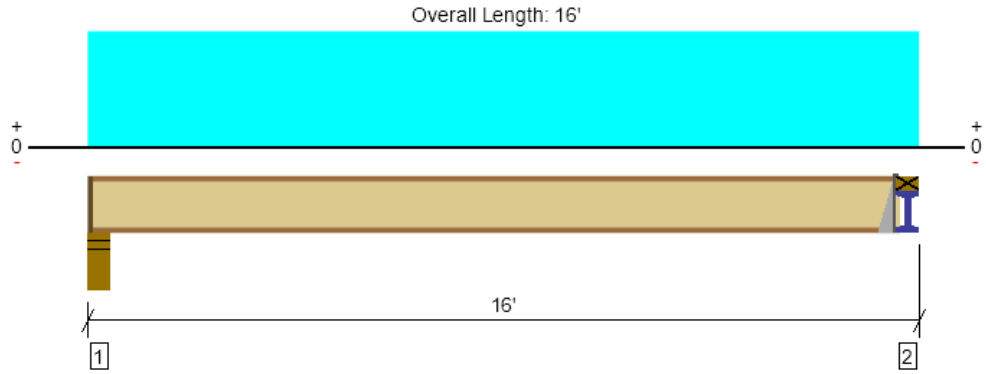
Project Phase
100% DD

Sheet Title
LOWER LEVEL 1 FLOOR FRAMING PLAN

Sheet Number
S101

LEVEL 4			
Member Name	Results (Max UTIL %)	Current Solution	Comments
Floor: Joist BEDROOM #4	Failed (54 TJP)	1 piece(s) 14" TJI® 210 @ 16" OC	
FLOOR JOIST LOBBY	Passed (54% R)	1 piece(s) 14" TJI® 360 @ 16" OC	
FLOOR KITCHEN/DINING	Passed (67% R)	1 piece(s) 14" TJI® 560 @ 16" OC	
PRIMARY BEDROOM	Passed (53% R)	1 piece(s) 14" TJI® 210 @ 16" OC	
Level 1			
Member Name	Results (Max UTIL %)	Current Solution	Comments
Floor: Joist	Passed (54% R)	1 piece(s) 14" TJI® 560 @ 12" OC	

LEVEL 4, Floor: Joist BEDROOM #4
1 piece(s) 14" TJI® 210 @ 16" OC



Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	708 @ 15' 6 1/2"	1005 (1.75")	Passed (70%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	708 @ 15' 6 1/2"	1945	Passed (36%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2684 @ 7' 11 1/2"	4490	Passed (60%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.136 @ 7' 11 1/2"	0.379	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.239 @ 7' 11 1/2"	0.758	Passed (L/763)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	54	55	Failed	--	--

Member Length : 15' 5 1/4"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 1/2" Gypsum ceiling, Pour Flooring Overlay.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	5.50"	4.25"	1.75"	318	424	743	1 1/4" Rim Board
2 - Hanger on Single 2X DF plate	5.50"	Hanger[1]	1.75" / - [2]	322	429	751	See note [1]

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.
- [2] Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 11" o/c	
Bottom Edge (Lu)	15' 5" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Top Mount Hanger	ITS2.06/14	2.00"	4-10dx1.5	2-10dx1.5	2-Strong-Grip	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 16'	16"	30.0	40.0	Default Load

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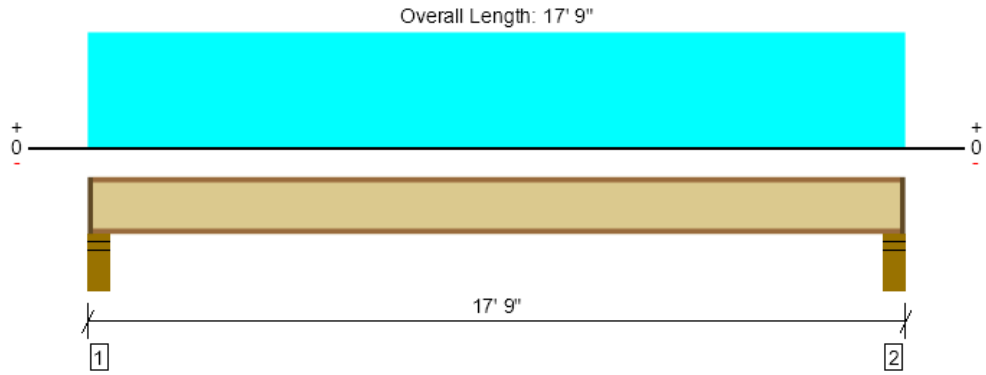
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

LEVEL 4, FLOOR JOIST LOBBY
1 piece(s) 14" TJI® 360 @ 16" OC



Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	819 @ 4 1/2"	1505 (3.50")	Passed (54%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	786 @ 5 1/2"	1955	Passed (40%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3372 @ 8' 10 1/2"	7335	Passed (46%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.169 @ 8' 10 1/2"	0.425	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.295 @ 8' 10 1/2"	0.850	Passed (L/691)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	55	55	Passed	--	--

Member Length : 17' 6 1/2"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 1/2" Gypsum ceiling, Pour Flooring Overlay.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	5.50"	4.25"	1.75"	355	473	828	1 1/4" Rim Board
2 - Stud wall - DF	5.50"	4.25"	1.75"	355	473	828	1 1/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 7" o/c	
Bottom Edge (Lu)	17' 7" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 17' 9"	16"	30.0	40.0	Default Load

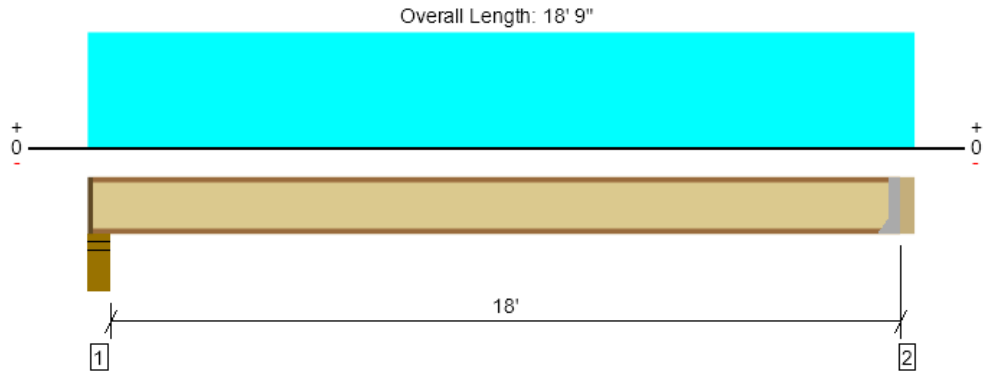
Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Jarod Concha JVA Inc. (303) 444-1951 jconcha@jvajva.com	

LEVEL 4, FLOOR KITCHEN/DINING
1 piece(s) 14" TJI® 560 @ 16" OC



Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	844 @ 18' 5 1/2"	1265 (1.75")	Passed (67%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	844 @ 18' 5 1/2"	2390	Passed (35%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3815 @ 9' 5"	11275	Passed (34%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.151 @ 9' 5"	0.452	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.265 @ 9' 5"	0.904	Passed (L/819)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	56	55	Passed	--	--

Member Length : 18' 4 1/4"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling, Pour Flooring Overlay.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	5.50"	4.25"	1.75"	377	502	879	1 1/4" Rim Board
2 - Hanger on 14" DF Ledger	3.50"	Hanger[1]	1.75" / - [2]	373	498	871	See note [1]

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.
- [2] Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	10' o/c	
Bottom Edge (Lu)	18' 4" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	IUS3.56/14	2.00"	N/A	12-10dx1.5	2-Strong-Grip	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 18' 9"	16"	30.0	40.0	Default Load

Weyerhaeuser Notes

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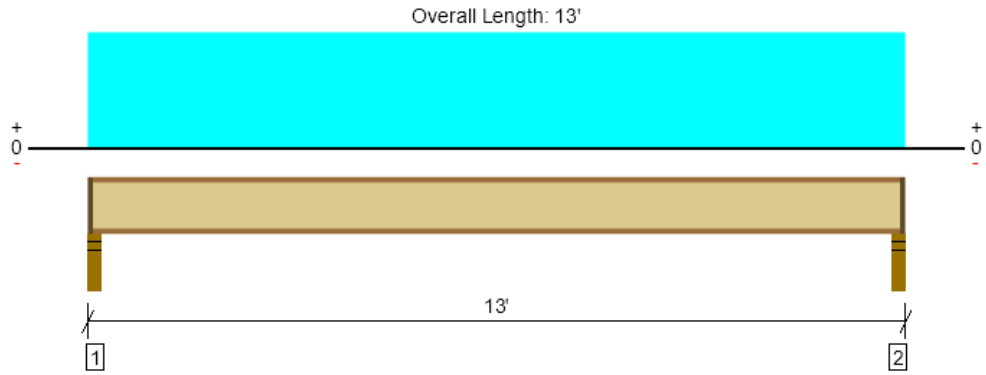
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Jarod Concha JVA Inc. (303) 444-1951 jconcha@jvajva.com	

LEVEL 4, PRIMARY BEDROOM
1 piece(s) 14" TJI® 210 @ 16" OC



Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	597 @ 2 1/2"	1134 (2.25")	Passed (53%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	579 @ 3 1/2"	1945	Passed (30%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1847 @ 6' 6"	4490	Passed (41%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.070 @ 6' 6"	0.315	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.122 @ 6' 6"	0.629	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	63	55	Passed	--	--

Member Length : 12' 9 1/2"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 1/2" Gypsum ceiling, Pour Flooring Overlay.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	3.50"	2.25"	1.75"	260	347	607	1 1/4" Rim Board
2 - Stud wall - DF	3.50"	2.25"	1.75"	260	347	607	1 1/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' o/c	
Bottom Edge (Lu)	12' 10" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 13'	16"	30.0	40.0	Default Load

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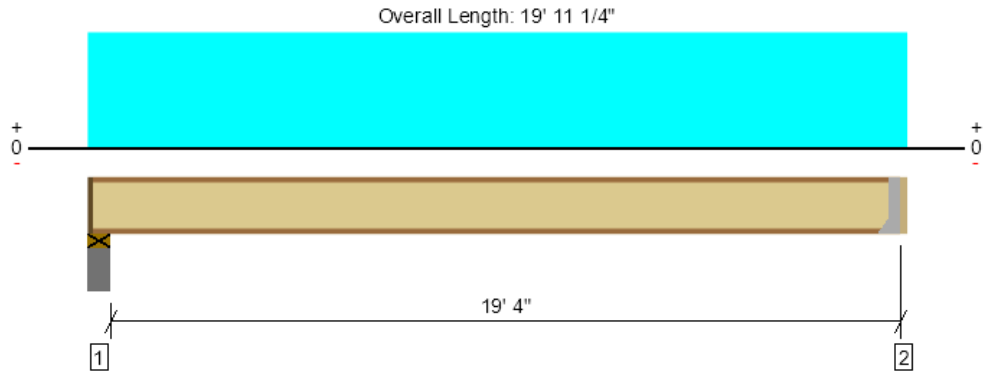
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Level 1, Floor: Joist
1 piece(s) 14" TJI® 560 @ 12" OC



Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	680 @ 19' 9 1/2"	1265 (1.75")	Passed (54%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	680 @ 19' 9 1/2"	2390	Passed (28%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3299 @ 10' 1"	11275	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.150 @ 10' 1"	0.485	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.263 @ 10' 1"	0.971	Passed (L/886)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	56	55	Passed	--	--

Member Length : 19' 8 1/4"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Plate on concrete - SPF	5.50"	4.25"	1.75"	302	403	706	1 1/4" Rim Board
2 - Hanger on 14" LVL Ledger	1.75"	Hanger[1]	1.75" / - [2]	296	394	690	See note [1]

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.
- [2] Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	10' 10" o/c	
Bottom Edge (Lu)	19' 8" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	IUS3.56/14	2.00"	N/A	12-10dx1.5	2-Strong-Grip	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 19' 11 1/4"	12"	30.0	40.0	Default Load

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Jarod Concha JVA Inc. (303) 444-1951 jconcha@jvajva.com	

4TH FLOOR & LOW ROOF

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

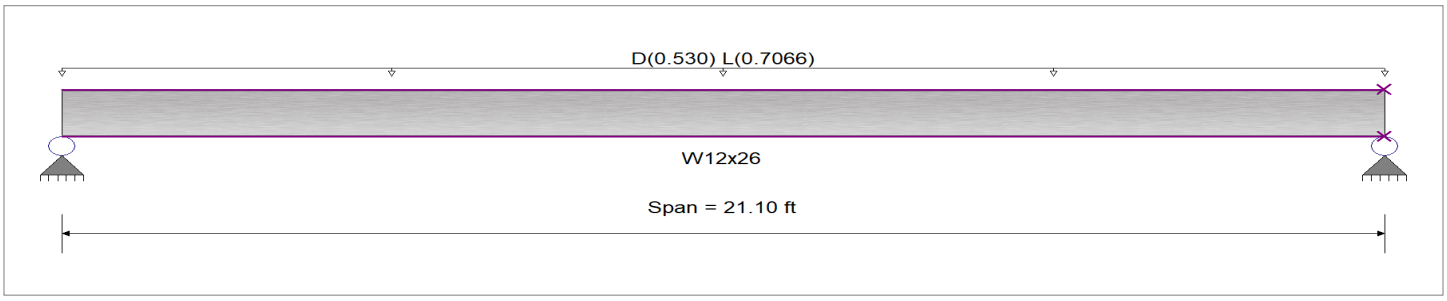
DESCRIPTION: Living Rm Bm (4B1)

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 17.665 ft, (Floor Joists)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.741** : 1	Maximum Shear Stress Ratio =	**0.232** : 1
Section used for this span	**W12x26**	Section used for this span	**W12x26**
Ma : Applied	68.816 k-ft	Va : Applied	13.046 k
Mn / Omega : Allowable	92.814 k-ft	Vn/Omega : Allowable	56.120 k
Load Combination	+D+L	Load Combination	+D+L
		Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.534 in	Ratio =	473	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.936 in	Ratio =	270	>=240.	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	<240.0	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values						Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	VnxVnx/Omega
D Only												
Dsgn. L = 21.10 ft	1	0.318	0.100	29.49		29.49	155.00	92.81	1.00	1.00	5.59	84.18	56.12
+D+L												
Dsgn. L = 21.10 ft	1	0.741	0.232	68.82		68.82	155.00	92.81	1.00	1.00	13.05	84.18	56.12
+D+0.750L												
Dsgn. L = 21.10 ft	1	0.636	0.199	58.98		58.98	155.00	92.81	1.00	1.00	11.18	84.18	56.12
+0.60D												
Dsgn. L = 21.10 ft	1	0.191	0.060	17.70		17.70	155.00	92.81	1.00	1.00	3.35	84.18	56.12

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.9364	10.610		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Span	Max. Upward Defl	Location in Span
D Only	1	0.4013	10.610		0.0000	0.000
+D+L	1	0.9364	10.610		0.0000	0.000
+D+0.750L	1	0.8027	10.610		0.0000	0.000
+0.60D	1	0.2408	10.610		0.0000	0.000
L Only	1	0.5351	10.610		0.0000	0.000

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: Living Rm Bm (4B1)

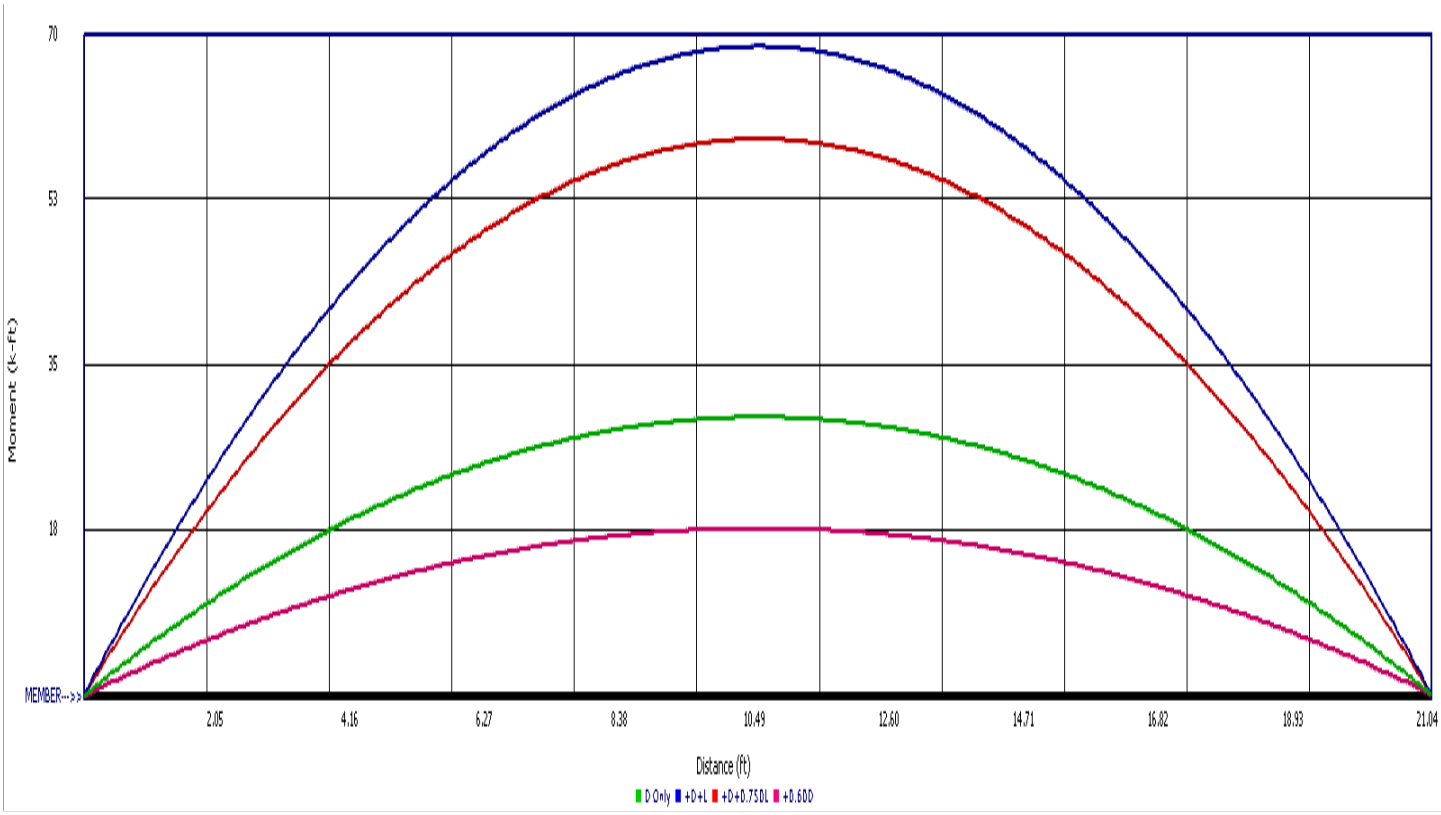
Vertical Reactions

Support notation : Far left is #: Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	13.046	13.046
Max Upward from Load Combinations	13.046	13.046
Max Upward from Load Cases	7.455	7.455
D Only	5.591	5.591
+D+L	13.046	13.046
+D+0.750L	11.182	11.182
+0.60D	3.355	3.355
L Only	7.455	7.455

Steel Section Properties : W12x26

Depth	=	12.200	in	I xx	=	204.00	in^4	J	=	0.300	in^4
Web Thick	=	0.230	in	S xx		33.40	in^3	Cw	=	607.00	in^6
Flange Width	=	6.490	in	R xx	=	5.170	in				
Flange Thick	=	0.380	in	Zx	=	37.200	in^3				
Area	=	7.650	in^2	I yy	=	17.300	in^4				
Weight	=	26.000	plf	S yy	=	5.340	in^3	Wno	=	19.200	in^2
Kdesign	=	0.680	in	R yy	=	1.510	in	Sw	=	11.800	in^4
K1	=	0.750	in	Zy	=	8.170	in^3	Qf	=	7.030	in^3
rts	=	1.750	in					Qw	=	18.300	in^3
Ycg	=	6.100	in								

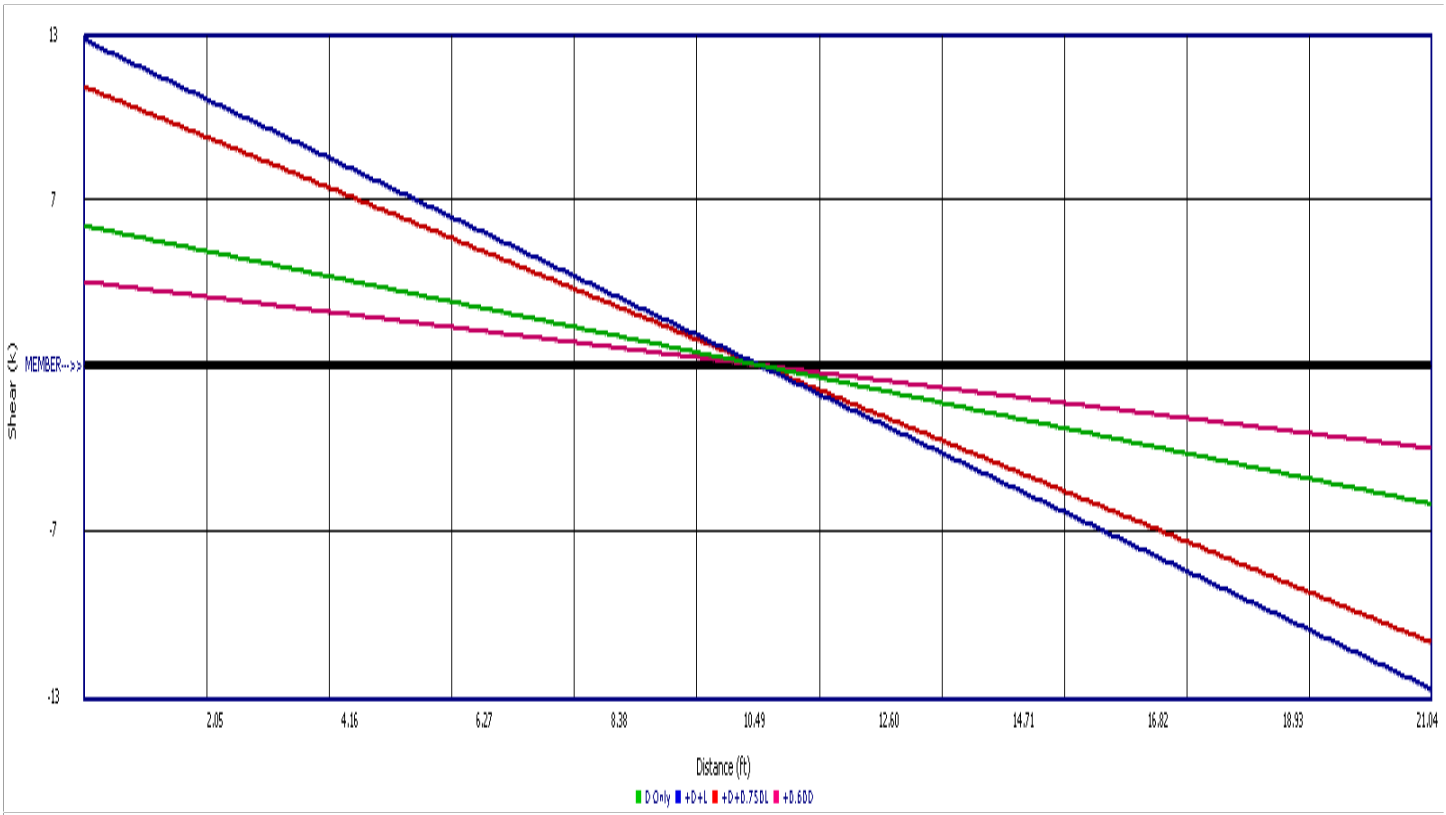


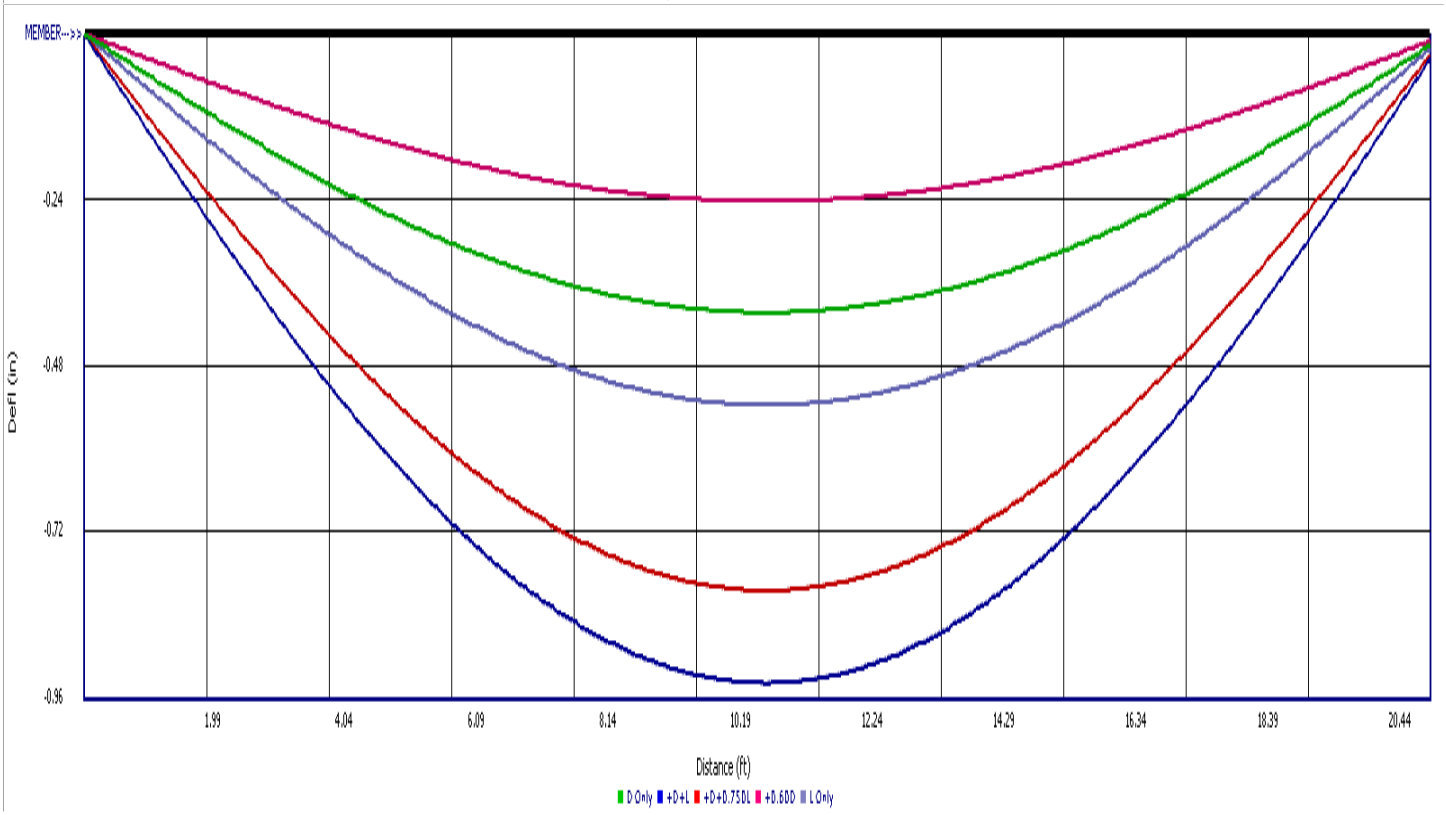
Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: Living Rm Bm (4B1)





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

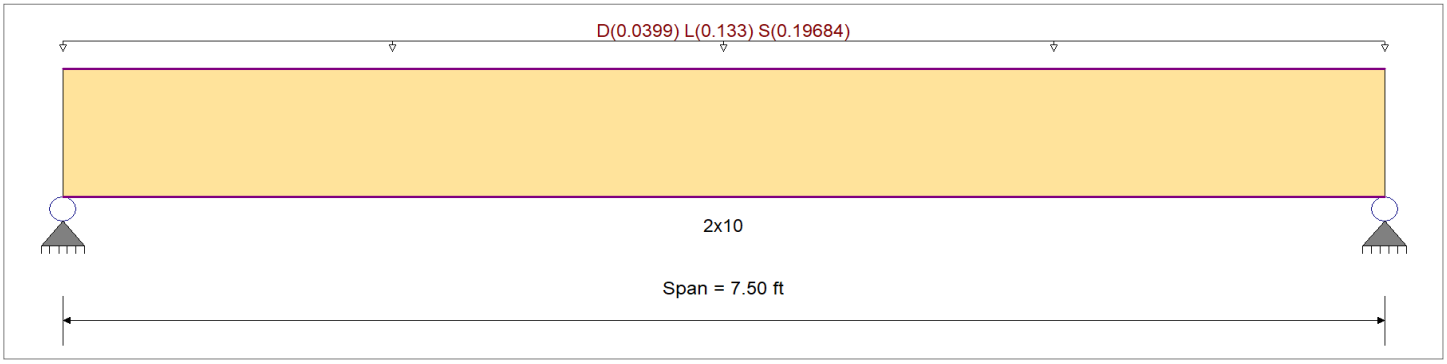
DESCRIPTION: MECH LOW ROOF JOISTS (4B5)

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,800.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2,800.0 psi	Ebend- xx	2,000.0 ksi
		Fc - Prll	1,400.0 psi	Eminbend - xx	580.0 ksi
Wood Species :	PWT Treated LVL	Fc - Perp	850.0 psi		
Wood Grade :		Fv	285.0 psi		
		Ft	500.0 psi	Density	30.590 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling			Repetitive Member Stress Increase	



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Uniform Load : D = 0.030, L = 0.10, S = 0.1480 ksf, Tributary Width = 1.330 ft, (MECH ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.351 : 1	Maximum Shear Stress Ratio	=	0.357 : 1
Section used for this span		**2x10**	Section used for this span		**2x10**
fb: Actual	=	1,144.80 psi	fv: Actual	=	93.61 psi
F'b	=	3,258.64 psi	F'v	=	262.20 psi
Load Combination		+D+0.750L+0.750S	Load Combination		+D+0.750L+0.750S
Location of maximum on span	=	3.750 ft	Location of maximum on span	=	6.734 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.075 in	Ratio =	1200	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.111 in	Ratio =	814	>=240	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 7.50 ft	1	0.066	0.067	0.90	1.00	1.00	1.00	1.100	1.00	0.80	1.15	0.30	169.0	2,550.2	0.13	13.8	205.2
+D+L					1.00	1.00	1.00	1.100	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 7.50 ft	1	0.245	0.249	1.00	1.00	1.00	1.00	1.100	1.00	0.80	1.15	1.24	693.6	2,833.6	0.52	56.7	228.0
+D+S					1.00	1.00	1.00	1.100	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 7.50 ft	1	0.290	0.295	1.15	1.00	1.00	1.00	1.100	1.00	0.80	1.15	1.69	945.4	3,258.6	0.72	77.3	262.2
+D+0.750L					1.00	1.00	1.00	1.100	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 7.50 ft	1	0.159	0.161	1.25	1.00	1.00	1.00	1.100	1.00	0.80	1.15	1.00	562.5	3,542.0	0.43	46.0	285.0
+D+0.750L+0.750S					1.00	1.00	1.00	1.100	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 7.50 ft	1	0.351	0.357	1.15	1.00	1.00	1.00	1.100	1.00	0.80	1.15	2.04	1,144.8	3,258.6	0.87	93.6	262.2

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: MECH LOW ROOF JOISTS (4B5)

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
+0.60D					1.00	1.00	1.00	1.100	1.00	0.80	1.15			0.0	0.00	0.0	0.0
Length = 7.50 ft	**1**	0.022	0.023	1.60	1.00	1.00	1.00	1.100	1.00	0.80	1.15	0.18	101.4	4,533.8	0.08	8.3	364.8

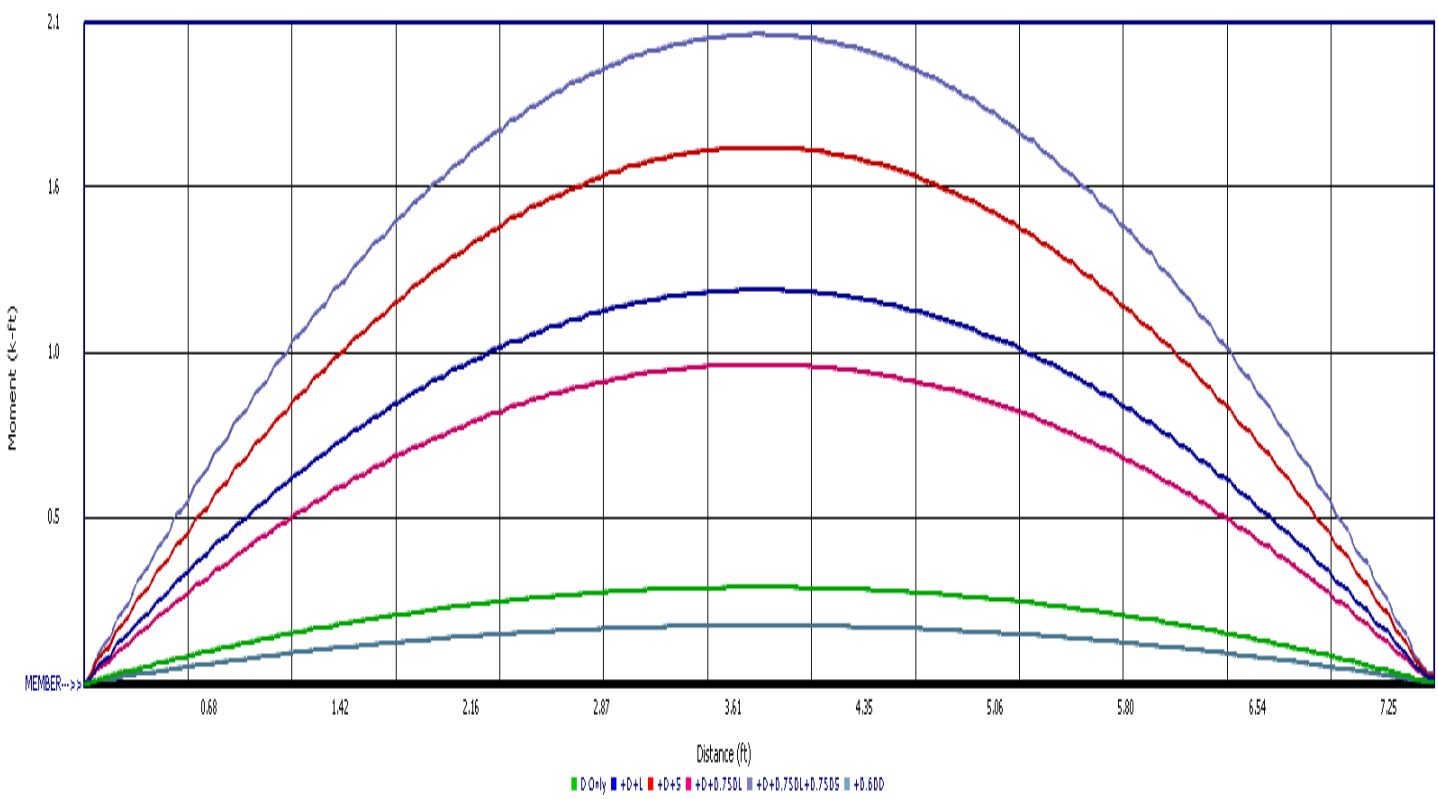
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.1106	3.777		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.088	1.088
Max Upward from Load Combinations	1.088	1.088
Max Upward from Load Cases	0.738	0.738
D Only	0.161	0.161
+D+L	0.659	0.659
+D+S	0.899	0.899
+D+0.750L	0.535	0.535
+D+0.750L+0.750S	1.088	1.088
+0.60D	0.096	0.096
L Only	0.499	0.499
S Only	0.738	0.738

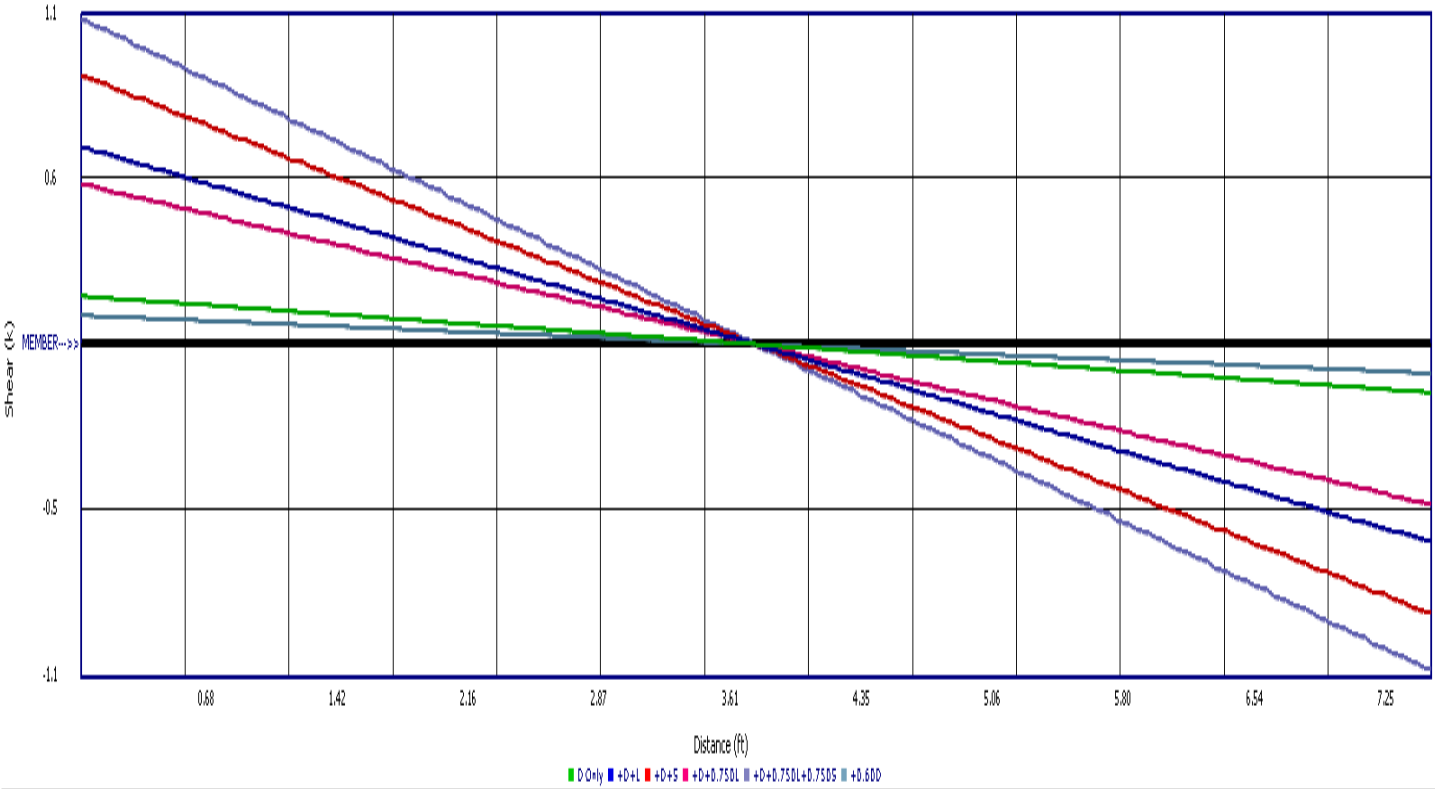


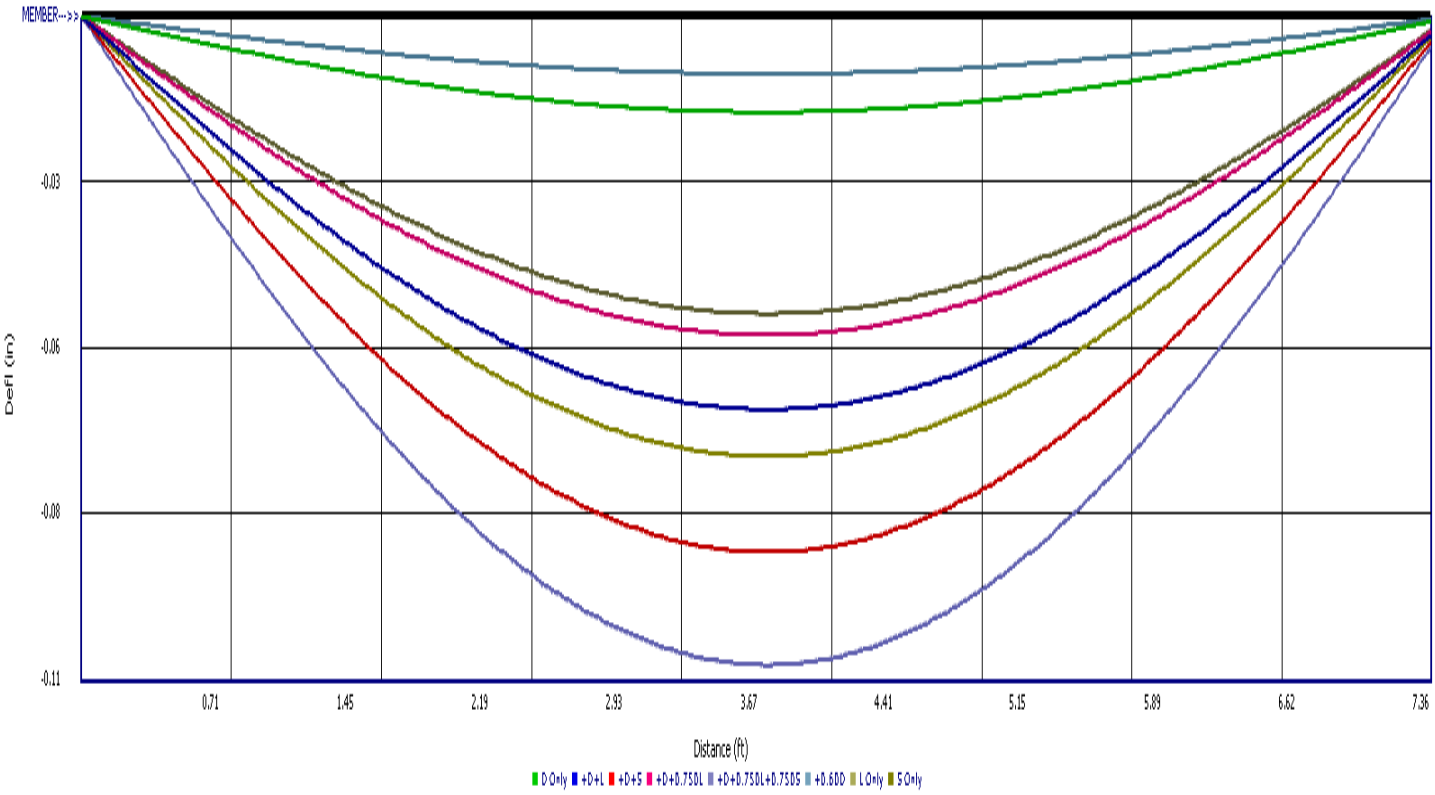
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: MECH LOW ROOF JOISTS (4B5)





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

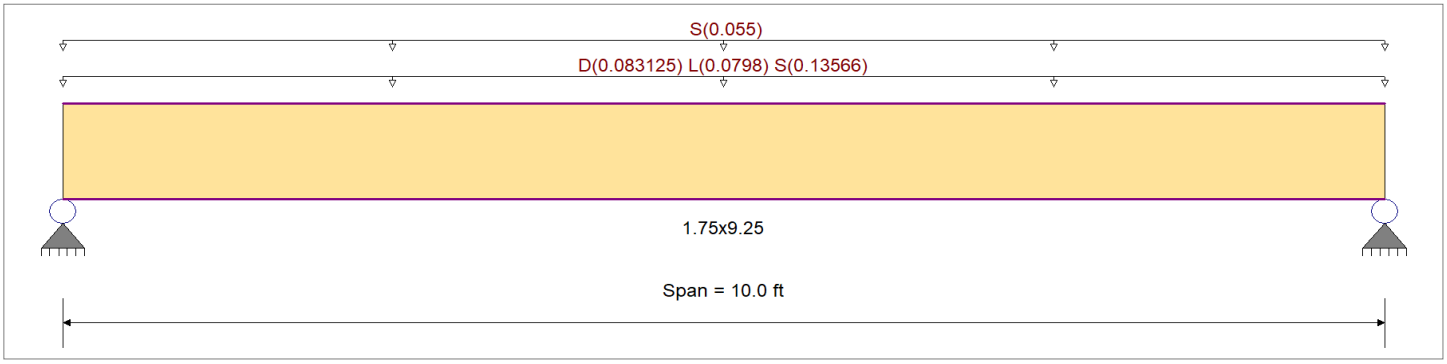
DESCRIPTION: Deck Joists (4B4)

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,800.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2,800.0 psi	Ebend- xx	2,000.0 ksi
		Fc - Prll	1,400.0 psi	Eminbend - xx	580.0 ksi
Wood Species :	PWT Treated LVL	Fc - Perp	850.0 psi		
Wood Grade :		Fv	285.0 psi		
		Ft	500.0 psi	Density	30.590 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling			Repetitive Member Stress Increase	



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Uniform Load : D = 0.06250, L = 0.060, S = 0.1020 ksf, Tributary Width = 1.330 ft, (Deck)
Uniform Load : S = 0.0550 , Tributary Width = 1.0 ft, (Drift Surcharge)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.521** : 1	Maximum Shear Stress Ratio	=	**0.398** : 1
Section used for this span		**1.75x9.25**	Section used for this span		**1.75x9.25**
fb: Actual	=	1,739.53 psi	fv: Actual	=	113.54 psi
F'b	=	3,336.02 psi	F'v	=	285.00 psi
Load Combination		+D+0.750L+0.750S	Load Combination		+D+0.750L+0.750S
Location of maximum on span	=	5.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.187 in	Ratio =	641	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.284 in	Ratio =	422	>=240	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.173	0.132	0.90	1.00	1.00	1.00	1.036	1.00	1.00	1.15	1.08	520.3	3,002.4	0.37	34.0	256.5
+D+L					1.00	1.00	1.00	1.036	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.300	0.229	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.15	2.08	1,000.0	3,336.0	0.70	65.3	285.0
+D+0.750L					1.00	1.00	1.00	1.036	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.211	0.161	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.15	1.83	880.0	4,170.0	0.62	57.4	356.3
+D+0.750L+0.750S					1.00	1.00	1.00	1.036	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.521	0.398	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.15	3.62	1,739.5	3,336.0	1.23	113.5	285.0
+0.60D					1.00	1.00	1.00	1.036	1.00	1.00	1.15			0.0	0.00	0.0	0.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: Deck Joists (4B4)

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 10.0 ft	**1**	0.058	0.045	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.15	0.65	312.2	5,337.6	0.22	20.4	456.0

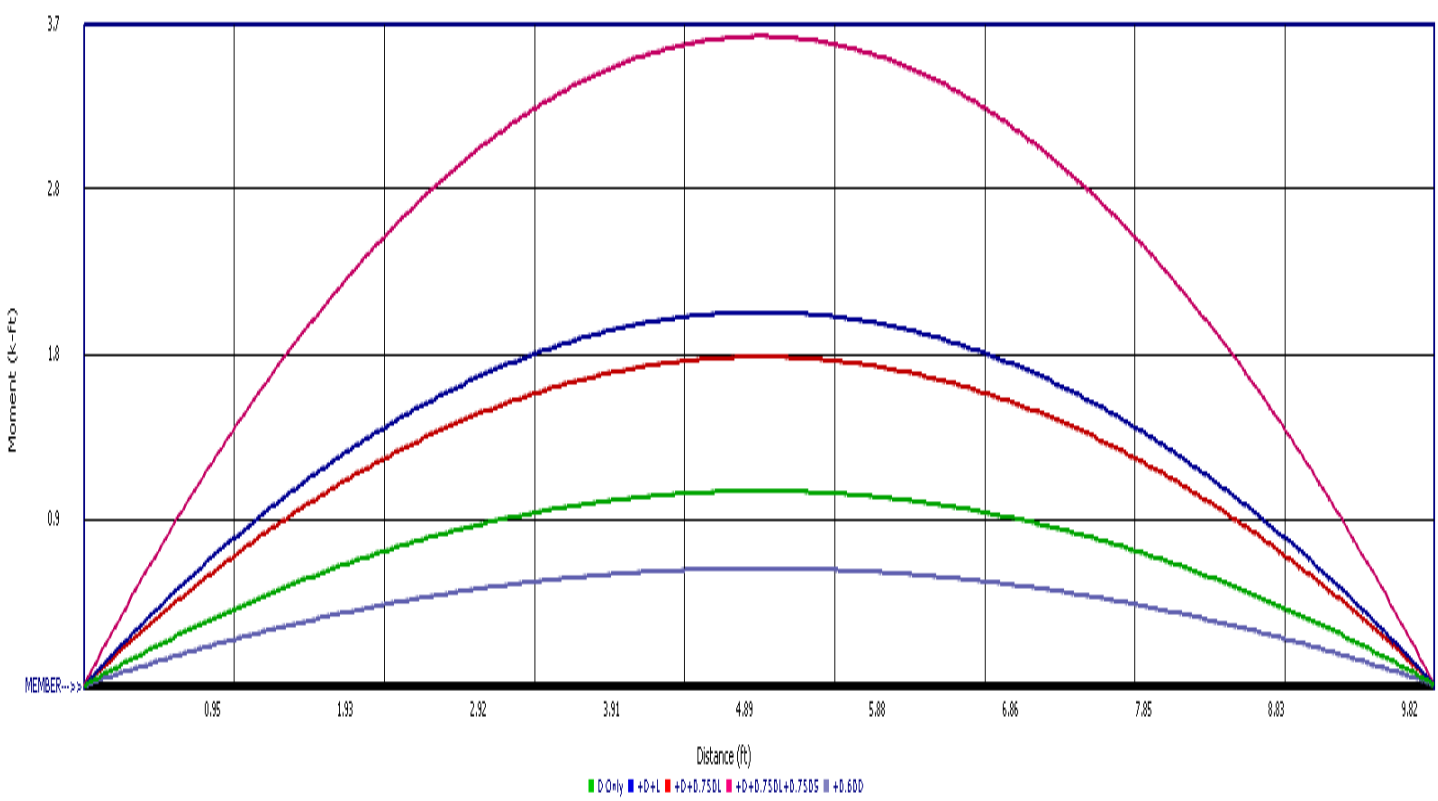
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.2837	5.036		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.447	1.447
Max Upward from Load Combinations	1.447	1.447
Max Upward from Load Cases	0.953	0.953
D Only	0.433	0.433
+D+L	0.832	0.832
+D+S	1.386	1.386
+D+0.750L	0.732	0.732
+D+0.750L+0.750S	1.447	1.447
+0.60D	0.260	0.260
L Only	0.399	0.399
S Only	0.953	0.953

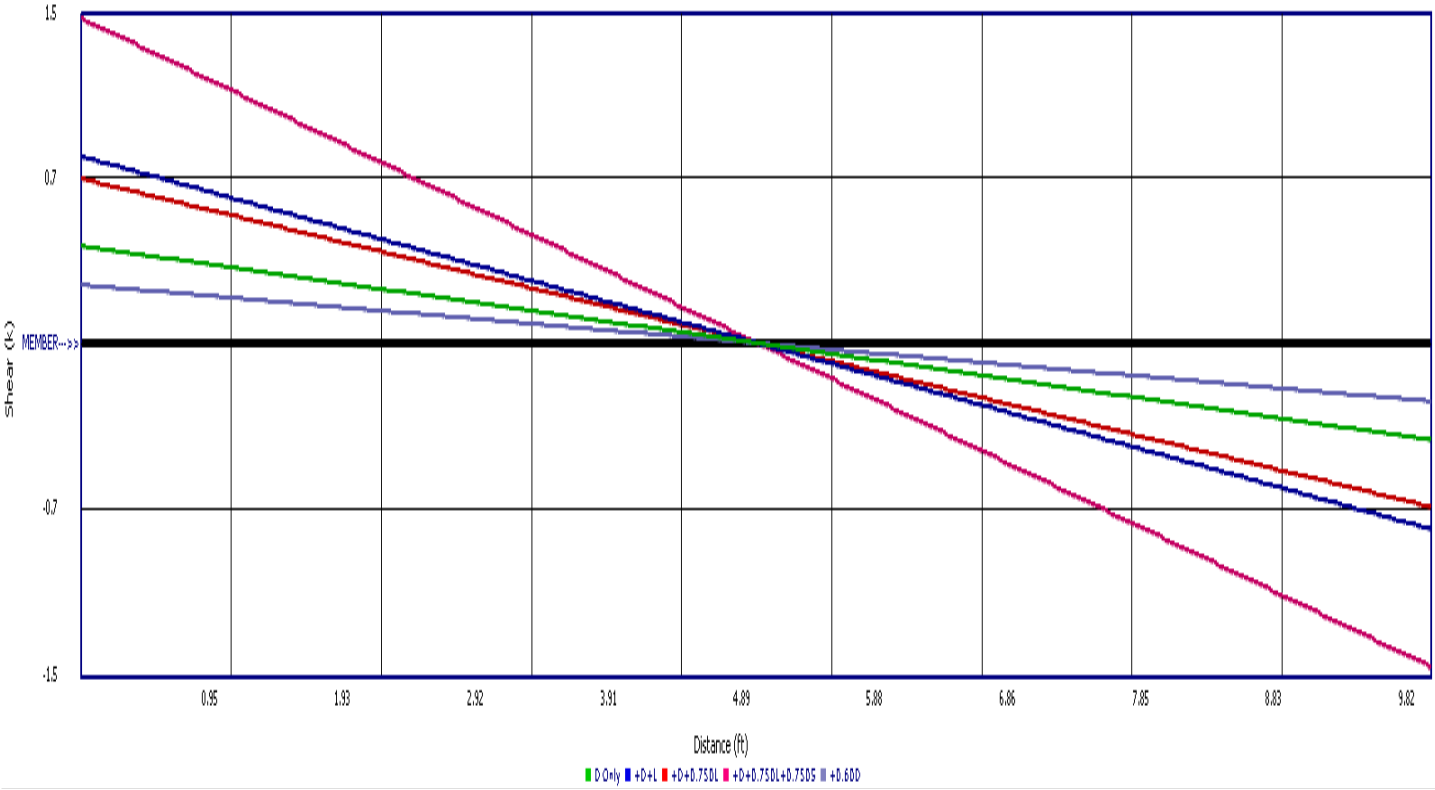


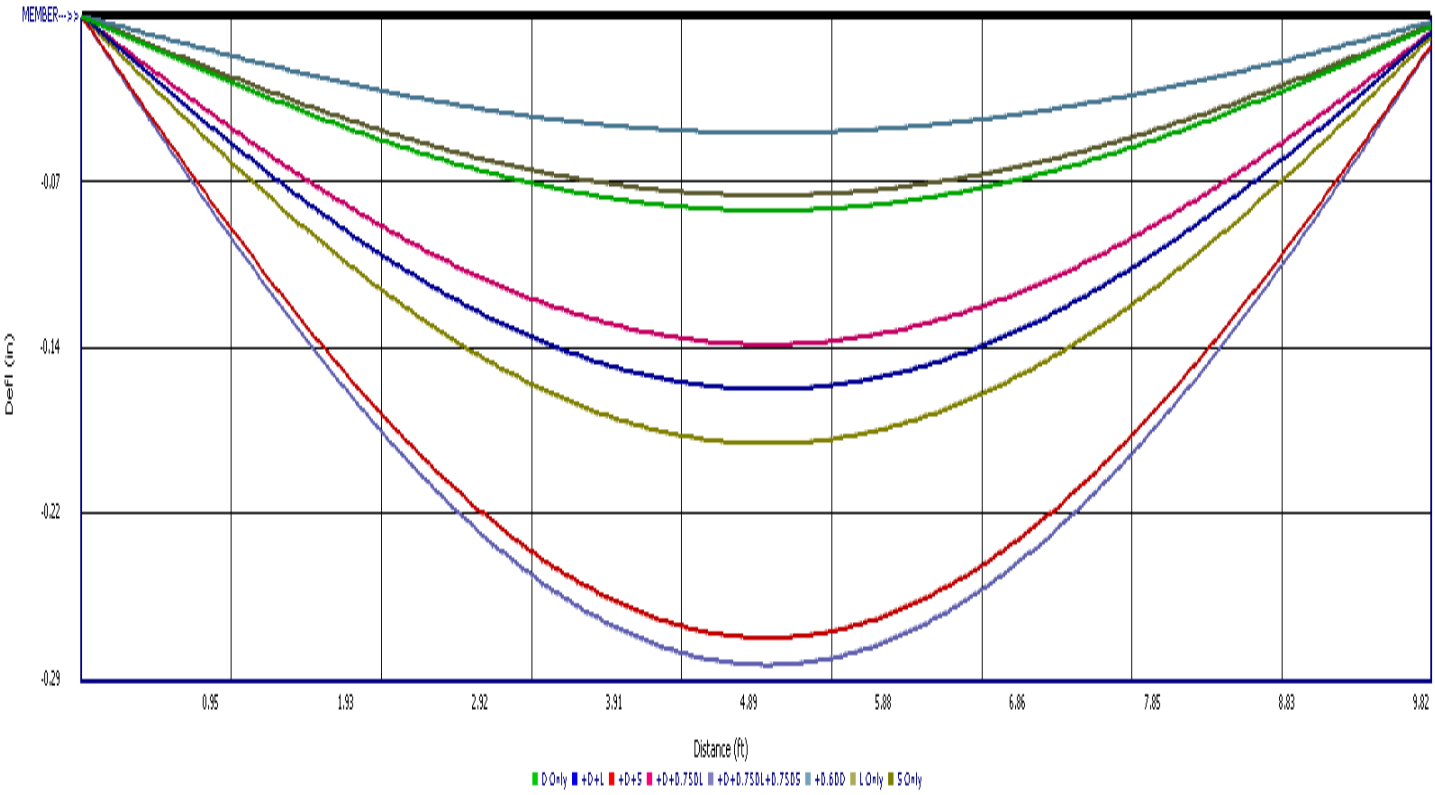
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: Deck Joists (4B4)





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

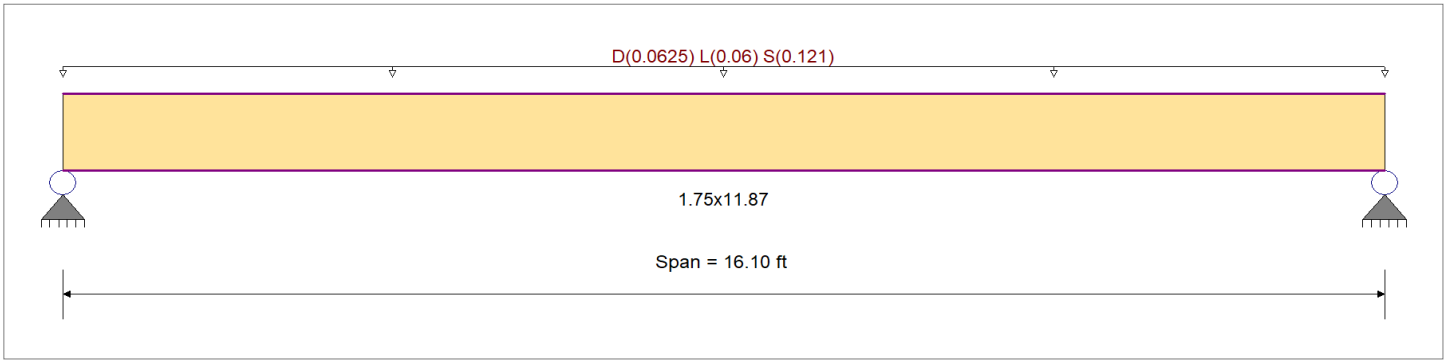
DESCRIPTION: 4B4.1 - ALT Deck Joists (N-S)

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,800.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2,800.0 psi	Ebend- xx	1,900.0 ksi
		Fc - Prll	2,510.0 psi	Eminbend - xx	965.71 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	850.0 psi		
Wood Grade :	PWT Treated LVL	Fv	285.0 psi		
		Ft	1,555.0 psi	Density	42.010 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling			Repetitive Member Stress Increase	



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Uniform Load : D = 0.06250, L = 0.060, S = 0.1210 ksf, Tributary Width = 1.0 ft, (Deck)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.828 : 1	Maximum Shear Stress Ratio	=	0.420 : 1
Section used for this span		**1.75x11.87**	Section used for this span		**1.75x11.87**
fb: Actual	=	1,931.45 psi	fv: Actual	=	104.85 psi
F'b	=	2,332.92 psi	F'v	=	249.38 psi
Load Combination		+D+0.750L+0.750S	Load Combination		+D+0.750L+0.750S
Location of maximum on span	=	8.050 ft	Location of maximum on span	=	15.160 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.476 in	Ratio =	405	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.804 in	Ratio =	240	>=240	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 16.10 ft	1	0.309	0.157	0.90	0.80	1.00	1.00	1.001	1.00	1.00	1.04	2.22	648.2	2,099.6	0.49	35.2	224.4
+D+L					0.80	1.00	1.00	1.001	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 16.10 ft	1	0.521	0.265	1.00	0.80	1.00	1.00	1.001	1.00	1.00	1.04	4.17	1,215.4	2,332.9	0.91	66.0	249.4
+D+0.750L					0.80	1.00	1.00	1.001	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 16.10 ft	1	0.460	0.234	1.00	0.80	1.00	1.00	1.001	1.00	1.00	1.04	3.68	1,073.6	2,332.9	0.81	58.3	249.4
+D+0.750L+0.750S					0.80	1.00	1.00	1.001	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 16.10 ft	1	0.828	0.420	1.00	0.80	1.00	1.00	1.001	1.00	1.00	1.04	6.62	1,931.5	2,332.9	1.45	104.9	249.4
+0.60D					0.80	1.00	1.00	1.001	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 16.10 ft	1	0.104	0.053	1.60	0.80	1.00	1.00	1.001	1.00	1.00	1.04	1.33	388.9	3,732.7	0.29	21.1	399.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B4.1 - ALT Deck Joists (N-S)

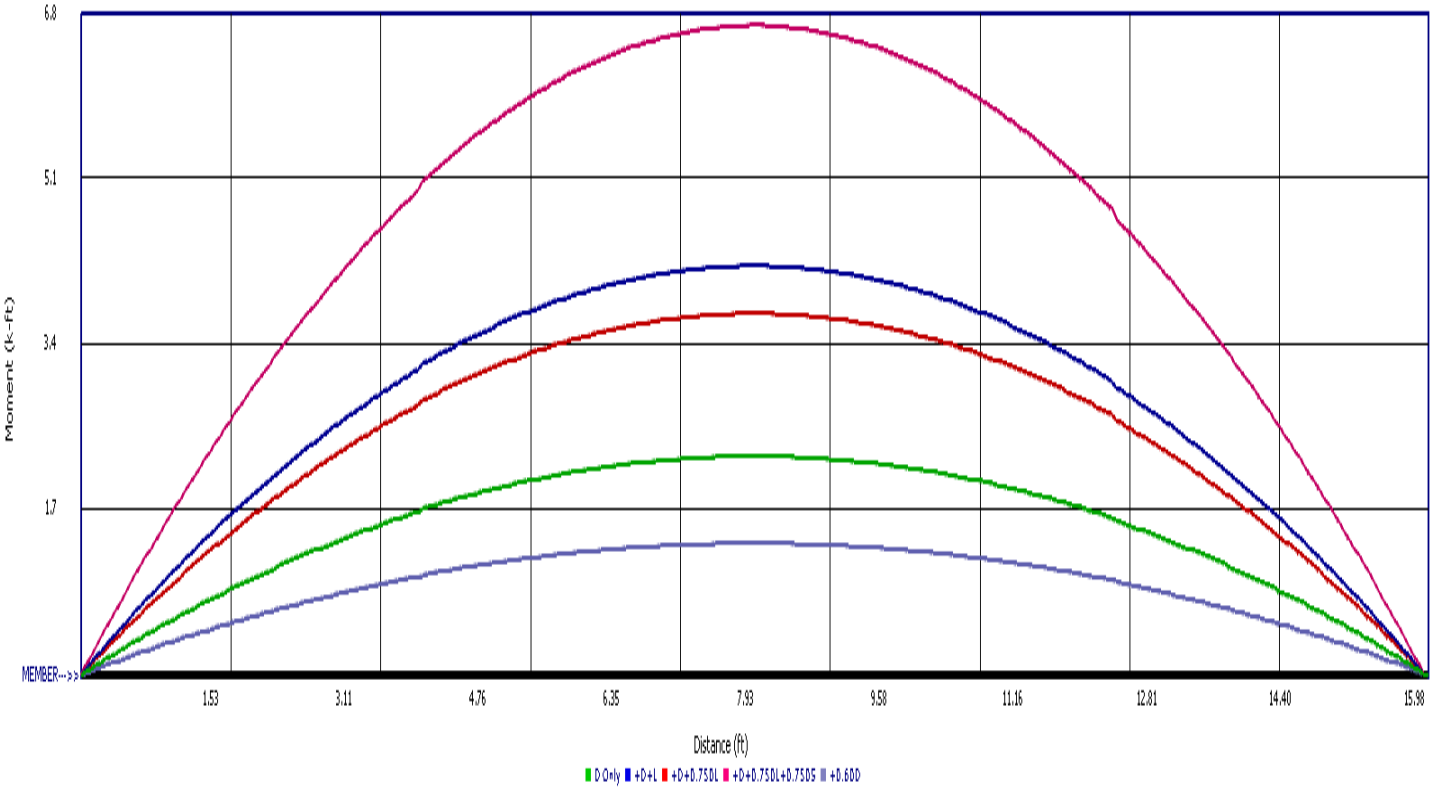
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.8038	8.109		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.645	1.645
Max Upward from Load Combinations	1.645	1.645
Max Upward from Load Cases	0.974	0.974
D Only	0.552	0.552
+D+L	1.035	1.035
+D+S	1.526	1.526
+D+0.750L	0.914	0.914
+D+0.750L+0.750S	1.645	1.645
+0.60D	0.331	0.331
L Only	0.483	0.483
S Only	0.974	0.974

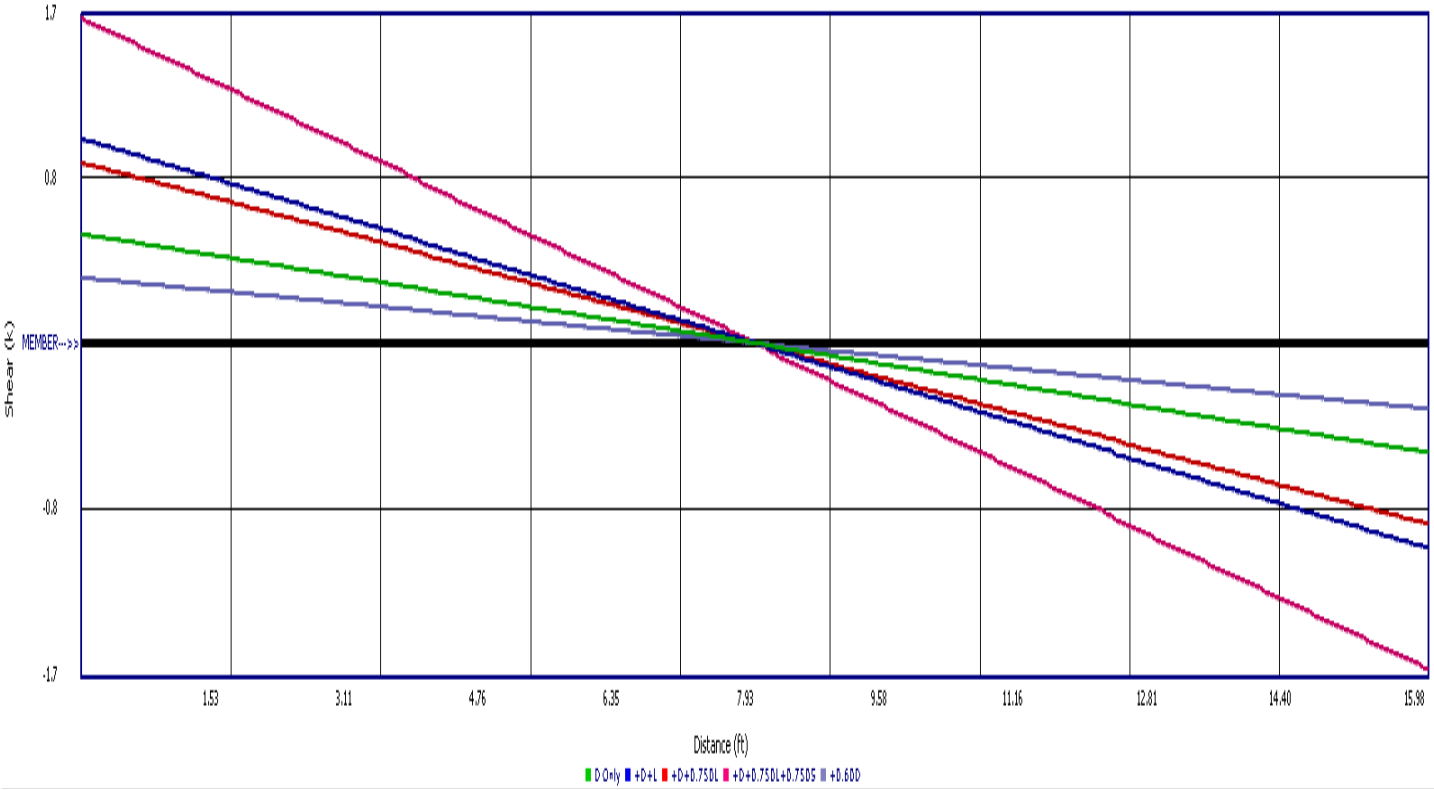


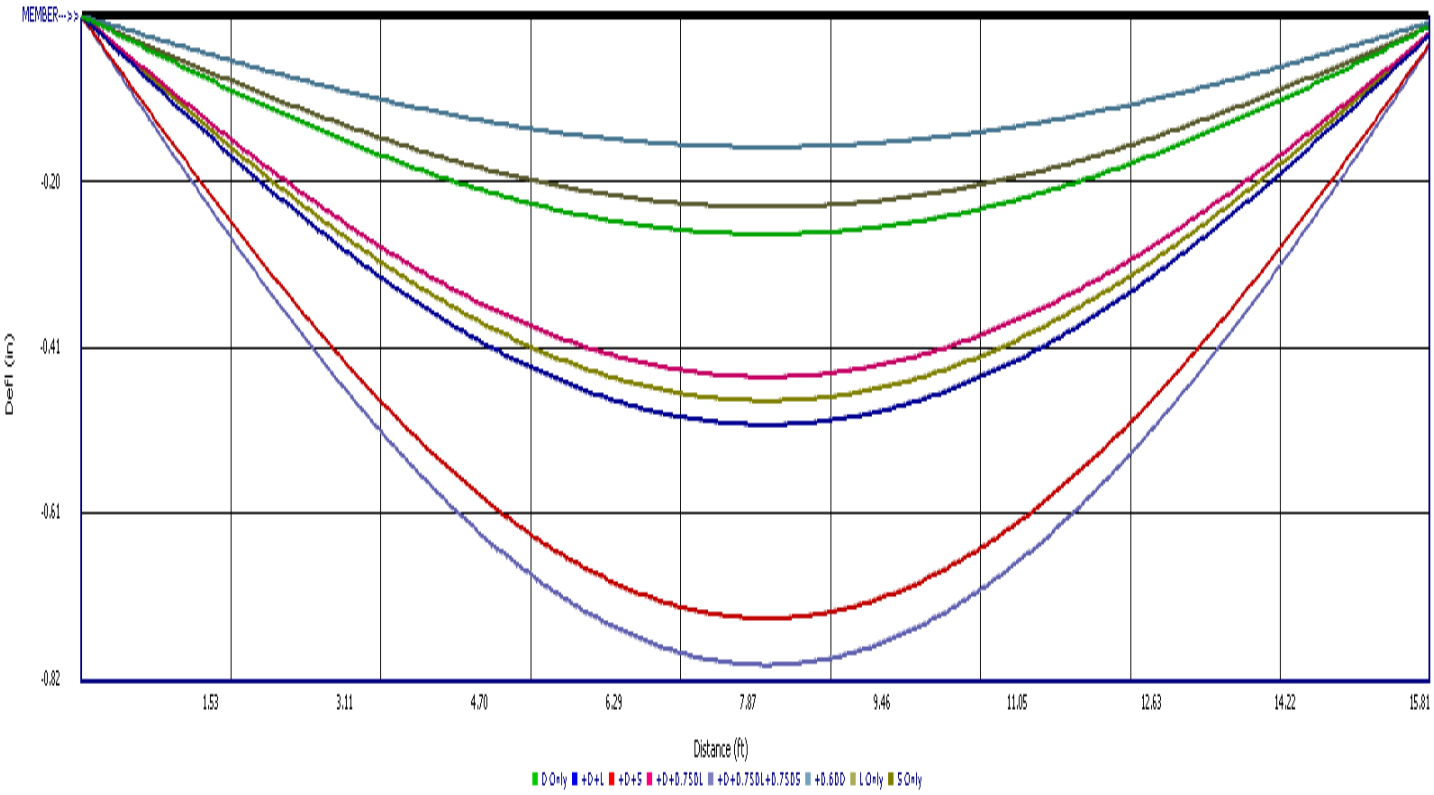
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B4.1 - ALT Deck Joists (N-S)





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

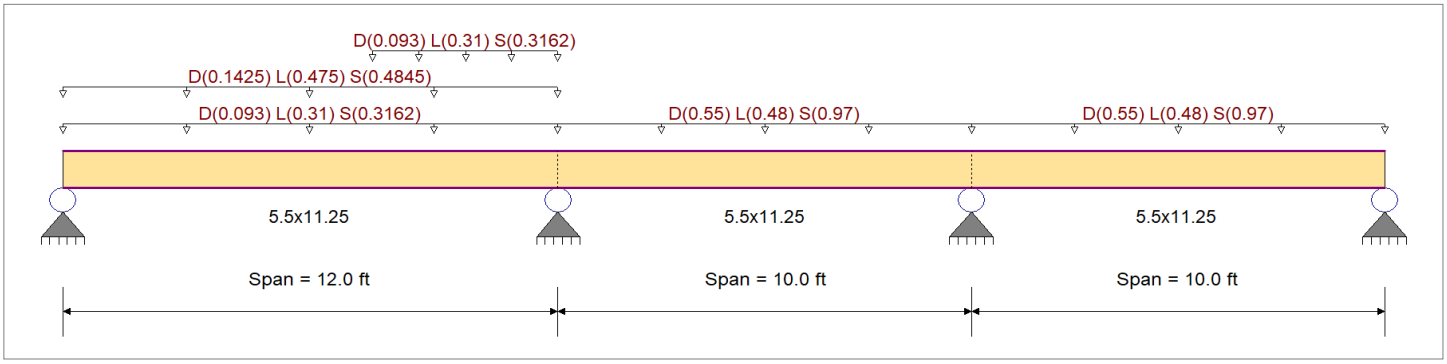
DESCRIPTION: 4B3.1 - ALT Deck Girder (WOOD)

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,000.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2,000.0 psi	Ebend- xx	1,500.0 ksi
		Fc - Prll	1,550.0 psi	Eminbend - xx	790.0 ksi
Wood Species :	AC/AC	Fc - Perp	560.0 psi	Ebend- yy	1,400.0 ksi
Wood Grade :	20F-V13	Fv	265.0 psi	Eminbend - yy	740.0 ksi
		Ft	950.0 psi	Density	28.720 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Load for Span Number 1
Uniform Load : D = 0.030, L = 0.10, S = 0.1020 ksf, Tributary Width = 3.10 ft, (Landing)
Uniform Load : D = 0.030, L = 0.10, S = 0.1020 ksf, Extent = 0.0 -->> 12.0 ft, Tributary Width = 4.750 ft, (Stair)
Uniform Load : D = 0.030, L = 0.10, S = 0.1020 ksf, Extent = 7.50 -->> 12.0 ft, Tributary Width = 3.10 ft, (Stair)
Load for Span Number 2
Uniform Load : D = 0.550, L = 0.480, S = 0.970 , Tributary Width = 1.0 ft, (N-S JOISTS (4B4.1))
Load for Span Number 3
Uniform Load : D = 0.550, L = 0.480, S = 0.970 , Tributary Width = 1.0 ft, (N-S JOISTS (4B4.1))

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.987 : 1	Maximum Shear Stress Ratio	=	0.846 : 1
Section used for this span		**5.5x11.25**	Section used for this span		**5.5x11.25**
fb: Actual	=	2,269.20 psi	fv: Actual	=	257.71 psi
F'b	=	2,300.00 psi	F'v	=	304.75 psi
Load Combination		+D+0.750L+0.750S	Load Combination		+D+0.750L+0.750S
Location of maximum on span	=	12.000 ft	Location of maximum on span	=	11.092 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.253 in	Ratio =	569	>=360	Span: 3 : S Only
Max Upward Transient Deflection	-0.052 in	Ratio =	2294	>=360	Span: 2 : L Only
Max Downward Total Deflection	0.423 in	Ratio =	340	>=240	Span: 3 : +D+0.750L+0.750S
Max Upward Total Deflection	-0.050 in	Ratio =	2422	>=240	Span: 2 : +D+0.750L+0.750S

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.257	0.215	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.47	462.1	1,800.0	2.11	51.2	238.5
Length = 10.0 ft	**2**	0.331	0.286	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.76	595.6	1,800.0	2.82	68.3	238.5
Length = 10.0 ft	**3**	0.331	0.286	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.76	595.6	1,800.0	2.82	68.3	238.5

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B3.1 - ALT Deck Girder (WOOD)

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
+D+L					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.790	0.693	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.28	1,580.8	2,000.0	7.58	183.7	265.0
Length = 10.0 ft	**2**	0.790	0.693	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.28	1,580.8	2,000.0	5.10	183.7	265.0
Length = 10.0 ft	**3**	0.468	0.693	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	9.05	936.5	2,000.0	5.10	183.7	265.0
+D+S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.762	0.622	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	16.95	1,752.9	2,300.0	7.81	189.4	304.8
Length = 10.0 ft	**2**	0.762	0.622	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	16.95	1,752.9	2,300.0	7.67	189.4	304.8
Length = 10.0 ft	**3**	0.664	0.622	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	14.76	1,527.0	2,300.0	7.67	189.4	304.8
+D+0.750L					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.520	0.449	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	12.58	1,301.1	2,500.0	6.14	148.9	331.3
Length = 10.0 ft	**2**	0.520	0.449	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	12.58	1,301.1	2,500.0	4.53	148.9	331.3
Length = 10.0 ft	**3**	0.341	0.449	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	8.23	851.3	2,500.0	4.53	148.9	331.3
+D+0.750L+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.987	0.846	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	21.94	2,269.2	2,300.0	10.63	257.7	304.8
Length = 10.0 ft	**2**	0.987	0.846	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	21.94	2,269.2	2,300.0	8.17	257.7	304.8
Length = 10.0 ft	**3**	0.674	0.846	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	14.98	1,549.9	2,300.0	8.17	257.7	304.8
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.087	0.072	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.68	277.3	3,200.0	1.27	30.7	424.0
Length = 10.0 ft	**2**	0.112	0.097	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.45	357.4	3,200.0	1.69	41.0	424.0
Length = 10.0 ft	**3**	0.112	0.097	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.45	357.4	3,200.0	1.69	41.0	424.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.4227	5.546		0.0000	0.000
	2	0.0000	5.546	L Only	-0.0523	3.361
+D+0.750L+0.750S	3	0.2150	5.546		0.0000	3.361

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

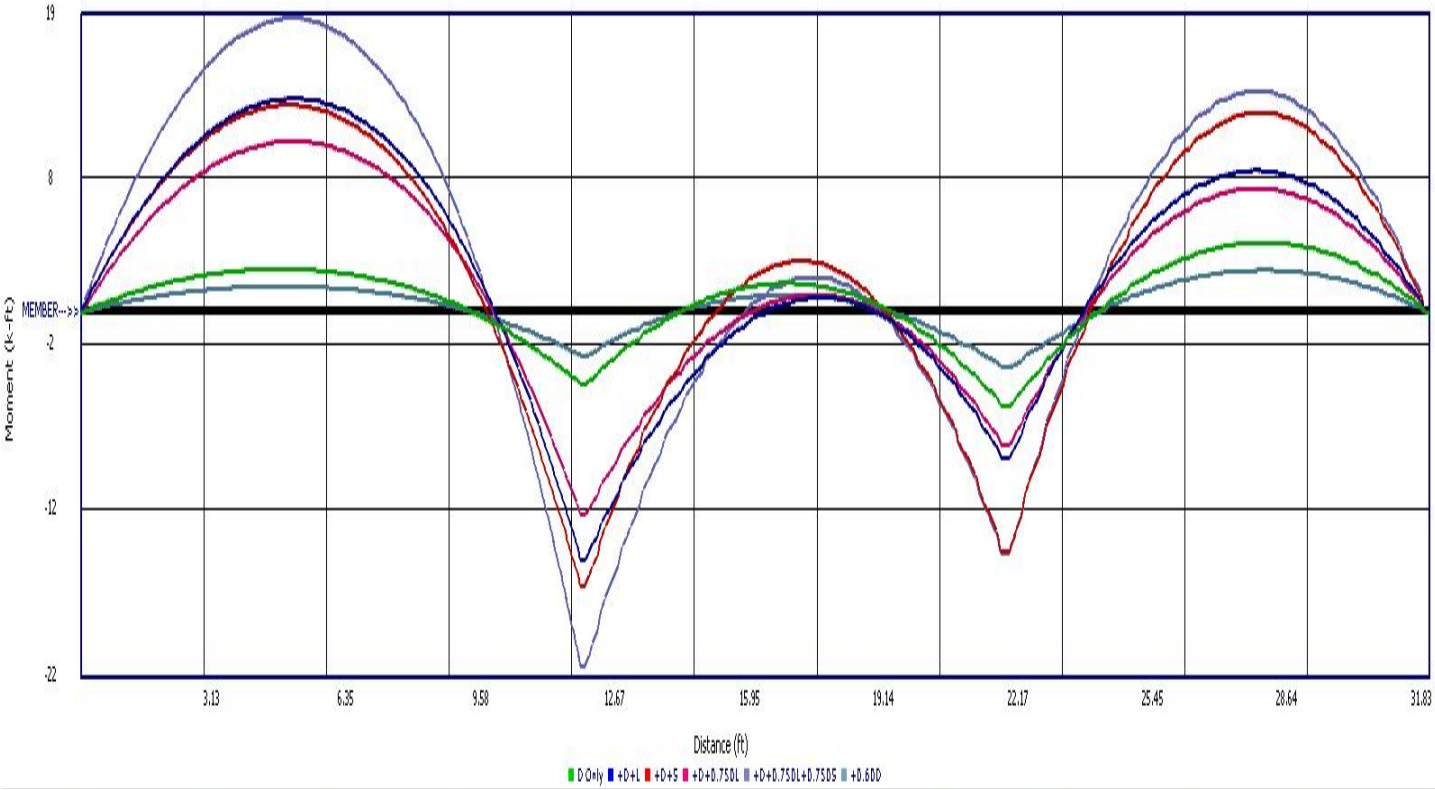
Load Combination	Support 1	Support 2	Support 3	Support 4
Max Upward from all Load Conditions	7.195	21.317	17.178	6.689
Max Upward from Load Combinations	7.195	21.317	17.178	6.689
Max Upward from Load Cases	4.070	12.198	10.253	3.949
D Only	1.119	4.746	6.205	2.174
+D+L	5.189	14.643	10.583	4.245
+D+S	5.150	16.944	16.458	6.124
+D+0.750L	4.172	12.169	9.488	3.727
+D+0.750L+0.750S	7.195	21.317	17.178	6.689
+0.60D	0.672	2.848	3.723	1.305
L Only	4.070	9.897	4.378	2.070
S Only	4.031	12.198	10.253	3.949

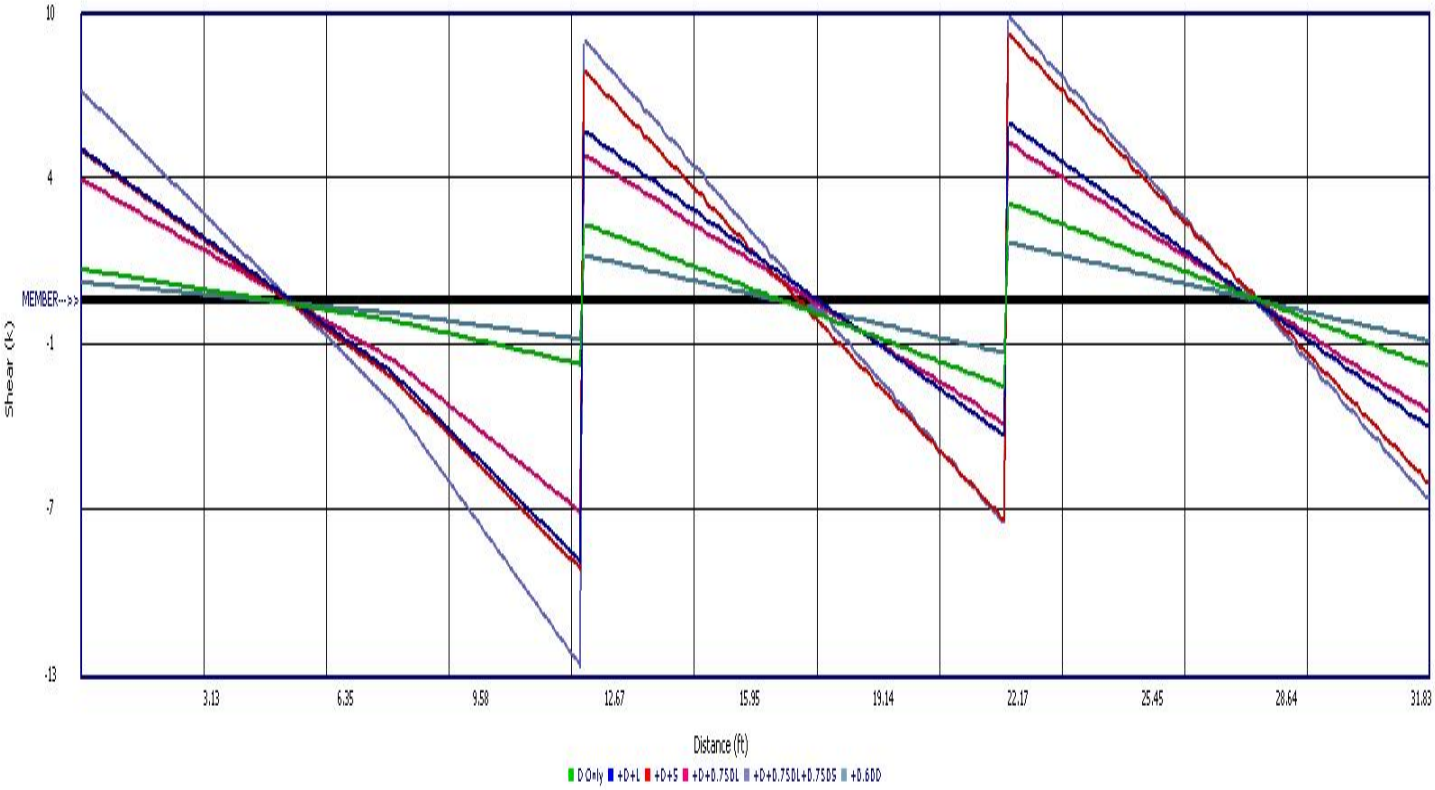
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B3.1 - ALT Deck Girder (WOOD)



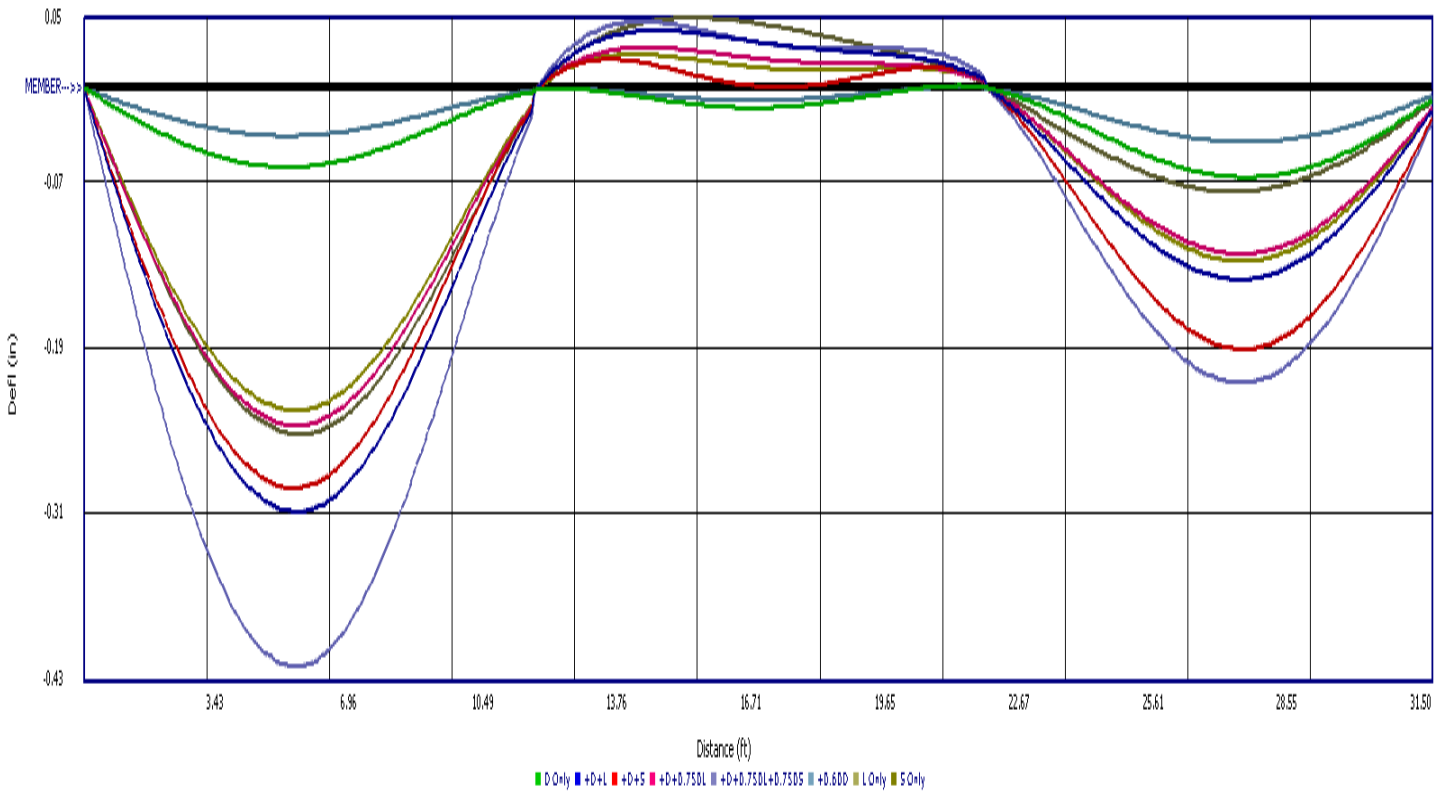


Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B3.1 - ALT Deck Girder (WOOD)



Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: COL_A2.2

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2021

General Information

Analysis Method	Allowable Stress Design	Wood Section Name	**6.75x7.5**
End Fixities	Top & Bottom Pinned	Wood Grading/Manuf.	Western
Overall Column Height	26.5 ft	Wood Member Type	GLB
(Used for non-slender calculations)			
Wood Species	AC/AC	Exact Width	**6.750** in
Wood Grade	20F-V13	Exact Depth	**7.50** in
Fb +	2,000.0 psi	Fv	265.0 psi
Fb -	2,000.0 psi	Ft	950.0 psi
Fc - Prll	1,550.0 psi	Density	28.720 pcf
Fc - Perp	560.0 psi		

Area	50.625 in^2
Ix	237.305 in^4
Iy	192.217 in^4

Allow Stress Modification Factors

Cf or Cv for Bending	N/A
Cf or Cv for Compressio	N/A
Cf or Cv for Tension	N/A
Cm : Wet Use Factor	1.0
Ct : Temperature Fact	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0
Use Cr : Repetitive ?	No

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial
Basic	1,500.0	1,400.0	1,500.0 ksi
Minimum	790.0	740.0	

Column Buckling Condition:
ABOUT X-X Axis: Lux = 12.0 ft, Kx = 1.0
ABOUT Y-Y Axis: Luy = 12.0 ft, Ky = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 267.567 lbs * Dead Load Factor
AXIAL LOADS . . .
Roof Load: Axial Load at 26.50 ft, D = 0.70, S = 3.120 k
Floor 4 Deck: Axial Load at 18.170 ft, D = 0.440, L = 2.10, S = 4.010 k
Floor 3 Deck: Axial Load at 6.50 ft, D = 0.440, L = 2.10, S = 4.010 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.2321 : 1**

Load Combination	+D+0.750L+0.750S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are .	
Applied Axial	13.353 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,136.57 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	26.50 ft
Applied Design Shear	0.0 psi
Allowable Shear	424.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

Bending Compression Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.743	0.03521	PASS	0.0 ft	0.0	PASS	26.50 ft
+D+L	1.000	0.699	0.1102	PASS	0.0 ft	0.0	PASS	26.50 ft
+D+S	1.150	0.638	0.2257	PASS	0.0 ft	0.0	PASS	26.50 ft
+D+0.750L	1.250	0.600	0.08493	PASS	0.0 ft	0.0	PASS	26.50 ft
+D+0.750L+0.750S	1.150	0.638	0.2321	PASS	0.0 ft	0.0	PASS	26.50 ft
+0.60D	1.600	0.491	0.01797	PASS	0.0 ft	0.0	PASS	26.50 ft

Wood Column

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: COL_A2.2

Maximum Reactions

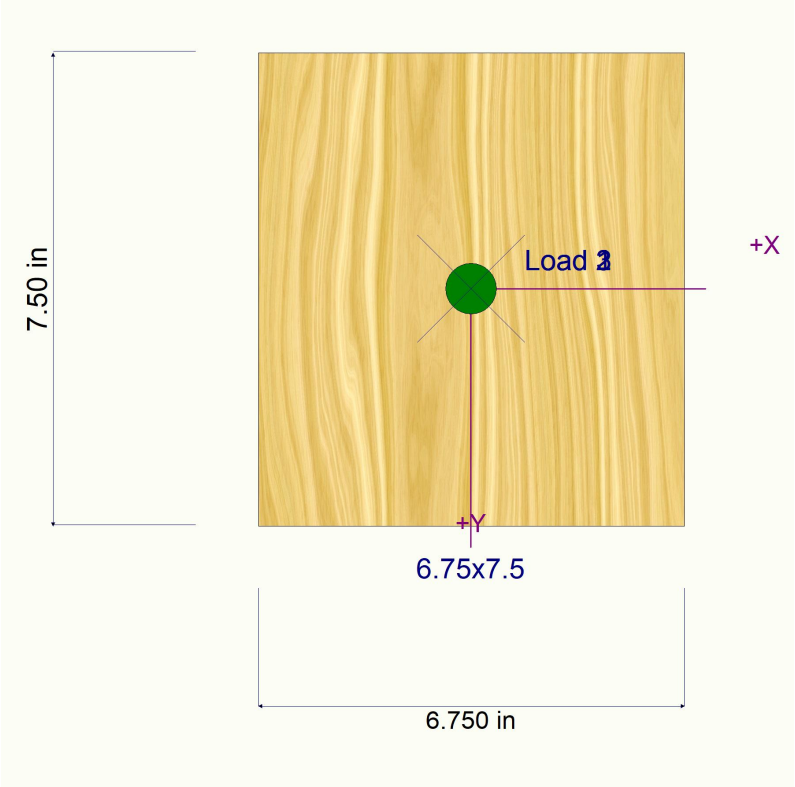
Note: Only non-zero reactions are listed.

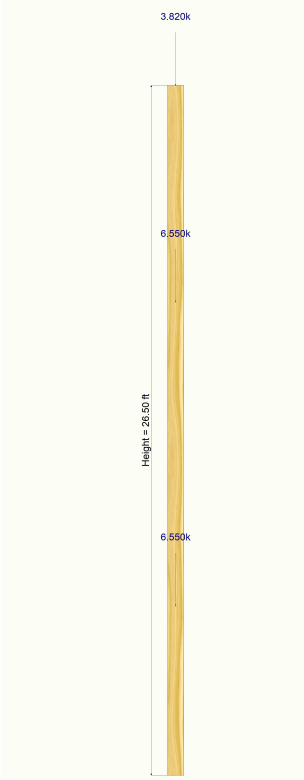
Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
D Only						1.848					
+D+L						6.048					
+D+S						12.988					
+D+0.750L						4.998					
+D+0.750L+0.750S						13.353					
+0.60D						1.109					
L Only						4.200					
S Only						11.140					

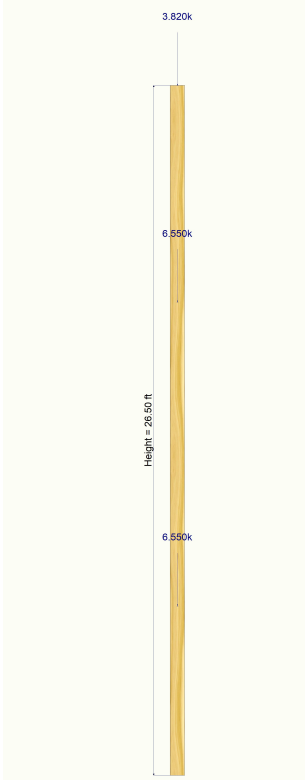
Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+L	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750L	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750L+0.750S	0.0000 in	0.000ft	0.000 in	0.000 ft
+0.60D	0.0000 in	0.000ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000ft	0.000 in	0.000 ft

Sketches







Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

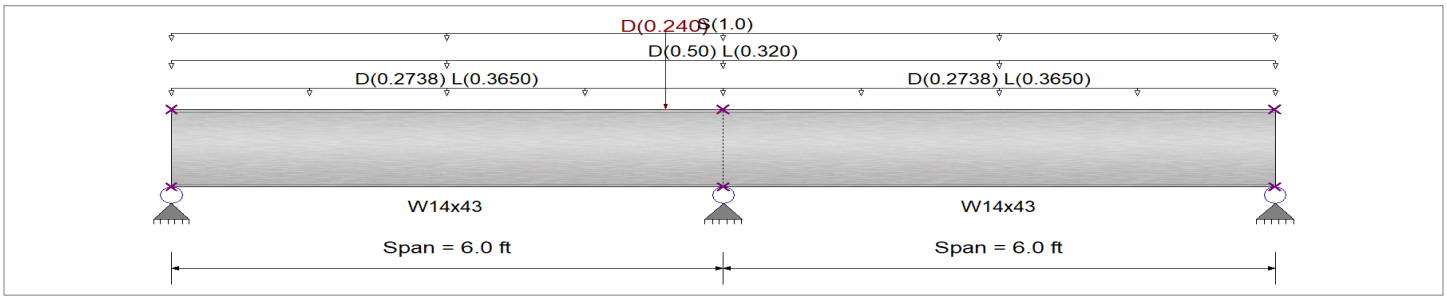
DESCRIPTION: 4B5 - DECK WINDOW HEADER

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Completely Unbraced	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Loads on all spans...
Uniform Load on ALL spans : D = 0.06250, L = 0.040 ksf, Tributary Width = 8.0 ft

Uniform Load on ALL spans : S = 1.0 k/ft

Load for Span Number 1
Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 9.125 ft, (FLOOR)

Point Load : D = 0.240 k @ 5.375 ft, (GIRDER)

Load for Span Number 2
Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 9.125 ft, (FLOOR)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.054 : 1	Maximum Shear Stress Ratio =	0.096 : 1
Section used for this span	**W14x43**	Section used for this span	**W14x43**
Ma : Applied	9.426 k-ft	Va : Applied	8.027 k
Mn / Omega : Allowable	173.653 k-ft	Vn/Omega : Allowable	83.570 k
Load Combination	+D+0.750L+0.750S	Load Combination	+D+0.750L+0.750S
		Location of maximum on span	6.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.002 in	Ratio =	34726	>=180	Span: 2 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0	<180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 6.00 ft	1	0.022	0.039	2.10	-3.74	3.74	290.00	173.65	2.07	1.00	3.29	125.36	83.57
Dsgn. L = 6.00 ft	2	0.022	0.037	2.04	-3.74	3.74	290.00	173.65	2.10	1.00	3.07	125.36	83.57
+D+L													
Dsgn. L = 6.00 ft	1	0.039	0.070	3.83	-6.82	6.82	290.00	173.65	2.08	1.00	5.86	125.36	83.57
Dsgn. L = 6.00 ft	2	0.039	0.068	3.78	-6.82	6.82	290.00	173.65	2.09	1.00	5.64	125.36	83.57
+D+S													
Dsgn. L = 6.00 ft	1	0.047	0.084	4.63	-8.24	8.24	290.00	173.65	2.08	1.00	7.04	125.36	83.57
Dsgn. L = 6.00 ft	2	0.047	0.082	4.57	-8.24	8.24	290.00	173.65	2.09	1.00	6.82	125.36	83.57

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B5 - DECK WINDOW HEADER

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+0.750L													
Dsgn. L = 6.00 ft	1	0.035	0.062	3.40	-6.05	6.05	290.00	173.65	2.08	1.00	5.21	125.36	83.57
Dsgn. L = 6.00 ft	2	0.035	0.060	3.34	-6.05	6.05	290.00	173.65	2.09	1.00	5.00	125.36	83.57
+D+0.750L+0.750S													
Dsgn. L = 6.00 ft	1	0.054	0.096	5.30	-9.43	9.43	290.00	173.65	2.08	1.00	8.03	125.36	83.57
Dsgn. L = 6.00 ft	2	0.054	0.093	5.24	-9.43	9.43	290.00	173.65	2.08	1.00	7.81	125.36	83.57
+0.60D													
Dsgn. L = 6.00 ft	1	0.013	0.024	1.26	-2.24	2.24	290.00	173.65	2.07	1.00	1.97	125.36	83.57
Dsgn. L = 6.00 ft	2	0.013	0.022	1.23	-2.24	2.24	290.00	173.65	2.10	1.00	1.84	125.36	83.57

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.0021	2.544		0.0000	0.000
+D+0.750L+0.750S	2	0.0020	3.480		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Span	Max. Upward Defl	Location in Span
D Only	1	0.0008	2.568		0.0000	0.000
+D+L	1	0.0015	2.544		0.0000	0.000
+D+S	1	0.0018	2.544		0.0000	0.000
+D+0.750L	1	0.0013	2.544		0.0000	0.000
+D+0.750L+0.750S	1	0.0021	2.544		0.0000	0.000
+0.60D	1	0.0005	2.568		0.0000	0.000
L Only	1	0.0007	2.544		0.0000	0.000
S Only	1	0.0010	2.544		0.0000	0.000

Vertical Reactions

Support notation : Far left is #: Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	4.696	15.840	4.671
Max Upward from Load Combinations	4.696	15.840	4.671
Max Upward from Load Cases	2.250	7.500	2.250
D Only	1.852	6.362	1.827
+D+L	3.393	11.499	3.368
+D+S	4.102	13.862	4.077
+D+0.750L	3.008	10.215	2.983
+D+0.750L+0.750S	4.696	15.840	4.671
+0.60D	1.111	3.817	1.096
L Only	1.541	5.137	1.541
S Only	2.250	7.500	2.250

Steel Section Properties : W14x43

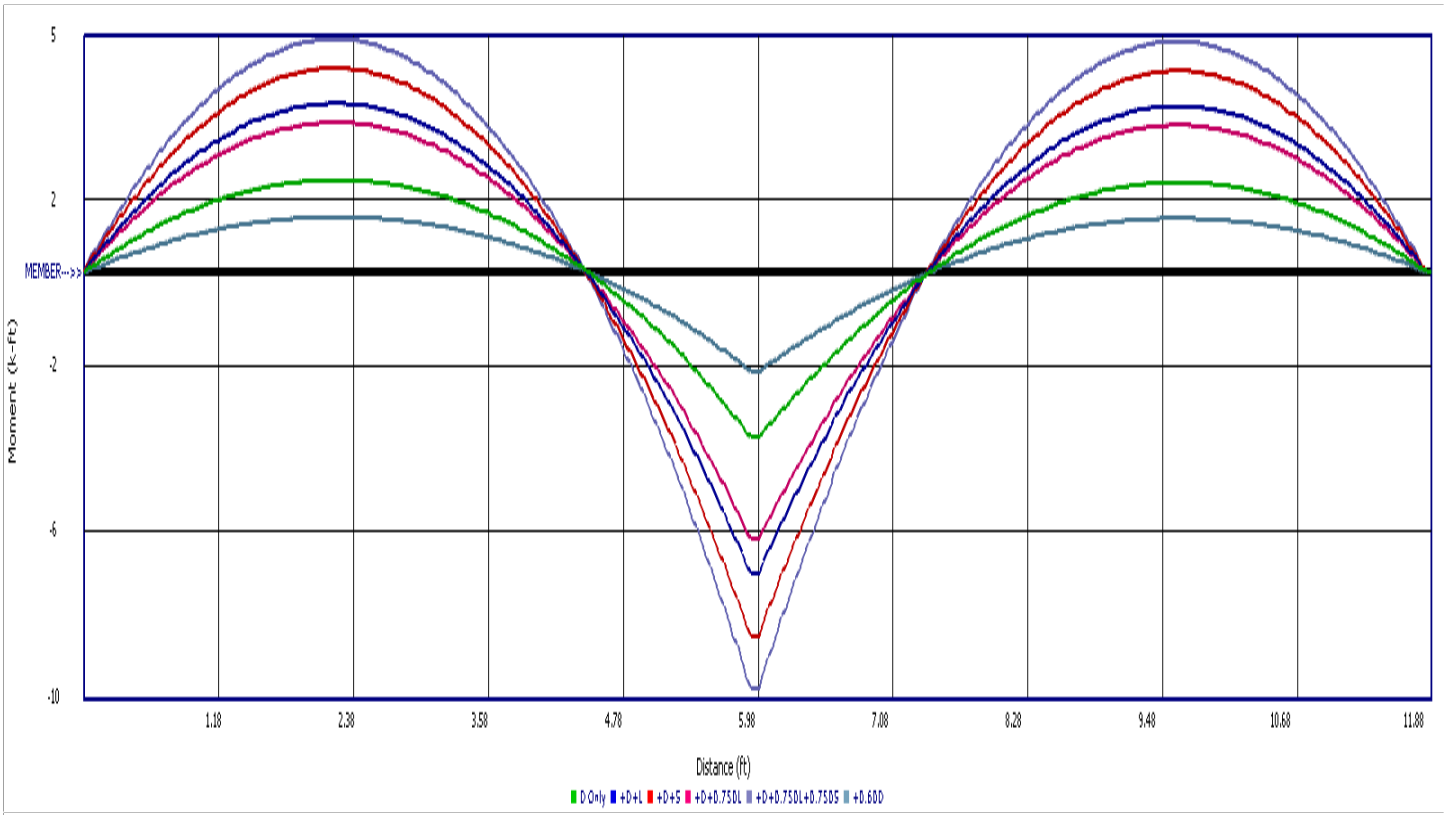
Depth	=	13.700	in	I xx	=	428.00	in^4	J	=	1.050 in^4
Web Thick	=	0.305	in	S xx		62.60	in^3	Cw	=	1,950.00 in^6
Flange Width	=	8.000	in	R xx	=	5.820	in			
Flange Thick	=	0.530	in	Zx	=	69.600	in^3			
Area	=	12.600	in^2	I yy	=	45.200	in^4			
Weight	=	43.000	plf	S yy	=	11.300	in^3	Wno	=	26.300 in^2
Kdesign	=	1.120	in	R yy	=	1.890	in	Sw	=	27.900 in^4
K1	=	1.000	in	Zy	=	17.300	in^3	Qf	=	13.400 in^3
rts	=	2.180	in					Qw	=	34.000 in^3
Ycg	=	6.850	in							

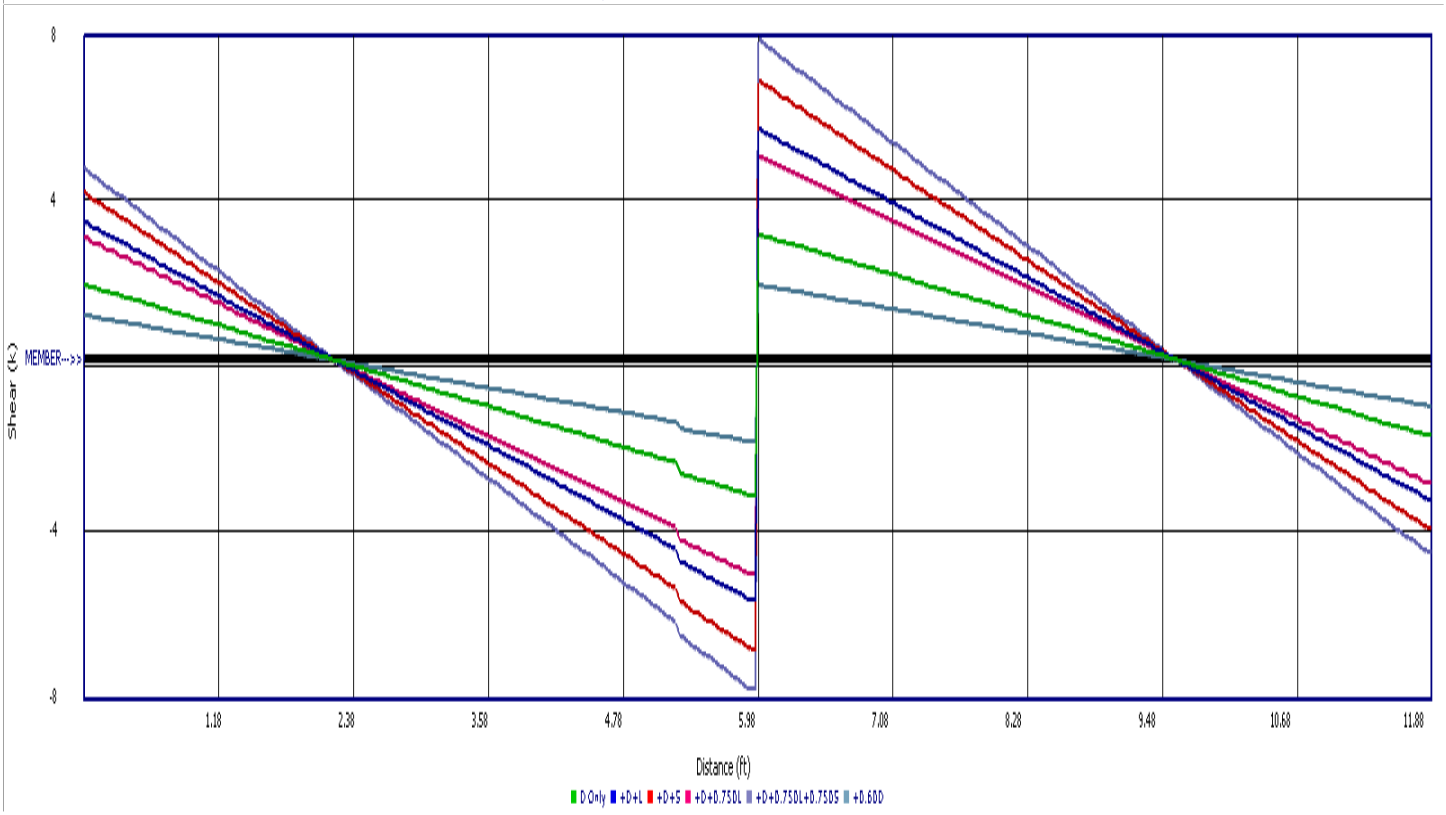
Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B5 - DECK WINDOW HEADER



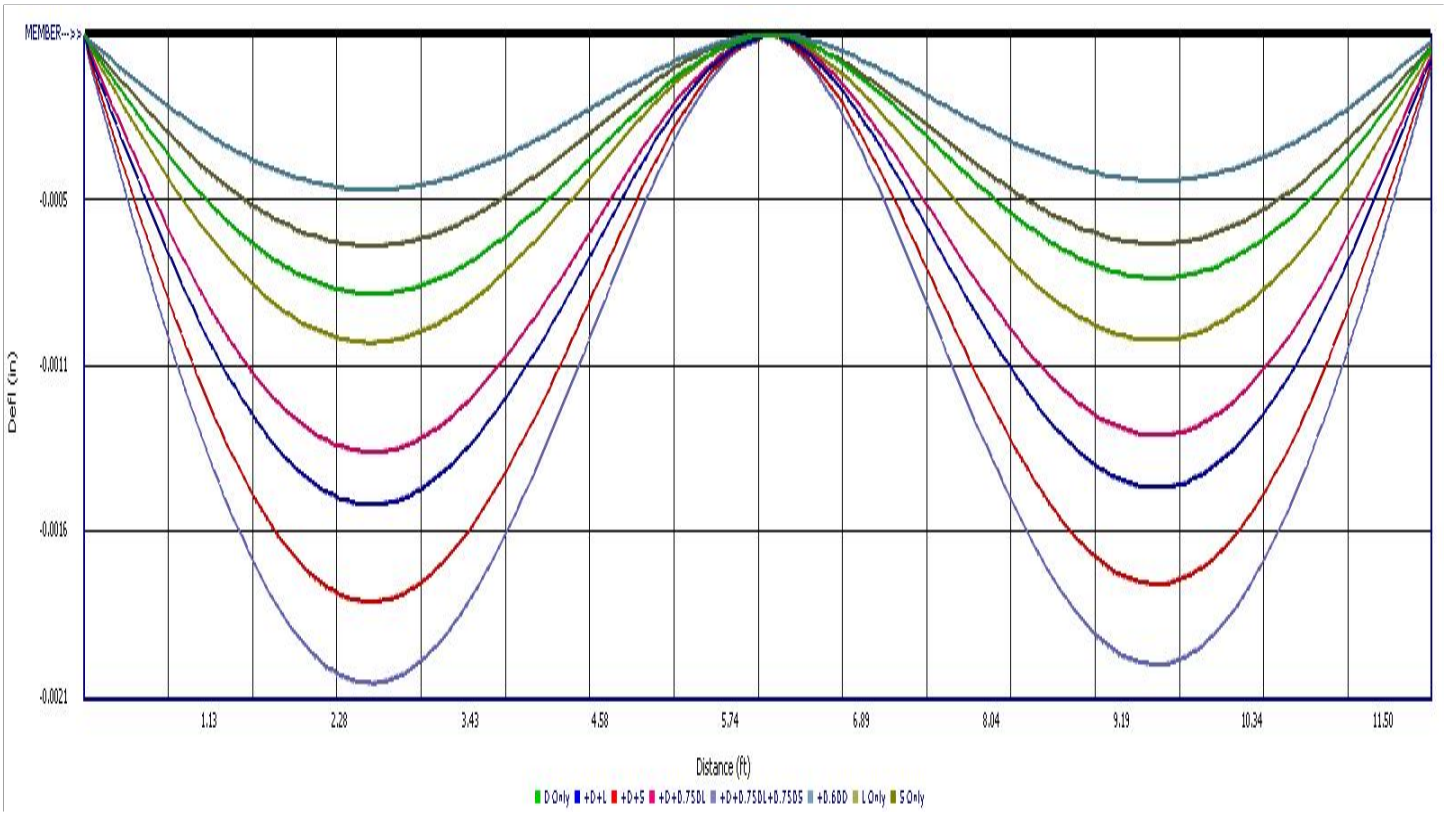


Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B5 - DECK WINDOW HEADER



Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

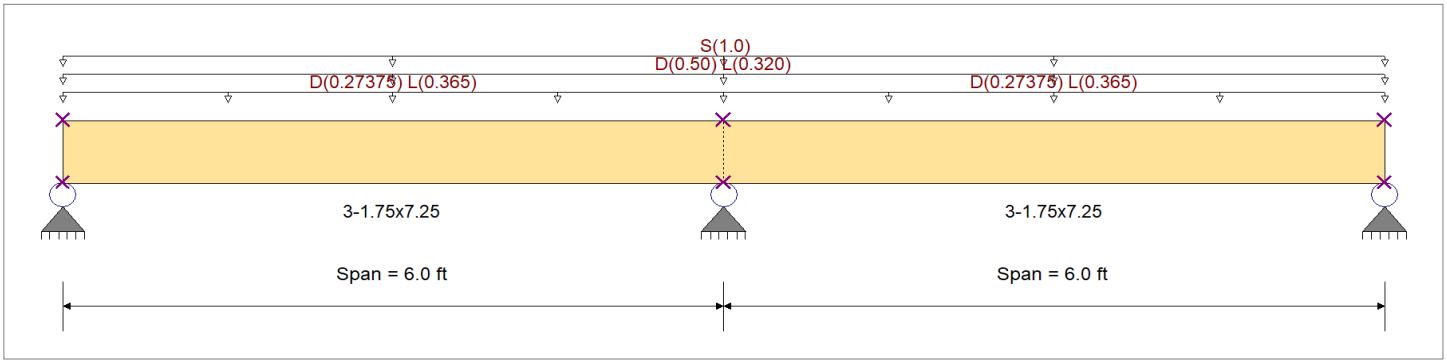
DESCRIPTION: MB5 - DECK WINDOW HEADER

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,600.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2,600.0 psi	Ebend- xx	1,900.0 ksi
		Fc - Prll	2,510.0 psi	Eminbend - xx	965.71 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade :	MicroLam LVL 1.9 E	Fv	285.0 psi		
		Ft	1,555.0 psi	Density	42.010 pcf
Beam Bracing :	Completely Unbraced				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Loads on all spans...
Uniform Load on ALL spans : D = 0.06250, L = 0.040 ksf, Tributary Width = 8.0 ft
Uniform Load on ALL spans : S = 1.0 k/ft
Load for Span Number 1
Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 9.125 ft, (FLOOR)
Load for Span Number 2
Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 9.125 ft, (FLOOR)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.755 : 1	Maximum Shear Stress Ratio	=	0.775 : 1
Section used for this span		**3-1.75x7.25**	Section used for this span		**3-1.75x7.25**
fb: Actual	=	2,405.29 psi	fv: Actual	=	254.04 psi
F'b	=	3,184.29 psi	F'v	=	327.75 psi
Load Combination		+D+0.750L+0.750S	Load Combination		+D+0.750L+0.750S
Location of maximum on span	=	6.000 ft	Location of maximum on span	=	5.397 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.039 in	Ratio =	1860	>=360	Span: 2 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.079 in	Ratio =	908	>=180	Span: 2 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0	<180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.369	0.379	0.90	1.00	1.00	1.00	1.071	1.00	1.00	1.00	3.53	921.5	2,495.3	2.47	97.3	256.5
Length = 6.0 ft	2	0.369	0.379	0.90	1.00	1.00	1.00	1.071	1.00	1.00	1.00	3.53	921.5	2,495.3	2.47	97.3	256.5
+D+L					1.00	1.00	1.00	1.071	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.623	0.640	1.00	1.00	1.00	1.00	1.071	1.00	1.00	1.00	6.61	1,725.8	2,771.1	4.63	182.3	285.0

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: MB5 - DECK WINDOW HEADER

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 6.0 ft	**2**	0.623	0.640	1.00	1.00	1.00	1.00	1.071	1.00	1.00	1.00	6.61	1,725.8	2,771.1	4.63	182.3	285.0
+D+S					1.00	1.00	1.00	1.071	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.0 ft	**1**	0.658	0.675	1.15	1.00	1.00	0.99	1.071	1.00	1.00	1.00	8.03	2,095.6	3,184.3	5.62	221.3	327.8
Length = 6.0 ft	**2**	0.658	0.675	1.15	1.00	1.00	0.99	1.071	1.00	1.00	1.00	8.03	2,095.6	3,184.3	5.62	221.3	327.8
+D+0.750L					1.00	1.00	0.99	1.071	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.0 ft	**1**	0.441	0.452	1.25	1.00	1.00	0.99	1.071	1.00	1.00	1.00	5.84	1,524.7	3,459.3	4.09	161.0	356.3
Length = 6.0 ft	**2**	0.441	0.452	1.25	1.00	1.00	0.99	1.071	1.00	1.00	1.00	5.84	1,524.7	3,459.3	4.09	161.0	356.3
+D+0.750L+0.750S					1.00	1.00	0.99	1.071	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.0 ft	**1**	0.755	0.775	1.15	1.00	1.00	0.99	1.071	1.00	1.00	1.00	9.22	2,405.3	3,184.3	6.45	254.0	327.8
Length = 6.0 ft	**2**	0.755	0.775	1.15	1.00	1.00	0.99	1.071	1.00	1.00	1.00	9.22	2,405.3	3,184.3	6.45	254.0	327.8
+0.60D					1.00	1.00	0.99	1.071	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.0 ft	**1**	0.125	0.128	1.60	1.00	1.00	0.99	1.071	1.00	1.00	1.00	2.12	552.9	4,419.3	1.48	58.4	456.0
Length = 6.0 ft	**2**	0.125	0.128	1.60	1.00	1.00	0.99	1.071	1.00	1.00	1.00	2.12	552.9	4,419.3	1.48	58.4	456.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.0793	2.547		0.0000	0.000
+D+0.750L+0.750S	2	0.0784	3.486		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

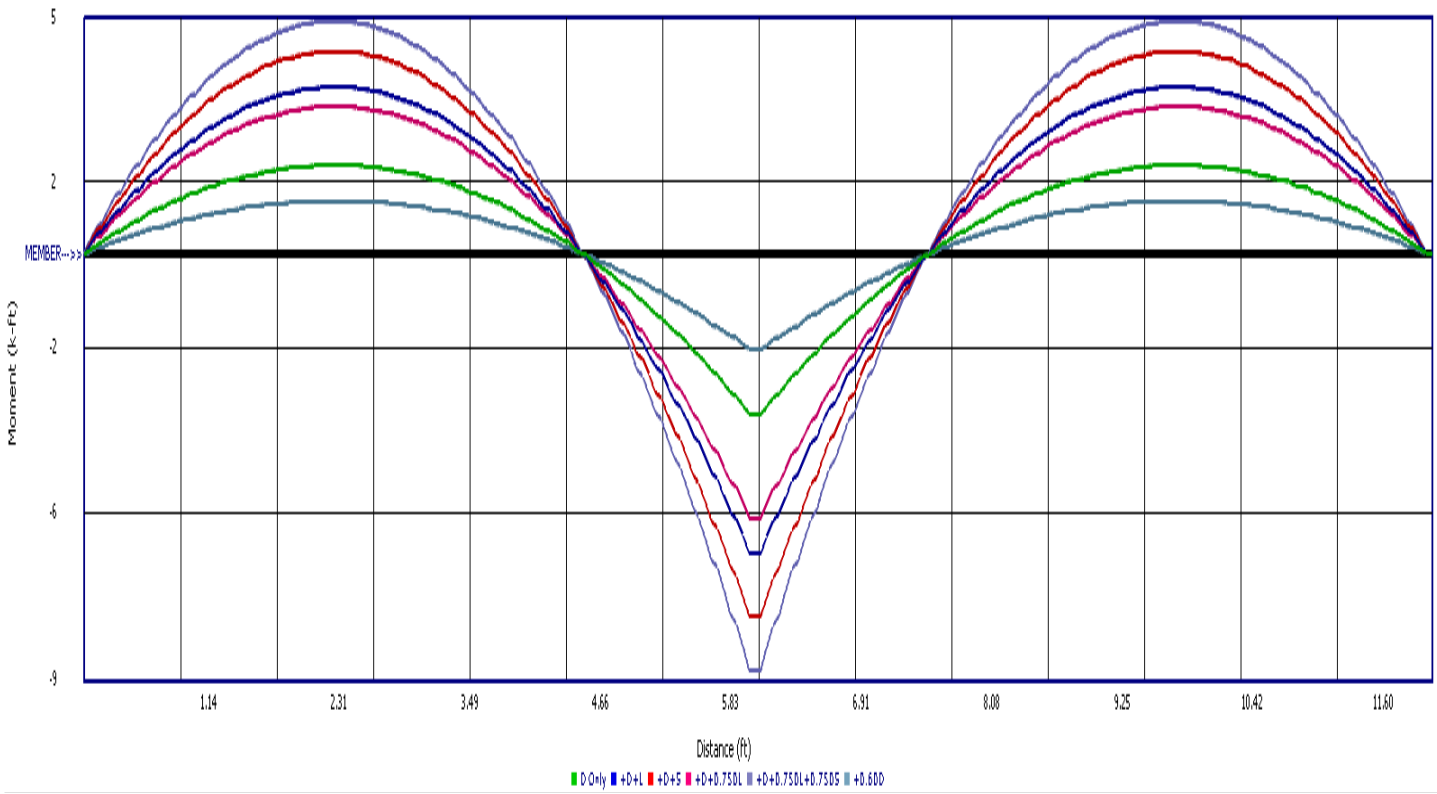
Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	4.609	15.365	4.609
Max Upward from Load Combinations	4.609	15.365	4.609
Max Upward from Load Cases	2.250	7.500	2.250
D Only	1.766	5.886	1.766
+D+L	3.307	11.024	3.307
+D+S	4.016	13.386	4.016
+D+0.750L	2.922	9.740	2.922
+D+0.750L+0.750S	4.609	15.365	4.609
+0.60D	1.060	3.532	1.060
L Only	1.541	5.137	1.541
S Only	2.250	7.500	2.250

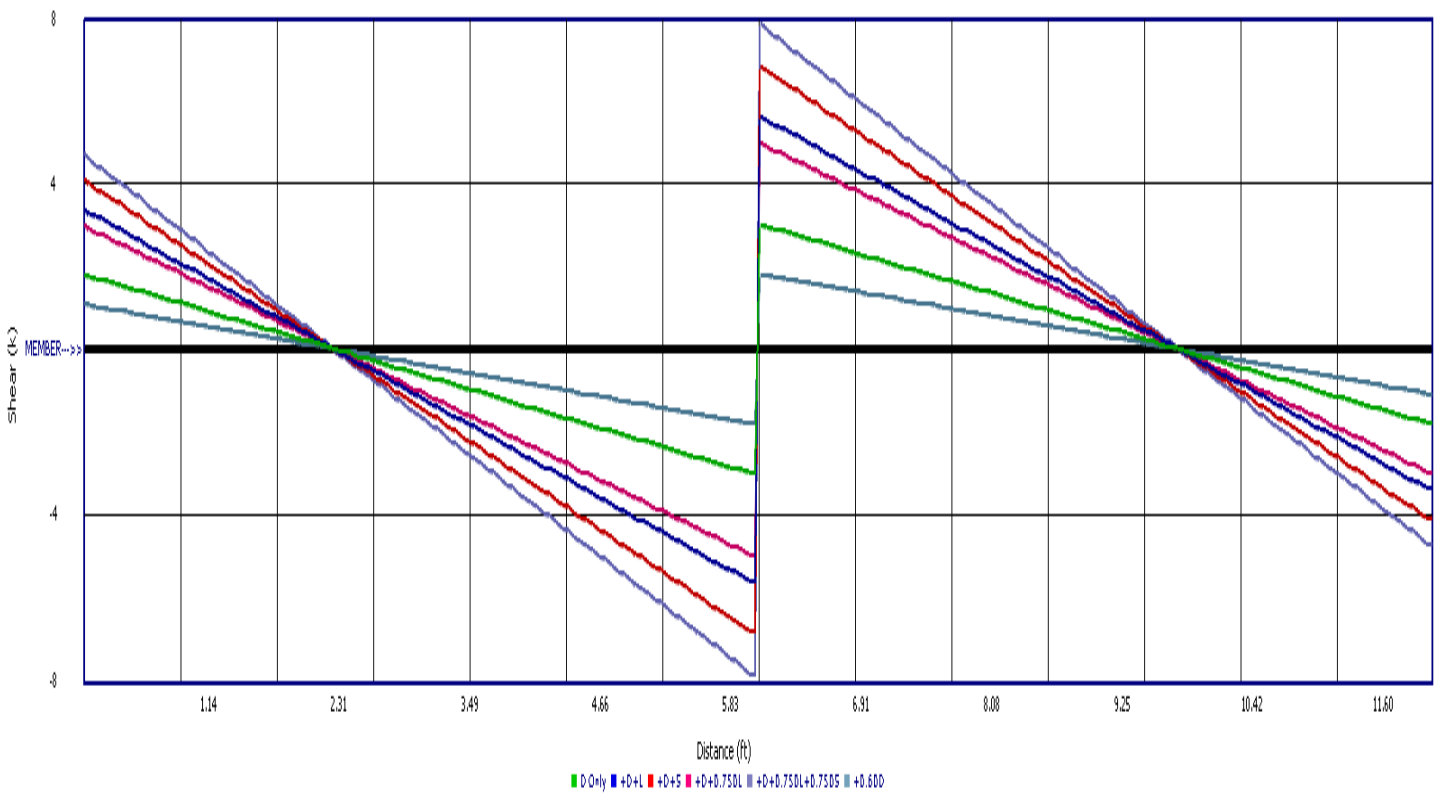
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: MB5 - DECK WINDOW HEADER



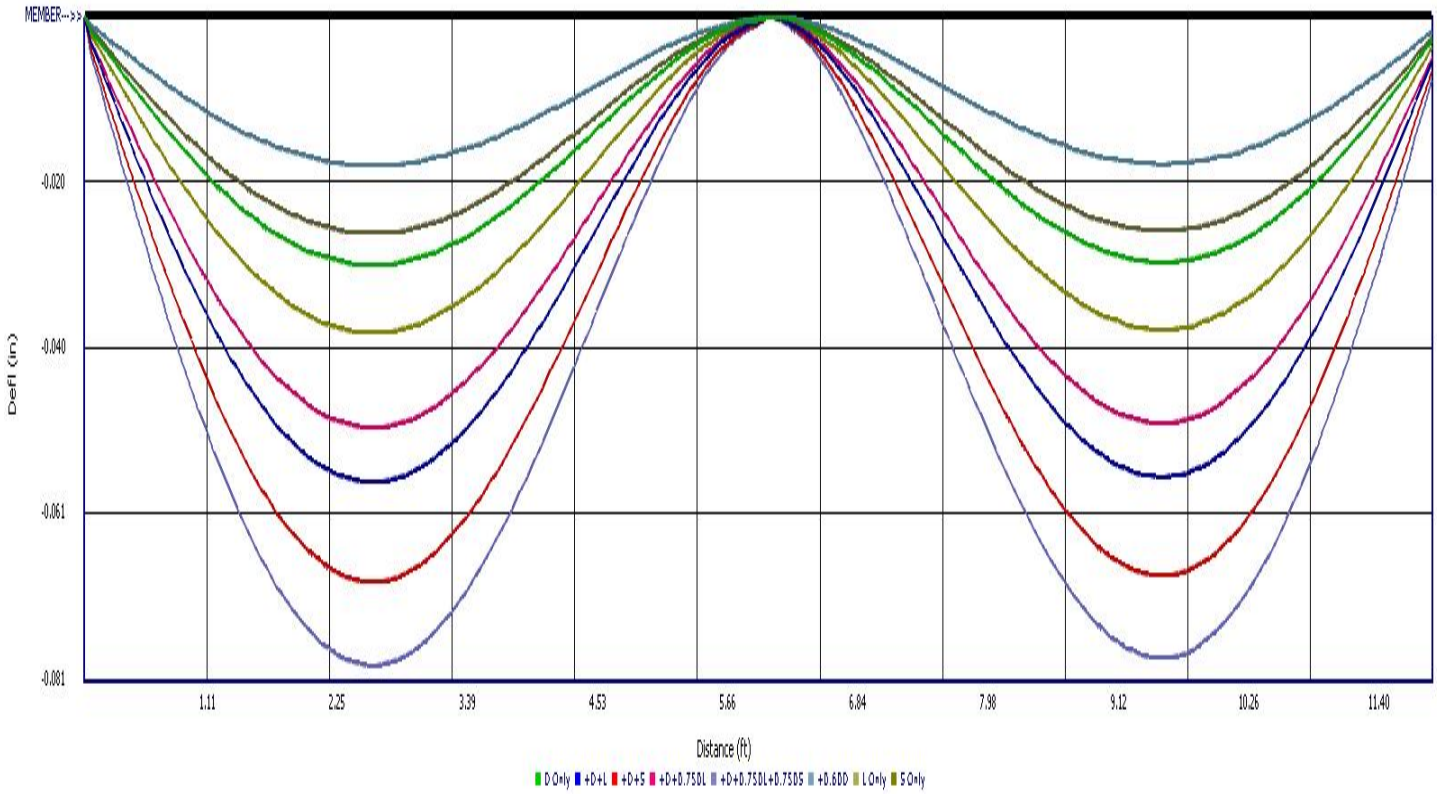


Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: MB5 - DECK WINDOW HEADER



Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

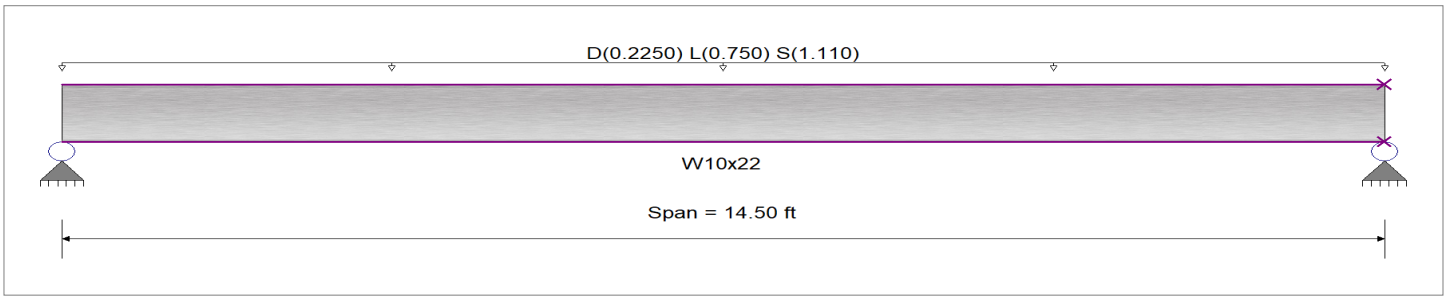
DESCRIPTION: 4B6 - MECH LOW ROOF STEEL

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Uniform Load : D = 0.030, L = 0.10, S = 0.1480 ksf, Tributary Width = 7.50 ft, (LOW ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.665 : 1	Maximum Shear Stress Ratio =	0.243 : 1
Section used for this span	W10x22	Section used for this span	W10x22
Ma : Applied	43.154 k-ft	Va : Applied	11.905 k
Mn / Omega : Allowable	64.870 k-ft	Vn/Omega : Allowable	48.960 k
Load Combination	+D+0.750L+0.750S	Load Combination	+D+0.750L+0.750S
		Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.324 in	Ratio =	536	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.479 in	Ratio =	363	>=240.	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0	<240.0	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values						Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	VnxVnx/Omega
D Only												
Dsgn. L = 14.50 ft	1	0.100	0.037	6.49		6.49	108.33	64.87	1.00	1.00	1.79	73.44	48.96
+D+L												
Dsgn. L = 14.50 ft	1	0.404	0.148	26.20		26.20	108.33	64.87	1.00	1.00	7.23	73.44	48.96
+D+S												
Dsgn. L = 14.50 ft	1	0.550	0.201	35.66		35.66	108.33	64.87	1.00	1.00	9.84	73.44	48.96
+D+0.750L												
Dsgn. L = 14.50 ft	1	0.328	0.120	21.27		21.27	108.33	64.87	1.00	1.00	5.87	73.44	48.96
+D+0.750L+0.750S												
Dsgn. L = 14.50 ft	1	0.665	0.243	43.15		43.15	108.33	64.87	1.00	1.00	11.90	73.44	48.96
+0.60D												
Dsgn. L = 14.50 ft	1	0.060	0.022	3.89		3.89	108.33	64.87	1.00	1.00	1.07	73.44	48.96

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.4794	7.291		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Span	Max. Upward Defl	Location in Span
D Only	1	0.0721	7.291		0.0000	0.000
+D+L	1	0.2911	7.291		0.0000	0.000
+D+S	1	0.3[illegible]	7.291		0.0000	0.000
+D+0.750L	1	0.2364	7.291		0.0000	0.000

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B6 - MECH LOW ROOF STEEL

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Span	Max. Upward Defl	Location in Span
+D+0.750L+0.750S	1	0.4794	7.291		0.0000	0.000
+0.60D	1	0.0433	7.291		0.0000	0.000
L Only	1	0.2190	7.291		0.0000	0.000
S Only	1	0.3241	7.291		0.0000	0.000

Vertical Reactions

Support notation : Far left is #: Values in KIPS

Load Combination	Support 1	Support 2	
Max Upward from all Load Conditions	11.905	11.905	2.250
Max Upward from Load Combinations	11.905	11.905	2.250
Max Upward from Load Cases	8.048	8.048	2.250
Max Downward from all Load Conditions (Resis			2.250
Max Downward from Load Combinations (Resi			2.250
Max Downward from Load Cases (Resisting Up			2.250
D Only	1.791	1.791	2.250
+D+L	7.228	7.228	2.250
+D+S	9.838	9.838	2.250
+D+0.750L	5.869	5.869	2.250
+D+0.750L+0.750S	11.905	11.905	2.250
+0.60D	1.074	1.074	2.250
L Only	5.438	5.438	2.250
S Only	8.048	8.048	2.250

Steel Section Properties : W10x22

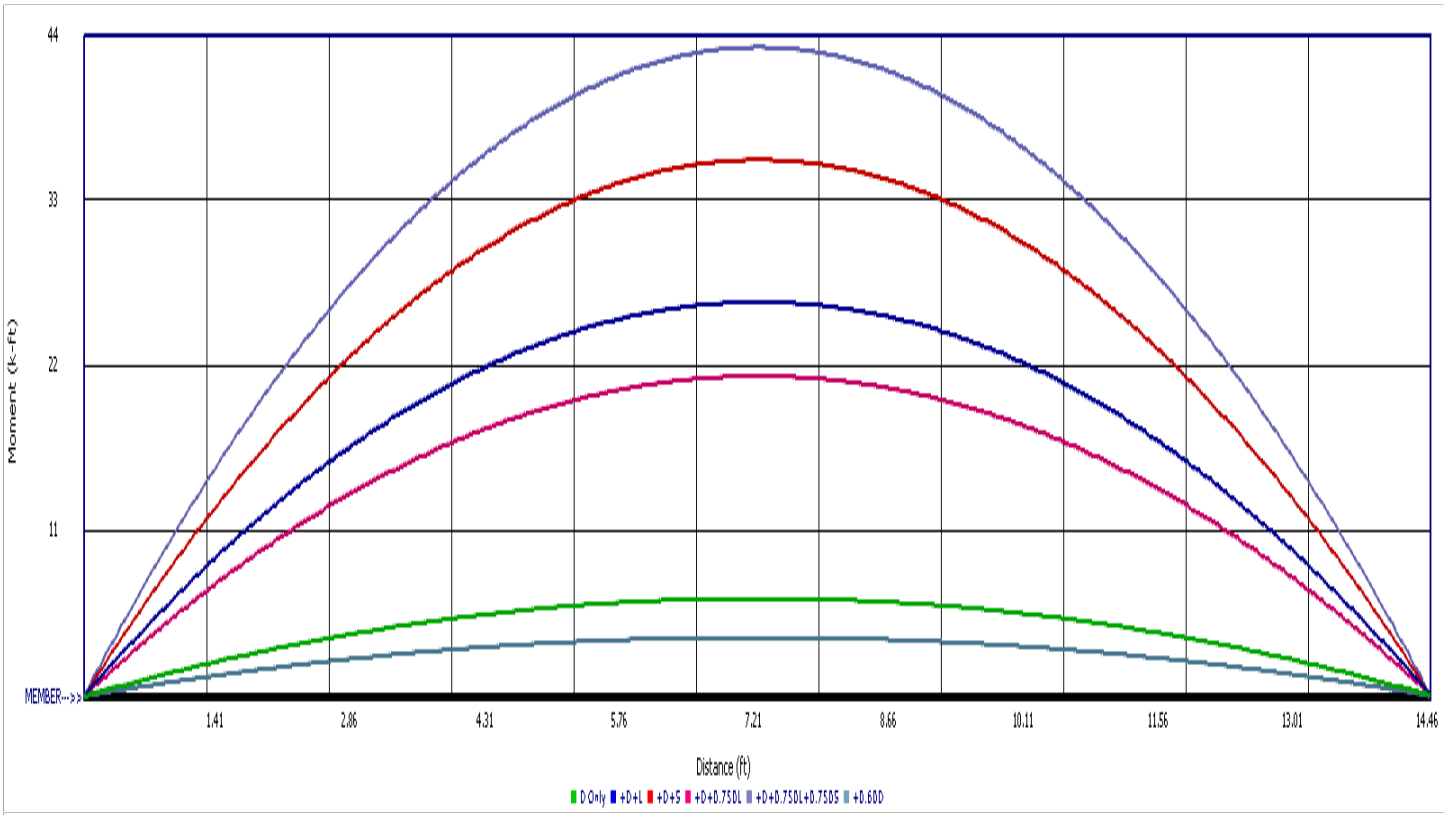
Depth	=	10.200	in	I xx	=	118.00	in^4	J	=	0.239	in^4
Web Thick	=	0.240	in	S xx		23.20	in^3	Cw	=	275.00	in^6
Flange Width	=	5.750	in	R xx	=	4.270	in				
Flange Thick	=	0.360	in	Zx	=	26.000	in^3				
Area	=	6.490	in^2	I yy	=	11.400	in^4				
Weight	=	22.000	plf	S yy	=	3.970	in^3	Wno	=	14.100	in^2
Kdesign	=	0.660	in	R yy	=	1.330	in	Sw	=	7.320	in^4
K1	=	0.625	in	Zy	=	6.100	in^3	Qf	=	4.880	in^3
rts	=	1.550	in					Qw	=	12.900	in^3
Ycg	=	5.100	in								

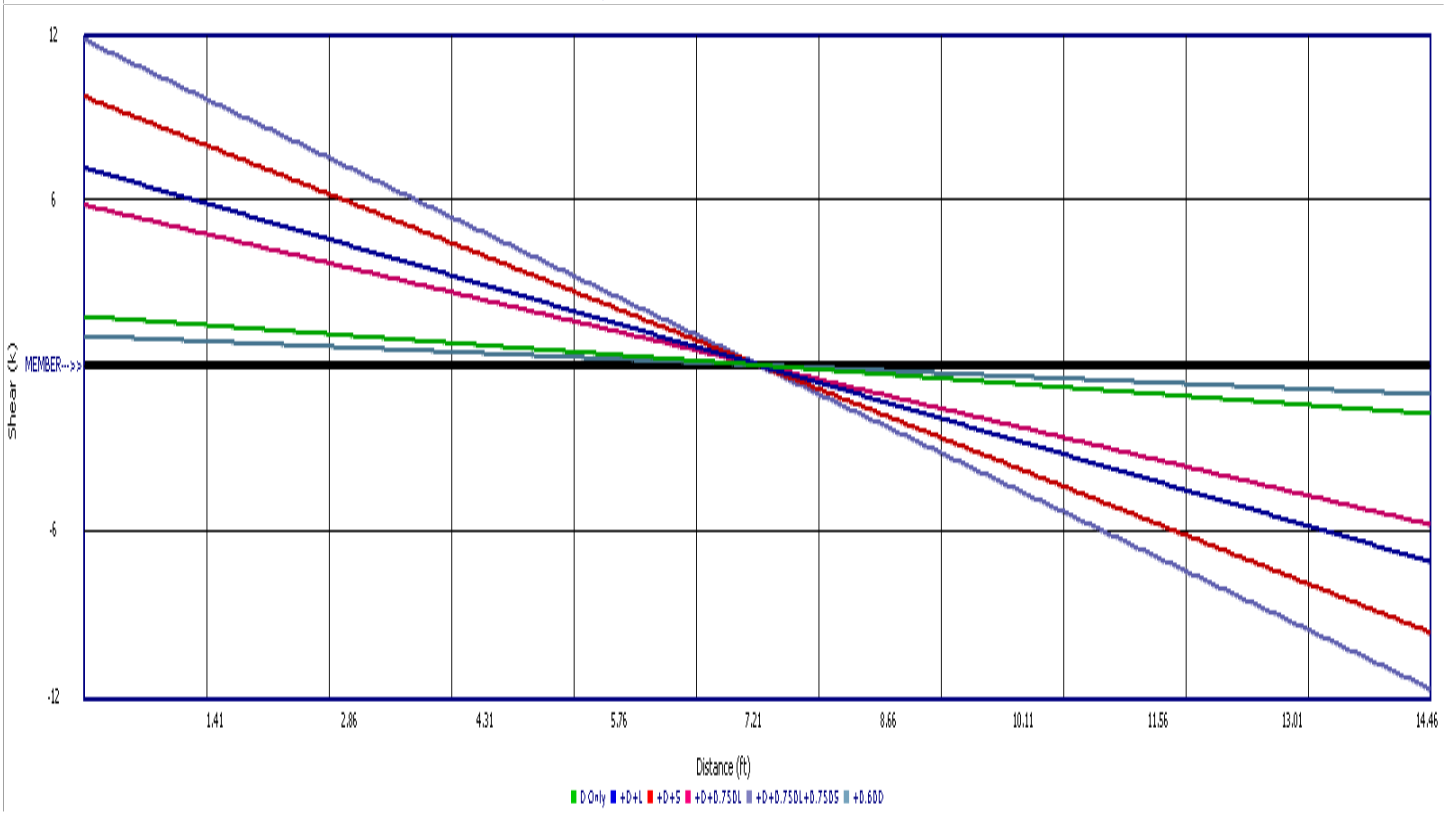
Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B6 - MECH LOW ROOF STEEL



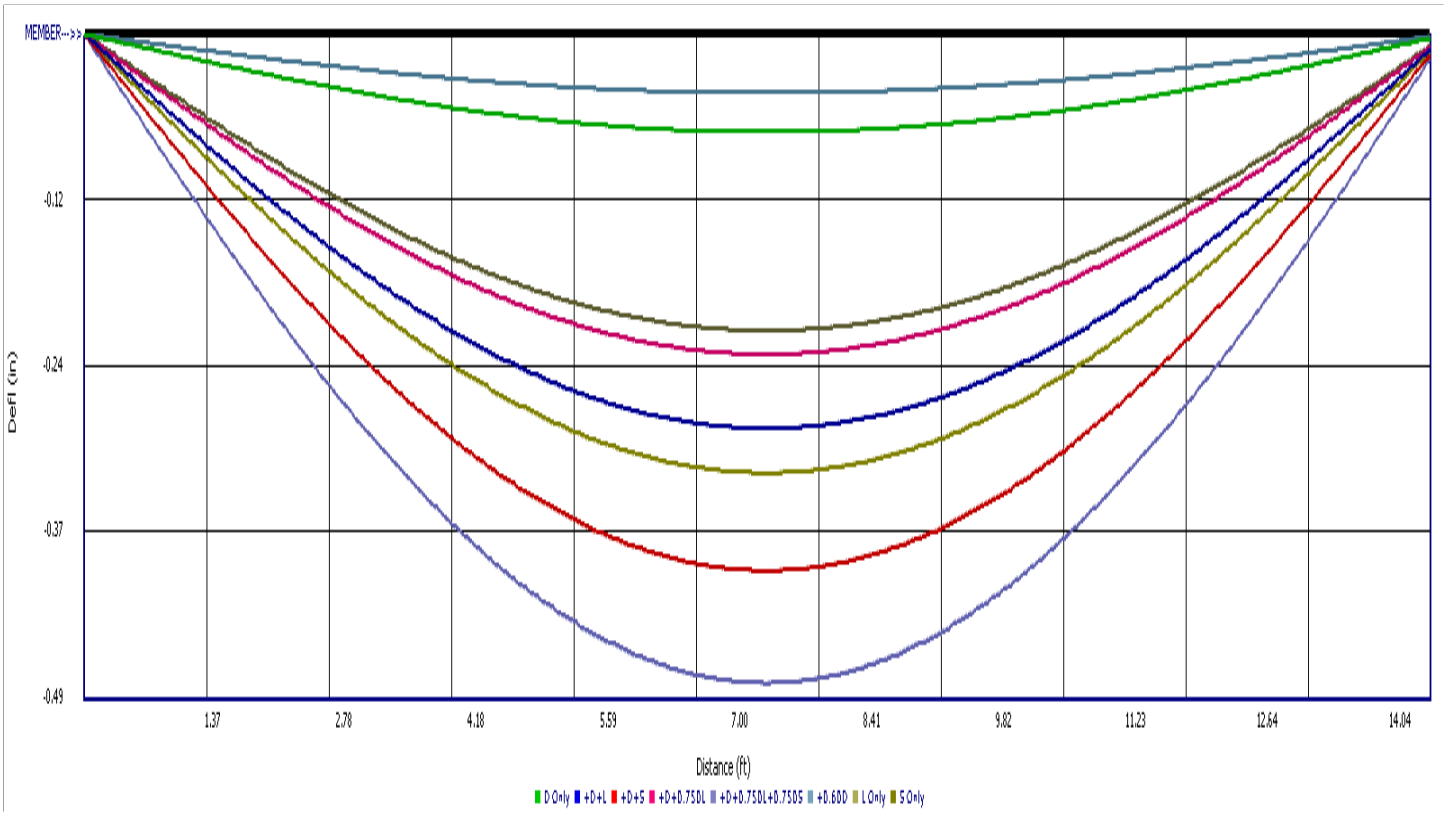


Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B6 - MECH LOW ROOF STEEL



Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B7 - MECH LOW ROOF

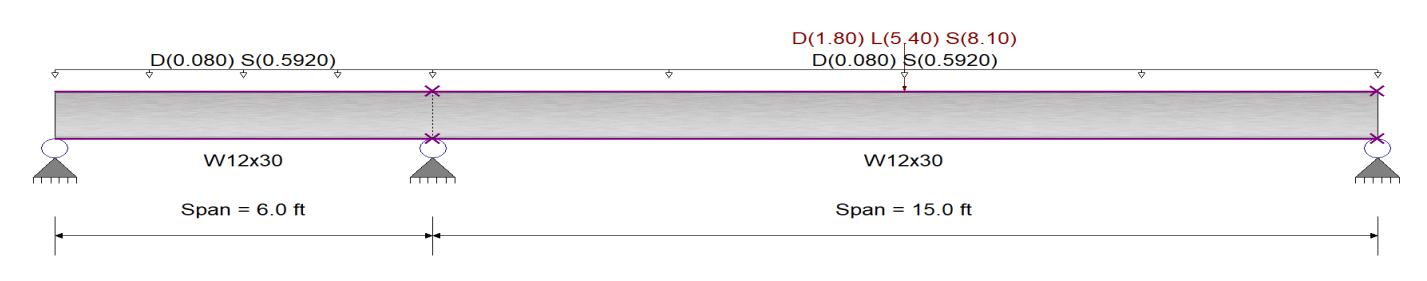
CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.020, S = 0.1480 ksf, Tributary Width = 4.0 ft, (LOW ROOF)

Load(s) for Span Number 2
Point Load : D = 1.80, L = 5.40, S = 8.10 k @ 7.50 ft, (MECH LOW ROOF BEAM)

Uniform Load : D = 0.020, S = 0.1480 ksf, Tributary Width = 4.0 ft, (LOW ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.394** : 1	Maximum Shear Stress Ratio =	**0.196** : 1
Section used for this span	**W12x30**	Section used for this span	**W12x30**
Ma : Applied	42.401 k-ft	Va : Applied	12.541 k
Mn / Omega : Allowable	107.535 k-ft	Vn/Omega : Allowable	63.960 k
Load Combination	+D+0.750L+0.750S+H, LL Comb Run (*L)	Load Combination	+D+S+H
		Location of maximum on span	6.000 ft
Span # where maximum occurs	Span # 2	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.140 in	Ratio =	1,284	>=360	Span: 2 : S Only
Max Upward Transient Deflection	-0.014 in	Ratio =	5,007	>=360	Span: 2 : S Only
Max Downward Total Deflection	0.177 in	Ratio =	1015	>=240.	Span: 2 : +D+0.750L+0.750S+H, LL Comb Run (*L)
Max Upward Total Deflection	-0.019 in	Ratio =	3886	>=240.	Span: 2 : +D+0.750L+0.750S+H, LL Comb Run (*L)

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 6.00 ft	1	0.055	0.033		-5.97	5.97	179.58	107.53	1.00	1.00	2.12	95.94	63.96
Dsgn. L = 15.00 ft	2	0.064	0.033	6.86	-5.97	6.86	179.58	107.53	1.00	1.00	2.12	95.94	63.96
+D+L+H, LL Comb Run (*L)													
Dsgn. L = 6.00 ft	1	0.156	0.087		-16.82	16.82	179.58	107.53	1.00	1.00	5.55	95.94	63.96
Dsgn. L = 15.00 ft	2	0.202	0.087	21.69	-16.82	21.69	179.58	107.53	1.00	1.00	5.55	95.94	63.96
+D+L+H, LL Comb Run (L*)													
Dsgn. L = 6.00 ft	1	0.055	0.033		-5.97	5.97	179.58	107.53	1.00	1.00	2.12	95.94	63.96
Dsgn. L = 15.00 ft	2	0.064	0.033	6.86	-5.97	6.86	179.58	107.53	1.00	1.00	2.12	95.94	63.96
+D+L+H, LL Comb Run (LL)													
Dsgn. L = 6.00 ft	1	0.156	0.087		-16.82	16.82	179.58	107.53	1.00	1.00	5.55	95.94	63.96
Dsgn. L = 15.00 ft	2	0.202	0.087	21.69	-16.82	21.69	179.58	107.53	1.00	1.00	5.55	95.94	63.96
+D+Lr+H, LL Comb Run (*L)													
Dsgn. L = 6.00 ft	1	0.055	0.033		-5.97	5.97	179.58	107.53	1.00	1.00	2.12	95.94	63.96
Dsgn. L = 15.00 ft	2	0.064	0.033	6.86	-5.97	6.86	179.58	107.53	1.00	1.00	2.12	95.94	63.96

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B7 - MECH LOW ROOF

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+Lr+H, LL Comb Run (L*)													
Dsgn. L = 6.00 ft	1	0.055	0.033		-5.97	5.97	179.58	107.53	1.00	1.00	2.12	95.94	63.96
Dsgn. L = 15.00 ft	2	0.064	0.033	6.86	-5.97	6.86	179.58	107.53	1.00	1.00	2.12	95.94	63.96
+D+Lr+H, LL Comb Run (LL)													
Dsgn. L = 6.00 ft	1	0.055	0.033		-5.97	5.97	179.58	107.53	1.00	1.00	2.12	95.94	63.96
Dsgn. L = 15.00 ft	2	0.064	0.033	6.86	-5.97	6.86	179.58	107.53	1.00	1.00	2.12	95.94	63.96
+D+S+H													
Dsgn. L = 6.00 ft	1	0.324	0.196		-34.89	34.89	179.58	107.53	1.00	1.00	12.54	95.94	63.96
Dsgn. L = 15.00 ft	2	0.367	0.196	39.42	-34.89	39.42	179.58	107.53	1.00	1.00	12.54	95.94	63.96
+D+0.750Lr+0.750L+H, LL Comb													
Dsgn. L = 6.00 ft	1	0.131	0.073		-14.10	14.10	179.58	107.53	1.00	1.00	4.69	95.94	63.96
Dsgn. L = 15.00 ft	2	0.167	0.073	17.98	-14.10	17.98	179.58	107.53	1.00	1.00	4.69	95.94	63.96
+D+0.750Lr+0.750L+H, LL Comb													
Dsgn. L = 6.00 ft	1	0.055	0.033		-5.97	5.97	179.58	107.53	1.00	1.00	2.12	95.94	63.96
Dsgn. L = 15.00 ft	2	0.064	0.033	6.86	-5.97	6.86	179.58	107.53	1.00	1.00	2.12	95.94	63.96
+D+0.750Lr+0.750L+H, LL Comb													
Dsgn. L = 6.00 ft	1	0.131	0.073		-14.10	14.10	179.58	107.53	1.00	1.00	4.69	95.94	63.96
Dsgn. L = 15.00 ft	2	0.167	0.073	17.98	-14.10	17.98	179.58	107.53	1.00	1.00	4.69	95.94	63.96
+D+0.750L+0.750S+H, LL Comb													
Dsgn. L = 6.00 ft	1	0.333	0.195		-35.80	35.80	179.58	107.53	1.00	1.00	12.50	95.94	63.96
Dsgn. L = 15.00 ft	2	0.394	0.195	42.40	-35.80	42.40	179.58	107.53	1.00	1.00	12.50	95.94	63.96
+D+0.750L+0.750S+H, LL Comb													
Dsgn. L = 6.00 ft	1	0.257	0.155		-27.66	27.66	179.58	107.53	1.00	1.00	9.94	95.94	63.96
Dsgn. L = 15.00 ft	2	0.291	0.155	31.28	-27.66	31.28	179.58	107.53	1.00	1.00	9.94	95.94	63.96
+D+0.750L+0.750S+H, LL Comb													
Dsgn. L = 6.00 ft	1	0.333	0.195		-35.80	35.80	179.58	107.53	1.00	1.00	12.50	95.94	63.96
Dsgn. L = 15.00 ft	2	0.394	0.195	42.40	-35.80	42.40	179.58	107.53	1.00	1.00	12.50	95.94	63.96
+D+0.60W+H													
Dsgn. L = 6.00 ft	1	0.055	0.033		-5.97	5.97	179.58	107.53	1.00	1.00	2.12	95.94	63.96
Dsgn. L = 15.00 ft	2	0.064	0.033	6.86	-5.97	6.86	179.58	107.53	1.00	1.00	2.12	95.94	63.96
+D+0.70E+H													
Dsgn. L = 6.00 ft	1	0.055	0.033		-5.97	5.97	179.58	107.53	1.00	1.00	2.12	95.94	63.96
Dsgn. L = 15.00 ft	2	0.064	0.033	6.86	-5.97	6.86	179.58	107.53	1.00	1.00	2.12	95.94	63.96
+D+0.750Lr+0.750L+0.450W+H,													
Dsgn. L = 6.00 ft	1	0.131	0.073		-14.10	14.10	179.58	107.53	1.00	1.00	4.69	95.94	63.96
Dsgn. L = 15.00 ft	2	0.167	0.073	17.98	-14.10	17.98	179.58	107.53	1.00	1.00	4.69	95.94	63.96
+D+0.750Lr+0.750L+0.450W+H,													
Dsgn. L = 6.00 ft	1	0.055	0.033		-5.97	5.97	179.58	107.53	1.00	1.00	2.12	95.94	63.96
Dsgn. L = 15.00 ft	2	0.064	0.033	6.86	-5.97	6.86	179.58	107.53	1.00	1.00	2.12	95.94	63.96
+D+0.750Lr+0.750L+0.450W+H,													
Dsgn. L = 6.00 ft	1	0.131	0.073		-14.10	14.10	179.58	107.53	1.00	1.00	4.69	95.94	63.96
Dsgn. L = 15.00 ft	2	0.167	0.073	17.98	-14.10	17.98	179.58	107.53	1.00	1.00	4.69	95.94	63.96
+D+0.750L+0.750S+0.450W+H, L													
Dsgn. L = 6.00 ft	1	0.333	0.195		-35.80	35.80	179.58	107.53	1.00	1.00	12.50	95.94	63.96
Dsgn. L = 15.00 ft	2	0.394	0.195	42.40	-35.80	42.40	179.58	107.53	1.00	1.00	12.50	95.94	63.96
+D+0.750L+0.750S+0.450W+H, L													
Dsgn. L = 6.00 ft	1	0.257	0.155		-27.66	27.66	179.58	107.53	1.00	1.00	9.94	95.94	63.96
Dsgn. L = 15.00 ft	2	0.291	0.155	31.28	-27.66	31.28	179.58	107.53	1.00	1.00	9.94	95.94	63.96
+D+0.750L+0.750S+0.450W+H, L													
Dsgn. L = 6.00 ft	1	0.333	0.195		-35.80	35.80	179.58	107.53	1.00	1.00	12.50	95.94	63.96
Dsgn. L = 15.00 ft	2	0.394	0.195	42.40	-35.80	42.40	179.58	107.53	1.00	1.00	12.50	95.94	63.96
+D+0.750L+0.750S+0.5250E+H,													
Dsgn. L = 6.00 ft	1	0.333	0.195		-35.80	35.80	179.58	107.53	1.00	1.00	12.50	95.94	63.96
Dsgn. L = 15.00 ft	2	0.394	0.195	42.40	-35.80	42.40	179.58	107.53	1.00	1.00	12.50	95.94	63.96
+D+0.750L+0.750S+0.5250E+H,													
Dsgn. L = 6.00 ft	1	0.257	0.155		-27.66	27.66	179.58	107.53	1.00	1.00	9.94	95.94	63.96
Dsgn. L = 15.00 ft	2	0.291	0.155	31.28	-27.66	31.28	179.58	107.53	1.00	1.00	9.94	95.94	63.96
+D+0.750L+0.750S+0.5250E+H,													
Dsgn. L = 6.00 ft	1	0.333	0.195		-35.80	35.80	179.58	107.53	1.00	1.00	12.50	95.94	63.96
Dsgn. L = 15.00 ft	2	0.394	0.195	42.40	-35.80	42.40	179.58	107.53	1.00	1.00	12.50	95.94	63.96
+0.60D+0.60W+0.60H													
Dsgn. L = 6.00 ft	1	0.033	0.020		-3.58	3.58	179.58	107.53	1.00	1.00	1.27	95.94	63.96
Dsgn. L = 15.00 ft	2	0.038	0.020	4.12	-3.58	4.12	179.58	107.53	1.00	1.00	1.27	95.94	63.96

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B7 - MECH LOW ROOF

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+0.60D+0.70E+0.60H													
Dsgn. L = 6.00 ft	1	0.033	0.020		-3.58	3.58	179.58	107.53	1.00	1.00	1.27	95.94	63.96
Dsgn. L = 15.00 ft	2	0.038	0.020	4.12	-3.58	4.12	179.58	107.53	1.00	1.00	1.27	95.94	63.96

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+0.750L+0.750S+0.5250E+H	-0.0185	3.528
+D+0.750L+0.750S+0.5250E+H	2	0.1773	8.100		0.0000	3.528

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Span	Max. Upward Defl	Location in Span
+D+H	2	0.0292	8.100	1	-0.0030	3.552
+D+L+H, LL Comb Run (*L)	2	0.0866	8.040	1	-0.0093	3.504
+D+L+H, LL Comb Run (L*)	2	0.0292	8.100	1	-0.0030	3.552
+D+L+H, LL Comb Run (LL)	2	0.0866	8.040	1	-0.0093	3.504
+D+Lr+H, LL Comb Run (*L)	2	0.0292	8.100	1	-0.0030	3.552
+D+Lr+H, LL Comb Run (L*)	2	0.0292	8.100	1	-0.0030	3.552
+D+Lr+H, LL Comb Run (LL)	2	0.0292	8.100	1	-0.0030	3.552
+D+S+H	2	0.1693	8.100	1	-0.0174	3.552
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	2	0.0722	8.040	1	-0.0077	3.504
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	2	0.0292	8.100	1	-0.0030	3.552
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	2	0.0722	8.040	1	-0.0077	3.504
+D+0.750L+0.750S+H, LL Comb Run (*L)	2	0.1773	8.100	1	-0.0185	3.528
+D+0.750L+0.750S+H, LL Comb Run (L*)	2	0.1343	8.100	1	-0.0138	3.552
+D+0.750L+0.750S+H, LL Comb Run (LL)	2	0.1773	8.100	1	-0.0185	3.528
+D+0.60W+H	2	0.0292	8.100	1	-0.0030	3.552
+D+0.70E+H	2	0.0292	8.100	1	-0.0030	3.552
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (	2	0.0722	8.040	1	-0.0077	3.504
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (	2	0.0292	8.100	1	-0.0030	3.552
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (	2	0.0722	8.040	1	-0.0077	3.504
+D+0.750L+0.750S+0.450W+H, LL Comb Run (	2	0.1773	8.100	1	-0.0185	3.528
+D+0.750L+0.750S+0.450W+H, LL Comb Run (	2	0.1343	8.100	1	-0.0138	3.552
+D+0.750L+0.750S+0.450W+H, LL Comb Run (	2	0.1773	8.100	1	-0.0185	3.528
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (	2	0.1773	8.100	1	-0.0185	3.528
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (	2	0.1343	8.100	1	-0.0138	3.552
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (	2	0.1773	8.100	1	-0.0185	3.528
+0.60D+0.60W+0.60H	2	0.0175	8.100	1	-0.0018	3.552
+0.60D+0.70E+0.60H	2	0.0175	8.100	1	-0.0018	3.552
D Only	2	0.0292	8.100	1	-0.0030	3.552
L Only, LL Comb Run (*L)	2	0.0574	7.980	1	-0.0063	3.480
L Only, LL Comb Run (LL)	2	0.0574	7.980	1	-0.0063	3.480
S Only	2	0.1401	8.100	1	-0.0144	3.552

Vertical Reactions

Support notation : Far left is #: Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions		20.463	7.889
Max Upward from Load Combinations		20.463	7.889
Max Upward from Load Cases		17.015	6.562
Max Downward from all Load Conditions (Resis	-4.304		
Max Downward from Load Combinations (Resi	-4.304		
Max Downward from Load Cases (Resisting Up	-3.045		
+D+H	-0.665	3.447	1.327
+D+L+H, LL Comb Run (*L)	-2.473	8.679	3.304
+D+L+H, LL Comb Run (L*)	-0.665	3.447	1.327
+D+L+H, LL Comb Run (LL)	-2.473	8.679	3.304
+D+Lr+H, LL Comb Run (*L)	-0.665	3.447	1.327
+D+Lr+H, LL Comb Run (L*)	-0.665	3.447	1.327
+D+Lr+H, LL Comb Run (LL)	-0.665	3.447	1.327
+D+S+H	-3.710	20.463	7.889
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	-2.021	7.371	2.810
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	-0.665	3.447	1.327
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	-2.021	7.371	2.810
+D+0.750L+0.750S+H, LL Comb Run (*L)	-4.304	20.132	7.731

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B7 - MECH LOW ROOF

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+0.750L+0.750S+H, LL Comb Run (L*)	-2.948	16.209	6.248
+D+0.750L+0.750S+H, LL Comb Run (LL)	-4.304	20.132	7.731
+D+0.60W+H	-0.665	3.447	1.327
+D+0.70E+H	-0.665	3.447	1.327
+D+0.750Lr+0.750L+0.450W+H, LL Comb Rur	-2.021	7.371	2.810
+D+0.750Lr+0.750L+0.450W+H, LL Comb Rur	-0.665	3.447	1.327
+D+0.750Lr+0.750L+0.450W+H, LL Comb Rur	-2.021	7.371	2.810
+D+0.750L+0.750S+0.450W+H, LL Comb Run	-4.304	20.132	7.731
+D+0.750L+0.750S+0.450W+H, LL Comb Run	-2.948	16.209	6.248
+D+0.750L+0.750S+0.450W+H, LL Comb Run	-4.304	20.132	7.731
+D+0.750L+0.750S+0.5250E+H, LL Comb Rur	-4.304	20.132	7.731
+D+0.750L+0.750S+0.5250E+H, LL Comb Rur	-2.948	16.209	6.248
+D+0.750L+0.750S+0.5250E+H, LL Comb Rur	-4.304	20.132	7.731
+0.60D+0.60W+0.60H	-0.399	2.068	0.796
+0.60D+0.70E+0.60H	-0.399	2.068	0.796
D Only	-0.665	3.447	1.327
L Only, LL Comb Run (*L)	-1.808	5.231	1.977
L Only, LL Comb Run (LL)	-1.808	5.231	1.977
S Only	-3.045	17.015	6.562
H Only			

Steel Section Properties : W12x30

Depth	=	12.300	in	I xx	=	238.00	in^4	J	=	0.457 in^4
Web Thick	=	0.260	in	S xx		38.60	in^3	Cw	=	720.00 in^6
Flange Width	=	6.520	in	R xx	=	5.210	in			
Flange Thick	=	0.440	in	Zx	=	43.100	in^3			
Area	=	8.790	in^2	I yy	=	20.300	in^4			
Weight	=	30.000	plf	S yy	=	6.240	in^3	Wno	=	19.300 in^2
Kdesign	=	0.740	in	R yy	=	1.520	in	Sw	=	13.900 in^4
K1	=	0.750	in	Zy	=	9.560	in^3	Qf	=	8.170 in^3
rts	=	1.770	in					Qw	=	21.300 in^3
Ycg	=	6.150	in							

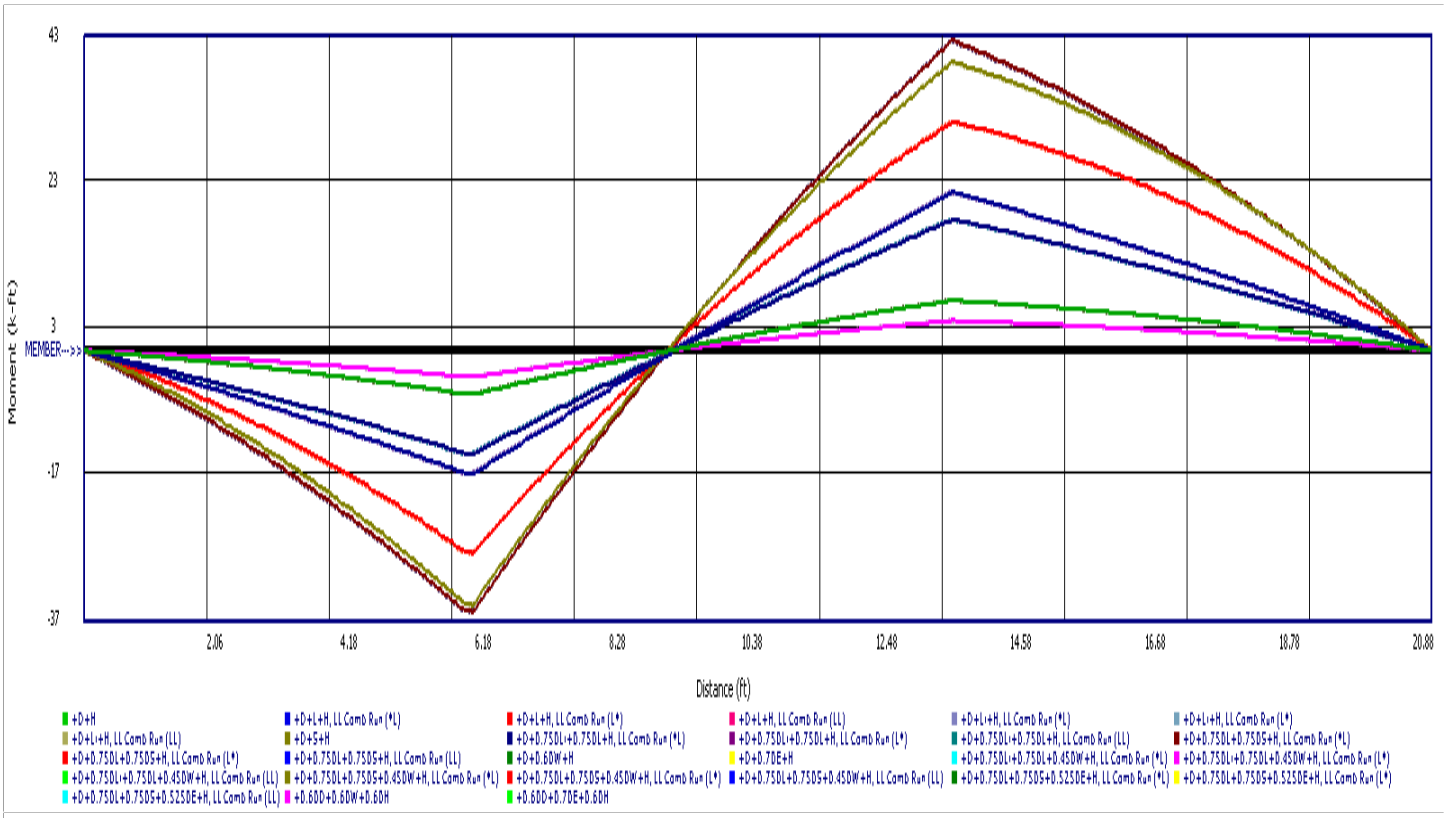
Project Title:
Engineer:
Project ID:
Project Descr:

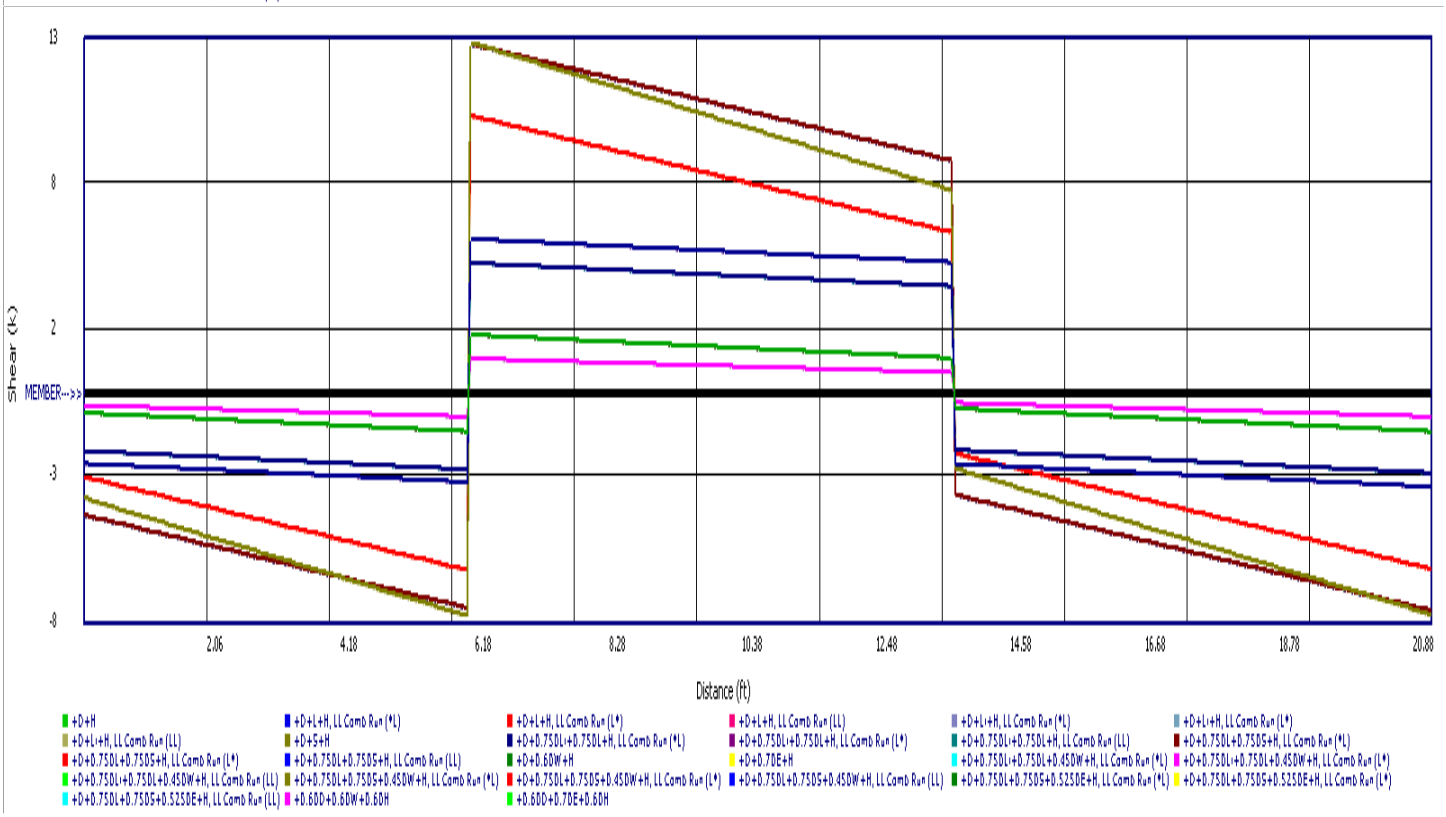
Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B7 - MECH LOW ROOF





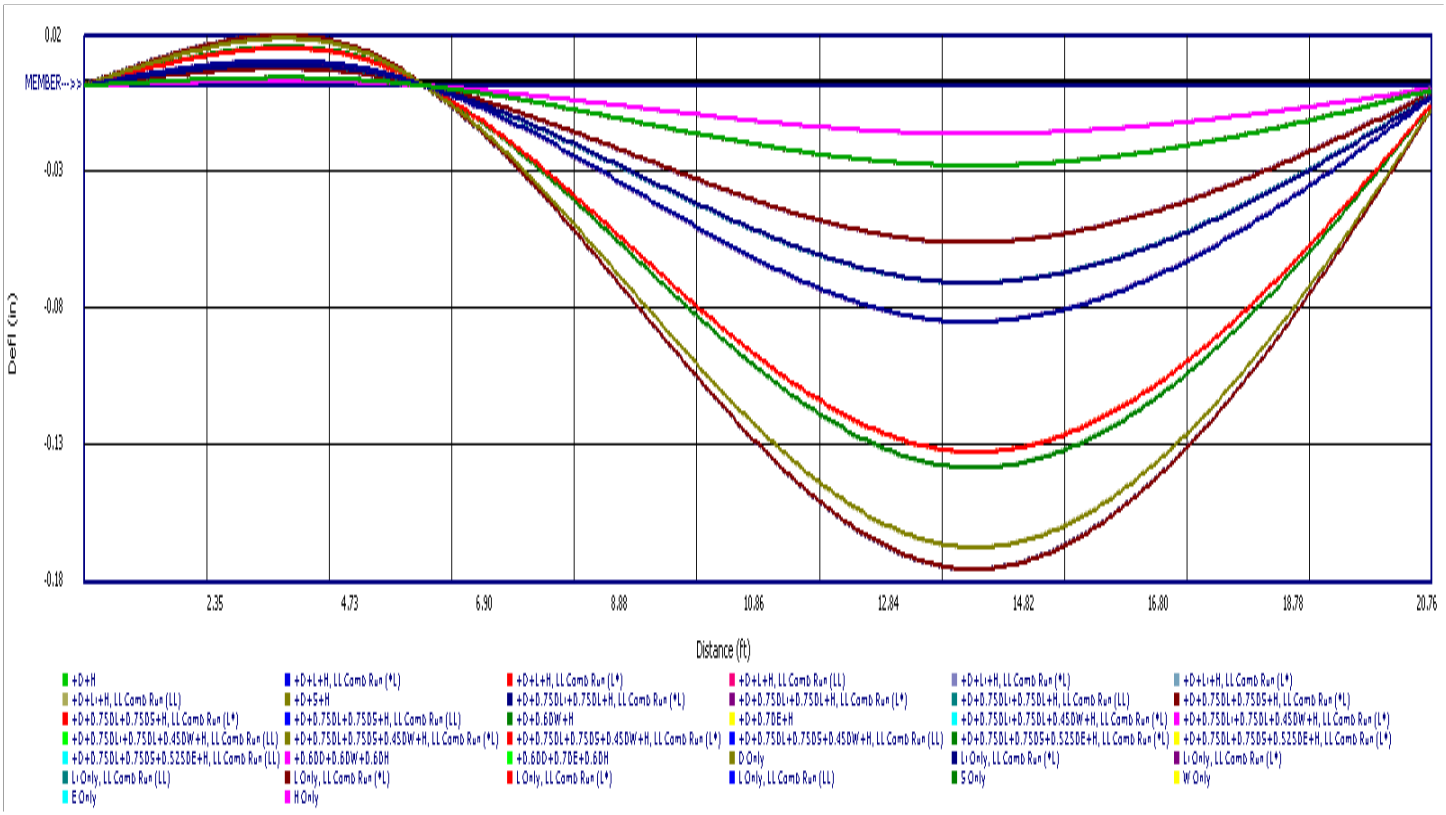
Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B7 - MECH LOW ROOF



Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

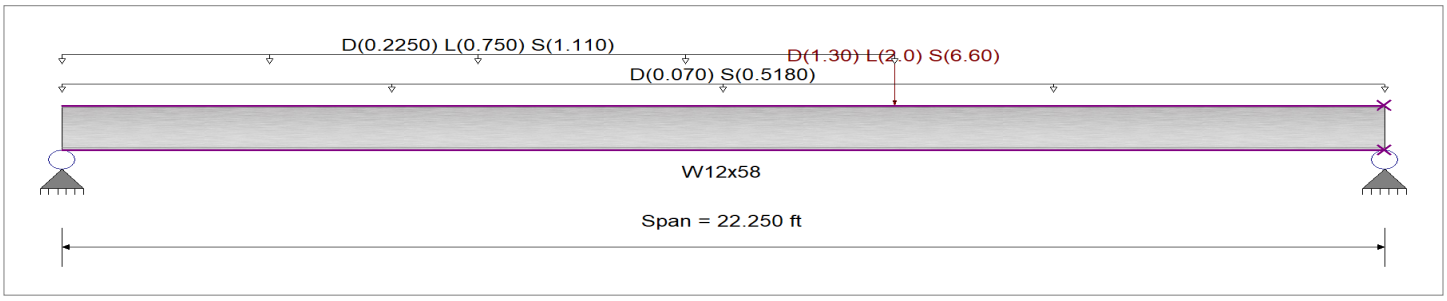
DESCRIPTION: 4B8 - MECH LOW ROOF

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load(s) for Span Number 1

Point Load : D = 1.30, L = 2.0, S = 6.60 k @ 14.0 ft, (MECH LOW ROOF BEAM)

Uniform Load : D = 0.020, S = 0.1480 ksf, Tributary Width = 3.50 ft, (JACK TRUSSES)

Uniform Load : D = 0.030, L = 0.10, S = 0.1480 ksf, Extent = 0.0 -->> 14.0 ft, Tributary Width = 7.50 ft, (LOW MECH ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.634 : 1	Maximum Shear Stress Ratio =	0.275 : 1
Section used for this span	W12x58	Section used for this span	W12x58
Ma : Applied	136.653 k-ft	Va : Applied	24.164 k
Mn / Omega : Allowable	215.569 k-ft	Vn/Omega : Allowable	87.840 k
Load Combination	+D+0.750L+0.750S	Load Combination	+D+0.750L+0.750S
		Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.694 in	Ratio =	384	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.868 in	Ratio =	308	>=240.	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0	<240.0	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values						Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	VnxVnx/Omega
D Only												
Dsgn. L = 22.25 ft	1	0.109	0.046	23.41		23.41	360.00	215.57	1.00	1.00	4.07	131.76	87.84
+D+L												
Dsgn. L = 22.25 ft	1	0.303	0.137	65.31		65.31	360.00	215.57	1.00	1.00	12.00	131.76	87.84
+D+S												
Dsgn. L = 22.25 ft	1	0.615	0.261	132.66		132.66	360.00	215.57	1.00	1.00	22.93	131.76	87.84
+D+0.750L												
Dsgn. L = 22.25 ft	1	0.254	0.114	54.82		54.82	360.00	215.57	1.00	1.00	10.02	131.76	87.84
+D+0.750L+0.750S												
Dsgn. L = 22.25 ft	1	0.634	0.275	136.65		136.65	360.00	215.57	1.00	1.00	24.16	131.76	87.84
+0.60D												
Dsgn. L = 22.25 ft	1	0.065	0.028	14.04		14.04	360.00	215.57	1.00	1.00	2.44	131.76	87.84

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.8676	11.061		0.0000	0.000

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B8 - MECH LOW ROOF

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Span	Max. Upward Defl	Location in Span
D Only	1	0.1490	11.125		0.0000	0.000
+D+L	1	0.4129	10.998		0.0000	0.000
+D+S	1	0.8433	11.125		0.0000	0.000
+D+0.750L	1	0.3469	10.998		0.0000	0.000
+D+0.750L+0.750S	1	0.8676	11.061		0.0000	0.000
+0.60D	1	0.0894	11.125		0.0000	0.000
L Only	1	0.2639	10.934		0.0000	0.000
S Only	1	0.6943	11.125		0.0000	0.000

Vertical Reactions

Support notation : Far left is #: Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	24.164	18.038
Max Upward from Load Combinations	24.164	18.038
Max Upward from Load Cases	18.861	14.805
D Only	4.065	3.233
+D+L	12.003	7.795
+D+S	22.926	18.038
+D+0.750L	10.019	6.654
+D+0.750L+0.750S	24.164	17.758
+0.60D	2.439	1.940
L Only	7.938	4.562
S Only	18.861	14.805

Steel Section Properties : W12x58

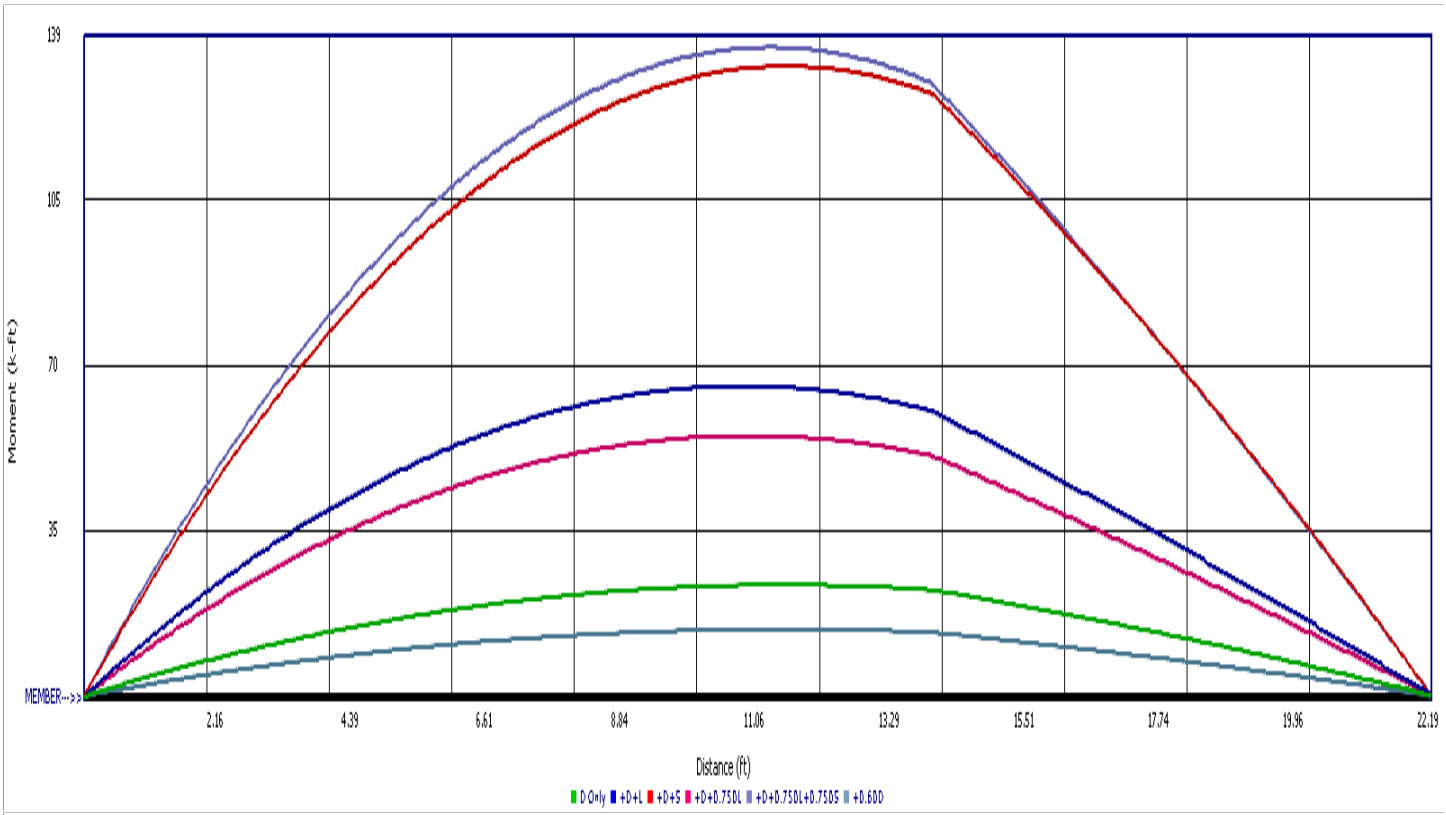
Depth	=	12.200	in	I xx	=	475.00	in^4	J	= 2.100 in^4
Web Thick	=	0.360	in	S xx		78.00	in^3	Cw	= 3,570.00 in^6
Flange Width	=	10.000	in	R xx	=	5.280	in		
Flange Thick	=	0.640	in	Zx	=	86.400	in^3		
Area	=	17.000	in^2	I yy	=	107.000	in^4		
Weight	=	58.000	plf	S yy	=	21.400	in^3	Wno	= 28.900 in^2
Kdesign	=	1.240	in	R yy	=	2.510	in	Sw	= 46.200 in^4
K1	=	0.938	in	Zy	=	32.500	in^3	Qf	= 17.800 in^3
rts	=	2.810	in					Qw	= 42.400 in^3
Ycg	=	6.100	in						

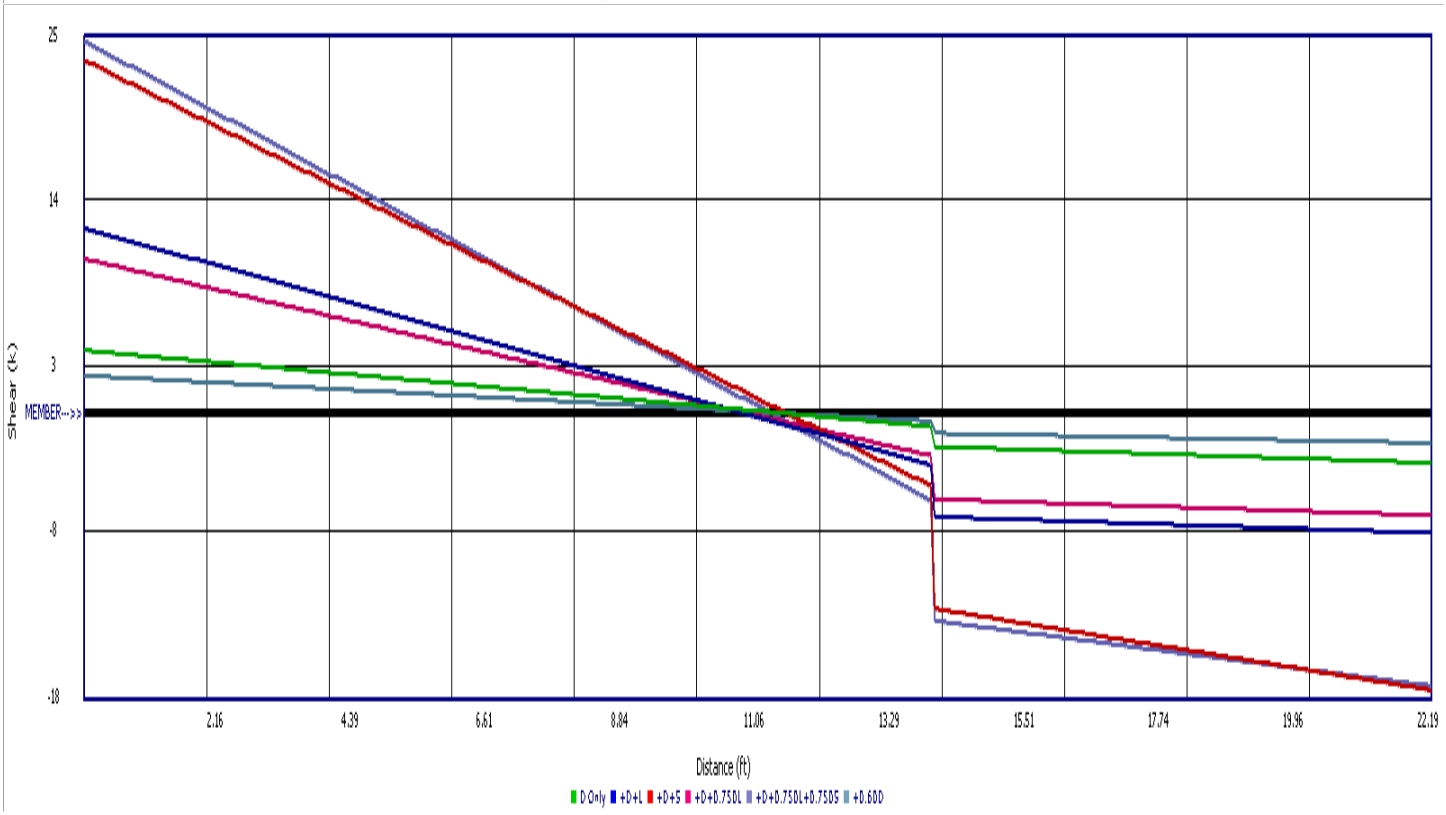
Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B8 - MECH LOW ROOF



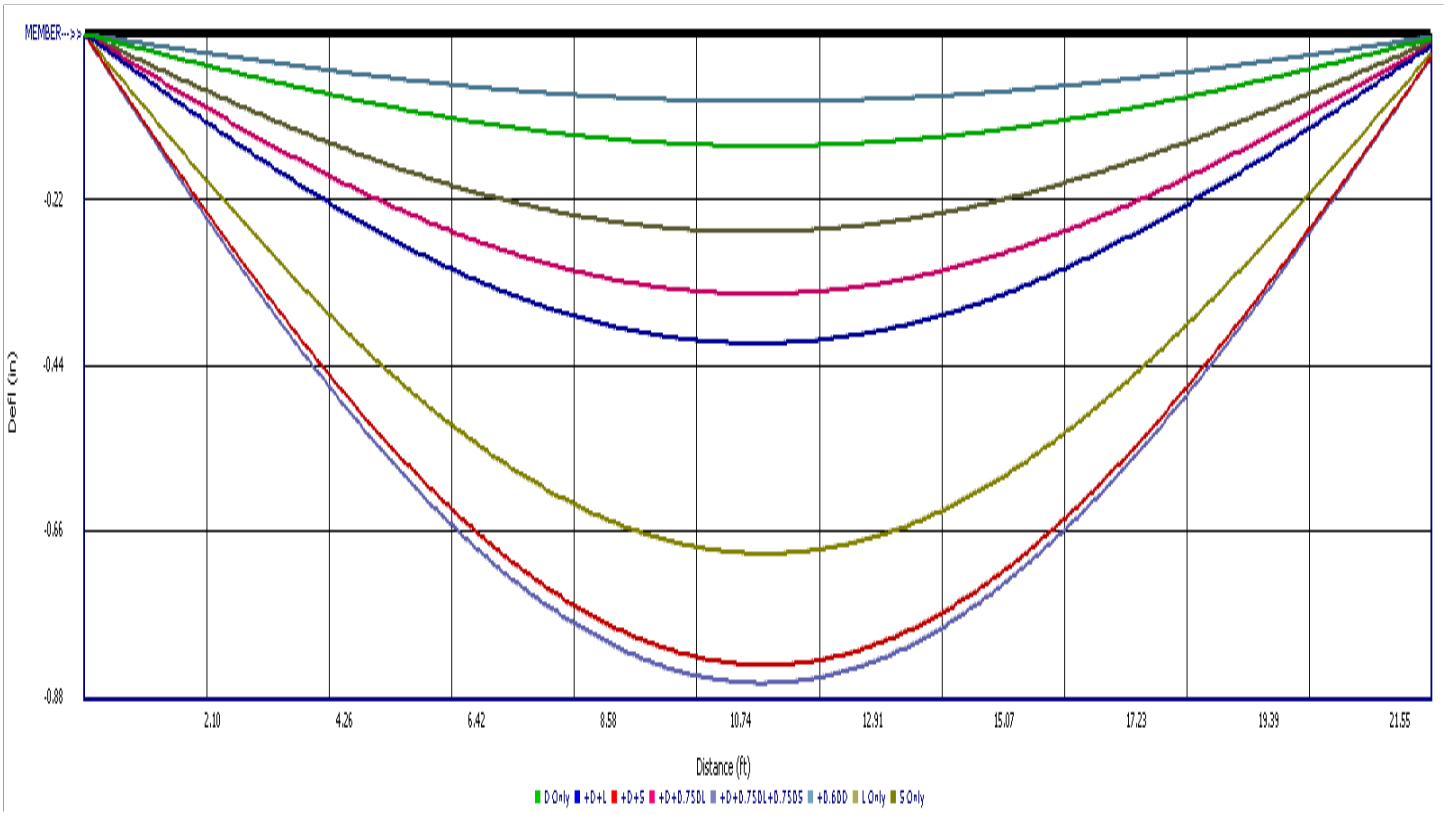


Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B8 - MECH LOW ROOF



Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

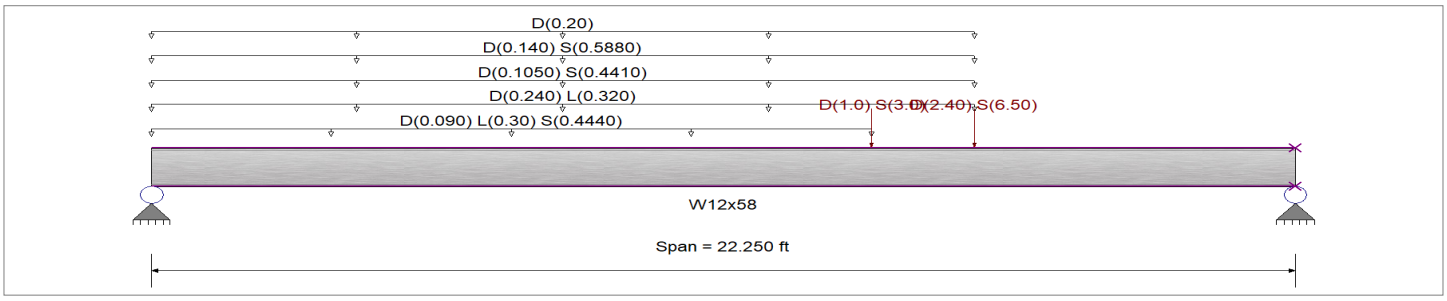
DESCRIPTION: 4B11 - MECH LOW ROOF

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1

Uniform Load : D = 0.030, L = 0.10, S = 0.1480 ksf, Extent = 0.0 -->> 14.0 ft, Tributary Width = 3.0 ft, (LOW ROOF MECH)

Uniform Load : D = 0.030, L = 0.040 ksf, Extent = 0.0 -->> 16.0 ft, Tributary Width = 8.0 ft, (FLOOR)

Point Load : D = 2.40, S = 6.50 k @ 16.0 ft, (4B9)

Uniform Load : D = 0.020, S = 0.0840 ksf, Extent = 0.0 -->> 16.0 ft, Tributary Width = 5.250 ft, (HIGH ROOF)

Point Load : D = 1.0, S = 3.0 k @ 14.0 ft, (4B10)

Uniform Load : D = 0.020, S = 0.0840 ksf, Extent = 0.0 -->> 16.0 ft, Tributary Width = 7.0 ft, (HIGH ROOF)

Uniform Load : D = 0.20 k/ft, Extent = 0.0 -->> 16.0 ft, Tributary Width = 1.0 ft, (WALL)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.751** : 1	Maximum Shear Stress Ratio =	**0.313** : 1
Section used for this span	**W12x58**	Section used for this span	**W12x58**
Ma : Applied	161.788 k-ft	Va : Applied	27.499 k
Mn / Omega : Allowable	215.569 k-ft	Vn/Omega : Allowable	87.840 k
Load Combination	+D+S	Load Combination	+D+0.750L+0.750S
		Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.685 in	Ratio =	389	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	1.038 in	Ratio =	257	>=240.	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240.0	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 22.25 ft	1	0.255	0.109	55.01		55.01	360.00	215.57	1.00	1.00	9.57	131.76	87.84
+D+L													
Dsgn. L = 22.25 ft	1	0.395	0.179	85.15		85.15	360.00	215.57	1.00	1.00	15.73	131.76	87.84
+D+S													
Dsgn. L = 22.25 ft	1	0.751	0.311	161.79		161.79	360.00	215.57	1.00	1.00	27.32	131.76	87.84

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B11 - MECH LOW ROOF

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+0.750L													
Dsgn. L = 22.25 ft	1	0.360	0.162	77.58		77.58	360.00	215.57	1.00	1.00	14.19	131.76	87.84
+D+0.750L+0.750S													
Dsgn. L = 22.25 ft	1	0.730	0.313	157.36		157.36	360.00	215.57	1.00	1.00	27.50	131.76	87.84
+0.60D													
Dsgn. L = 22.25 ft	1	0.153	0.065	33.01		33.01	360.00	215.57	1.00	1.00	5.74	131.76	87.84

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	1.0385	11.252		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Span	Max. Upward Defl	Location in Span
D Only	1	0.3533	11.189		0.0000	0.000
+D+L	1	0.5435	10.998		0.0000	0.000
+D+S	1	1.0385	11.252		0.0000	0.000
+D+0.750L	1	0.4960	11.061		0.0000	0.000
+D+0.750L+0.750S	1	1.0098	11.125		0.0000	0.000
+0.60D	1	0.2120	11.189		0.0000	0.000
L Only	1	0.1904	10.744		0.0000	0.000
S Only	1	0.6852	11.252		0.0000	0.000

Vertical Reactions

Support notation : Far left is #: Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	27.499	21.774
Max Upward from Load Combinations	27.499	21.774
Max Upward from Load Cases	17.743	14.437
D Only	9.573	7.337
+D+L	15.731	10.500
+D+S	27.316	21.774
+D+0.750L	14.191	9.709
+D+0.750L+0.750S	27.499	20.537
+0.60D	5.744	4.402
L Only	6.158	3.162
S Only	17.743	14.437

Steel Section Properties : W12x58

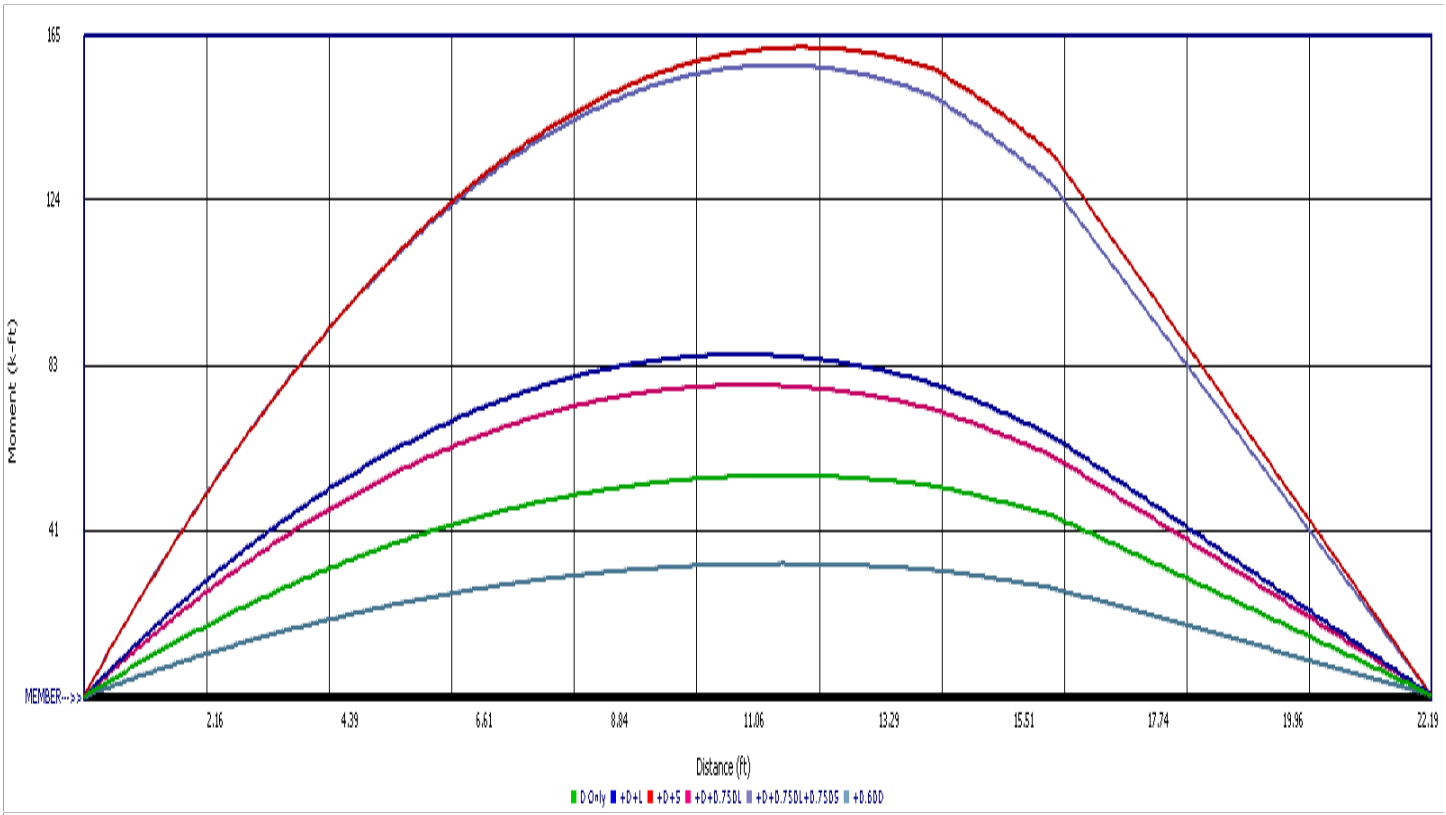
Depth	=	12.200	in	I xx	=	475.00	in^4	J	=	2.100 in^4
Web Thick	=	0.360	in	S xx		78.00	in^3	Cw	=	3,570.00 in^6
Flange Width	=	10.000	in	R xx	=	5.280	in			
Flange Thick	=	0.640	in	Zx	=	86.400	in^3			
Area	=	17.000	in^2	I yy	=	107.000	in^4			
Weight	=	58.000	plf	S yy	=	21.400	in^3	Wno	=	28.900 in^2
Kdesign	=	1.240	in	R yy	=	2.510	in	Sw	=	46.200 in^4
K1	=	0.938	in	Zy	=	32.500	in^3	Qf	=	17.800 in^3
rts	=	2.810	in					Qw	=	42.400 in^3
Ycg	=	6.100	in							

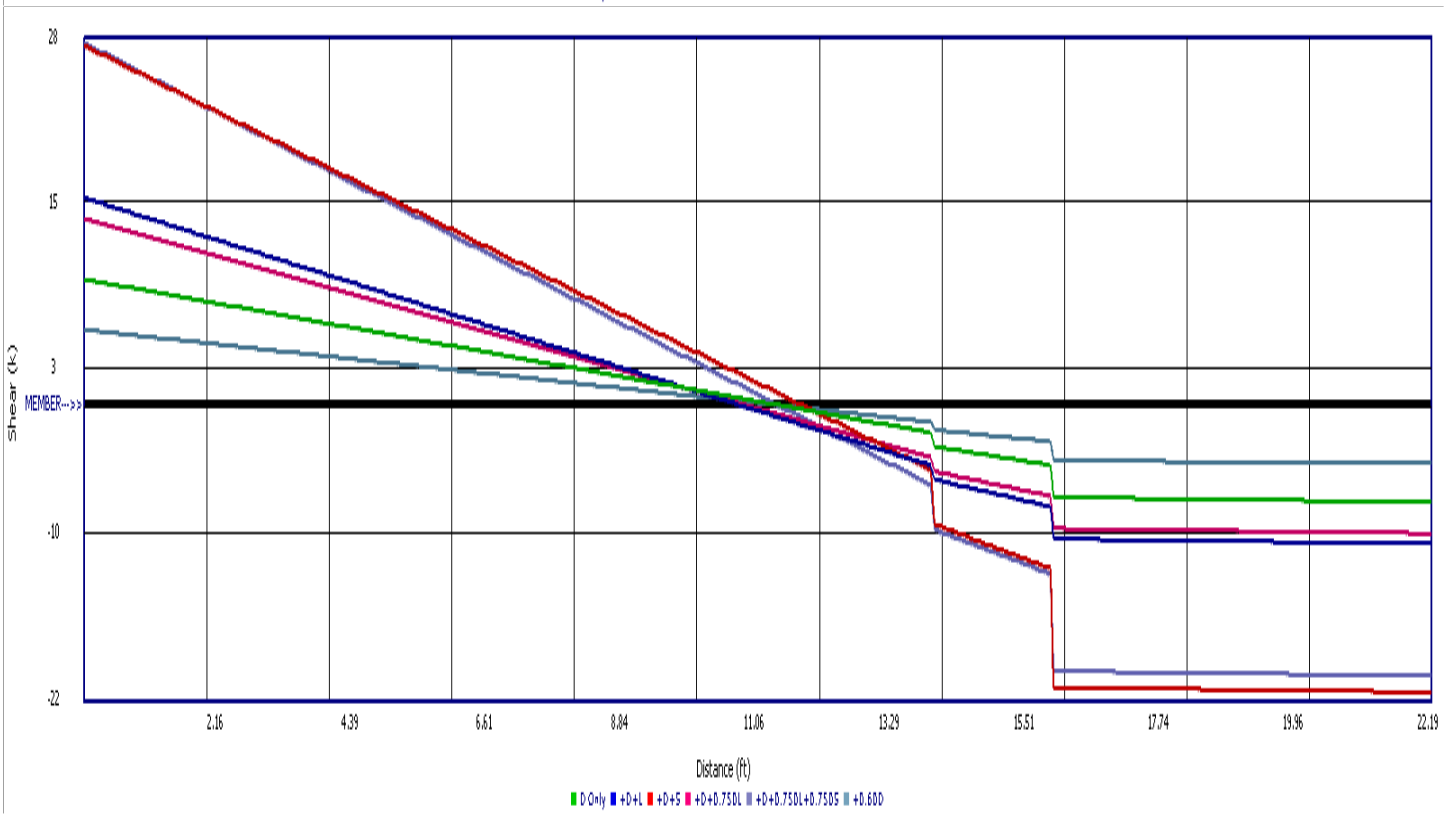
Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B11 - MECH LOW ROOF



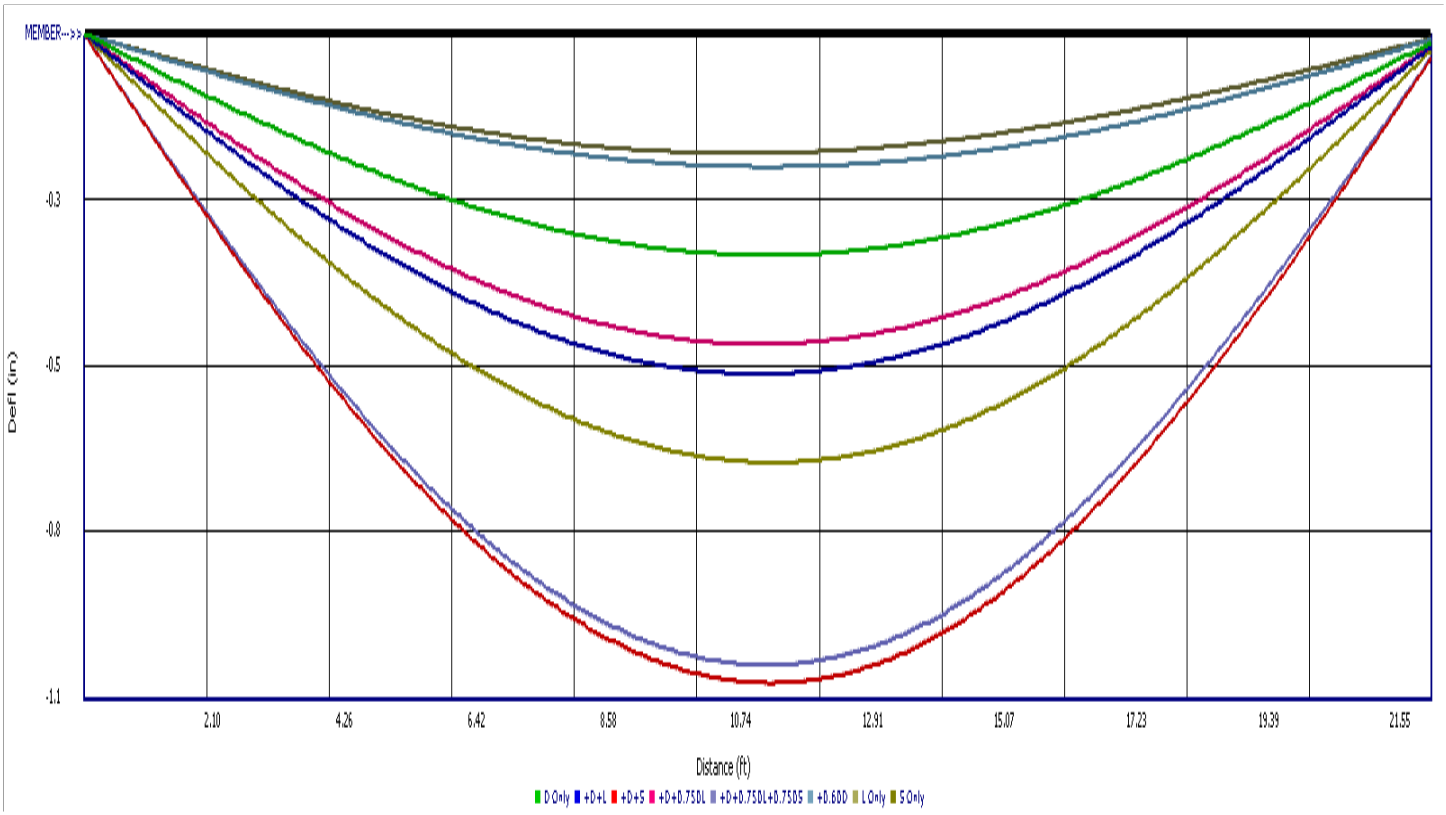


Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B11 - MECH LOW ROOF



Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

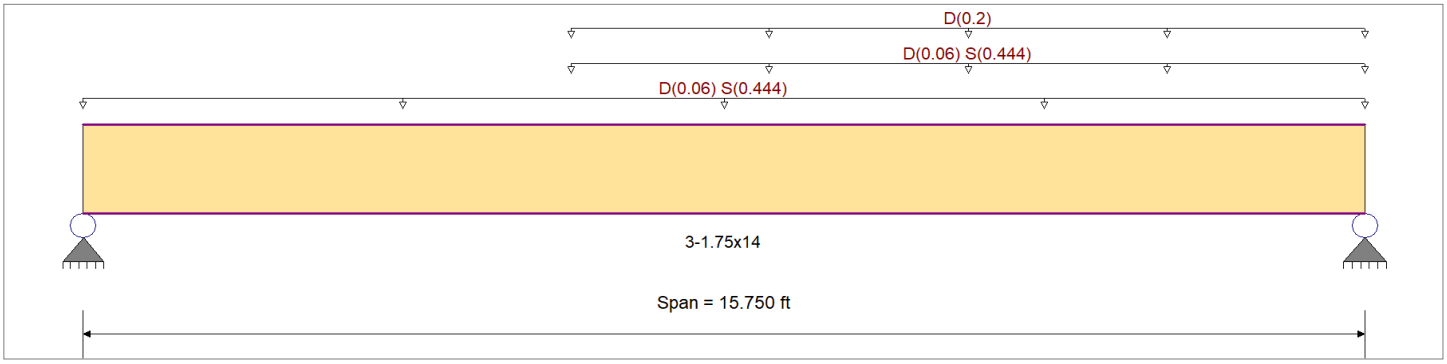
DESCRIPTION: 4B9 - BEDROOM 4

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,600.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2,600.0 psi	Ebend- xx	2,000.0 ksi
		Fc - Prll	2,510.0 psi	Eminbend - xx	1,016.54 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade :	MicroLam LVL 2.0 E	Fv	285.0 psi		
		Ft	1,555.0 psi	Density	42.010 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, S = 0.1480 ksf, Tributary Width = 3.0 ft, (LOW ROOF)
Uniform Load : D = 0.020, S = 0.1480 ksf, Extent = 6.0 -->> 15.750 ft, Tributary Width = 3.0 ft, (HIGH ROOF)
Uniform Load : D = 0.20 k/ft, Extent = 6.0 -->> 15.750 ft, Tributary Width = 1.0 ft, (WALL)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.766 : 1	Maximum Shear Stress Ratio	=	0.465 : 1
Section used for this span		**3-1.75x14**	Section used for this span		**3-1.75x14**
fb: Actual	=	2,242.52 psi	fv: Actual	=	152.32 psi
F'b	=	2,927.97 psi	F'v	=	327.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	8.507 ft	Location of maximum on span	=	14.600 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.434 in	Ratio =	435	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.585 in	Ratio =	323	>=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 15.750 ft	1	0.256	0.159	0.90	1.00	1.00	1.00	0.979	1.00	1.00	1.00	8.38	586.1	2,291.5	2.00	40.8	256.5
+D+S					1.00	1.00	1.00	0.979	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.750 ft	1	0.766	0.465	1.15	1.00	1.00	1.00	0.979	1.00	1.00	1.00	32.05	2,242.5	2,928.0	7.46	152.3	327.8
+D+0.750S					1.00	1.00	1.00	0.979	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.750 ft	1	0.624	0.380	1.15	1.00	1.00	1.00	0.979	1.00	1.00	1.00	26.13	1,828.3	2,928.0	6.10	124.4	327.8
+0.60D					1.00	1.00	1.00	0.979	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.750 ft	1	0.086	0.054	1.60	1.00	1.00	1.00	0.979	1.00	1.00	1.00	5.03	351.7	4,073.7	1.20	24.5	456.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B9 - BEDROOM 4

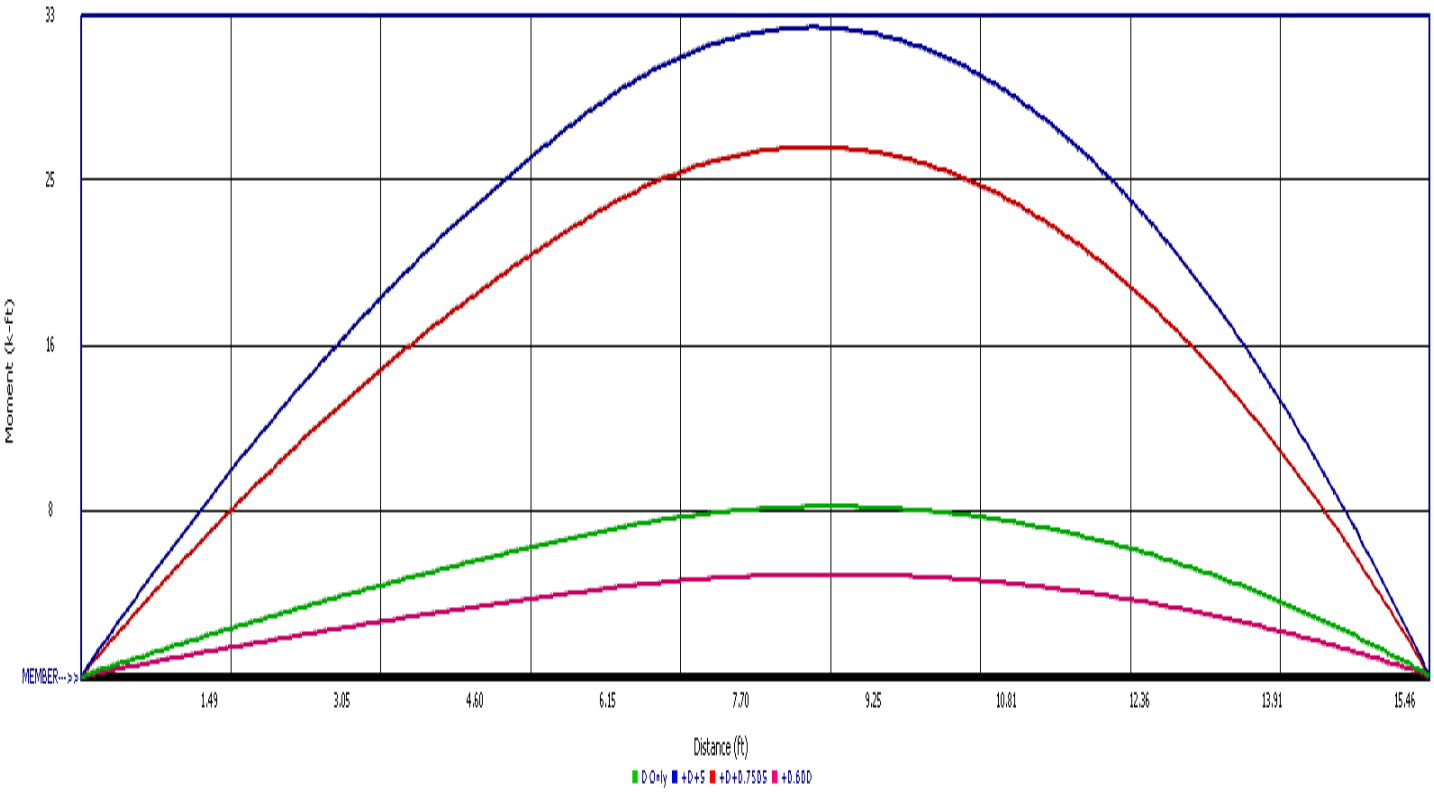
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.5849	8.105		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	6.262	8.877
Max Upward from Load Combinations	6.262	8.877
Max Upward from Load Cases	4.836	6.486
D Only	1.426	2.392
+D+S	6.262	8.877
+D+0.750S	5.053	7.256
+0.60D	0.856	1.435
S Only	4.836	6.486

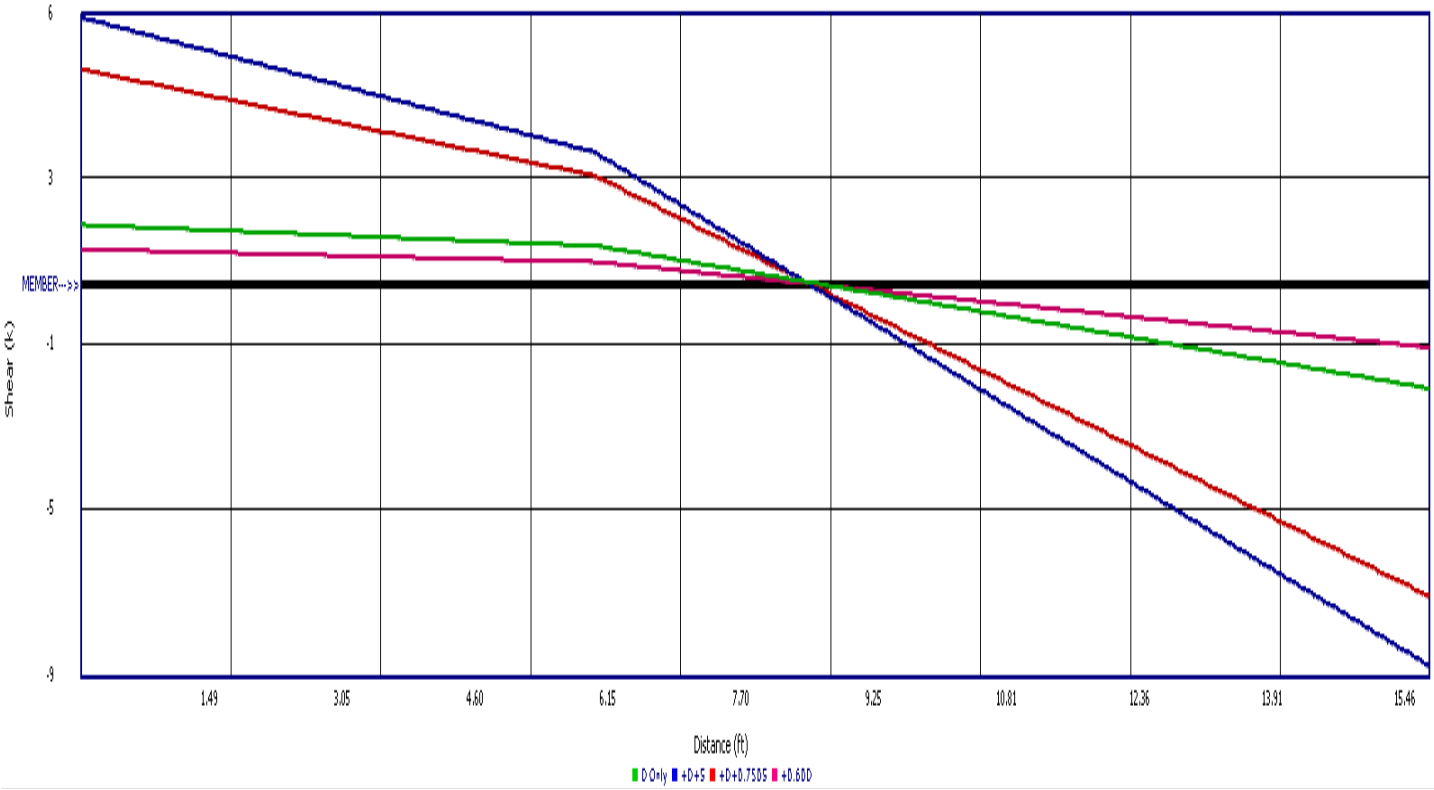


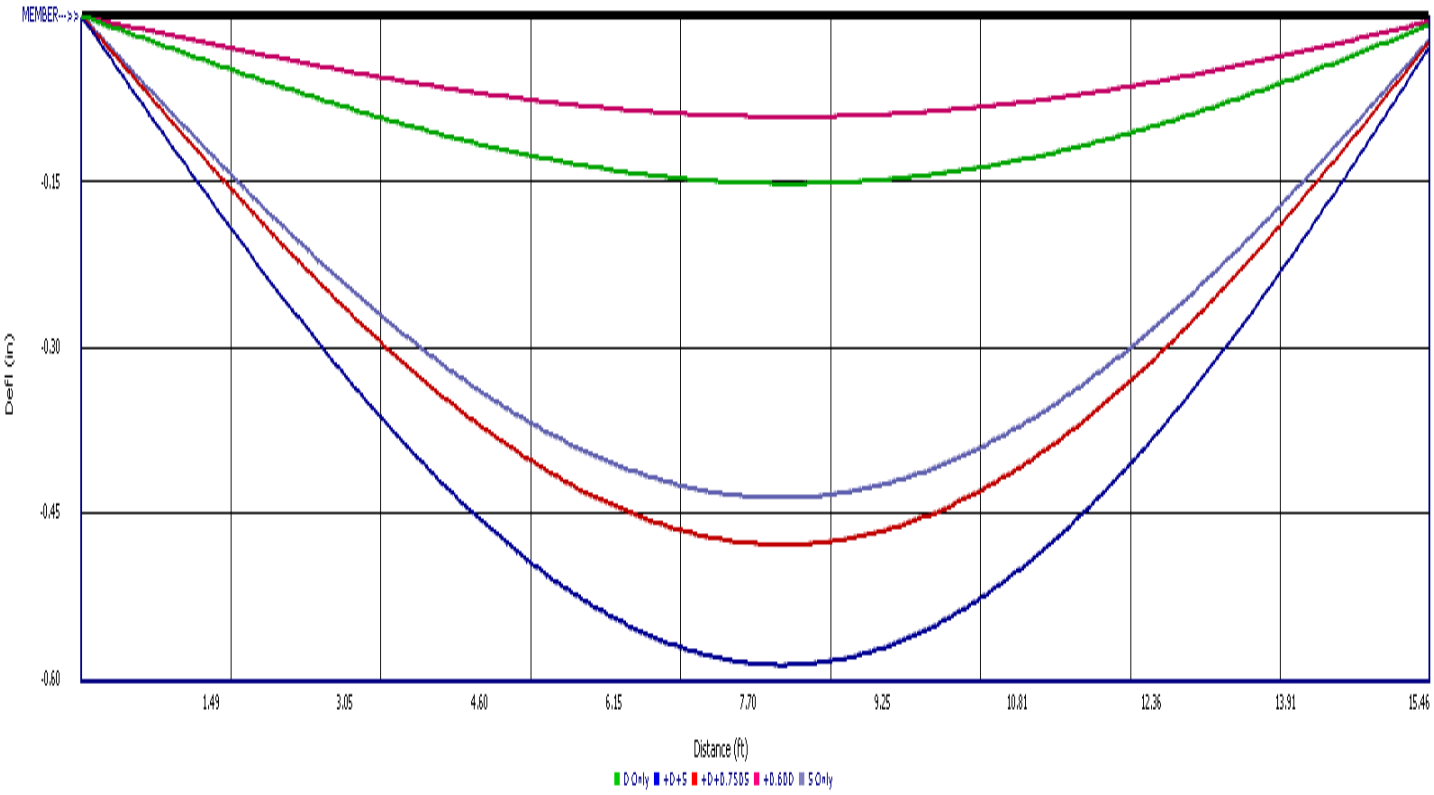
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B9 - BEDROOM 4





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

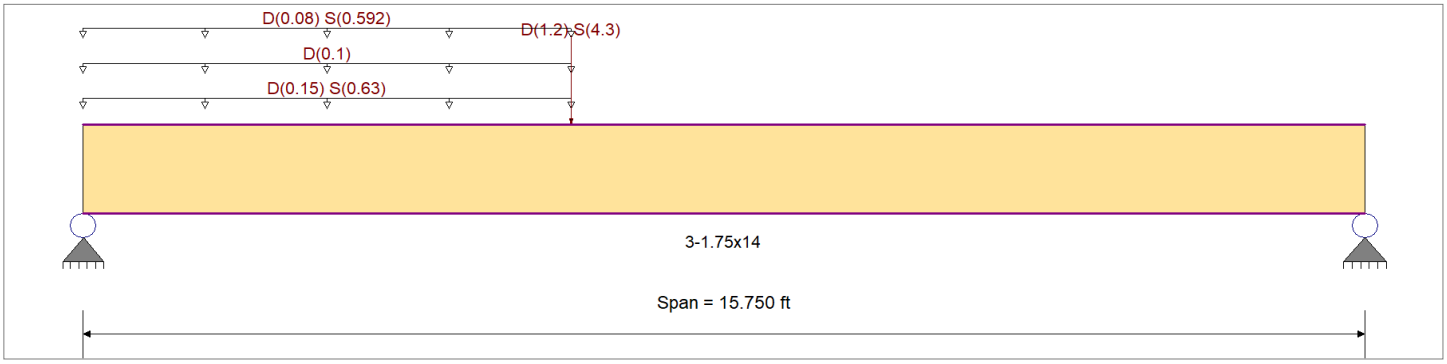
DESCRIPTION: 4B10 - BEDROOM 4

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,600.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2,600.0 psi	Ebend- xx	2,000.0 ksi
		Fc - Prll	2,510.0 psi	Eminbend - xx	1,016.54 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade :	MicroLam LVL 2.0 E	Fv	285.0 psi		
		Ft	1,555.0 psi	Density	42.010 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.020, S = 0.0840 ksf, Extent = 0.0 -->> 6.0 ft, Tributary Width = 7.50 ft, (HIGH ROOF)
Uniform Load : D = 0.10 k/ft, Extent = 0.0 -->> 6.0 ft, Tributary Width = 1.0 ft, (WALL)
Uniform Load : D = 0.020, S = 0.1480 ksf, Extent = 0.0 -->> 6.0 ft, Tributary Width = 4.0 ft, (LOW ROOF)
Point Load : D = 1.20, S = 4.30 k @ 6.0 ft, (RB1)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.916 : 1	Maximum Shear Stress Ratio	=	0.579 : 1
Section used for this span		**3-1.75x14**	Section used for this span		**3-1.75x14**
fb: Actual	=	2,680.76 psi	fv: Actual	=	189.86 psi
F'b	=	2,927.97 psi	F'v	=	327.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	5.978 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.461 in	Ratio =	409	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.600 in	Ratio =	314	>=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 15.750 ft	1	0.267	0.168	0.90	1.00	1.00	1.00	0.979	1.00	1.00	1.00	8.75	612.4	2,291.5	2.11	43.1	256.5
+D+S					1.00	1.00	1.00	0.979	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.750 ft	1	0.916	0.579	1.15	1.00	1.00	1.00	0.979	1.00	1.00	1.00	38.31	2,680.8	2,928.0	9.30	189.9	327.8
+D+0.750S					1.00	1.00	1.00	0.979	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.750 ft	1	0.739	0.467	1.15	1.00	1.00	1.00	0.979	1.00	1.00	1.00	30.92	2,163.7	2,928.0	7.50	153.2	327.8
+0.60D					1.00	1.00	1.00	0.979	1.00	1.00	1.00			0.0	0.00	0.0	0.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B10 - BEDROOM 4

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 15.750 ft	**1**	0.090	0.057	1.60	1.00	1.00	1.00	0.979	1.00	1.00	1.00	5.25	367.5	4,073.7	1.27	25.8	456.0

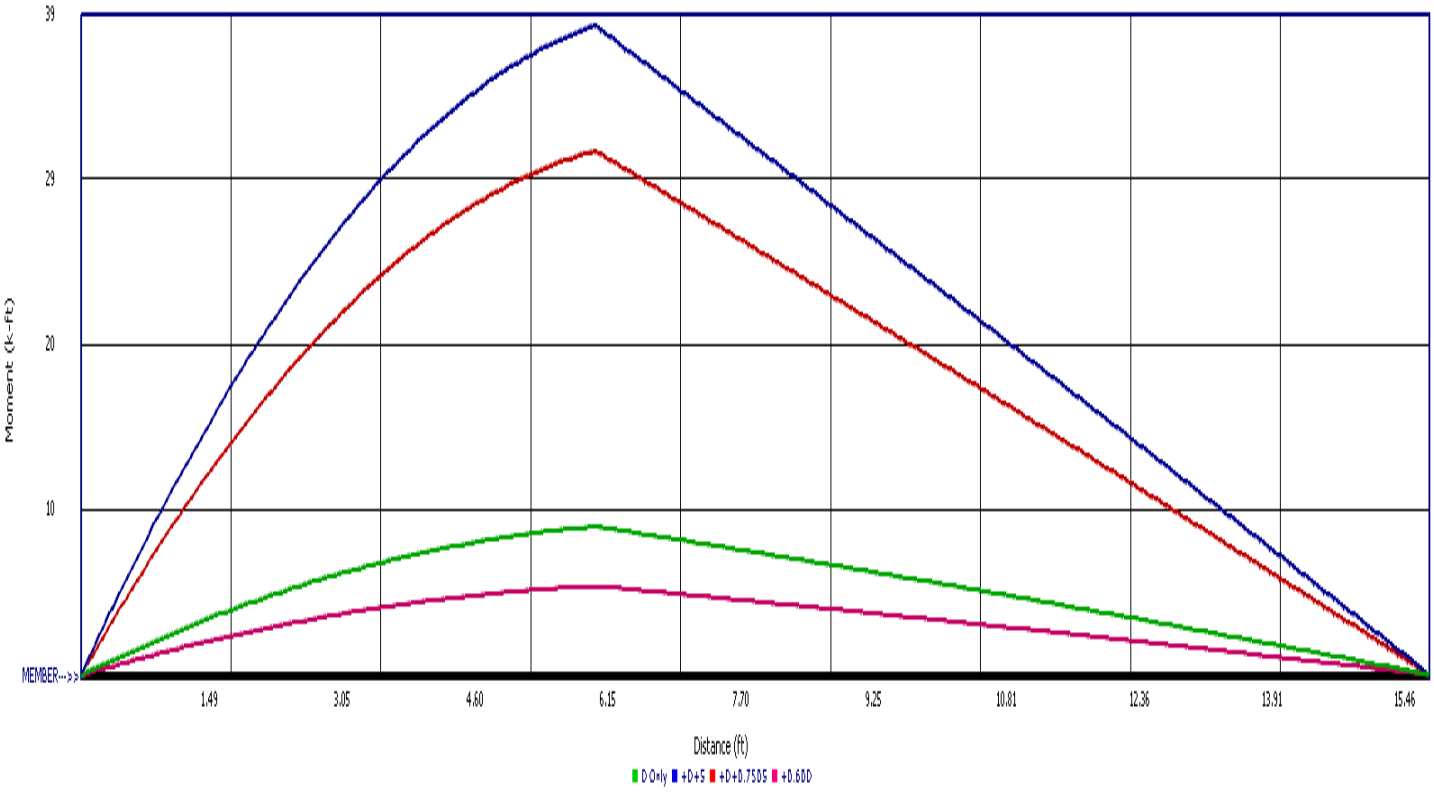
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.6002	7.243		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	11.112	4.038
Max Upward from Load Combinations	11.112	4.038
Max Upward from Load Cases	8.597	3.035
D Only	2.515	1.003
+D+S	11.112	4.038
+D+0.750S	8.963	3.279
+0.60D	1.509	0.602
S Only	8.597	3.035

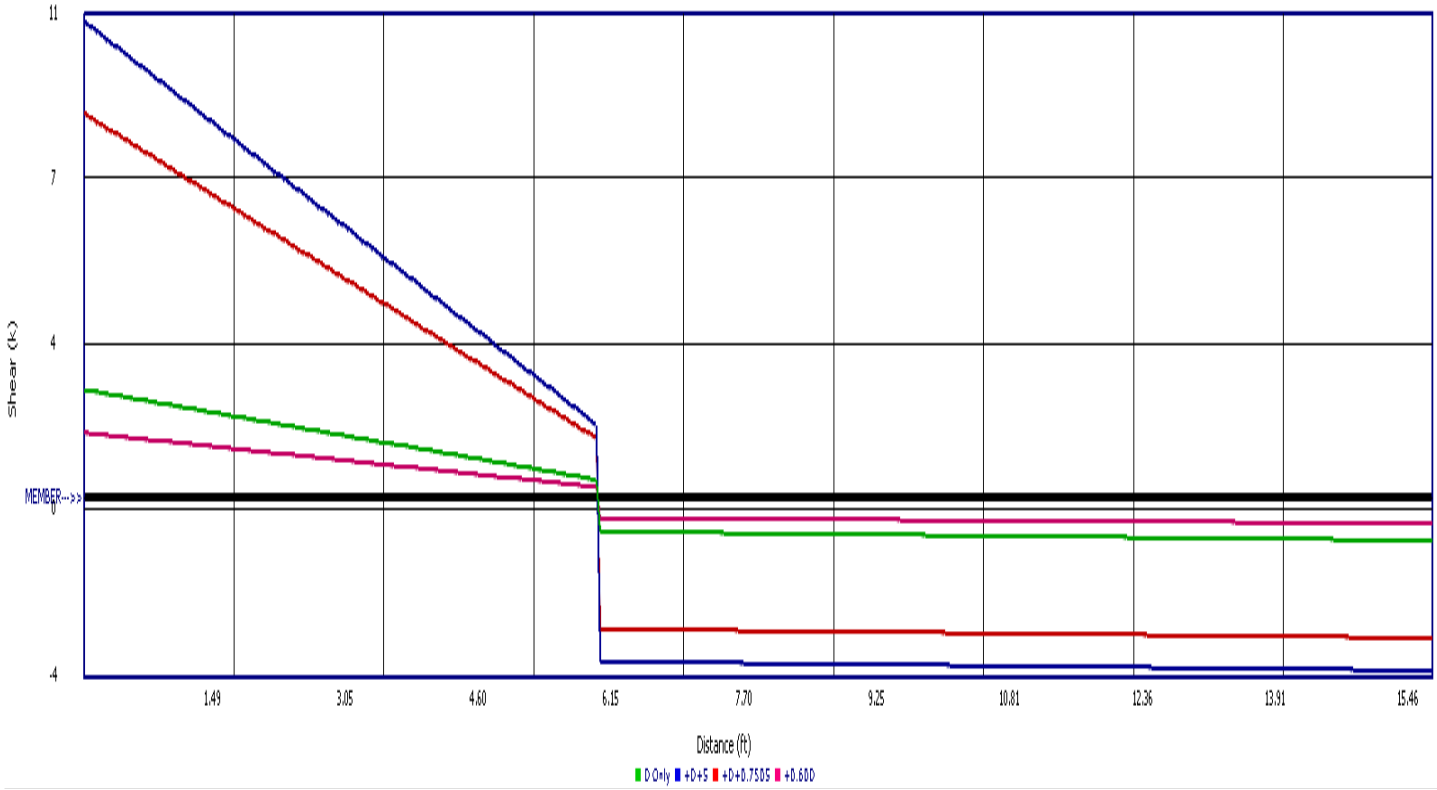


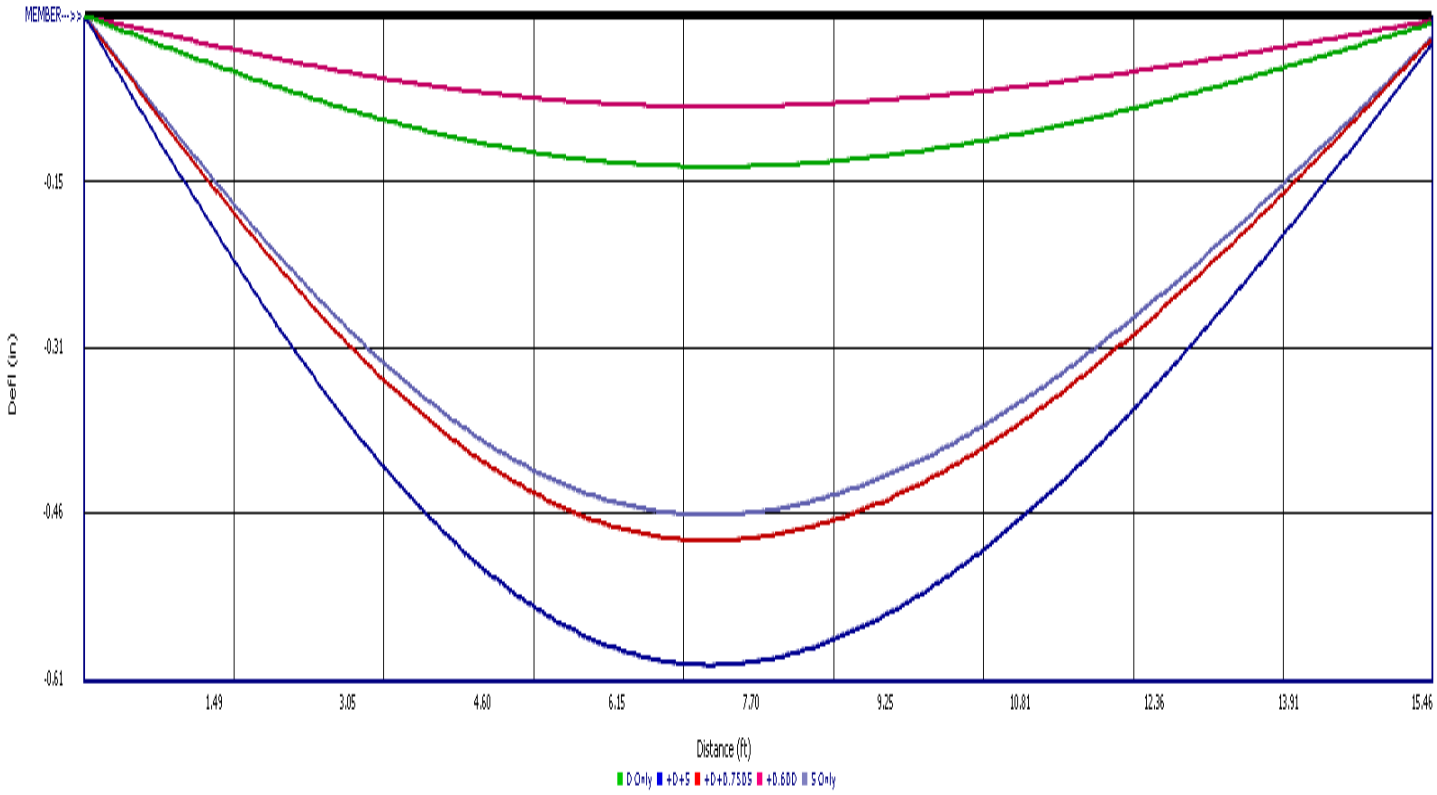
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B10 - BEDROOM 4





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

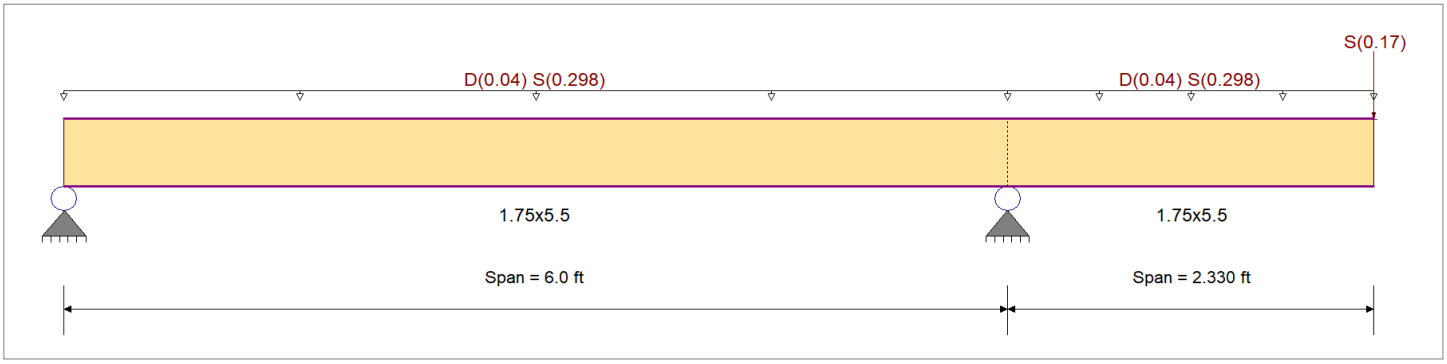
DESCRIPTION: 4B11 - SMALLER DECK ROOF RAFTERS

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,600.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2,600.0 psi	Ebend- xx	2,000.0 ksi
		Fc - Prll	2,510.0 psi	Eminbend - xx	1,016.54 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade :	MicroLam LVL 2.0 E	Fv	285.0 psi		
		Ft	1,555.0 psi	Density	42.010 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling			Repetitive Member Stress Increase	



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.020, S = 0.1490 ksf, Tributary Width = 2.0 ft, (ROOF)
Load for Span Number 2
Uniform Load : D = 0.020, S = 0.1490 ksf, Tributary Width = 2.0 ft, (ROOF)
Point Load : S = 0.170 k @ 2.330 ft, (ICE)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.598 : 1	Maximum Shear Stress Ratio	=	0.598 : 1
Section used for this span		**1.75x5.5**	Section used for this span		**1.75x5.5**
fb: Actual	=	1,796.97 psi	fv: Actual	=	170.51 psi
F'b	=	3,006.67 psi	F'v	=	285.00 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	6.000 ft	Location of maximum on span	=	5.564 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.086 in	Ratio =	841	>=360	Span: 2 : S Only
Max Upward Transient Deflection	-0.001 in	Ratio =	45752	>=360	Span: 2 : S Only
Max Downward Total Deflection	0.102 in	Ratio =	704	>=240	Span: 2 : +D+S
Max Upward Total Deflection	-0.007 in	Ratio =	7888	>=240	Span: 2 : D Only

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.070	0.078	0.90	1.00	1.00	1.00	1.112	1.00	1.00	1.04	0.14	188.9	2,706.0	0.13	20.1	256.5
Length = 2.330 ft	2	0.058	0.078	0.90	1.00	1.00	1.00	1.112	1.00	1.00	1.04	0.12	158.0	2,706.0	0.08	20.1	256.5
+D+S					1.00	1.00	1.00	1.112	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.598	0.598	1.00	1.00	1.00	1.00	1.112	1.00	1.00	1.04	1.32	1,797.0	3,006.7	1.09	170.5	285.0
Length = 2.330 ft	2	0.598	0.598	1.00	1.00	1.00	1.00	1.112	1.00	1.00	1.04	1.32	1,797.0	3,006.7	0.81	170.5	285.0
+D+0.750S					1.00	1.00	1.00	1.112	1.00	1.00	1.04			0.0	0.00	0.0	0.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B11 - SMALLER DECK ROOF RAFTERS

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 6.0 ft	1	0.401	0.406	1.15	1.00	1.00	1.00	1.112	1.00	1.00	1.04	1.02	1,387.2	3,457.7	0.85	132.9	327.8
Length = 2.330 ft	2	0.401	0.406	1.15	1.00	1.00	1.00	1.112	1.00	1.00	1.04	1.02	1,387.2	3,457.7	0.63	132.9	327.8
+0.60D					1.00	1.00	1.00	1.112	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.024	0.026	1.60	1.00	1.00	1.00	1.112	1.00	1.00	1.04	0.08	113.4	4,810.7	0.08	12.1	456.0
Length = 2.330 ft	2	0.020	0.026	1.60	1.00	1.00	1.00	1.112	1.00	1.00	1.04	0.07	94.8	4,810.7	0.05	12.1	456.0

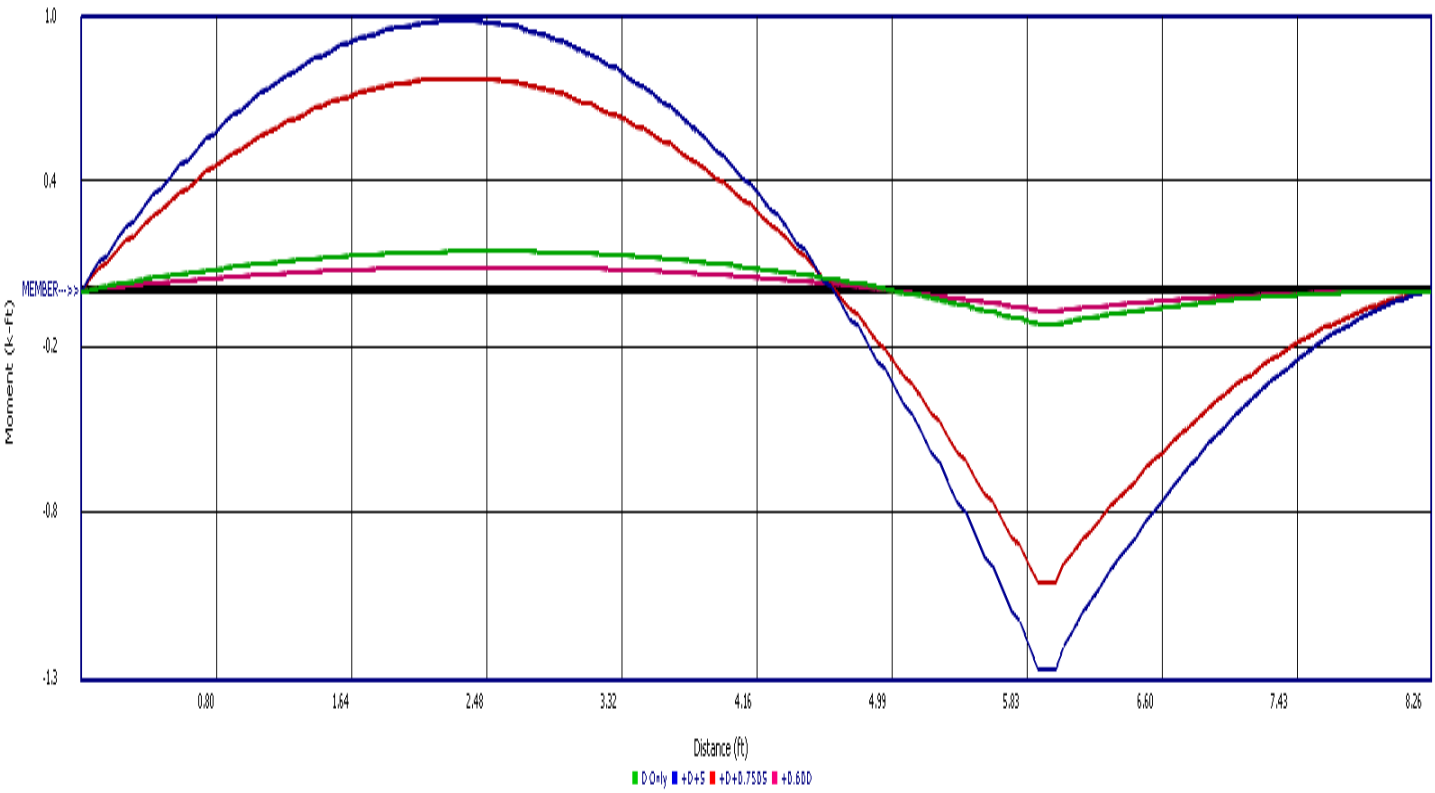
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.1022	2.648		0.0000	0.000
S Only	2	0.0418	2.330	D Only	-0.0033	0.794

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	0.802	2.207	
Max Upward from Load Combinations	0.802	2.207	
Max Upward from Load Cases	0.693	1.959	
D Only	0.109	0.248	
+D+S	0.802	2.207	
+D+0.750S	0.629	1.717	
+0.60D	0.065	0.149	
S Only	0.693	1.959	

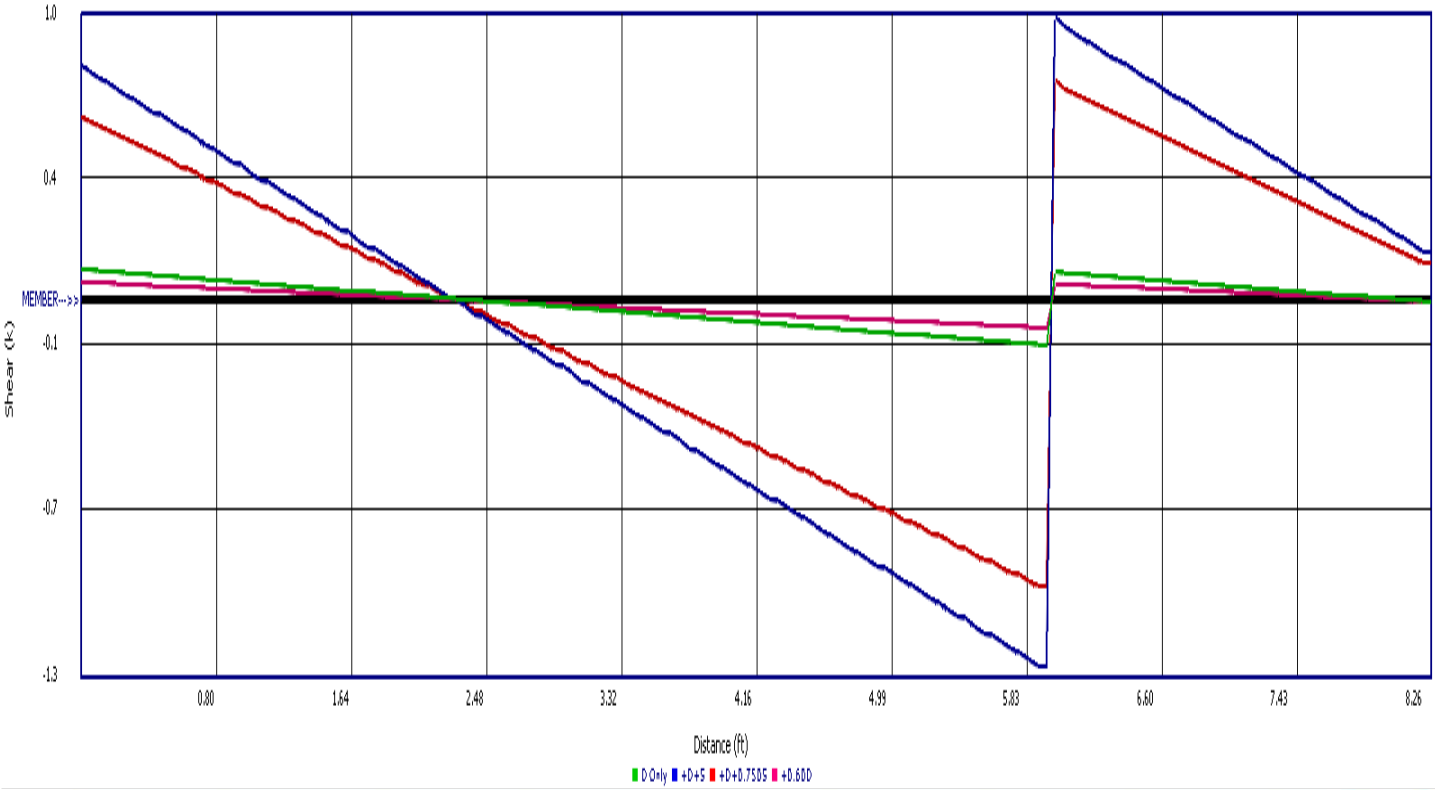


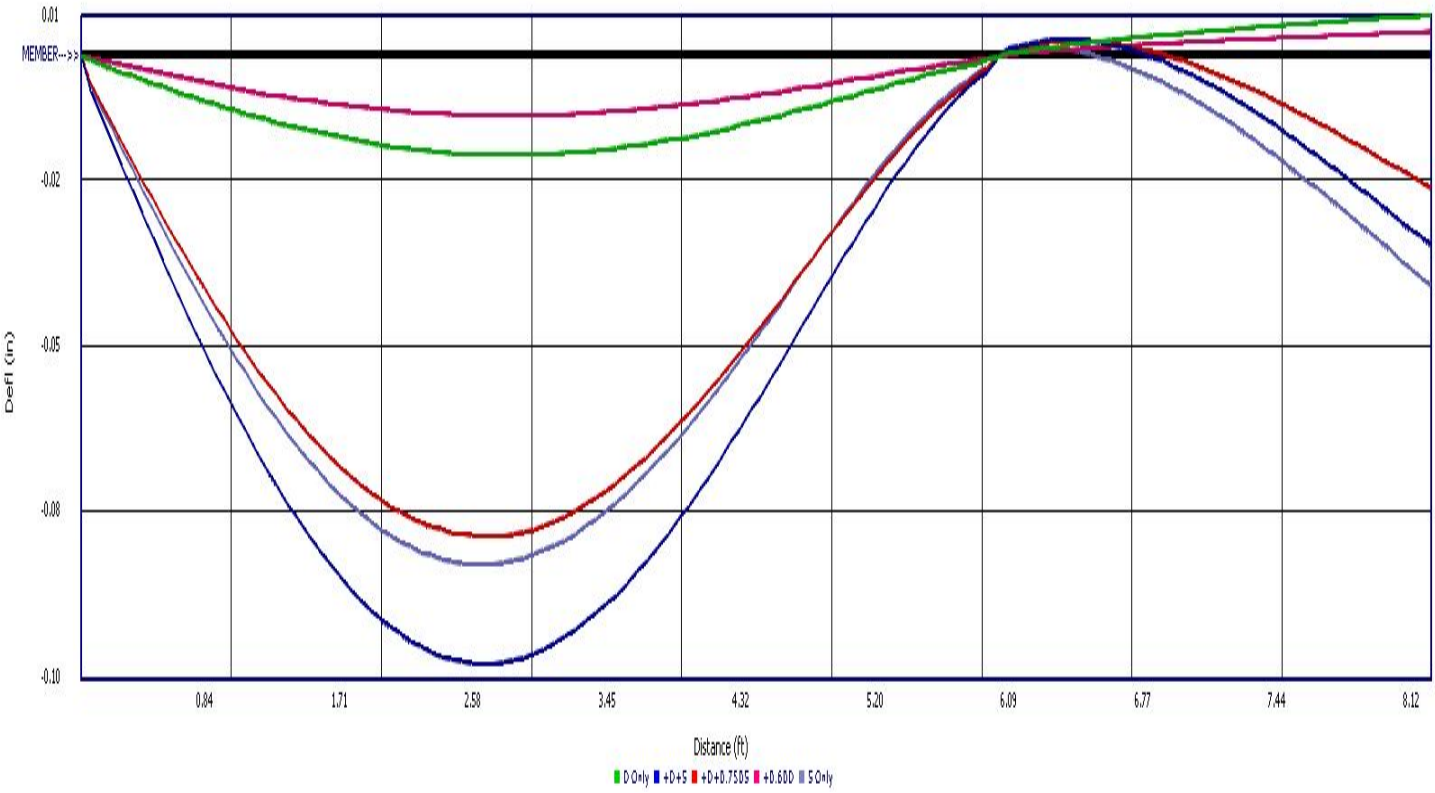
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B11 - SMALLER DECK ROOF RAFTERS





Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

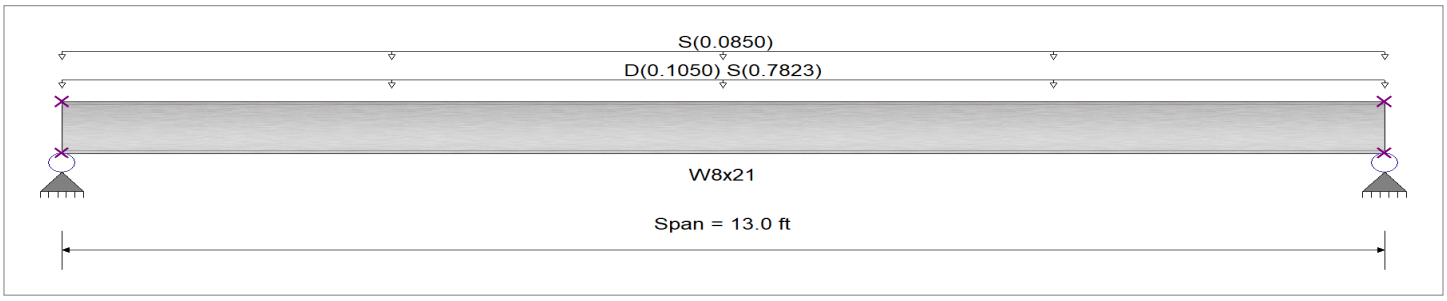
DESCRIPTION: 4B12 - SMALL DECK ROOF BEAM

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Completely Unbraced	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, S = 0.1490 ksf, Tributary Width = 5.250 ft, (ROOF)

Uniform Load : S = 0.0850 k/ft, Tributary Width = 1.0 ft, (ICE)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.527** : 1	Maximum Shear Stress Ratio =	**0.156** : 1
Section used for this span	**W8x21**	Section used for this span	**W8x21**
Ma : Applied	20.982 k-ft	Va : Applied	6.456 k
Mn / Omega : Allowable	39.802 k-ft	Vn/Omega : Allowable	41.40 k
Load Combination	+D+S	Load Combination	+D+S
		Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.256 in	Ratio =	608	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.294 in	Ratio =	531	>=240.	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240.0	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 13.00 ft	1	0.067	0.020	2.66		2.66	66.47	39.80	1.14	1.00	0.82	62.10	41.40
+D+S													
Dsgn. L = 13.00 ft	1	0.527	0.156	20.98		20.98	66.47	39.80	1.14	1.00	6.46	62.10	41.40
+D+0.750S													
Dsgn. L = 13.00 ft	1	0.412	0.122	16.40		16.40	66.47	39.80	1.14	1.00	5.05	62.10	41.40
+0.60D													
Dsgn. L = 13.00 ft	1	0.040	0.012	1.60		1.60	66.47	39.80	1.14	1.00	0.49	62.10	41.40

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.2936	6.537		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Span	Max. Upward Defl	Location in Span
D Only	1	0.0372	6.537		0.0000	0.000
+D+S	1	0.2936	6.537		0.0000	0.000
+D+0.750S	1	0.2295	6.537		0.0000	0.000
+0.60D	1	0.0223	6.537		0.0000	0.000
S Only	1	0.2364	6.537		0.0000	0.000

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B12 - SMALL DECK ROOF BEAM

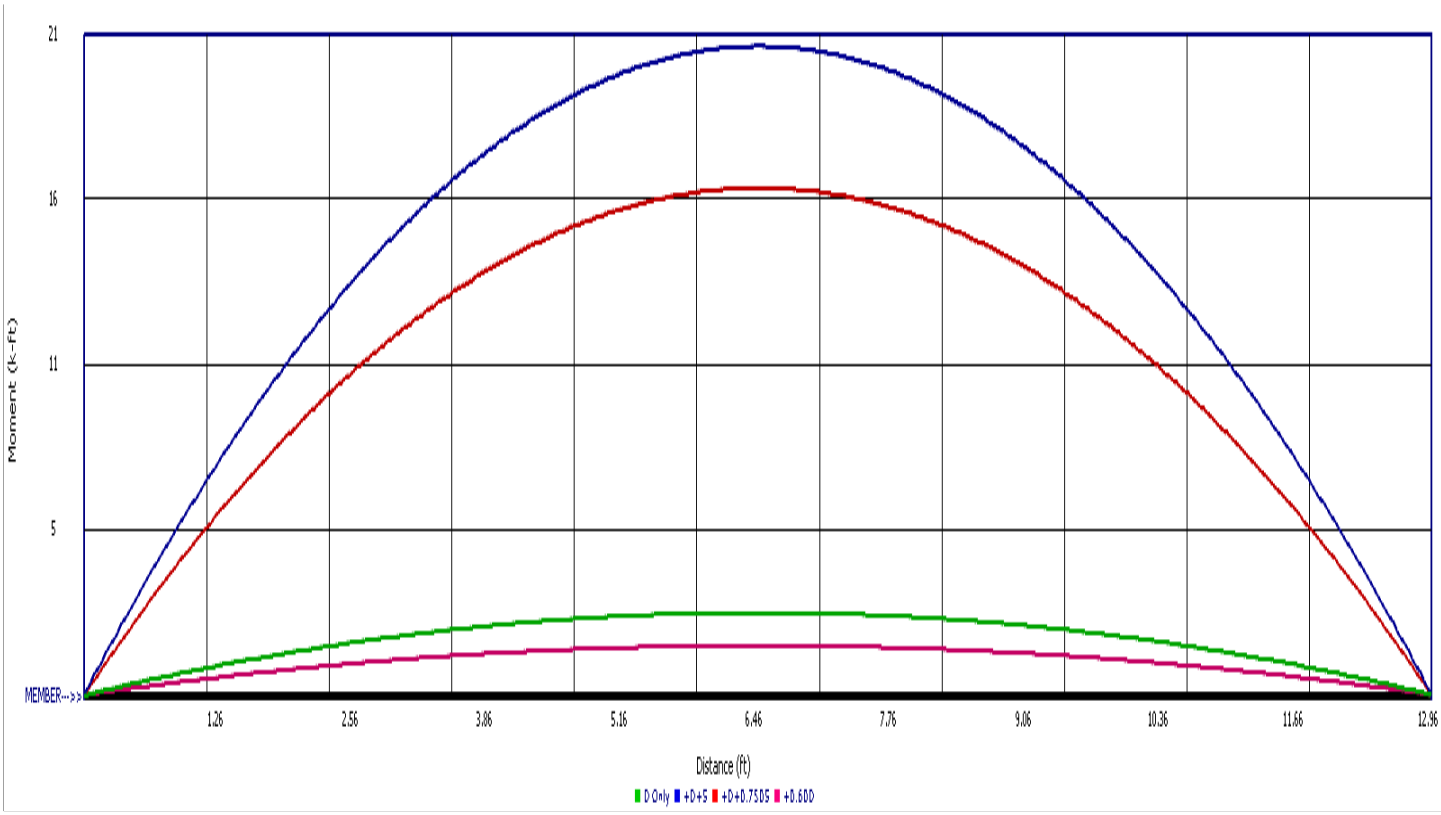
Vertical Reactions

Support notation : Far left is #: Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	6.456	6.456
Max Upward from Load Combinations	6.456	6.456
Max Upward from Load Cases	5.637	5.637
D Only	0.819	0.819
+D+S	6.456	6.456
+D+0.750S	5.047	5.047
+0.60D	0.491	0.491
S Only	5.637	5.637

Steel Section Properties : W8x21

Depth	=	8.280	in	I xx	=	75.30	in^4	J	=	0.282	in^4
Web Thick	=	0.250	in	S xx		18.20	in^3	Cw	=	152.00	in^6
Flange Width	=	5.270	in	R xx	=	3.490	in				
Flange Thick	=	0.400	in	Zx	=	20.400	in^3				
Area	=	6.160	in^2	I yy	=	9.770	in^4				
Weight	=	21.000	plf	S yy	=	3.710	in^3	Wno	=	10.400	in^2
Kdesign	=	0.700	in	R yy	=	1.260	in	Sw	=	5.470	in^4
K1	=	0.563	in	Zy	=	5.690	in^3	Qf	=	3.960	in^3
rts	=	1.460	in					Qw	=	10.100	in^3
Ycg	=	4.140	in								

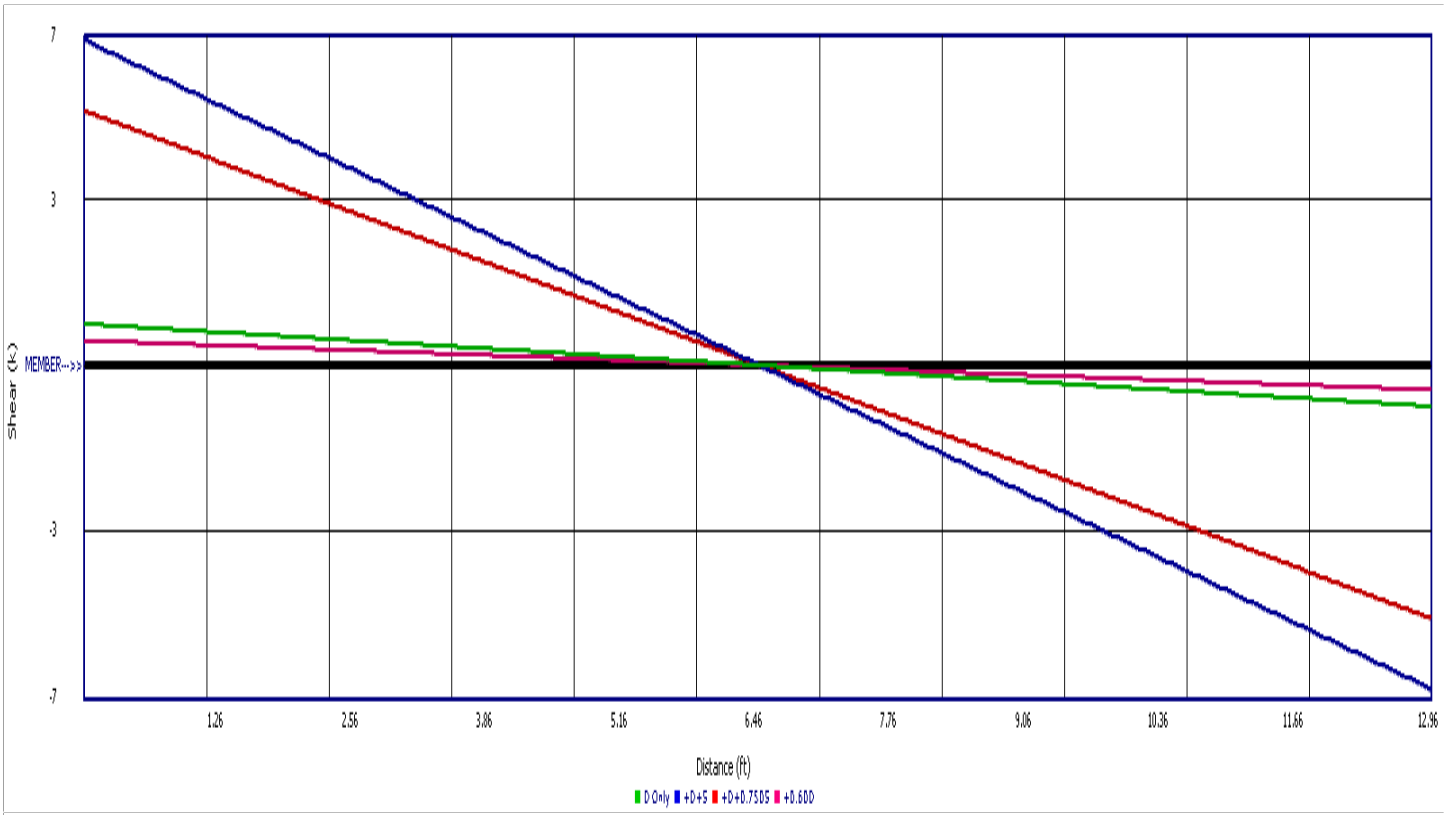


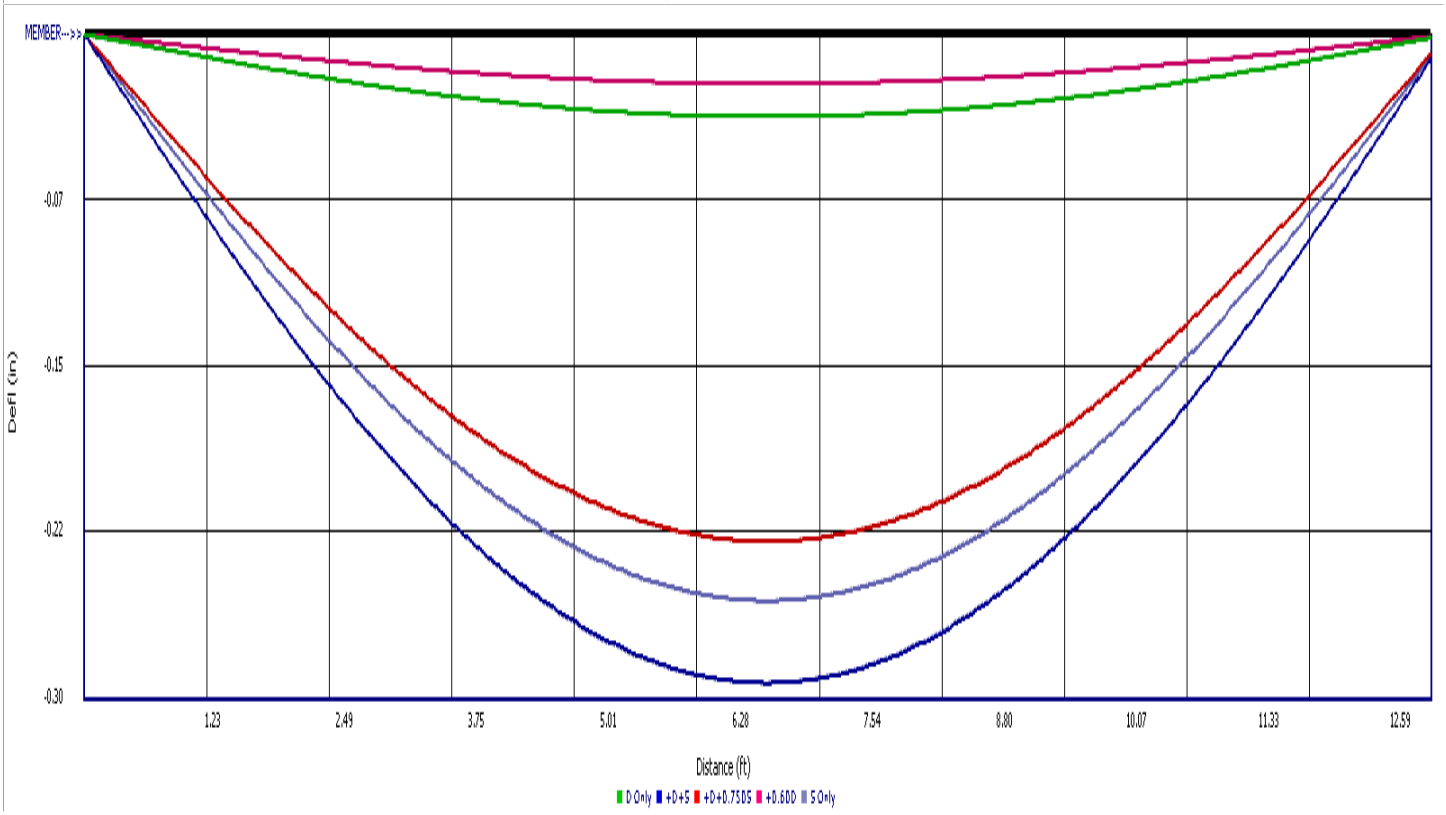
Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B12 - SMALL DECK ROOF BEAM





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

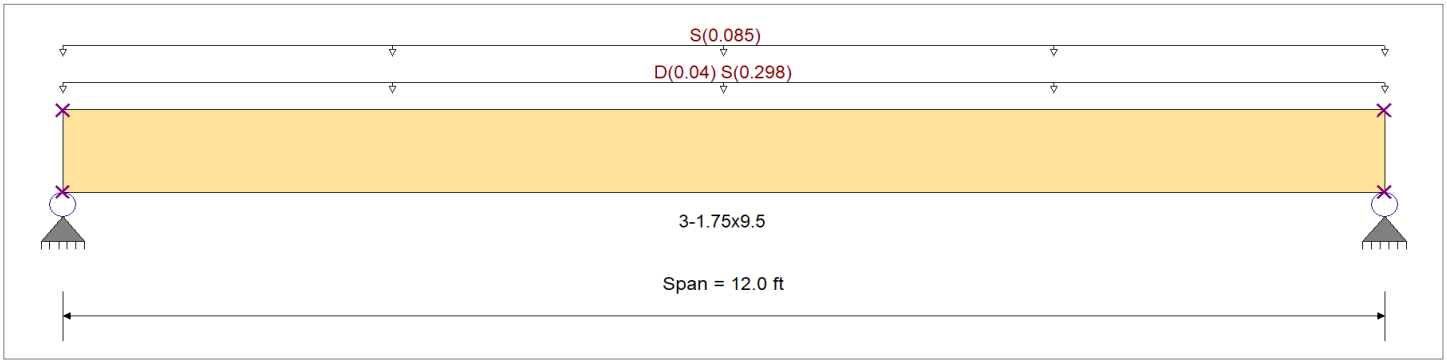
DESCRIPTION: 4B13

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	850.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	850.0 psi	Ebend- xx	1,600.0 ksi
		Fc - Prll	1,400.0 psi	Eminbend - xx	580.0 ksi
Wood Species :	Douglas Fir-Larch (North)	Fc - Perp	625.0 psi		
Wood Grade :	No. 1/No. 2	Fv	180.0 psi		
		Ft	500.0 psi	Density	30.590 pcf
Beam Bracing :	Completely Unbraced				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.020, S = 0.1490 ksf, Tributary Width = 2.0 ft, (ROOF)
Uniform Load : S = 0.0850 , Tributary Width = 1.0 ft, (ICE)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.894 : 1	Maximum Shear Stress Ratio	=	0.248 : 1
Section used for this span		**3-1.75x9.5**	Section used for this span		**3-1.75x9.5**
fb: Actual	=	895.11 psi	fv: Actual	=	51.29 psi
F'b	=	1,001.48 psi	F'v	=	207.00 psi
Load Combination		+D+0.750S	Load Combination		+D+0.750S
Location of maximum on span	=	6.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.299 in	Ratio =	480	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.331 in	Ratio =	435	>=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.139	0.039	0.90	1.00	1.00	0.99	1.032	1.00	1.00	1.00	0.72	109.4	785.2	0.21	6.3	162.0
+D+0.750S					1.00	1.00	0.99	1.032	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.894	0.248	1.15	1.00	1.00	0.99	1.032	1.00	1.00	1.00	5.89	895.1	1,001.5	1.71	51.3	207.0
+0.60D					1.00	1.00	0.99	1.032	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.047	0.013	1.60	1.00	1.00	0.99	1.032	1.00	1.00	1.00	0.43	65.6	1,388.4	0.13	3.8	288.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.3308	6.044		0.0000	0.000

Wood Beam

Project File: 22025 Astrid Building 7.ec6

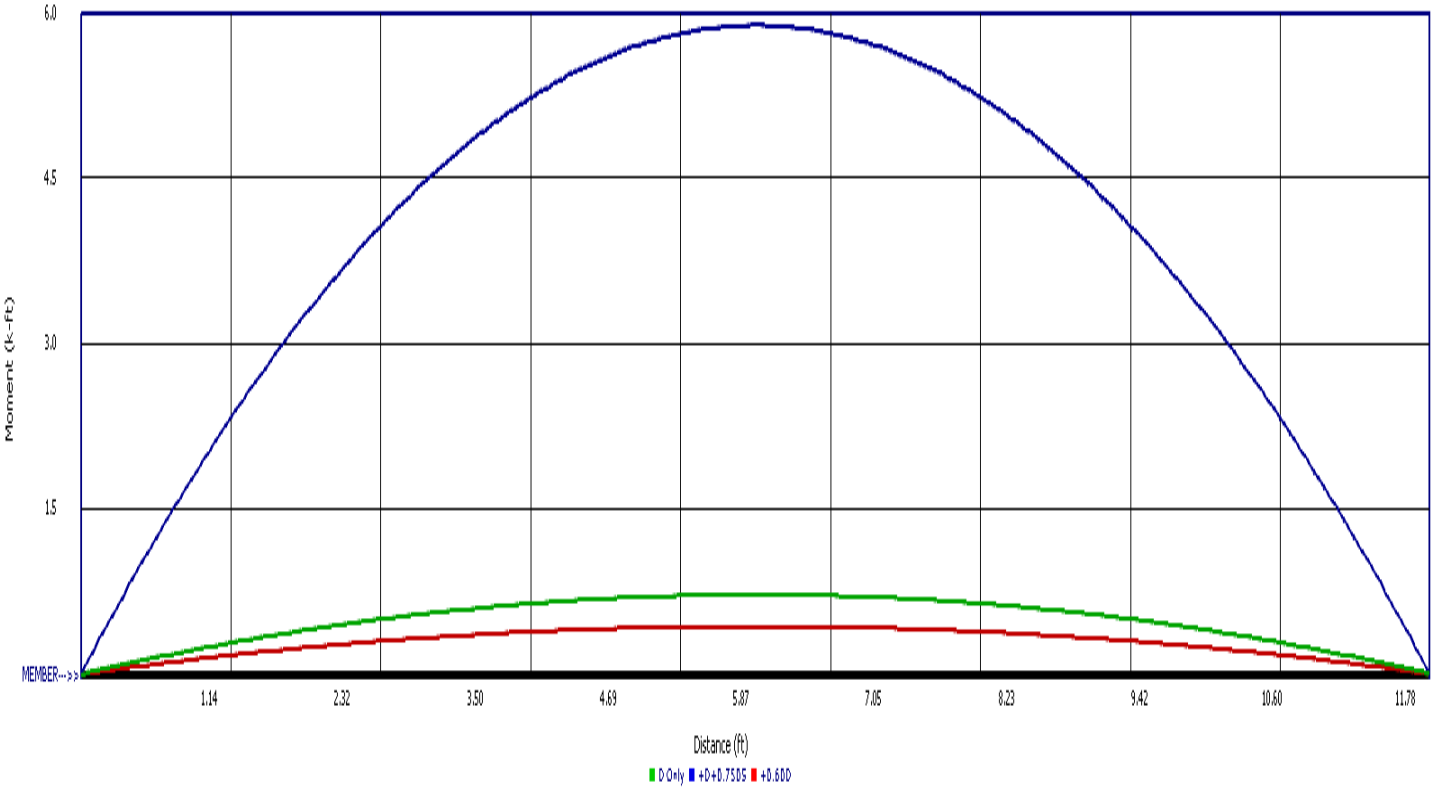
LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B13

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.538	2.538
Max Upward from Load Combinations	2.538	2.538
Max Upward from Load Cases	2.298	2.298
D Only	0.240	0.240
+D+S	2.538	2.538
+D+0.750S	1.964	1.964
+0.60D	0.144	0.144
S Only	2.298	2.298

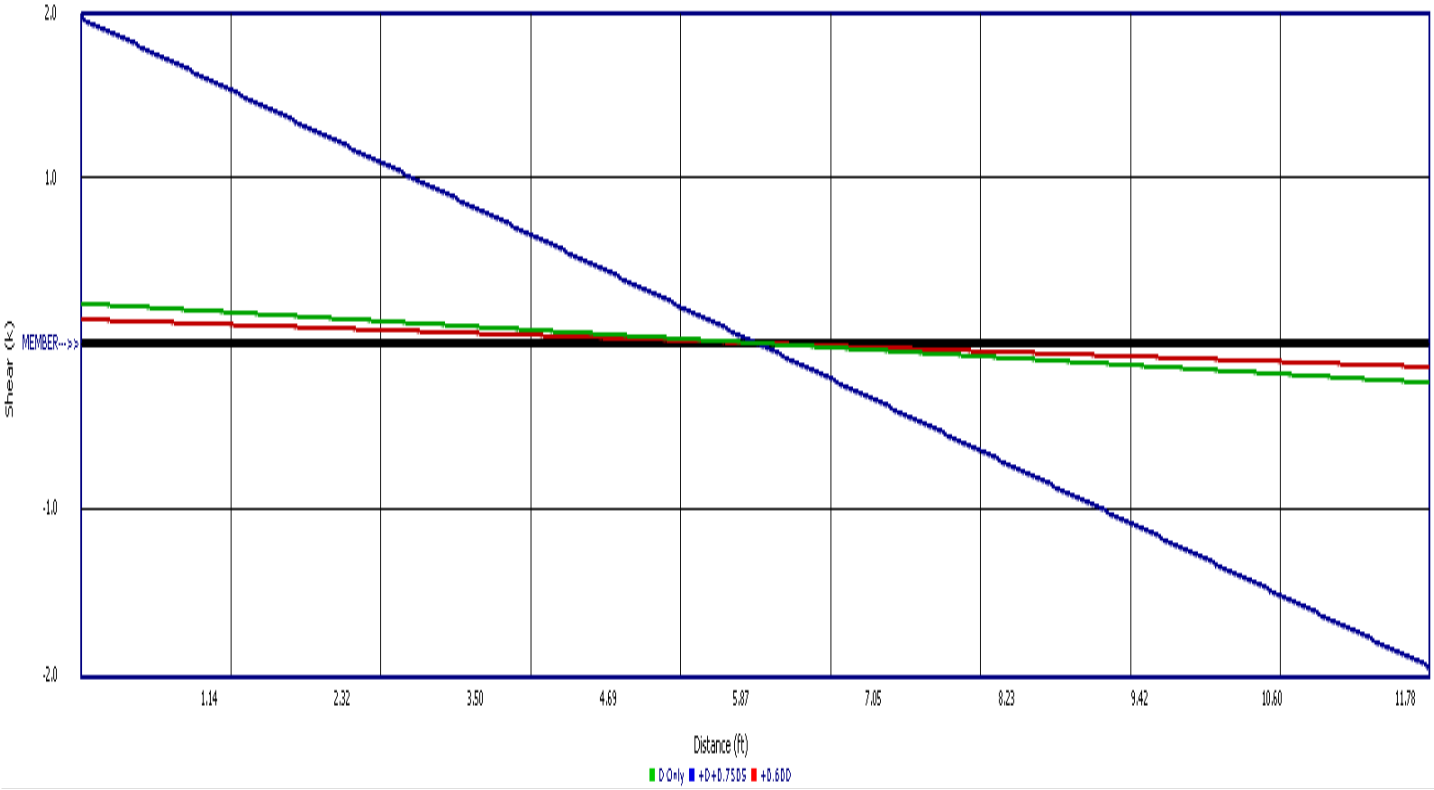


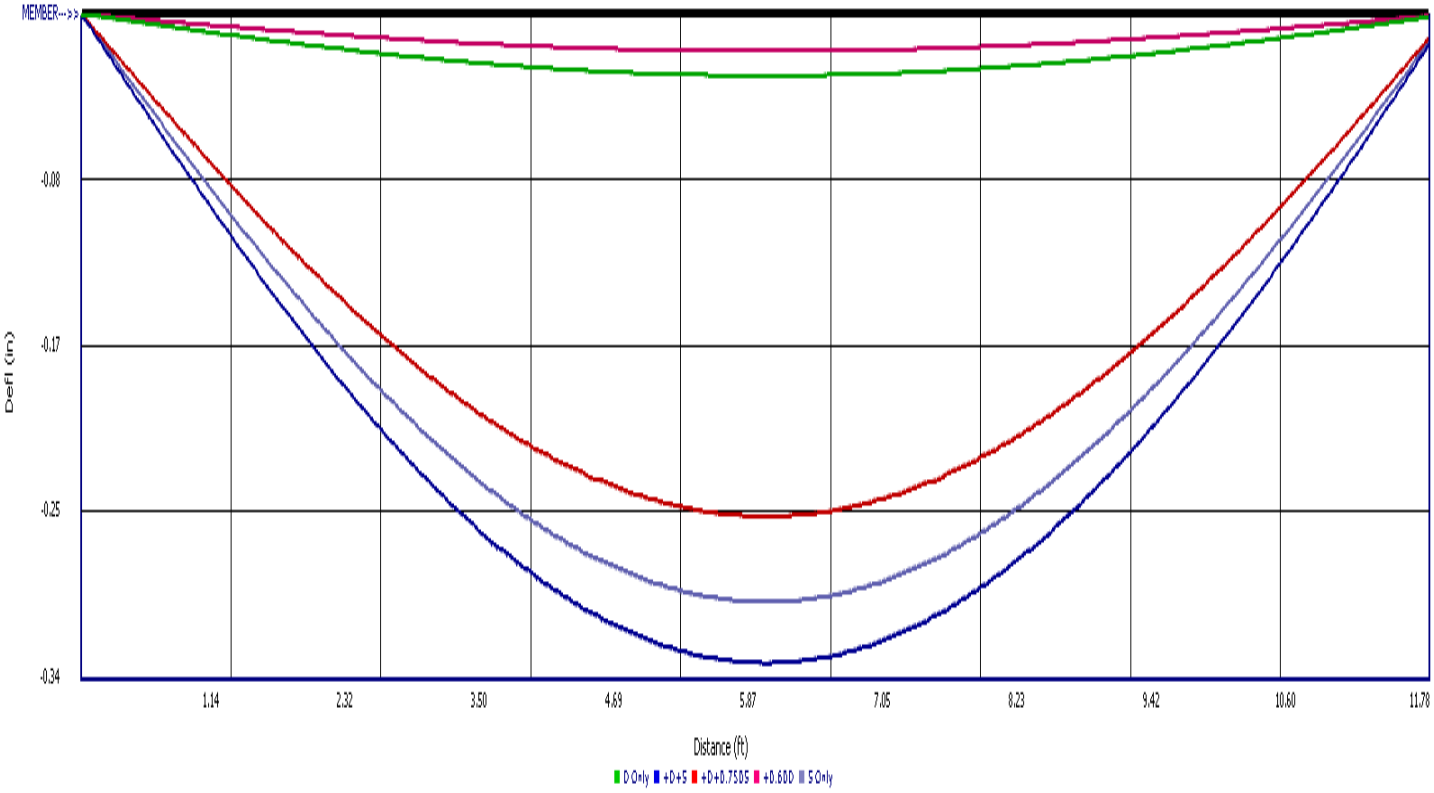
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B13





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

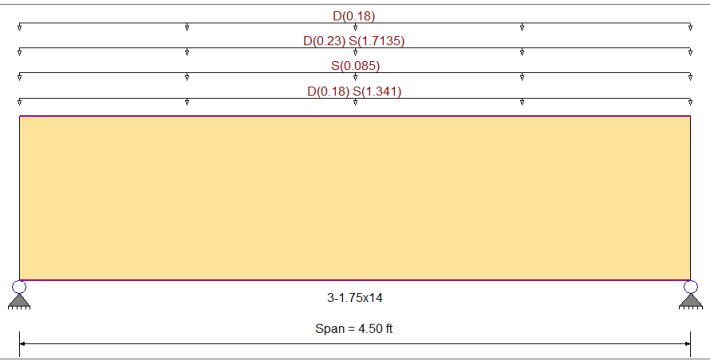
DESCRIPTION: 4B14

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2600 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2600 psi	Ebend- xx	2000 ksi
		Fc - Prll	2510 psi	Eminbend - xx	1016.535 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750 psi		
Wood Grade :	MicroLam LVL 2.0 E	Fv	285 psi		
		Ft	1555 psi	Density	42.01 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.020, S = 0.1490 ksf, Tributary Width = 9.0 ft, (LOW ROOF)
Uniform Load : S = 0.0850 , Tributary Width = 1.0 ft, (ICE)
Uniform Load : D = 0.020, S = 0.1490 ksf, Tributary Width = 11.50 ft, (HIGH ROOF)
Uniform Load : D = 0.180 , Tributary Width = 1.0 ft, (WALL)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.178 : 1	Maximum Shear Stress Ratio	=	0.199 : 1
Section used for this span		**3-1.75x14**	Section used for this span		**3-1.75x14**
fb: Actual	=	521.53 psi	fv: Actual	=	65.14 psi
F'b	=	2,927.97 psi	F'v	=	327.75 psi
Load Combination		+D+0.750S	Load Combination		+D+0.750S
Location of maximum on span	=	2.250 ft	Location of maximum on span	=	3.334 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.012 in	Ratio =	4450	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.014 in	Ratio =	3746	>=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 4.50 ft	1	0.046	0.051	0.90	1.00	1.00	1.00	0.979	1.00	1.00	1.00	1.49	104.5	2,291.5	0.64	13.1	256.5
+D+0.750S					1.00	1.00	1.00	0.979	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 4.50 ft	1	0.178	0.199	1.15	1.00	1.00	1.00	0.979	1.00	1.00	1.00	7.45	521.5	2,928.0	3.19	65.1	327.8
+0.60D					1.00	1.00	1.00	0.979	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 4.50 ft	1	0.015	0.017	1.60	1.00	1.00	1.00	0.979	1.00	1.00	1.00	0.90	62.7	4,073.7	0.38	7.8	456.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B14

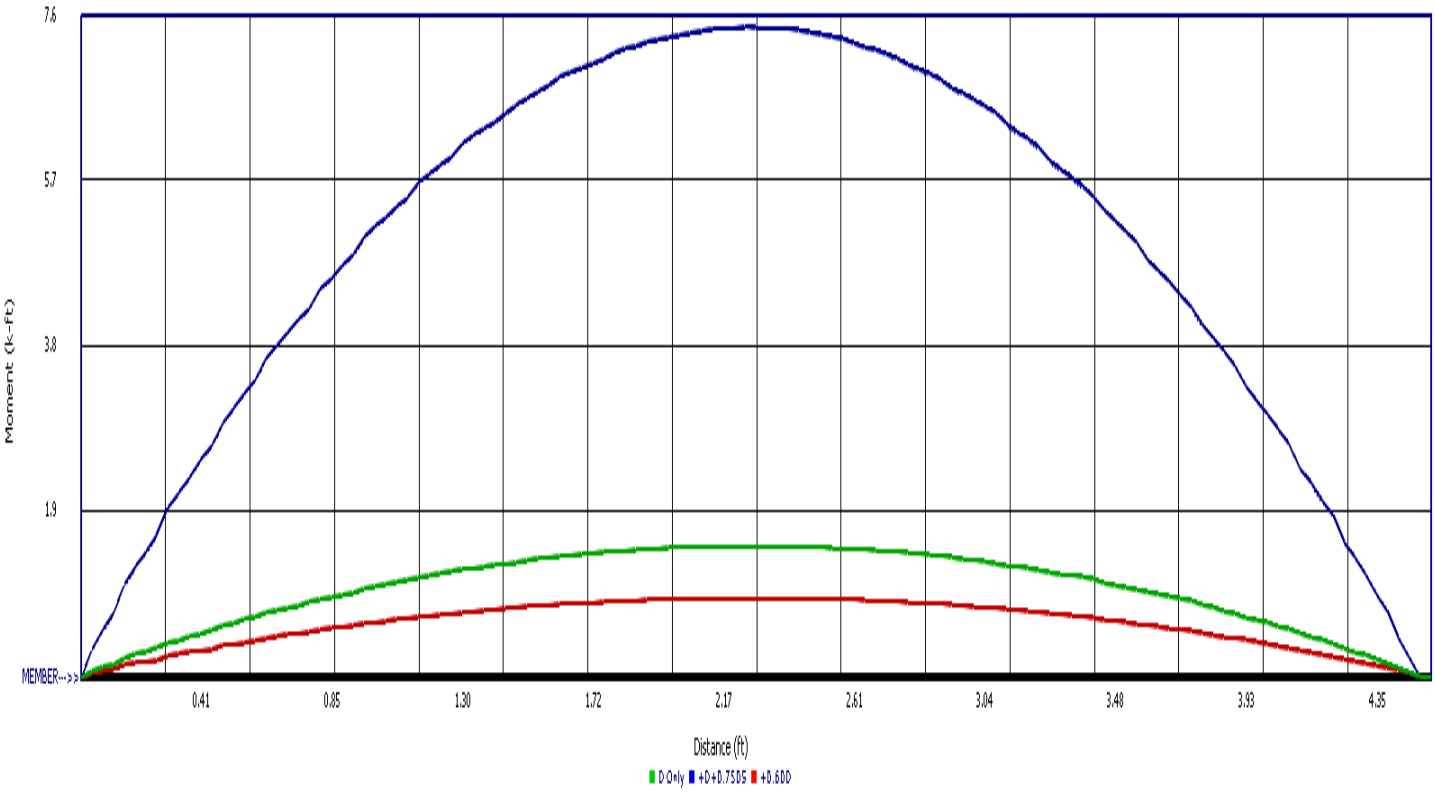
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0144	2.266		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	8.391	8.391
Max Upward from Load Combinations	8.391	8.391
Max Upward from Load Cases	7.064	7.064
D Only	1.328	1.328
+D+S	8.391	8.391
+D+0.750S	6.625	6.625
+0.60D	0.797	0.797
S Only	7.064	7.064

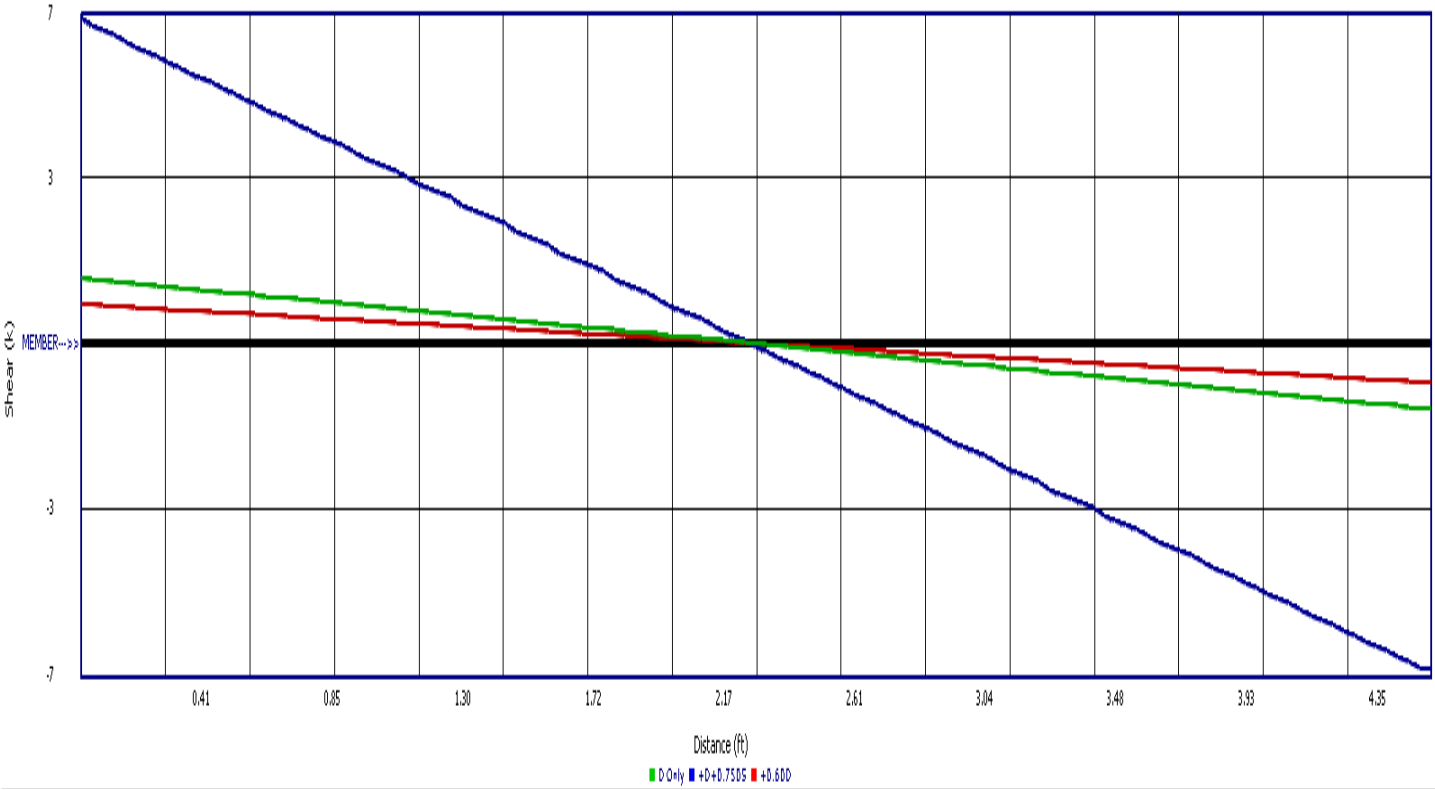


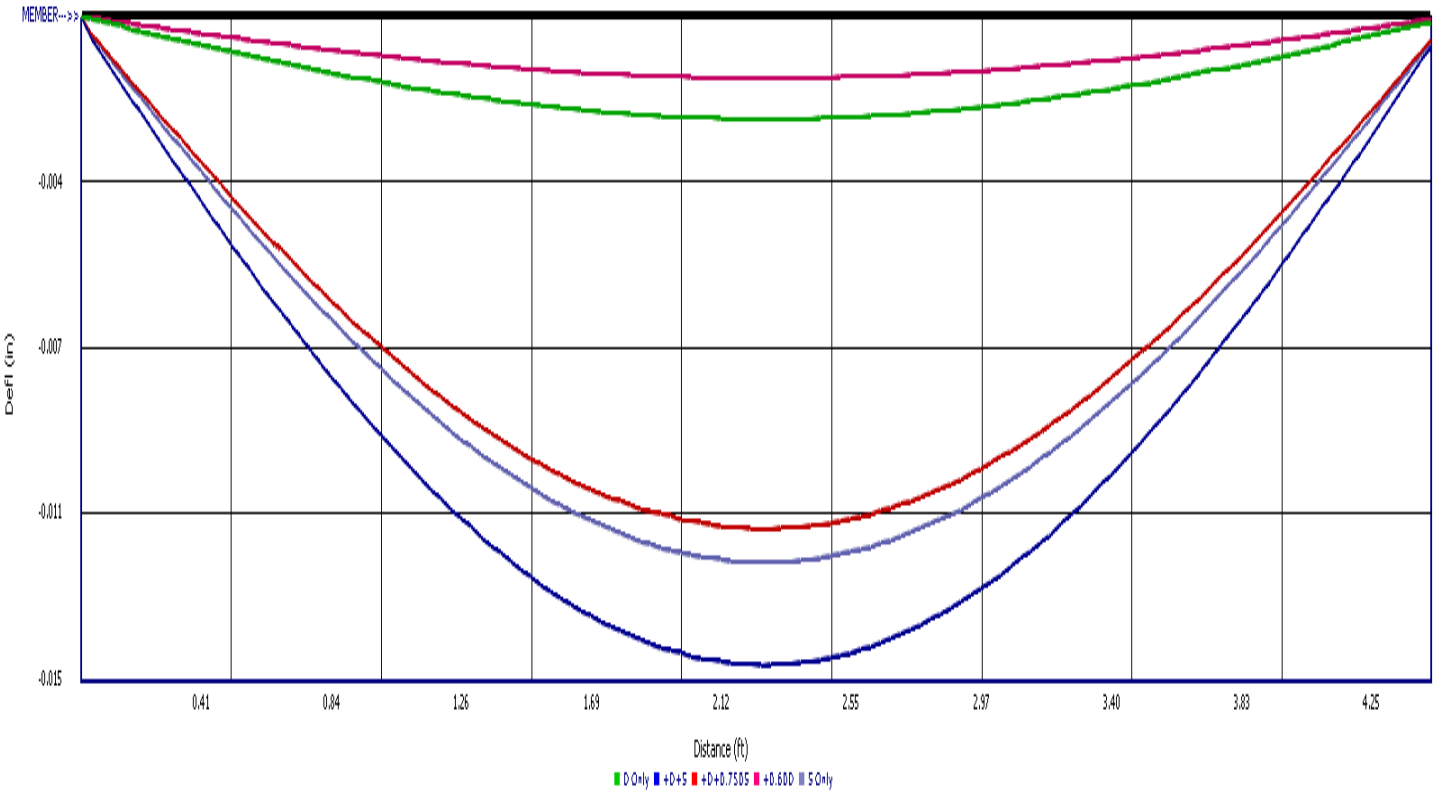
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B14





Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B15

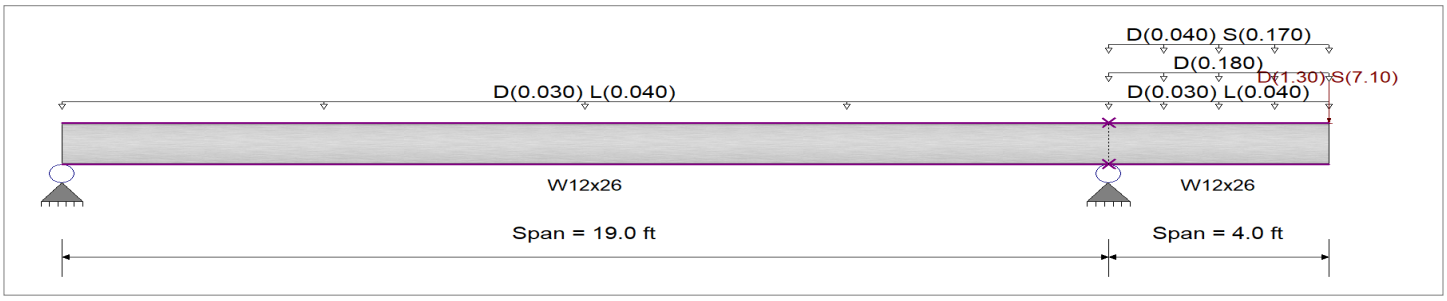
CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.030, L = 0.040 k/ft, Tributary Width = 1.0 ft, (FLOOR)

Load for Span Number 2
Uniform Load : D = 0.030, L = 0.040 k/ft, Tributary Width = 1.0 ft, (FLOOR)

Uniform Load : D = 0.180 k/ft, Tributary Width = 1.0 ft, (WALL)

Uniform Load : D = 0.020, S = 0.0850 ksf, Tributary Width = 2.0 ft, (ROOF)

Point Load : D = 1.30, S = 7.10 k @ 4.0 ft, (4B13)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.323** : 1	Maximum Shear Stress Ratio =	**0.149** : 1
Section used for this span	**W12x26**	Section used for this span	**W12x26**
Ma : Applied	29.968 k-ft	Va : Applied	8.359 k
Mn / Omega : Allowable	92.814 k-ft	Vn/Omega : Allowable	56.120 k
Load Combination	+D+0.750L+0.750S	Load Combination	+D+0.750L+0.750S
		Location of maximum on span	19.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.266 in	Ratio =	361	>=360	Span: 2 : S Only
Max Upward Transient Deflection	-0.202 in	Ratio =	1,126	>=360	Span: 2 : S Only
Max Downward Total Deflection	0.313 in	Ratio =	307	>=240.	Span: 2 : +D+S
Max Upward Total Deflection	-0.226 in	Ratio =	1010	>=240.	Span: 2 : +D+S

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 19.00 ft	1	0.080	0.043	0.18	-7.41	7.41	155.00	92.81	1.00	1.00	2.40	84.18	56.12
Dsgn. L = 4.00 ft	2	0.080	0.043		-7.41	7.41	155.00	92.81	1.00	1.00	2.40	84.18	56.12
+D+L													
Dsgn. L = 19.00 ft	1	0.083	0.046	1.33	-7.73	7.73	155.00	92.81	1.00	1.00	2.56	84.18	56.12
Dsgn. L = 4.00 ft	2	0.083	0.046		-7.73	7.73	155.00	92.81	1.00	1.00	2.56	84.18	56.12
+D+0.750L													
Dsgn. L = 19.00 ft	1	0.082	0.045	1.00	-7.65	7.65	155.00	92.81	1.00	1.00	2.52	84.18	56.12
Dsgn. L = 4.00 ft	2	0.082	0.045		-7.65	7.65	155.00	92.81	1.00	1.00	2.52	84.18	56.12
+D+0.750L+0.750S													

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B15

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	VnxVnx/Omega	
Dsgn. L = 19.00 ft	1	0.323	0.149		-29.97	29.97	155.00	92.81	1.00	1.00	8.36	84.18	56.12
Dsgn. L = 4.00 ft	2	0.323	0.149		-29.97	29.97	155.00	92.81	1.00	1.00	8.36	84.18	56.12
+0.60D													
Dsgn. L = 19.00 ft	1	0.048	0.026	0.11	-4.44	4.44	155.00	92.81	1.00	1.00	1.44	84.18	56.12
Dsgn. L = 4.00 ft	2	0.048	0.026		-4.44	4.44	155.00	92.81	1.00	1.00	1.44	84.18	56.12

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S	-0.2257	11.172
+D+S	2	0.3127	4.000		0.0000	11.172

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Span	Max. Upward Defl	Location in Span
D Only	2	0.0468	4.000	1	-0.0242	12.692
+D+L	2	0.0362	4.000	1	-0.0108	14.972
+D+S	2	0.3127	4.000	1	-0.2257	11.172
+D+0.750L	2	0.0388	4.000	1	-0.0137	14.364
+D+0.750L+0.750S	2	0.2382	4.000	1	-0.1624	11.400
+0.60D	2	0.0281	4.000	1	-0.0145	12.692
L Only	1	0.0178	9.348	2	-0.0106	4.000
S Only	2	0.2659	4.000	1	-0.2024	11.020

Vertical Reactions

Support notation : Far left is #: Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	0.505	12.672	
Max Upward from Load Combinations	0.505	12.672	
Max Upward from Load Cases	0.363	9.346	
Max Downward from all Load Conditions (Resis	-1.566		
Max Downward from Load Combinations (Resis	-1.424		
Max Downward from Load Cases (Resisting Up	-1.566		
D Only	0.142	3.326	
+D+L	0.505	3.883	
+D+S	-1.424	12.672	
+D+0.750L	0.414	3.744	
+D+0.750L+0.750S	-0.760	10.753	
+0.60D	0.085	1.996	
L Only	0.363	0.557	
S Only	-1.566	9.346	

Steel Section Properties : W12x26

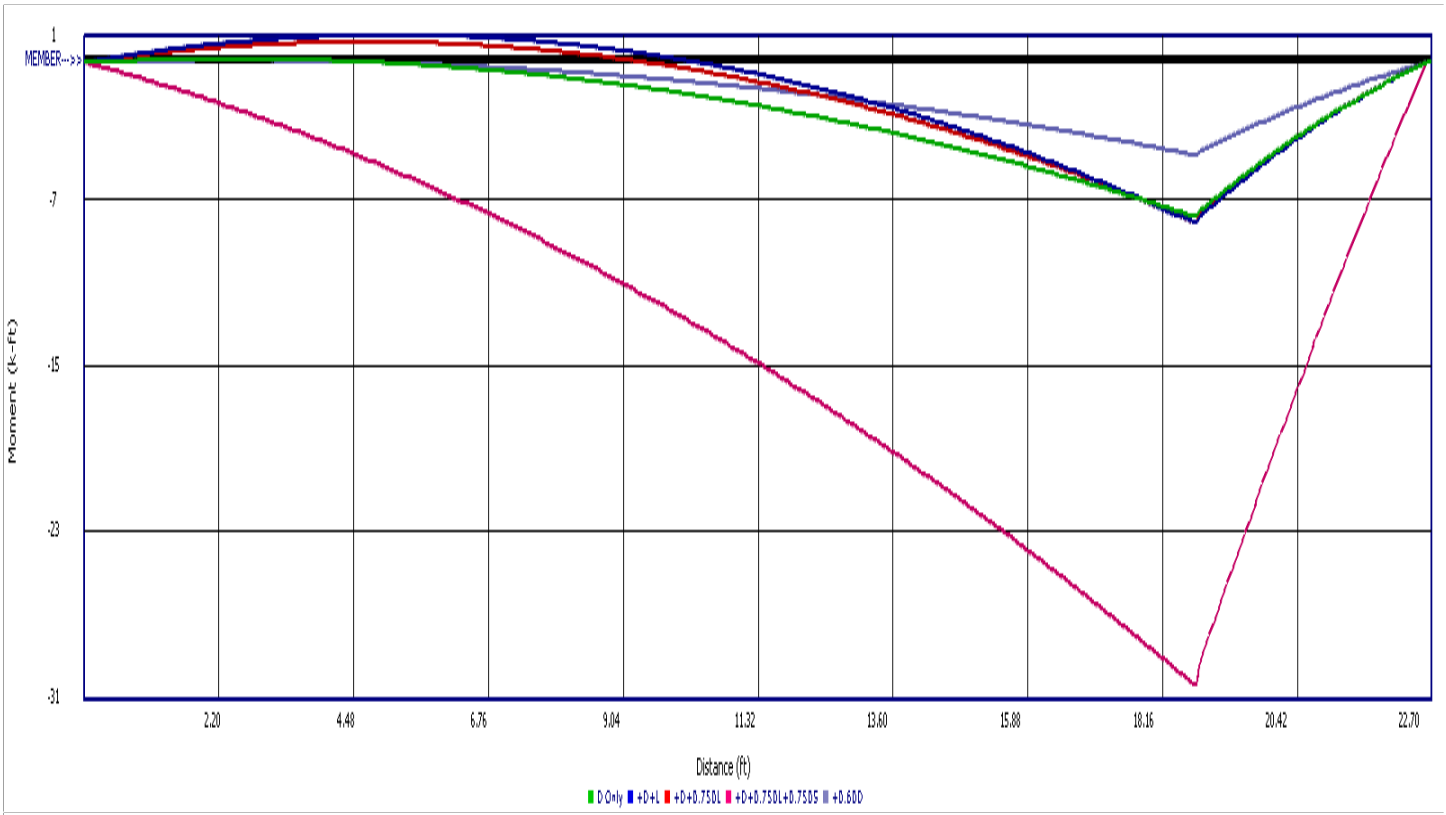
Depth	=	12.200	in	I xx	=	204.00	in^4	J	=	0.300	in^4
Web Thick	=	0.230	in	S xx		33.40	in^3	Cw	=	607.00	in^6
Flange Width	=	6.490	in	R xx	=	5.170	in				
Flange Thick	=	0.380	in	Zx	=	37.200	in^3				
Area	=	7.650	in^2	I yy	=	17.300	in^4				
Weight	=	26.000	plf	S yy	=	5.340	in^3	Wno	=	19.200	in^2
Kdesign	=	0.680	in	R yy	=	1.510	in	Sw	=	11.800	in^4
K1	=	0.750	in	Zy	=	8.170	in^3	Qf	=	7.030	in^3
rts	=	1.750	in					Qw	=	18.300	in^3
Ycg	=	6.100	in								

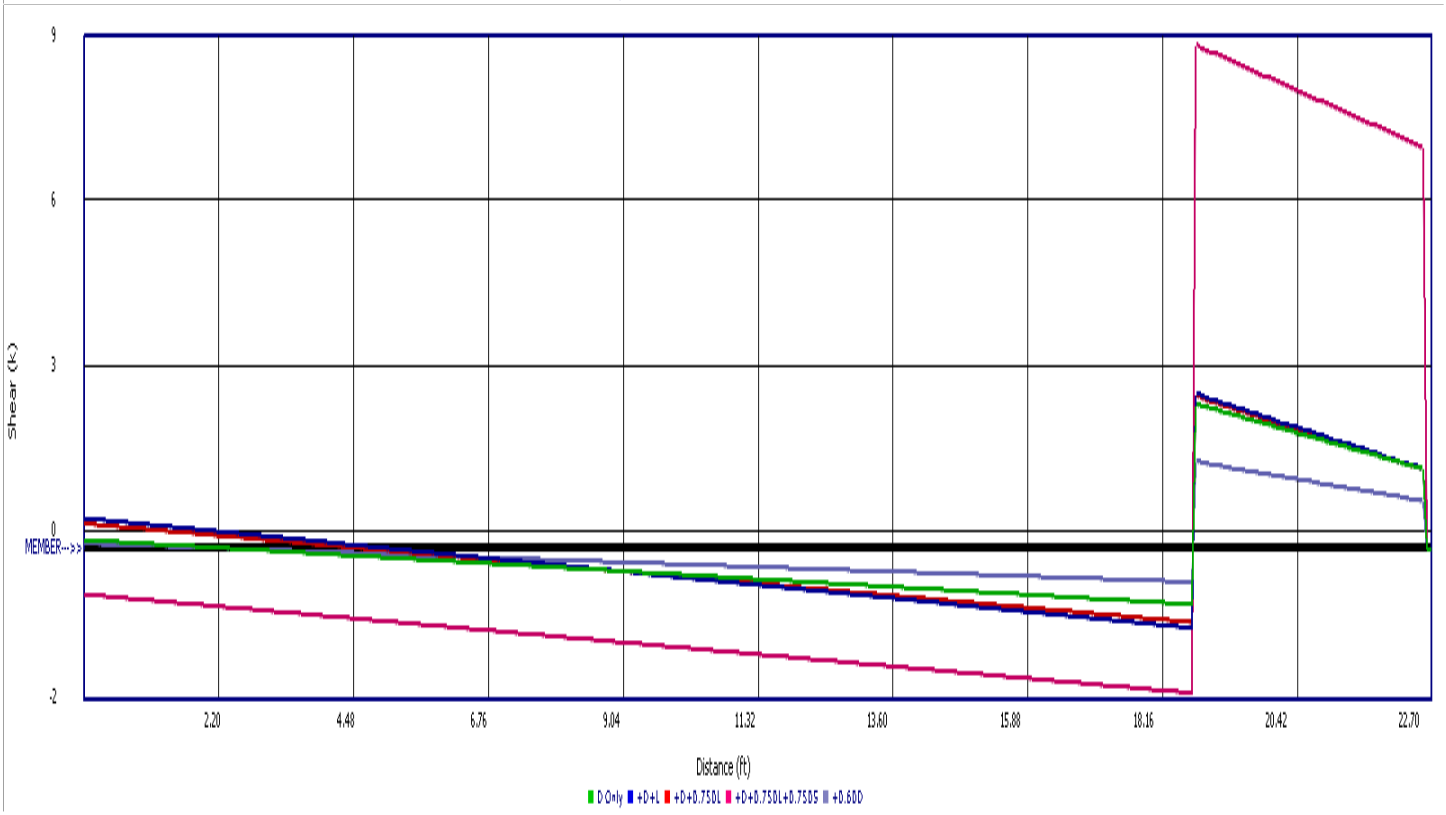
Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B15



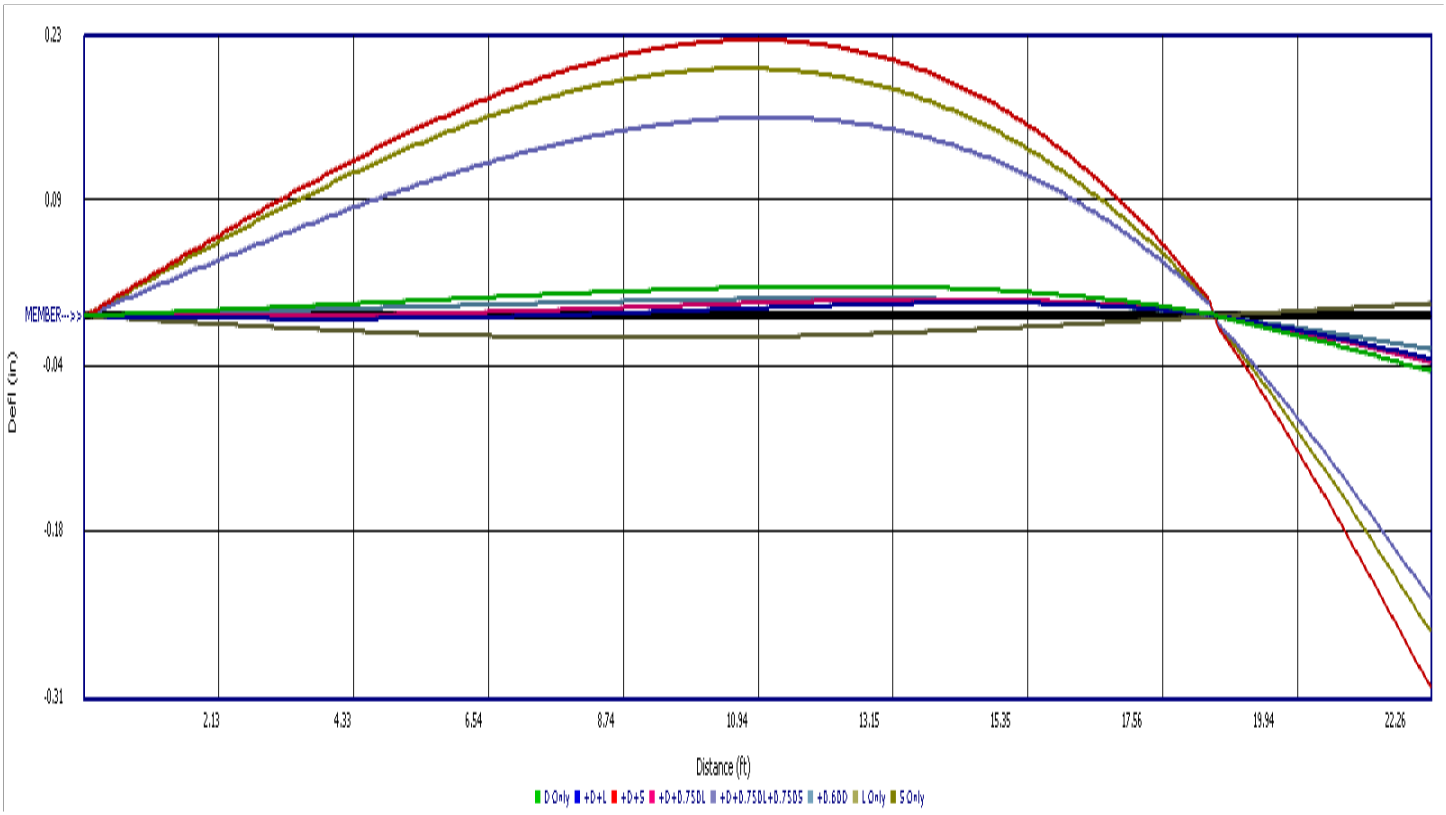


Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B15



Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

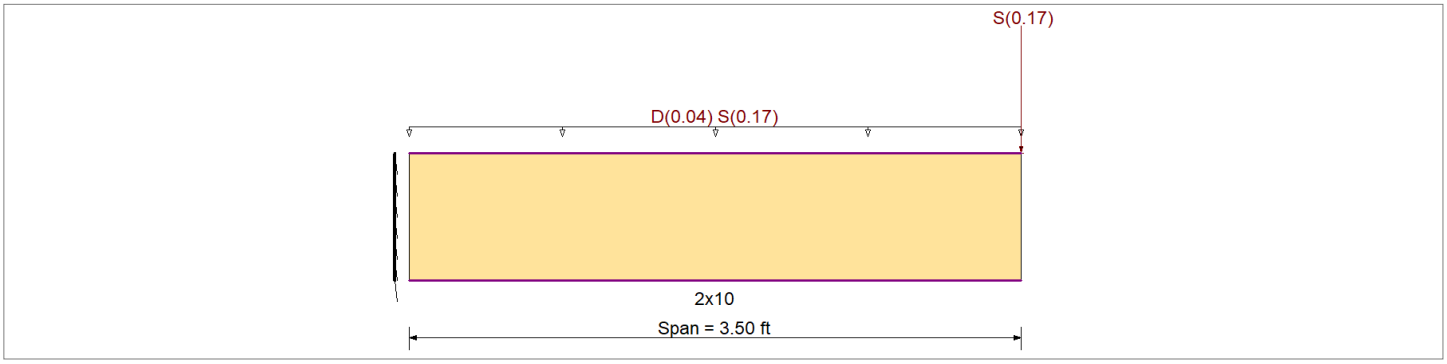
DESCRIPTION: typ lookouts 3'-6" high roof

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	900 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	900 psi	Ebend- xx	1600 ksi
		Fc - Prll	1350 psi	Eminbend - xx	580 ksi
Wood Species :	Douglas Fir-Larch	Fc - Perp	625 psi		
Wood Grade :	No.2	Fv	180 psi		
		Ft	575 psi	Density	31.21 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.020, S = 0.0850 ksf, Tributary Width = 2.0 ft, (roof)
Point Load : S = 0.170 k @ 3.50 ft, (ice)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.521** : 1	Maximum Shear Stress Ratio	=	**0.220** : 1
Section used for this span		**2x10**	Section used for this span		**2x10**
fb: Actual	=	825.89 psi	fv: Actual	=	63.28 psi
F'b	=	1,584.00 psi	F'v	=	288.00 psi
Load Combination		+D+0.750S	Load Combination		+D+0.750S
Location of maximum on span	=	0.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.061 in	Ratio =	1372	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.069 in	Ratio =	1210	>=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 3.50 ft	1	0.154	0.073	0.90	1.00	1.00	1.00	1.100	1.00	1.00	1.00	0.25	137.4	891.0	0.11	11.8	162.0
+D+0.750S					1.00	1.00	1.00	1.100	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.50 ft	1	0.521	0.220	1.60	1.00	1.00	1.00	1.100	1.00	1.00	1.00	1.47	825.9	1,584.0	0.59	63.3	288.0
+0.60D					1.00	1.00	1.00	1.100	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.50 ft	1	0.052	0.025	1.60	1.00	1.00	1.00	1.100	1.00	1.00	1.00	0.15	82.5	1,584.0	0.07	7.1	288.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0693	3.500		0.0000	0.000

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B16

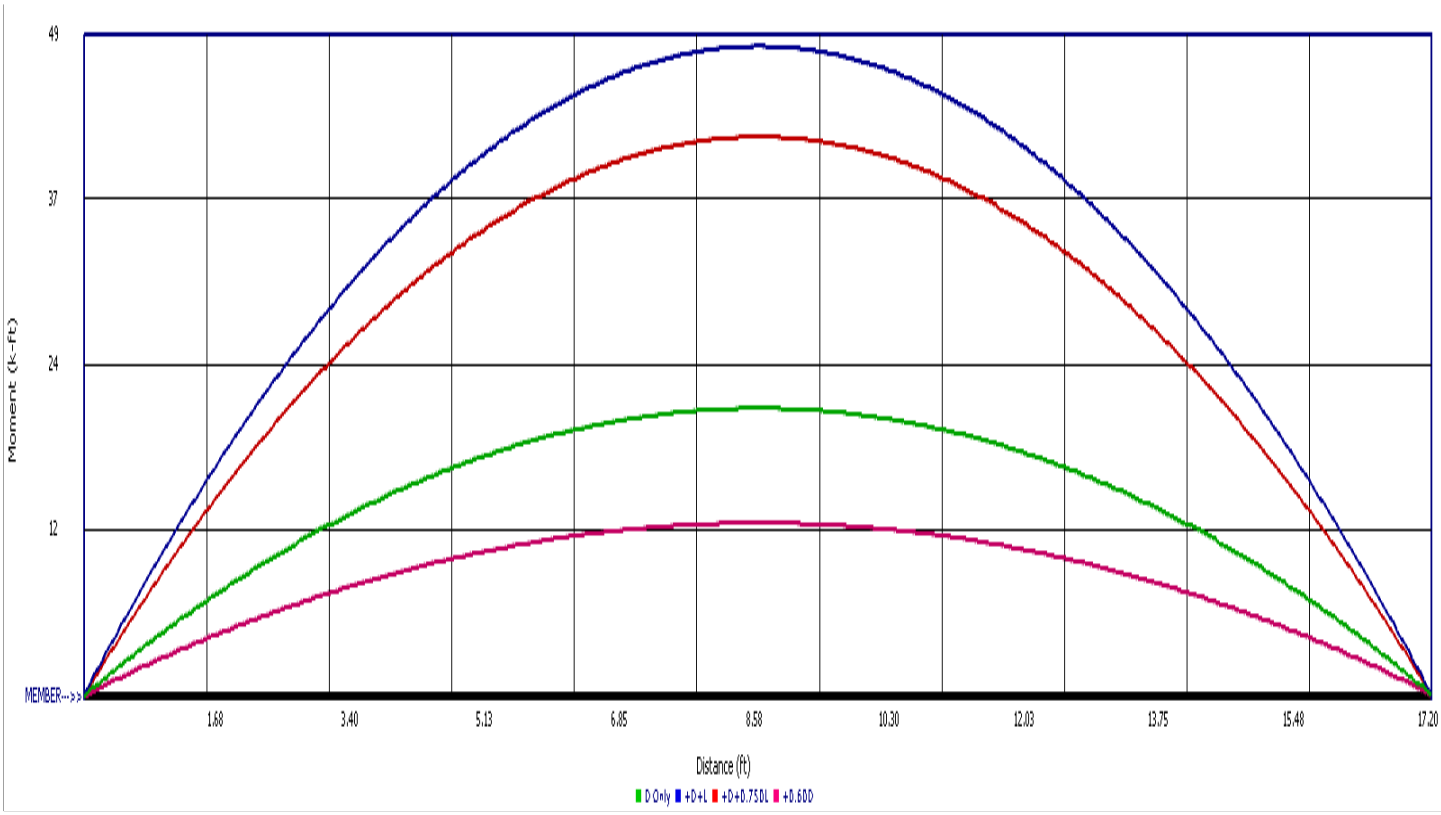
Vertical Reactions

Support notation : Far left is #: Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	11.126	11.126
Max Upward from Load Combinations	11.126	11.126
Max Upward from Load Cases	6.210	6.210
D Only	4.916	4.916
+D+L	11.126	11.126
+D+0.750L	9.574	9.574
+0.60D	2.950	2.950
L Only	6.210	6.210

Steel Section Properties : W12x30

Depth	=	12.300	in	I xx	=	238.00	in^4	J	=	0.457	in^4
Web Thick	=	0.260	in	S xx		38.60	in^3	Cw	=	720.00	in^6
Flange Width	=	6.520	in	R xx	=	5.210	in				
Flange Thick	=	0.440	in	Zx	=	43.100	in^3				
Area	=	8.790	in^2	I yy	=	20.300	in^4				
Weight	=	30.000	plf	S yy	=	6.240	in^3	Wno	=	19.300	in^2
Kdesign	=	0.740	in	R yy	=	1.520	in	Sw	=	13.900	in^4
K1	=	0.750	in	Zy	=	9.560	in^3	Qf	=	8.170	in^3
rts	=	1.770	in					Qw	=	21.300	in^3
Ycg	=	6.150	in								

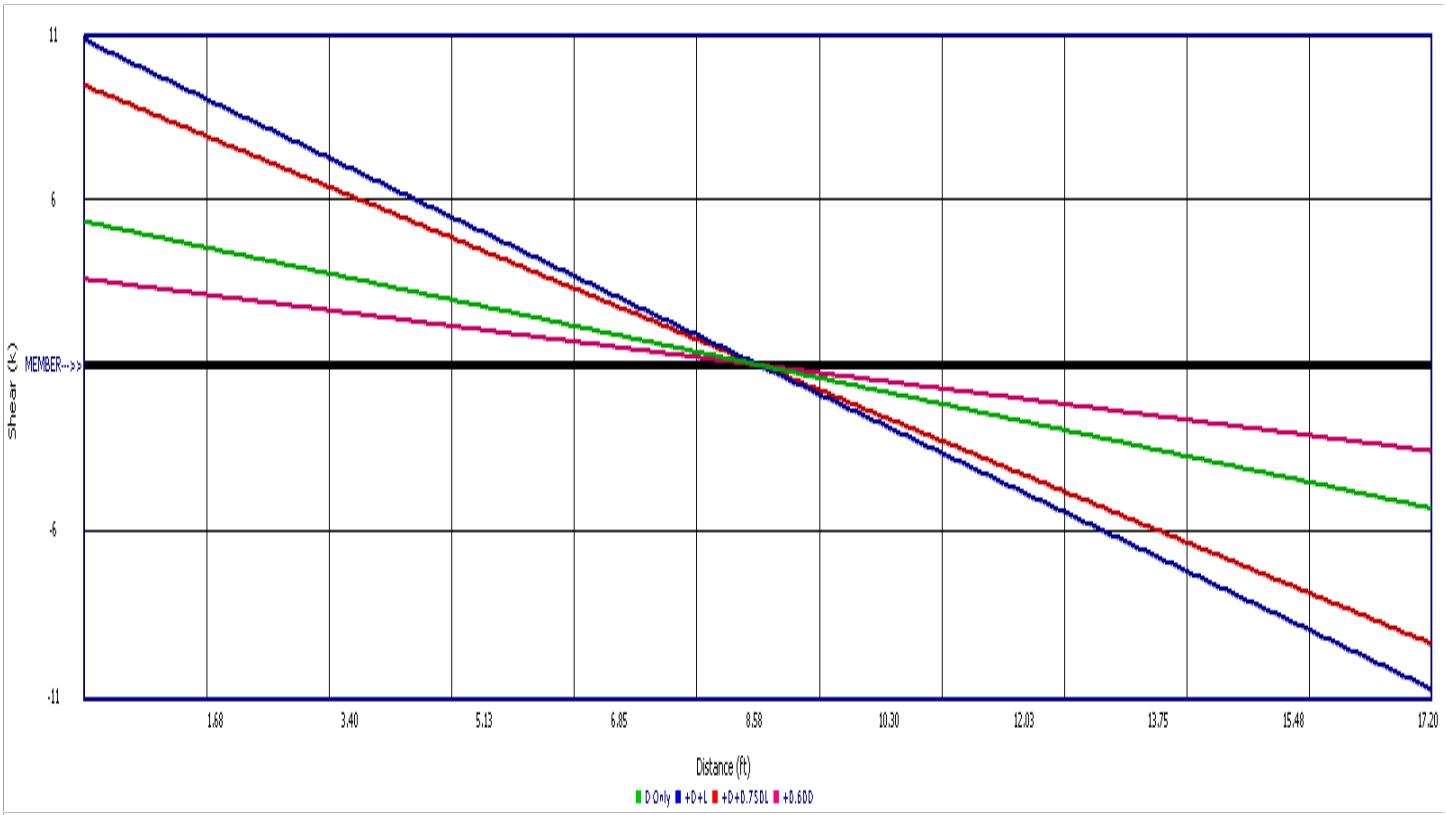


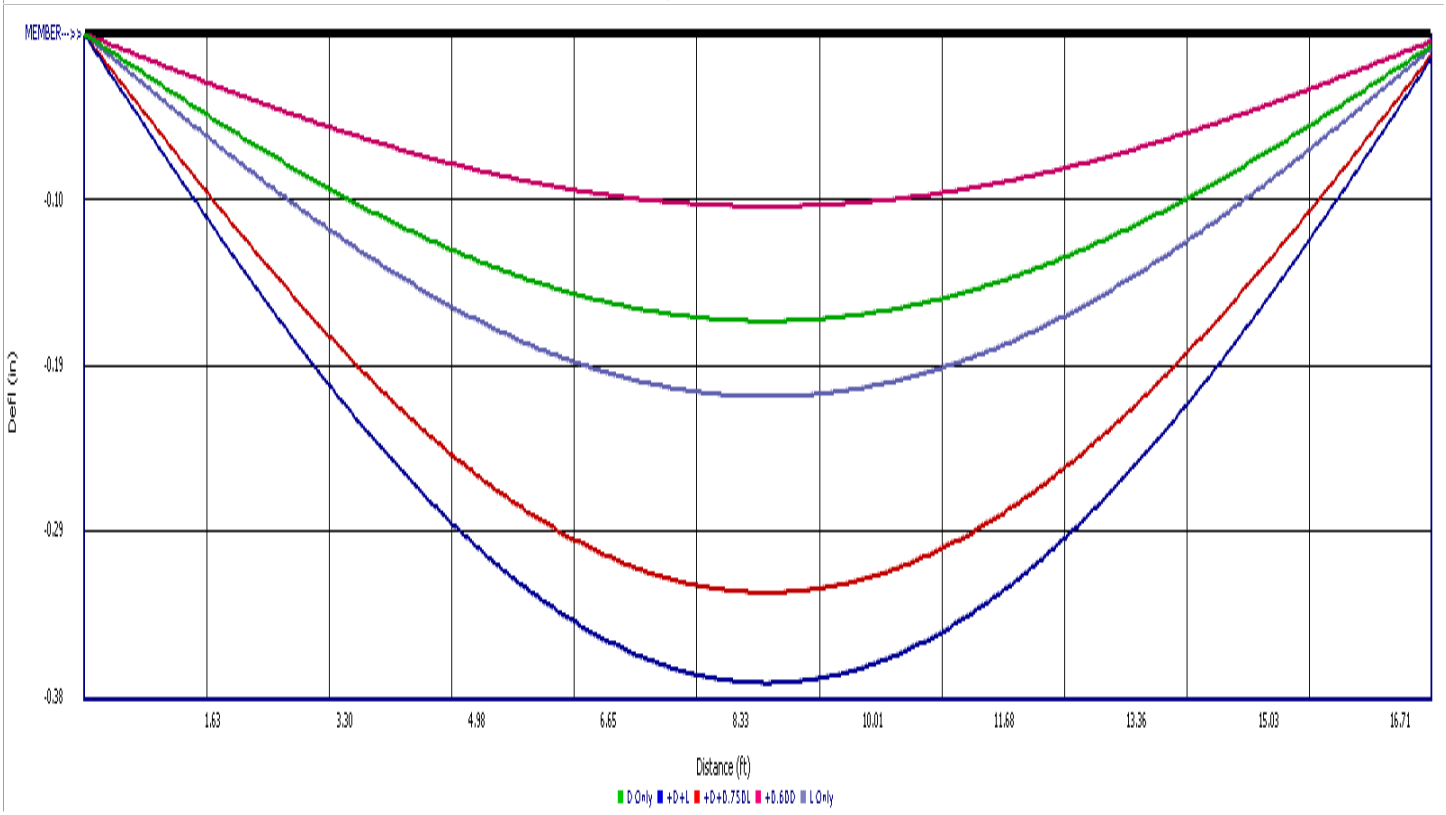
Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 4B16





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

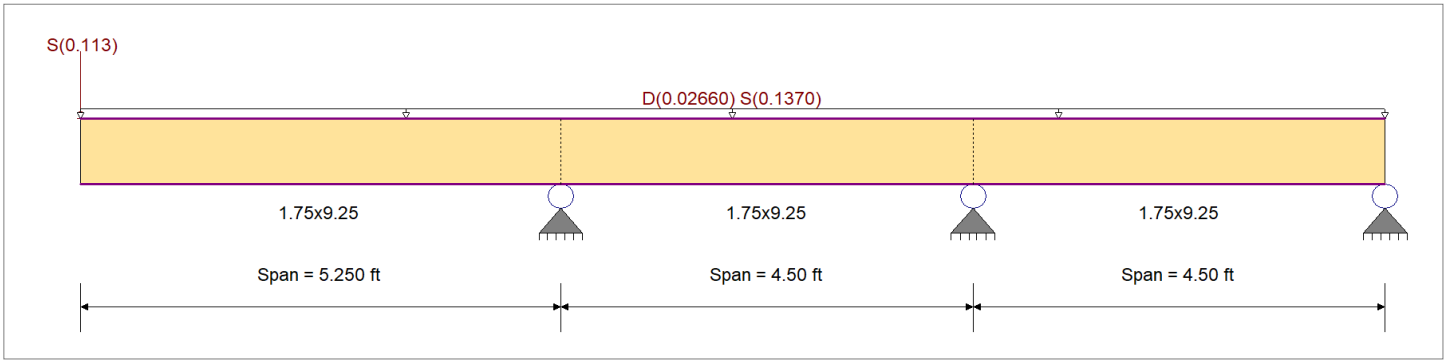
DESCRIPTION: RJ1 - ENTRY ROOF JOIST

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,600.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2,600.0 psi	Ebend- xx	2,000.0 ksi
		Fc - Prll	2,510.0 psi	Eminbend - xx	1,016.54 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade :	MicroLam LVL 2.0 E	Fv	285.0 psi		
		Ft	1,555.0 psi	Density	42.010 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling			Repetitive Member Stress Increase	



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Loads on all spans...
Uniform Load on ALL spans : D = 0.020, S = 0.1030 ksf, Tributary Width = 1.330 ft
Load for Span Number 1
Point Load : S = 0.1130 k @ 0.0 ft, (ICE)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.500 : 1	Maximum Shear Stress Ratio	=	0.314 : 1
Section used for this span		**1.75x9.25**	Section used for this span		**1.75x9.25**
fb: Actual	=	1,400.63 psi	fv: Actual	=	89.50 psi
F'b	=	2,801.43 psi	F'v	=	285.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	5.250 ft	Location of maximum on span	=	5.250 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.257 in	Ratio =	490	>=360	Span: 3 : S Only
Max Upward Transient Deflection	-0.017 in	Ratio =	3175	>=360	Span: 2 : S Only
Max Downward Total Deflection	0.299 in	Ratio =	420	>=240	Span: 3 : +D+S+H
Max Upward Total Deflection	-0.020 in	Ratio =	2722	>=240	Span: 2 : +D+S+H

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
+D+H														0.0	0.00	0.0	0.0
Length = 5.250 ft	1	0.082	0.054	0.90	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	2,521.3	0.15	13.8	256.5
Length = 4.50 ft	2	0.082	0.054	0.90	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	2,521.3	0.15	13.8	256.5
Length = 4.50 ft	3	0.018	0.054	0.90	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	2,521.3	0.05	13.8	256.5
+D+L+H, LL Comb Run (**L)					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	1	0.074	0.048	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	2,801.4	0.15	13.8	285.0
Length = 4.50 ft	2	0.074	0.048	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	2,801.4	0.15	13.8	285.0
Length = 4.50 ft	3	0.016	0.048	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	2,801.4	0.05	13.8	285.0

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RJ1 - ENTRY ROOF JOIST

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
+D+L+H, LL Comb Run (*L*)					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	1	0.074	0.048	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	2,801.4	0.15	13.8	285.0
Length = 4.50 ft	2	0.074	0.048	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	2,801.4	0.15	13.8	285.0
Length = 4.50 ft	3	0.016	0.048	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	2,801.4	0.05	13.8	285.0
+D+L+H, LL Comb Run (*LL)					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	1	0.074	0.048	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	2,801.4	0.15	13.8	285.0
Length = 4.50 ft	2	0.074	0.048	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	2,801.4	0.15	13.8	285.0
Length = 4.50 ft	3	0.016	0.048	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	2,801.4	0.05	13.8	285.0
+D+L+H, LL Comb Run (L**)					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	1	0.074	0.048	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	2,801.4	0.15	13.8	285.0
Length = 4.50 ft	2	0.074	0.048	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	2,801.4	0.15	13.8	285.0
Length = 4.50 ft	3	0.016	0.048	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	2,801.4	0.05	13.8	285.0
+D+L+H, LL Comb Run (L*L)					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	1	0.074	0.048	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	2,801.4	0.15	13.8	285.0
Length = 4.50 ft	2	0.074	0.048	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	2,801.4	0.15	13.8	285.0
Length = 4.50 ft	3	0.016	0.048	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	2,801.4	0.05	13.8	285.0
+D+L+H, LL Comb Run (LL*)					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	1	0.074	0.048	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	2,801.4	0.15	13.8	285.0
Length = 4.50 ft	2	0.074	0.048	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	2,801.4	0.15	13.8	285.0
Length = 4.50 ft	3	0.016	0.048	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	2,801.4	0.05	13.8	285.0
+D+L+H, LL Comb Run (LLL)					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	1	0.074	0.048	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	2,801.4	0.15	13.8	285.0
Length = 4.50 ft	2	0.074	0.048	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	2,801.4	0.15	13.8	285.0
Length = 4.50 ft	3	0.016	0.048	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	2,801.4	0.05	13.8	285.0
+D+Lr+H, LL Comb Run (**L)					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	1	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	2	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	3	0.013	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	3,501.8	0.05	13.8	356.3
+D+Lr+H, LL Comb Run (*L*)					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	1	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	2	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	3	0.013	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	3,501.8	0.05	13.8	356.3
+D+Lr+H, LL Comb Run (*LL)					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	1	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	2	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	3	0.013	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	3,501.8	0.05	13.8	356.3
+D+Lr+H, LL Comb Run (L**)					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	1	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	2	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	3	0.013	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	3,501.8	0.05	13.8	356.3
+D+Lr+H, LL Comb Run (L*L)					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	1	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	2	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	3	0.013	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	3,501.8	0.05	13.8	356.3
+D+Lr+H, LL Comb Run (LL*)					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	1	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	2	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3

DESCRIPTION: RJ1 - ENTRY ROOF JOIST

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 4.50 ft	**3**	0.013	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	3,501.8	0.05	13.8	356.3
+D+Lr+H, LL Comb Run (LLL					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	**2**	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	**3**	0.013	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	3,501.8	0.05	13.8	356.3
+D+S+H					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.500	0.314	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.91	1,400.6	2,801.4	0.97	89.5	285.0
Length = 4.50 ft	**2**	0.500	0.314	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.91	1,400.6	2,801.4	0.97	89.5	285.0
Length = 4.50 ft	**3**	0.101	0.314	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.59	283.9	2,801.4	0.32	89.5	285.0
+D+0.750Lr+0.750L+H, LL C					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	**2**	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	**3**	0.013	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	3,501.8	0.05	13.8	356.3
+D+0.750Lr+0.750L+H, LL C					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	**2**	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	**3**	0.013	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	3,501.8	0.05	13.8	356.3
+D+0.750Lr+0.750L+H, LL C					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	**2**	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	**3**	0.013	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	3,501.8	0.05	13.8	356.3
+D+0.750Lr+0.750L+H, LL C					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	**2**	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	**3**	0.013	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	3,501.8	0.05	13.8	356.3
+D+0.750Lr+0.750L+H, LL C					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	**2**	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	**3**	0.013	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	3,501.8	0.05	13.8	356.3
+D+0.750Lr+0.750L+H, LL C					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	**2**	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	**3**	0.013	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	3,501.8	0.05	13.8	356.3
+D+0.750Lr+0.750L+H, LL C					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	**2**	0.059	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	3,501.8	0.15	13.8	356.3
Length = 4.50 ft	**3**	0.013	0.039	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	3,501.8	0.05	13.8	356.3
+D+0.750L+0.750S+H, LL Co					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.342	0.215	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	3,221.6	0.76	70.6	327.8
Length = 4.50 ft	**2**	0.342	0.215	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	3,221.6	0.76	70.6	327.8
Length = 4.50 ft	**3**	0.070	0.215	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.47	224.2	3,221.6	0.25	70.6	327.8
+D+0.750L+0.750S+H, LL Co					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.342	0.215	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	3,221.6	0.76	70.6	327.8
Length = 4.50 ft	**2**	0.342	0.215	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	3,221.6	0.76	70.6	327.8
Length = 4.50 ft	**3**	0.070	0.215	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.47	224.2	3,221.6	0.25	70.6	327.8
+D+0.750L+0.750S+H, LL Co					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.342	0.215	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	3,221.6	0.76	70.6	327.8

DESCRIPTION: RJ1 - ENTRY ROOF JOIST

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 4.50 ft	**2**	0.342	0.215	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	3,221.6	0.76	70.6	327.8
Length = 4.50 ft	**3**	0.070	0.215	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.47	224.2	3,221.6	0.25	70.6	327.8
+D+0.750L+0.750S+H, LL Co					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.342	0.215	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	3,221.6	0.76	70.6	327.8
Length = 4.50 ft	**2**	0.342	0.215	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	3,221.6	0.76	70.6	327.8
Length = 4.50 ft	**3**	0.070	0.215	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.47	224.2	3,221.6	0.25	70.6	327.8
+D+0.750L+0.750S+H, LL Co					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.342	0.215	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	3,221.6	0.76	70.6	327.8
Length = 4.50 ft	**2**	0.342	0.215	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	3,221.6	0.76	70.6	327.8
Length = 4.50 ft	**3**	0.070	0.215	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.47	224.2	3,221.6	0.25	70.6	327.8
+D+0.750L+0.750S+H, LL Co					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.342	0.215	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	3,221.6	0.76	70.6	327.8
Length = 4.50 ft	**2**	0.342	0.215	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	3,221.6	0.76	70.6	327.8
Length = 4.50 ft	**3**	0.070	0.215	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.47	224.2	3,221.6	0.25	70.6	327.8
+D+0.750L+0.750S+H, LL Co					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.342	0.215	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	3,221.6	0.76	70.6	327.8
Length = 4.50 ft	**2**	0.342	0.215	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	3,221.6	0.76	70.6	327.8
Length = 4.50 ft	**3**	0.070	0.215	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.47	224.2	3,221.6	0.25	70.6	327.8
+D+0.60W+H					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.046	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	4,482.3	0.15	13.8	456.0
Length = 4.50 ft	**2**	0.046	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	4,482.3	0.15	13.8	456.0
Length = 4.50 ft	**3**	0.010	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	4,482.3	0.05	13.8	456.0
+D+0.70E+H					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.046	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	4,482.3	0.15	13.8	456.0
Length = 4.50 ft	**2**	0.046	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	4,482.3	0.15	13.8	456.0
Length = 4.50 ft	**3**	0.010	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	4,482.3	0.05	13.8	456.0
+D+0.750Lr+0.750L+0.450W-					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.046	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	4,482.3	0.15	13.8	456.0
Length = 4.50 ft	**2**	0.046	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	4,482.3	0.15	13.8	456.0
Length = 4.50 ft	**3**	0.010	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	4,482.3	0.05	13.8	456.0
+D+0.750Lr+0.750L+0.450W-					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.046	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	4,482.3	0.15	13.8	456.0
Length = 4.50 ft	**2**	0.046	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	4,482.3	0.15	13.8	456.0
Length = 4.50 ft	**3**	0.010	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	4,482.3	0.05	13.8	456.0
+D+0.750Lr+0.750L+0.450W-					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.046	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	4,482.3	0.15	13.8	456.0
Length = 4.50 ft	**2**	0.046	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	4,482.3	0.15	13.8	456.0
Length = 4.50 ft	**3**	0.010	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	4,482.3	0.05	13.8	456.0
+D+0.750Lr+0.750L+0.450W-					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.046	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	4,482.3	0.15	13.8	456.0
Length = 4.50 ft	**2**	0.046	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	4,482.3	0.15	13.8	456.0
Length = 4.50 ft	**3**	0.010	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	4,482.3	0.05	13.8	456.0
+D+0.750Lr+0.750L+0.450W-					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.046	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	4,482.3	0.15	13.8	456.0
Length = 4.50 ft	**2**	0.046	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	4,482.3	0.15	13.8	456.0
Length = 4.50 ft	**3**	0.010	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	4,482.3	0.05	13.8	456.0
+D+0.750Lr+0.750L+0.450W-					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA

DESCRIPTION: RJ1 - ENTRY ROOF JOIST

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 5.250 ft	**1**	0.046	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	4,482.3	0.15	13.8	456.0
Length = 4.50 ft	**2**	0.046	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	4,482.3	0.15	13.8	456.0
Length = 4.50 ft	**3**	0.010	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	4,482.3	0.05	13.8	456.0
+D+0.750Lr+0.750L+0.450W-					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.046	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	4,482.3	0.15	13.8	456.0
Length = 4.50 ft	**2**	0.046	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.43	207.6	4,482.3	0.15	13.8	456.0
Length = 4.50 ft	**3**	0.010	0.030	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.09	45.3	4,482.3	0.05	13.8	456.0
+D+0.750L+0.750S+0.450W+					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	**2**	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	**3**	0.050	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.47	224.2	4,482.3	0.25	70.6	456.0
+D+0.750L+0.750S+0.450W+					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	**2**	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	**3**	0.050	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.47	224.2	4,482.3	0.25	70.6	456.0
+D+0.750L+0.750S+0.450W+					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	**2**	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	**3**	0.050	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.47	224.2	4,482.3	0.25	70.6	456.0
+D+0.750L+0.750S+0.450W+					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	**2**	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	**3**	0.050	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.47	224.2	4,482.3	0.25	70.6	456.0
+D+0.750L+0.750S+0.450W+					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	**2**	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	**3**	0.050	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.47	224.2	4,482.3	0.25	70.6	456.0
+D+0.750L+0.750S+0.450W+					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	**2**	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	**3**	0.050	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.47	224.2	4,482.3	0.25	70.6	456.0
+D+0.750L+0.750S+0.450W+					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	**2**	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	**3**	0.050	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.47	224.2	4,482.3	0.25	70.6	456.0
+D+0.750L+0.750S+0.5250E-					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	**2**	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	**3**	0.050	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.47	224.2	4,482.3	0.25	70.6	456.0
+D+0.750L+0.750S+0.5250E-					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	**2**	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	**3**	0.050	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.47	224.2	4,482.3	0.25	70.6	456.0
+D+0.750L+0.750S+0.5250E-					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	**1**	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	**2**	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	**3**	0.050	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.47	224.2	4,482.3	0.25	70.6	456.0

DESCRIPTION: RJ1 - ENTRY ROOF JOIST

Maximum Forces & Stresses for Load Combinations

Load Combination Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750L+0.750S+0.5250E-					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	1	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	2	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	3	0.050	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.47	224.2	4,482.3	0.25	70.6	456.0
+D+0.750L+0.750S+0.5250E-					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	1	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	2	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	3	0.050	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.47	224.2	4,482.3	0.25	70.6	456.0
+D+0.750L+0.750S+0.5250E-					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	1	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	2	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	3	0.050	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.47	224.2	4,482.3	0.25	70.6	456.0
+D+0.750L+0.750S+0.5250E-					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	1	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	2	0.246	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.29	1,102.4	4,482.3	0.76	70.6	456.0
Length = 4.50 ft	3	0.050	0.155	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.47	224.2	4,482.3	0.25	70.6	456.0
+0.60D+0.60W+0.60H					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	1	0.028	0.018	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.26	124.5	4,482.3	0.09	8.3	456.0
Length = 4.50 ft	2	0.028	0.018	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.26	124.5	4,482.3	0.09	8.3	456.0
Length = 4.50 ft	3	0.006	0.018	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.06	27.2	4,482.3	0.03	8.3	456.0
+0.60D+0.70E+0.60H					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 5.250 ft	1	0.028	0.018	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.26	124.5	4,482.3	0.09	8.3	456.0
Length = 4.50 ft	2	0.028	0.018	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.26	124.5	4,482.3	0.09	8.3	456.0
Length = 4.50 ft	3	0.006	0.018	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	0.06	27.2	4,482.3	0.03	8.3	456.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.2991	0.000		0.0000	0.000
	2	0.0000	0.000	+D+S+H	-0.0198	1.702
+D+S+H	3	0.0098	2.155		0.0000	1.702

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Max Upward from all Load Conditions		2.090	0.032	0.446
Max Upward from Load Combinations		2.090	0.032	0.446
Max Upward from Load Cases		1.753	0.032	0.369
Max Downward from all Load Conditio			-0.056	
Max Downward from Load Combinations			-0.024	
Max Downward from Load Cases (Resis			-0.056	
+D+H		0.337	0.032	0.077
+D+L+H, LL Comb Run (**L)		0.337	0.032	0.077
+D+L+H, LL Comb Run (*L*)		0.337	0.032	0.077
+D+L+H, LL Comb Run (*LL)		0.337	0.032	0.077
+D+L+H, LL Comb Run (L**)		0.337	0.032	0.077
+D+L+H, LL Comb Run (L*L)		0.337	0.032	0.077
+D+L+H, LL Comb Run (LL*)		0.337	0.032	0.077
+D+L+H, LL Comb Run (LLL)		0.337	0.032	0.077
+D+Lr+H, LL Comb Run (**L)		0.337	0.032	0.077
+D+Lr+H, LL Comb Run (*L*)		0.337	0.032	0.077
+D+Lr+H, LL Comb Run (*LL)		0.337	0.032	0.077
+D+Lr+H, LL Comb Run (L**)		0.337	0.032	0.077
+D+Lr+H, LL Comb Run (L*L)		0.337	0.032	0.077
+D+Lr+H, LL Comb Run (LL*)		0.337	0.032	0.077

DESCRIPTION: RJ1 - ENTRY ROOF JOIST

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
+D+Lr+H, LL Comb Run (LLL)		0.337	0.032	0.077
+D+S+H		2.090	-0.024	0.446
+D+0.750Lr+0.750L+H, LL Comb Run (*		0.337	0.032	0.077
+D+0.750Lr+0.750L+H, LL Comb Run (*		0.337	0.032	0.077
+D+0.750Lr+0.750L+H, LL Comb Run (*		0.337	0.032	0.077
+D+0.750Lr+0.750L+H, LL Comb Run (L		0.337	0.032	0.077
+D+0.750Lr+0.750L+H, LL Comb Run (L		0.337	0.032	0.077
+D+0.750Lr+0.750L+H, LL Comb Run (L		0.337	0.032	0.077
+D+0.750Lr+0.750L+H, LL Comb Run (L		0.337	0.032	0.077
+D+0.750L+0.750S+H, LL Comb Run (**		1.652	-0.010	0.354
+D+0.750L+0.750S+H, LL Comb Run (*L		1.652	-0.010	0.354
+D+0.750L+0.750S+H, LL Comb Run (*L		1.652	-0.010	0.354
+D+0.750L+0.750S+H, LL Comb Run (L*		1.652	-0.010	0.354
+D+0.750L+0.750S+H, LL Comb Run (L*		1.652	-0.010	0.354
+D+0.750L+0.750S+H, LL Comb Run (LL		1.652	-0.010	0.354
+D+0.750L+0.750S+H, LL Comb Run (LL		1.652	-0.010	0.354
+D+0.60W+H		0.337	0.032	0.077
+D+0.70E+H		0.337	0.032	0.077
+D+0.750Lr+0.750L+0.450W+H, LL Comb		0.337	0.032	0.077
+D+0.750Lr+0.750L+0.450W+H, LL Comb		0.337	0.032	0.077
+D+0.750Lr+0.750L+0.450W+H, LL Comb		0.337	0.032	0.077
+D+0.750Lr+0.750L+0.450W+H, LL Comb		0.337	0.032	0.077
+D+0.750Lr+0.750L+0.450W+H, LL Comb		0.337	0.032	0.077
+D+0.750Lr+0.750L+0.450W+H, LL Comb		0.337	0.032	0.077
+D+0.750Lr+0.750L+0.450W+H, LL Comb		0.337	0.032	0.077
+D+0.750L+0.750S+0.450W+H, LL Comb		1.652	-0.010	0.354
+D+0.750L+0.750S+0.450W+H, LL Comb		1.652	-0.010	0.354
+D+0.750L+0.750S+0.450W+H, LL Comb		1.652	-0.010	0.354
+D+0.750L+0.750S+0.450W+H, LL Comb		1.652	-0.010	0.354
+D+0.750L+0.750S+0.450W+H, LL Comb		1.652	-0.010	0.354
+D+0.750L+0.750S+0.450W+H, LL Comb		1.652	-0.010	0.354
+D+0.750L+0.750S+0.450W+H, LL Comb		1.652	-0.010	0.354
+D+0.750L+0.750S+0.5250E+H, LL Comb		1.652	-0.010	0.354
+D+0.750L+0.750S+0.5250E+H, LL Comb		1.652	-0.010	0.354
+D+0.750L+0.750S+0.5250E+H, LL Comb		1.652	-0.010	0.354
+D+0.750L+0.750S+0.5250E+H, LL Comb		1.652	-0.010	0.354
+D+0.750L+0.750S+0.5250E+H, LL Comb		1.652	-0.010	0.354
+D+0.750L+0.750S+0.5250E+H, LL Comb		1.652	-0.010	0.354
+D+0.750L+0.750S+0.5250E+H, LL Comb		1.652	-0.010	0.354
+0.60D+0.60W+0.60H		0.202	0.019	0.046
+0.60D+0.70E+0.60H		0.202	0.019	0.046
D Only		0.337	0.032	0.077
S Only		1.753	-0.056	0.369
H Only				

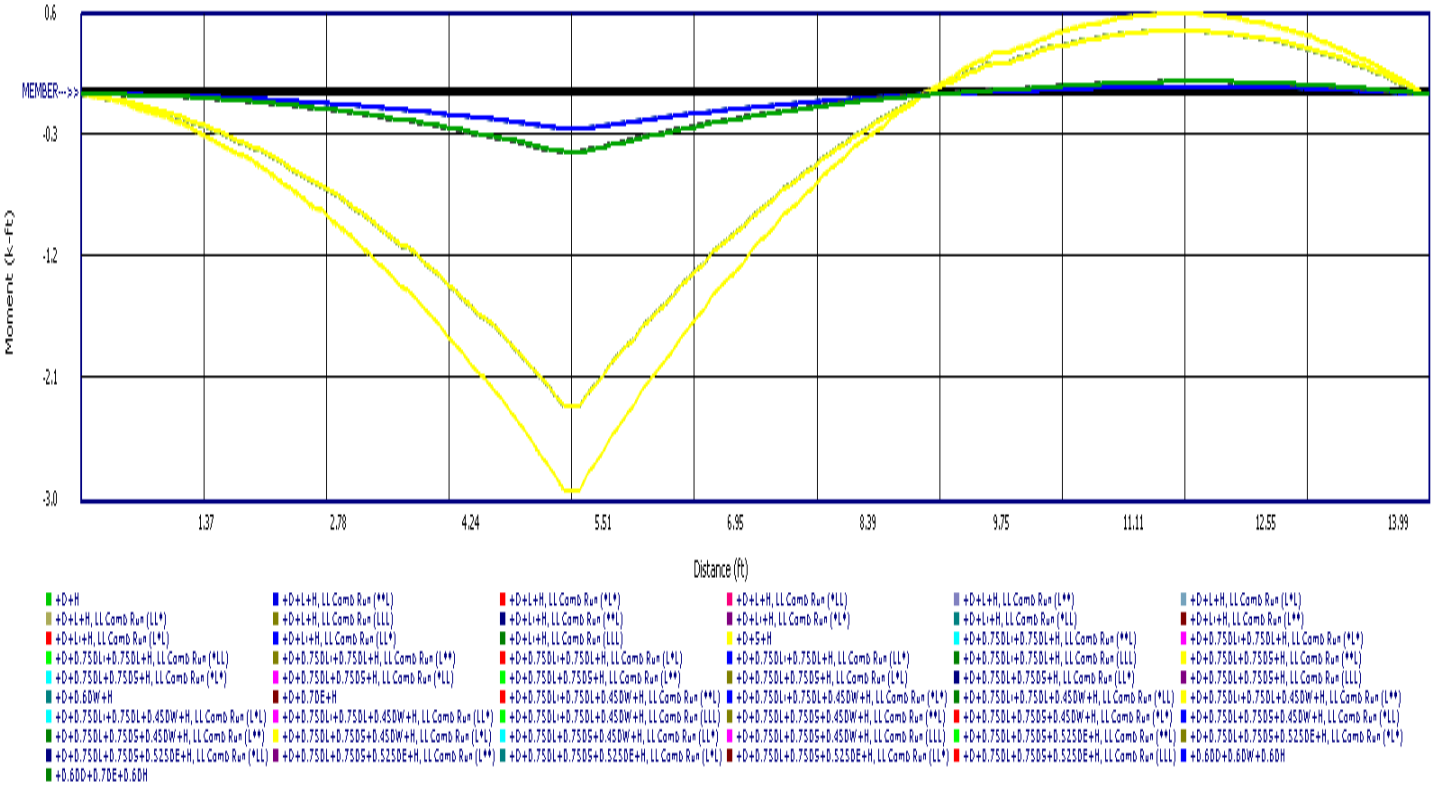
Project Title:
Engineer:
Project ID:
Project Descr:

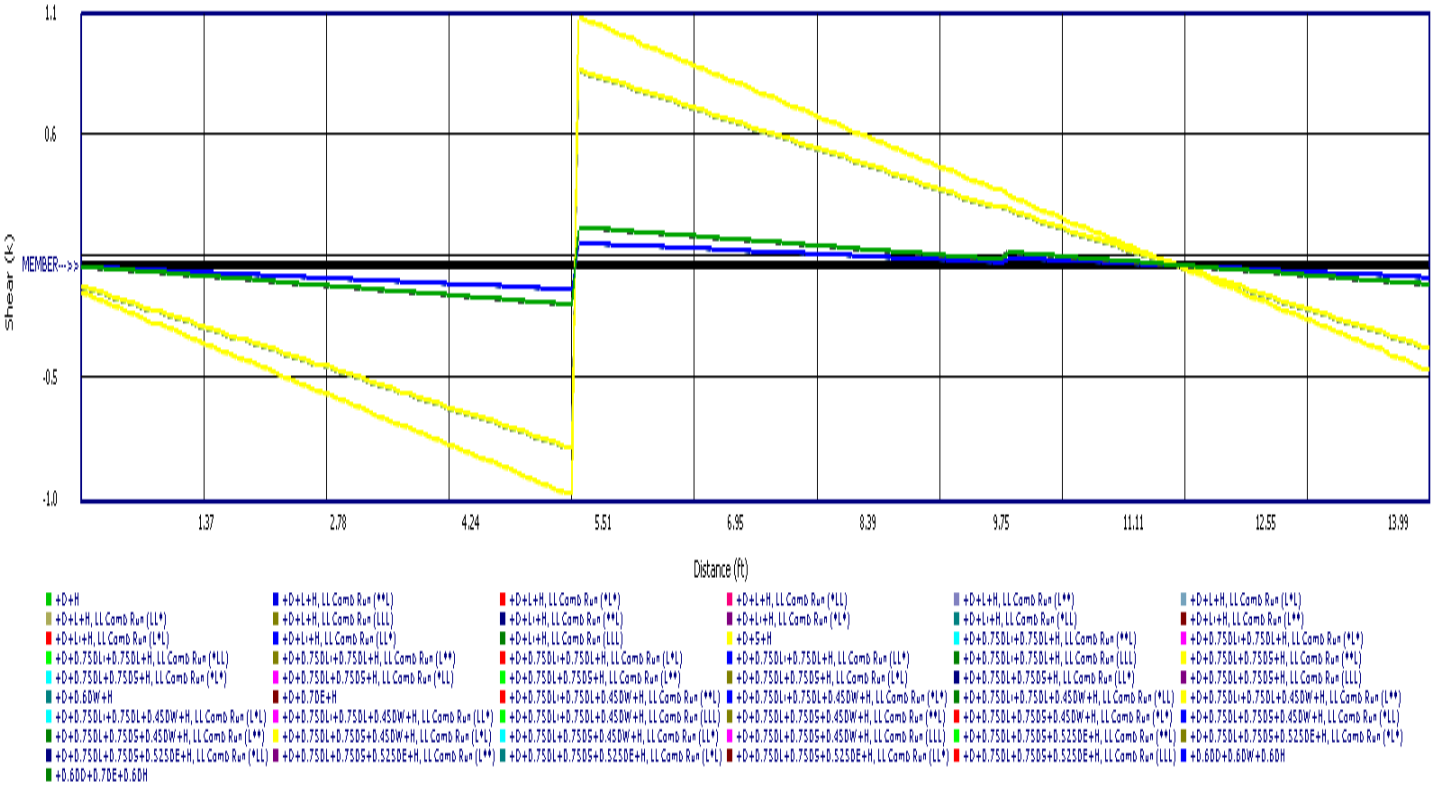
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RJ1 - ENTRY ROOF JOIST





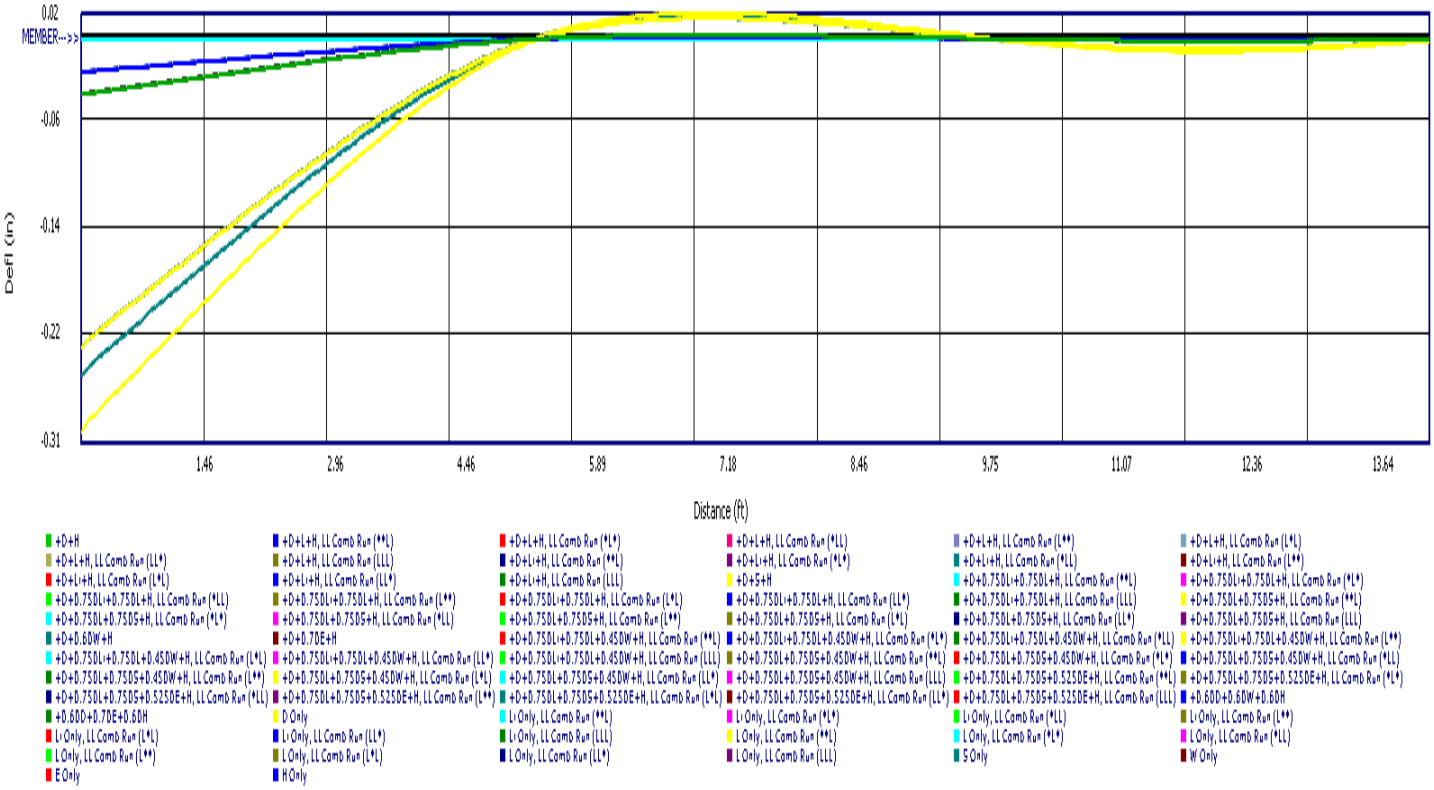
Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RJ1 - ENTRY ROOF JOIST



Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

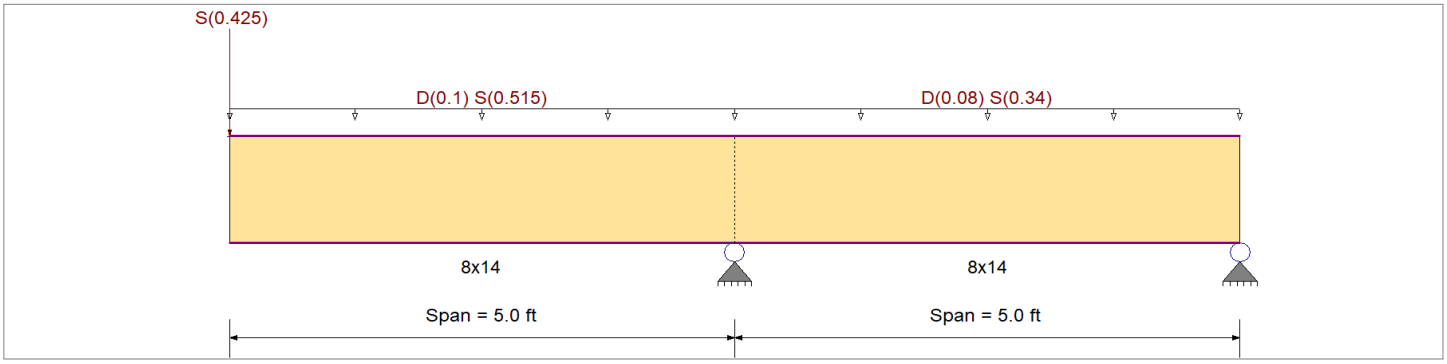
DESCRIPTION: RB17 - ENTRY ROOF BEAM

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	1,000.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	1,000.0 psi	Ebend- xx	1,700.0 ksi
		Fc - Prll	1,500.0 psi	Eminbend - xx	620.0 ksi
Wood Species :	Douglas Fir-Larch	Fc - Perp	625.0 psi		
Wood Grade :	No.1	Fv	180.0 psi		
		Ft	675.0 psi	Density	31.210 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Load for Span Number 1
Uniform Load : D = 0.020, S = 0.1030 ksf, Tributary Width = 5.0 ft, (ROOF)
Point Load : S = 0.4250 k @ 0.0 ft, (ICE)
Load for Span Number 2
Uniform Load : D = 0.020, S = 0.0850 ksf, Tributary Width = 4.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.524** : 1	Maximum Shear Stress Ratio	=	**0.232** : 1
Section used for this span		**8x14**	Section used for this span		**8x14**
fb: Actual	=	516.87 psi	fv: Actual	=	41.67 psi
F'b	=	987.00 psi	F'v	=	180.00 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	5.000 ft	Location of maximum on span	=	3.883 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.080 in	Ratio =	1504	>=360	Span: 1 : S Only
Max Upward Transient Deflection	-0.007 in	Ratio =	8075	>=360	Span: 2 : S Only
Max Downward Total Deflection	0.090 in	Ratio =	1326	>=240	Span: 1 : +D+S
Max Upward Total Deflection	-0.008 in	Ratio =	7179	>=240	Span: 2 : +D+S

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.074	0.036	0.90	1.00	1.00	1.00	0.987	1.00	1.00	1.00	1.25	65.8	888.3	0.39	5.8	162.0
Length = 5.0 ft	2	0.074	0.036	0.90	1.00	1.00	1.00	0.987	1.00	1.00	1.00	1.25	65.8	888.3	0.36	5.8	162.0
+D+S					1.00	1.00	1.00	0.987	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.524	0.232	1.00	1.00	1.00	1.00	0.987	1.00	1.00	1.00	9.81	516.9	987.0	2.81	41.7	180.0
Length = 5.0 ft	2	0.524	0.232	1.00	1.00	1.00	1.00	0.987	1.00	1.00	1.00	9.81	516.9	987.0	2.54	41.7	180.0
+D+0.750S					1.00	1.00	1.00	0.987	1.00	1.00	1.00			0.0	0.00	0.0	0.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RB17 - ENTRY ROOF BEAM

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 5.0 ft	**1**	0.356	0.158	1.15	1.00	1.00	1.00	0.987	1.00	1.00	1.00	7.67	404.1	1,135.0	2.21	32.7	207.0
Length = 5.0 ft	**2**	0.356	0.158	1.15	1.00	1.00	1.00	0.987	1.00	1.00	1.00	7.67	404.1	1,135.0	2.00	32.7	207.0
+0.60D					1.00	1.00	1.00	0.987	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.0 ft	**1**	0.025	0.012	1.60	1.00	1.00	1.00	0.987	1.00	1.00	1.00	0.75	39.5	1,579.2	0.23	3.5	288.0
Length = 5.0 ft	**2**	0.025	0.012	1.60	1.00	1.00	1.00	0.987	1.00	1.00	1.00	0.75	39.5	1,579.2	0.22	3.5	288.0

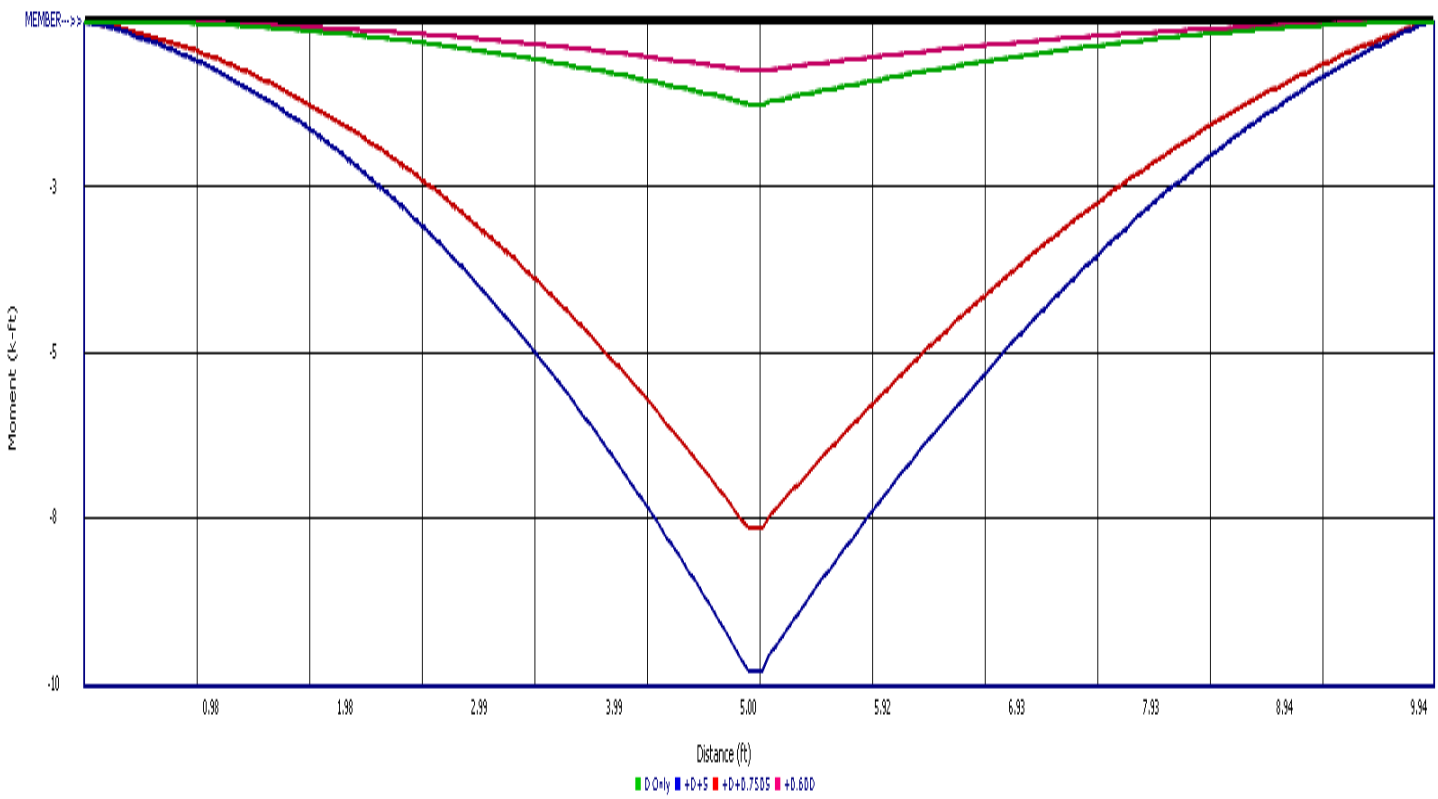
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0905	0.000		0.0000	0.000
	2	0.0000	0.000	+D+S	-0.0084	2.011

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions		6.513	
Max Upward from Load Combinations		6.513	
Max Upward from Load Cases		5.563	
Max Downward from all Load Conditio			-0.913
Max Downward from Load Combinations			-0.913
Max Downward from Load Cases (Resis			-0.863
D Only		0.950	-0.050
+D+S		6.513	-0.913
+D+0.750S		5.122	-0.697
+0.60D		0.570	-0.030
S Only		5.563	-0.863

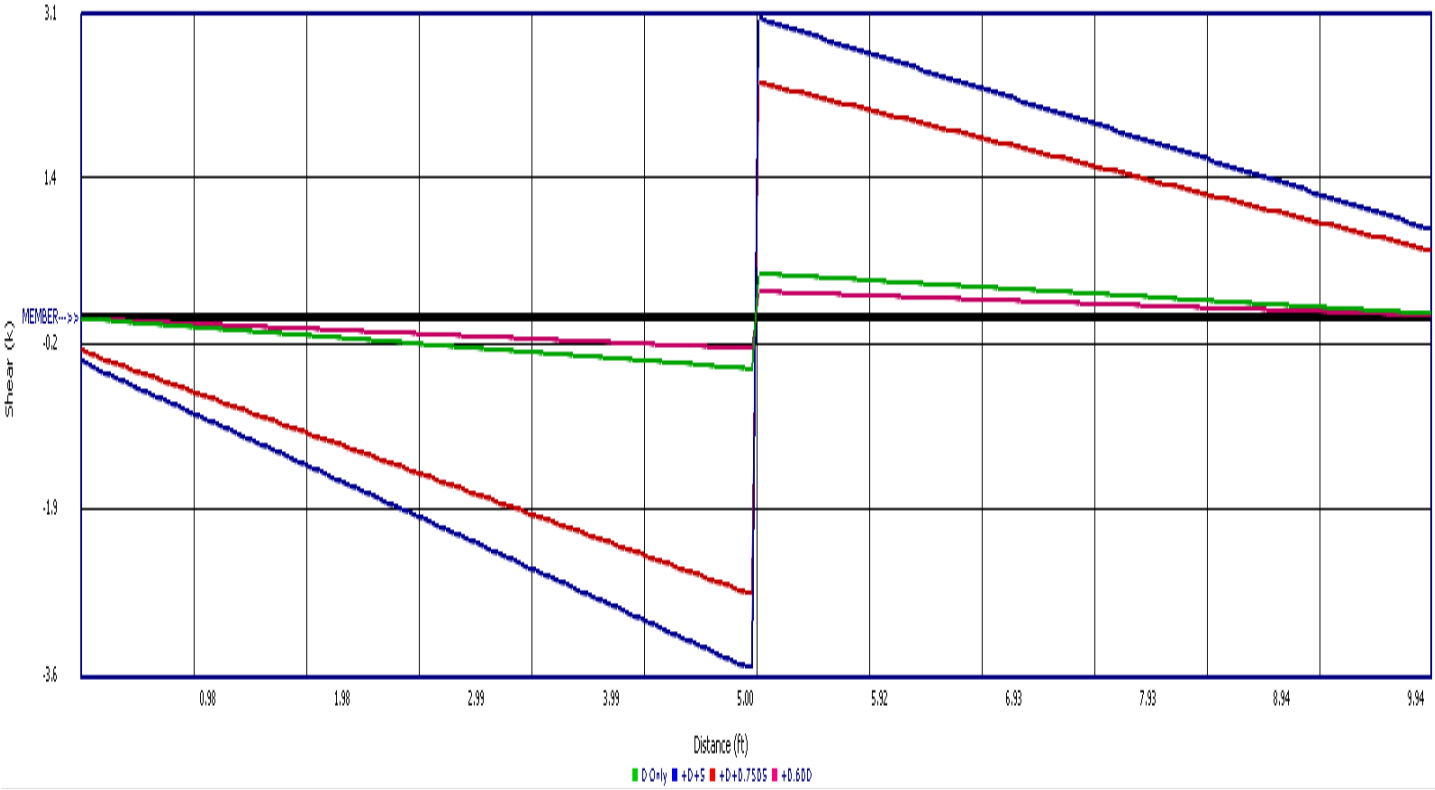


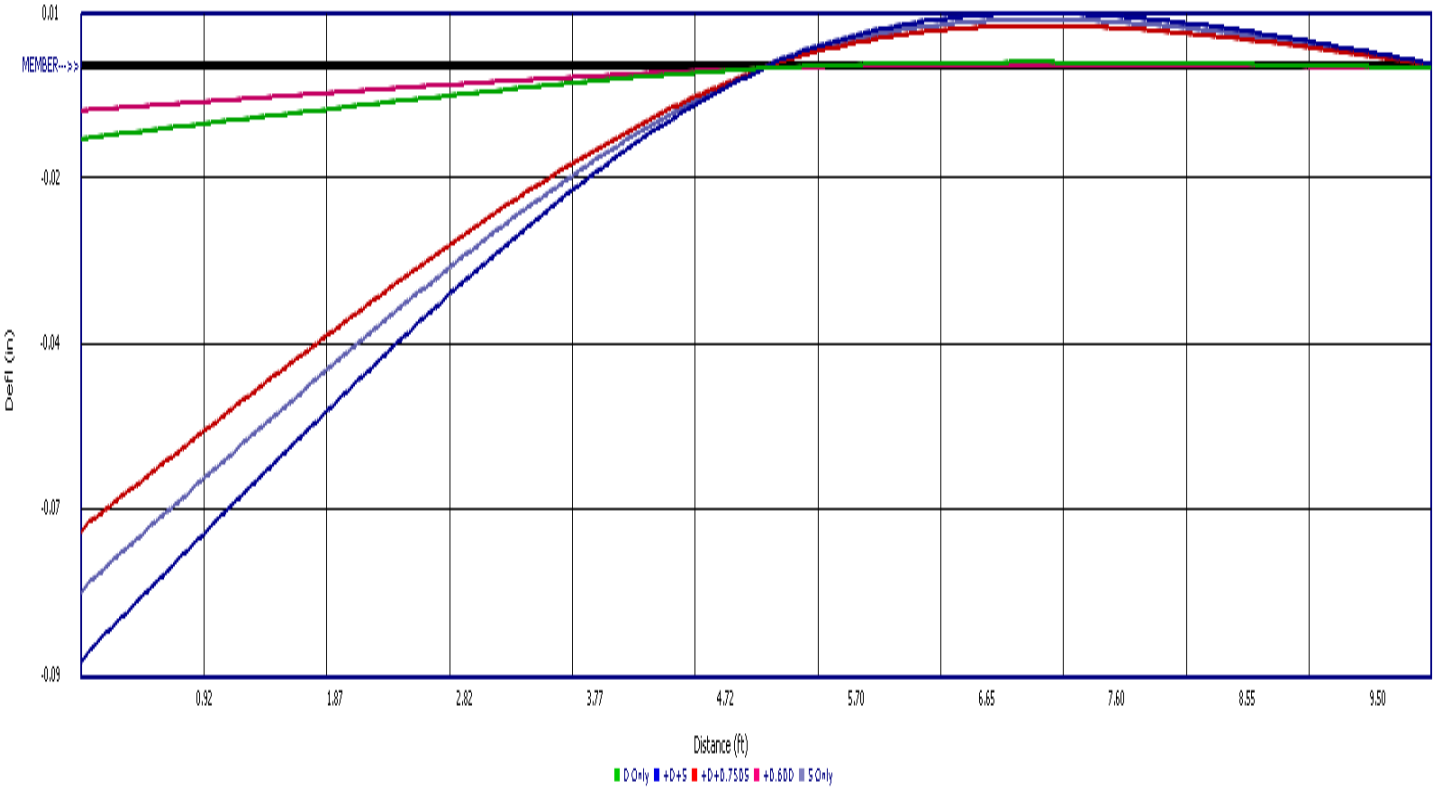
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RB17 - ENTRY ROOF BEAM





ROOF

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

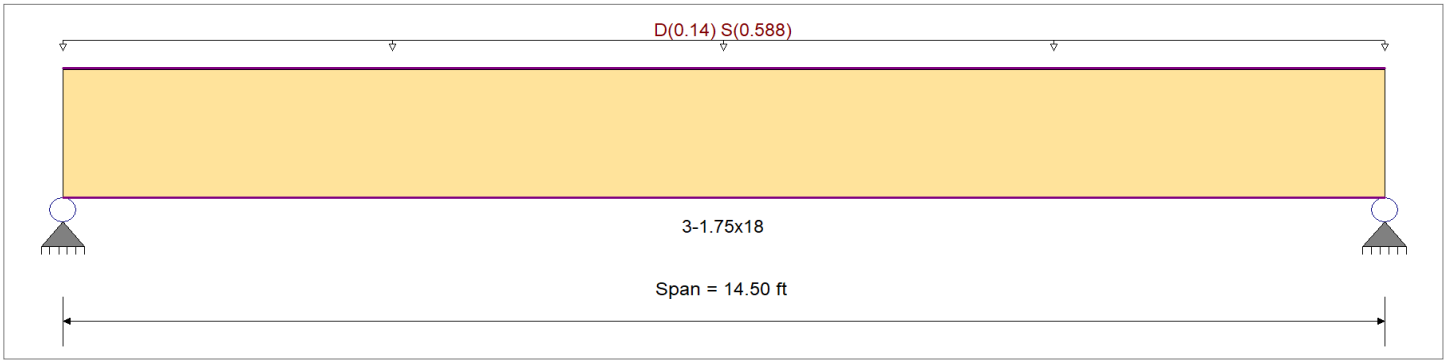
DESCRIPTION: RB1

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	850.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	850.0 psi	Ebend- xx	1,600.0 ksi
		Fc - Prll	1,400.0 psi	Eminbend - xx	580.0 ksi
Wood Species :	Douglas Fir-Larch (North)	Fc - Perp	625.0 psi		
Wood Grade :	No. 1/No. 2	Fv	180.0 psi		
		Ft	500.0 psi	Density	30.590 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, S = 0.0840 ksf, Tributary Width = 7.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.900 : 1	Maximum Shear Stress Ratio	=	0.331 : 1
Section used for this span		**3-1.75x18**	Section used for this span		**3-1.75x18**
fb: Actual	=	832.18 psi	fv: Actual	=	68.49 psi
F'b	=	925.06 psi	F'v	=	207.00 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	7.250 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.144 in	Ratio =	1207	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.183 in	Ratio =	949	>=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 14.50 ft	1	0.246	0.090	0.90	1.00	1.00	1.00	0.946	1.00	1.00	1.00	4.21	178.1	724.0	0.92	14.7	162.0
+D+S					1.00	1.00	1.00	0.946	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 14.50 ft	1	0.900	0.331	1.15	1.00	1.00	1.00	0.946	1.00	1.00	1.00	19.66	832.2	925.1	4.32	68.5	207.0
+D+0.750S					1.00	1.00	1.00	0.946	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 14.50 ft	1	0.723	0.266	1.15	1.00	1.00	1.00	0.946	1.00	1.00	1.00	15.80	668.7	925.1	3.47	55.0	207.0
+0.60D					1.00	1.00	1.00	0.946	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 14.50 ft	1	0.083	0.031	1.60	1.00	1.00	1.00	0.946	1.00	1.00	1.00	2.52	106.8	1,287.0	0.55	8.8	288.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RB1

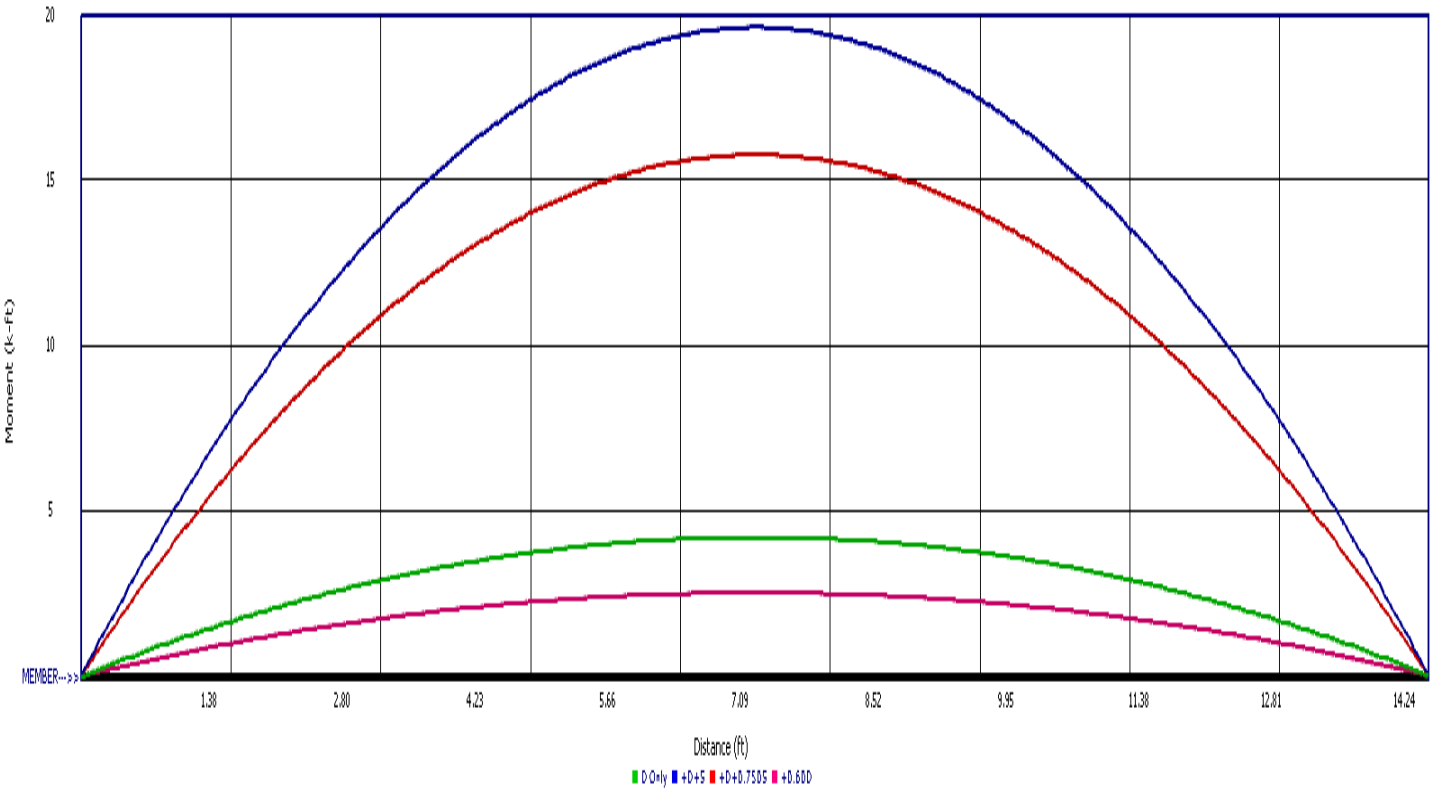
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.1833	7.303		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	5.424	5.424
Max Upward from Load Combinations	5.424	5.424
Max Upward from Load Cases	4.263	4.263
D Only	1.161	1.161
+D+S	5.424	5.424
+D+0.750S	4.358	4.358
+0.60D	0.696	0.696
S Only	4.263	4.263

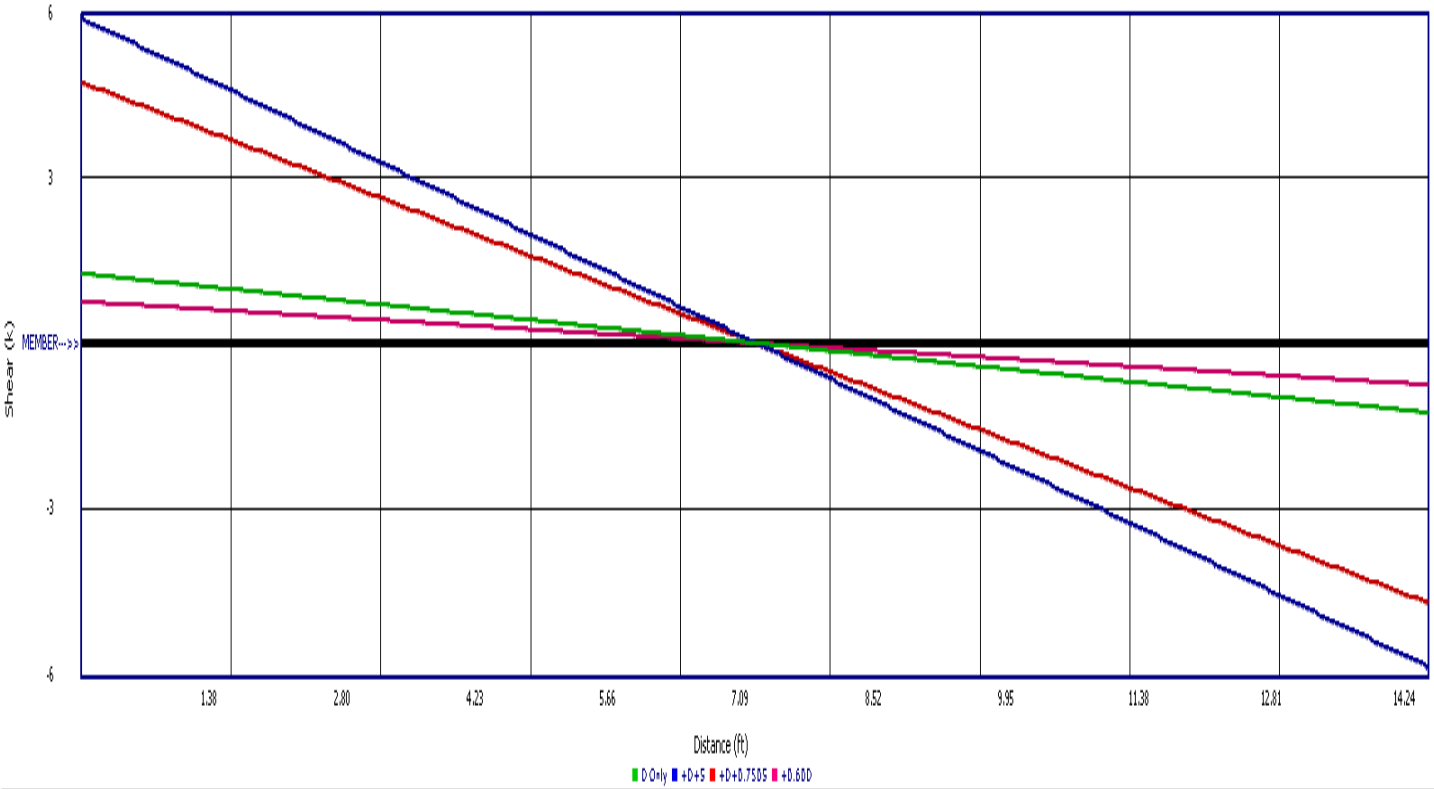


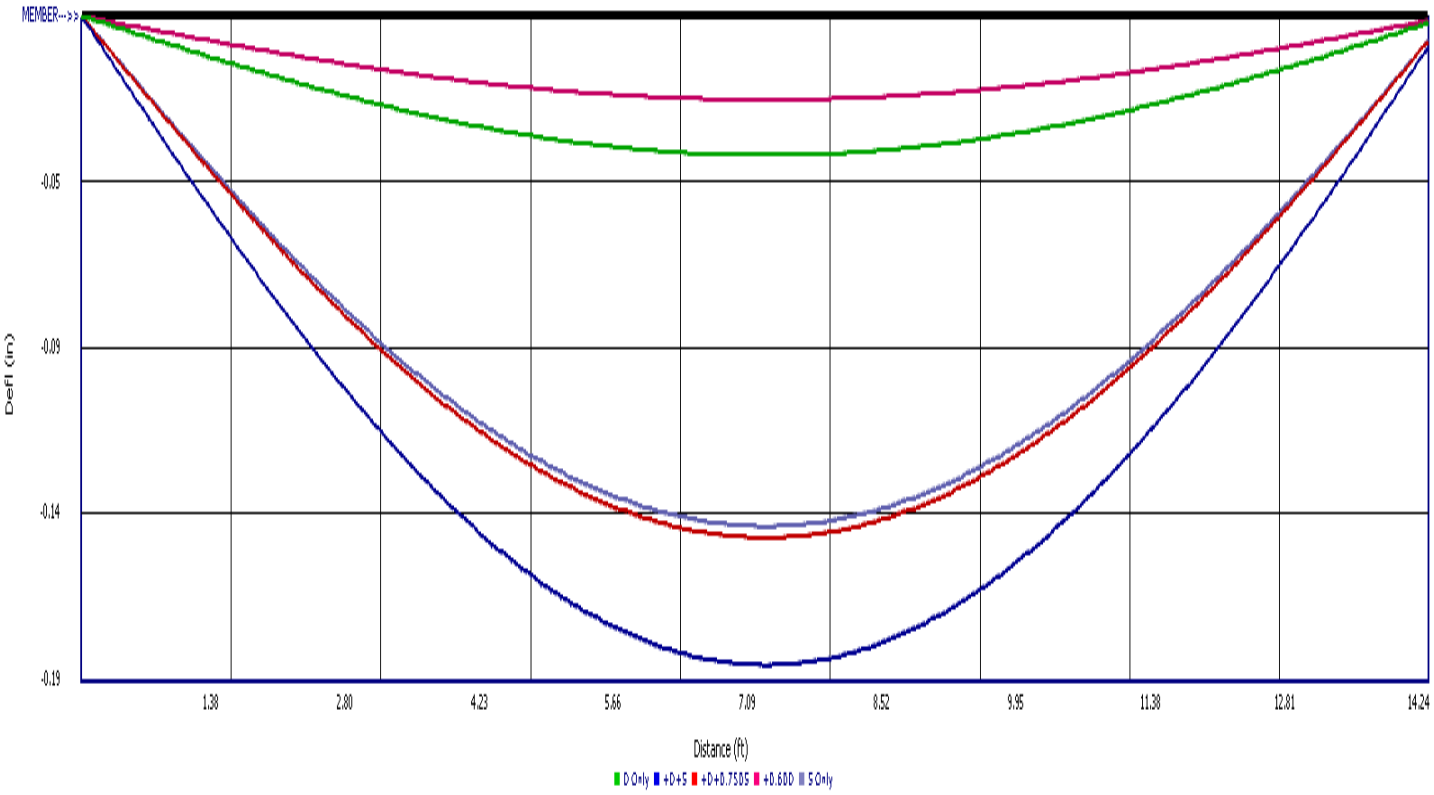
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RB1





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

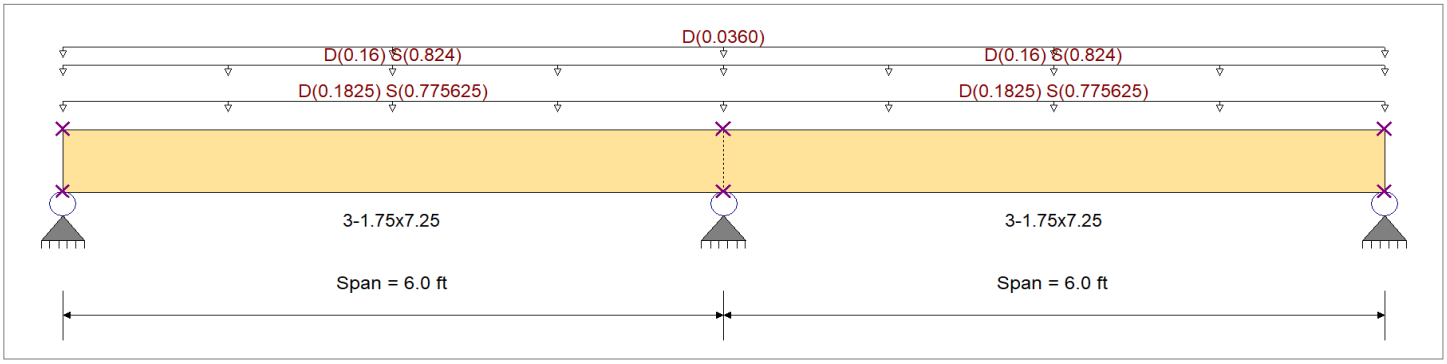
DESCRIPTION: RB2

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2600 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2600 psi	Ebend- xx	1900 ksi
		Fc - Prll	2510 psi	Eminbend - xx	965.71 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750 psi		
Wood Grade :	MicroLam LVL 1.9 E	Fv	285 psi		
		Ft	1555 psi	Density	42.01 pcf
Beam Bracing :	Completely Unbraced				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Loads on all spans...
Uniform Load on ALL spans : D = 0.00450 ksf, Tributary Width = 8.0 ft
Load for Span Number 1
Uniform Load : D = 0.020, S = 0.0850 ksf, Tributary Width = 9.125 ft, (HIGH ROOF)
Uniform Load : D = 0.020, S = 0.1030 ksf, Tributary Width = 8.0 ft, (LOW ROOF)
Load for Span Number 2
Uniform Load : D = 0.020, S = 0.0850 ksf, Tributary Width = 9.125 ft, (HIGH ROOF)
Uniform Load : D = 0.020, S = 0.1030 ksf, Tributary Width = 8.0 ft, (LOW ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.733** : 1	Maximum Shear Stress Ratio	=	**0.753** : 1
Section used for this span		**3-1.75x7.25**	Section used for this span		**3-1.75x7.25**
fb: Actual	=	2,335.58 psi	fv: Actual	=	246.68 psi
F'b	=	3,184.29 psi	F'v	=	327.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	6.000 ft	Location of maximum on span	=	5.397 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.062 in	Ratio =	1162	>=360	Span: 2 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.077 in	Ratio =	935	>=240	Span: 2 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.183	0.188	0.90	1.00	1.00	1.00	1.071	1.00	1.00	1.00	1.75	457.4	2,495.3	1.23	48.3	256.5
Length = 6.0 ft	2	0.183	0.188	0.90	1.00	1.00	1.00	1.071	1.00	1.00	1.00	1.75	457.4	2,495.3	1.23	48.3	256.5
+D+S					1.00	1.00	1.00	1.071	1.00	1.00	1.00			0.0	0.00	0.0	0.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RB2

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 6.0 ft	**1**	0.733	0.753	1.15	1.00	1.00	0.99	1.071	1.00	1.00	1.00	8.95	2,335.6	3,184.3	6.26	246.7	327.8
Length = 6.0 ft	**2**	0.733	0.753	1.15	1.00	1.00	0.99	1.071	1.00	1.00	1.00	8.95	2,335.6	3,184.3	6.26	246.7	327.8
+D+0.750S					1.00	1.00	0.99	1.071	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.0 ft	**1**	0.586	0.601	1.15	1.00	1.00	0.99	1.071	1.00	1.00	1.00	7.15	1,866.0	3,184.3	5.00	197.1	327.8
Length = 6.0 ft	**2**	0.586	0.601	1.15	1.00	1.00	0.99	1.071	1.00	1.00	1.00	7.15	1,866.0	3,184.3	5.00	197.1	327.8
+0.60D					1.00	1.00	0.99	1.071	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.0 ft	**1**	0.062	0.064	1.60	1.00	1.00	0.99	1.071	1.00	1.00	1.00	1.05	274.5	4,419.3	0.74	29.0	456.0
Length = 6.0 ft	**2**	0.062	0.064	1.60	1.00	1.00	0.99	1.071	1.00	1.00	1.00	1.05	274.5	4,419.3	0.74	29.0	456.0

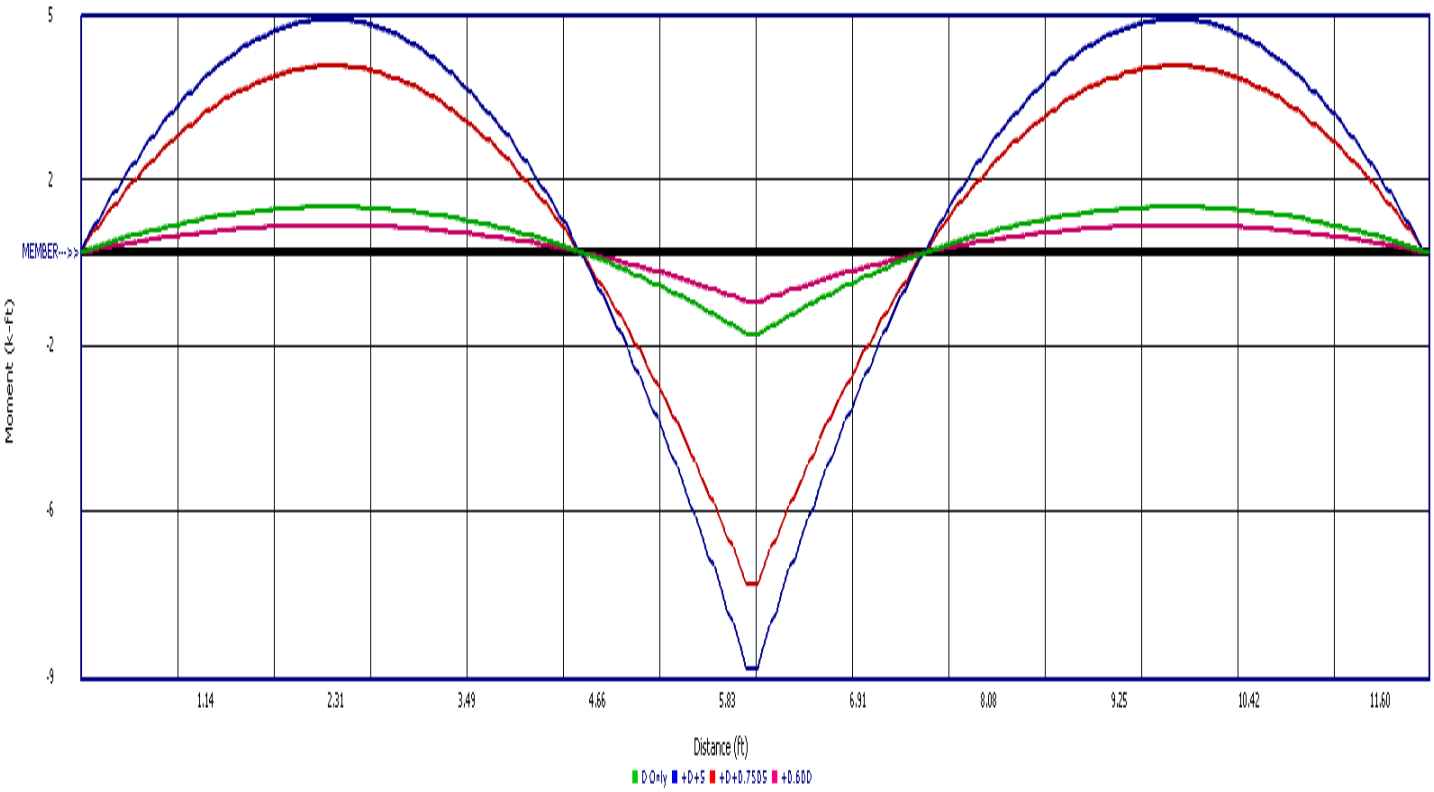
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0770	2.547		0.0000	0.000
+D+S	2	0.0762	3.486		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	4.476	14.919	4.476
Max Upward from Load Combinations	4.476	14.919	4.476
Max Upward from Load Cases	3.599	11.997	3.599
D Only	0.877	2.922	0.877
+D+S	4.476	14.919	4.476
+D+0.750S	3.576	11.920	3.576
+0.60D	0.526	1.753	0.526
S Only	3.599	11.997	3.599

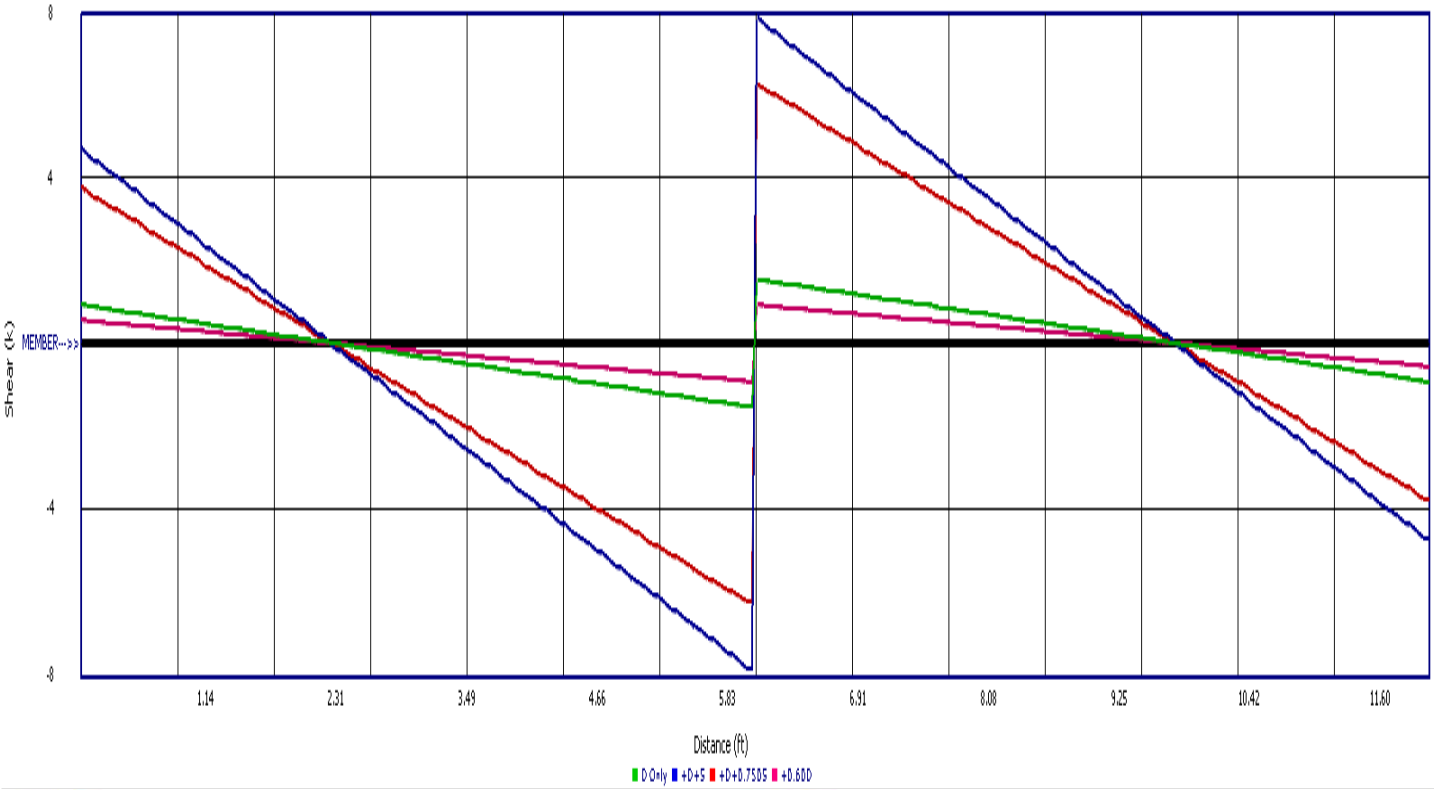


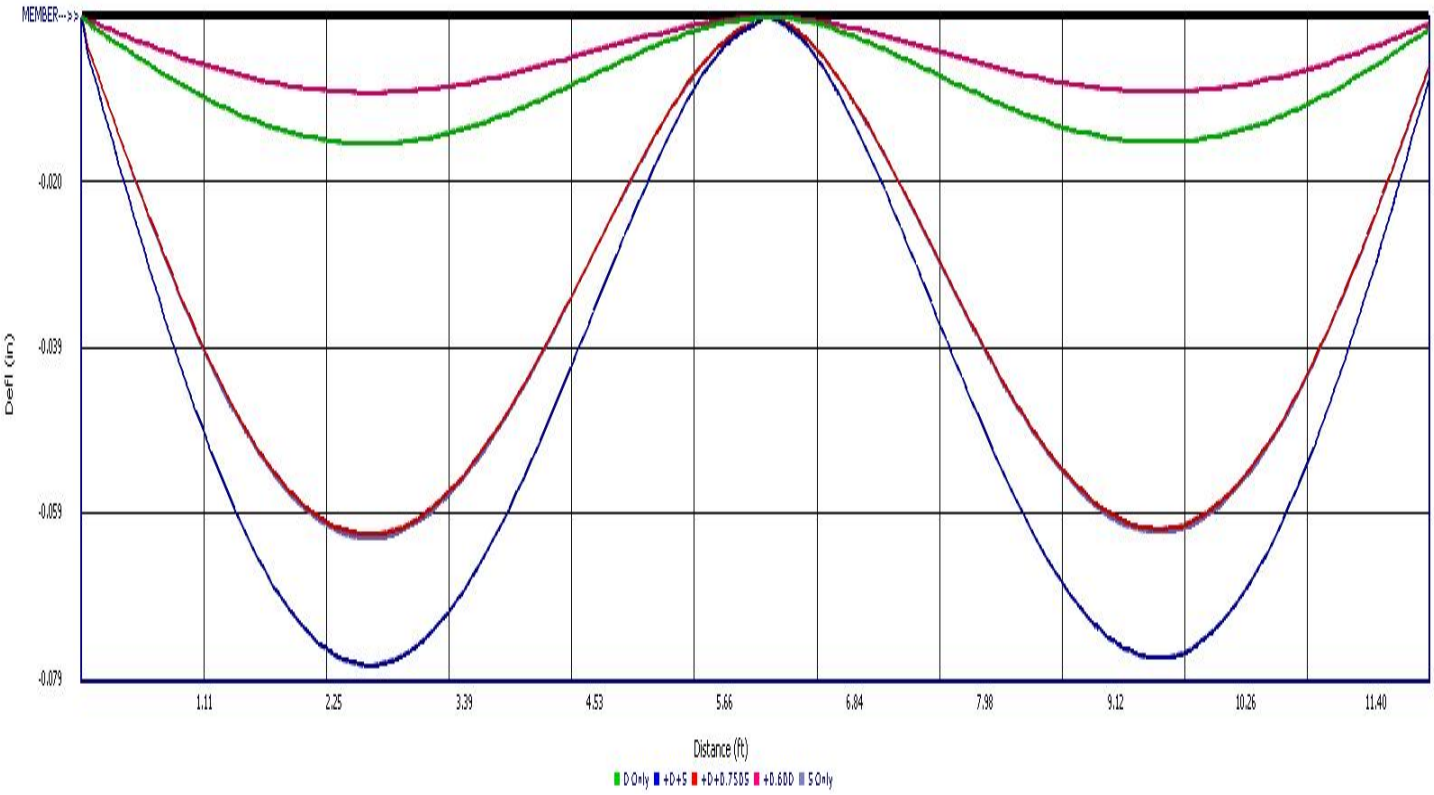
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RB2





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

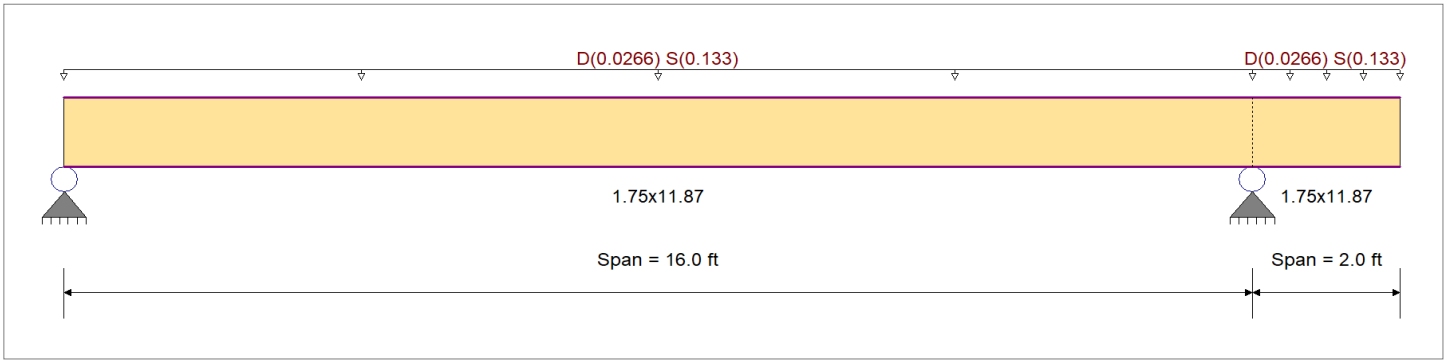
DESCRIPTION: RJ1

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,600.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2,600.0 psi	Ebend- xx	2,000.0 ksi
		Fc - Prll	2,510.0 psi	Eminbend - xx	1,016.54 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade :	MicroLam LVL 2.0 E	Fv	285.0 psi		
		Ft	1,555.0 psi	Density	42.010 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling			Repetitive Member Stress Increase	



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.020, S = 0.10 ksf, Tributary Width = 1.330 ft, (ROOF)
Load for Span Number 2
Uniform Load : D = 0.020, S = 0.10 ksf, Tributary Width = 1.330 ft, (ROOF)

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	0.553 : 1	Maximum Shear Stress Ratio	=	0.300 : 1
Section used for this span		**1.75x11.87**	Section used for this span		**1.75x11.87**
fb: Actual	=	1,498.73 psi	fv: Actual	=	85.40 psi
F'b	=	2,707.85 psi	F'v	=	285.00 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	7.866 ft	Location of maximum on span	=	15.017 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.390 in	Ratio =	492	>=360	Span: 1 : S Only
Max Upward Transient Deflection	-0.150 in	Ratio =	320	<360	Span: 2 : S Only
Max Downward Total Deflection	0.486 in	Ratio =	395	>=240	Span: 1 : +D+S
Max Upward Total Deflection	-0.186 in	Ratio =	256	>=240	Span: 2 : +D+S

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 16.0 ft	1	0.121	0.066	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.04	1.01	295.5	2,437.1	0.23	16.8	256.5
Length = 2.0 ft	2	0.008	0.066	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.04	0.07	19.1	2,437.1	0.03	16.8	256.5
+D+S					1.00	1.00	1.00	1.001	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 16.0 ft	1	0.553	0.300	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.04	5.14	1,498.7	2,707.9	1.18	85.4	285.0
Length = 2.0 ft	2	0.036	0.300	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.04	0.33	96.7	2,707.9	0.17	85.4	285.0
+D+0.750S					1.00	1.00	1.00	1.001	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 16.0 ft	1	0.442	0.240	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.04	4.11	1,197.9	2,707.9	0.95	68.3	285.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RJ1

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 2.0 ft	**2**	0.029	0.240	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.04	0.26	77.3	2,707.9	0.13	68.3	285.0
+0.60D					1.00	1.00	1.00	1.001	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 16.0 ft	**1**	0.041	0.022	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.04	0.61	177.3	4,332.6	0.14	10.1	456.0
Length = 2.0 ft	**2**	0.003	0.022	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.04	0.04	11.4	4,332.6	0.02	10.1	456.0

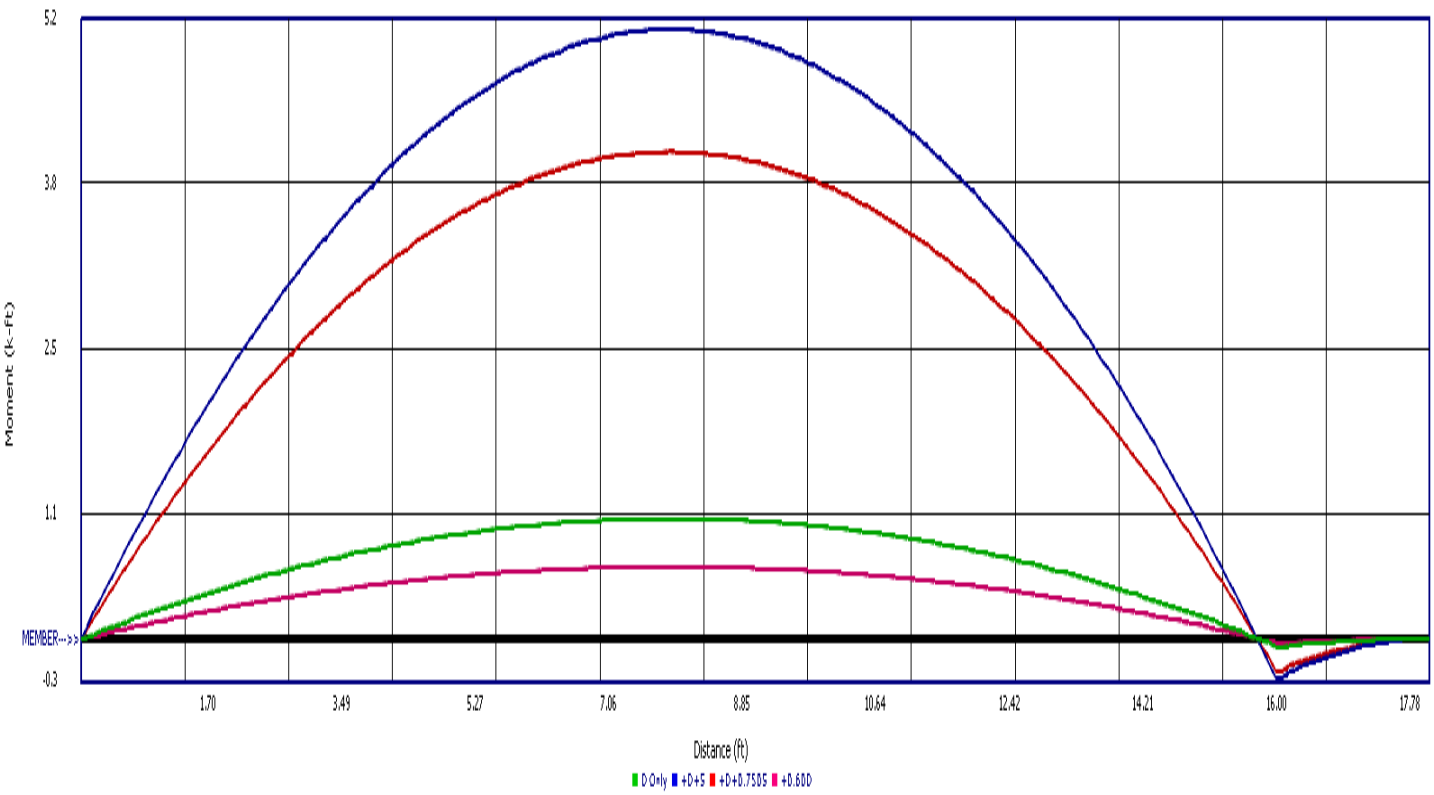
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.4857	8.045		0.0000	0.000
	2	0.0000	8.045	+D+S	-0.1864	2.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	1.305	1.677	
Max Upward from Load Combinations	1.305	1.677	
Max Upward from Load Cases	1.047	1.347	
D Only	0.257	0.331	
+D+S	1.305	1.677	
+D+0.750S	1.043	1.341	
+0.60D	0.154	0.198	
S Only	1.047	1.347	

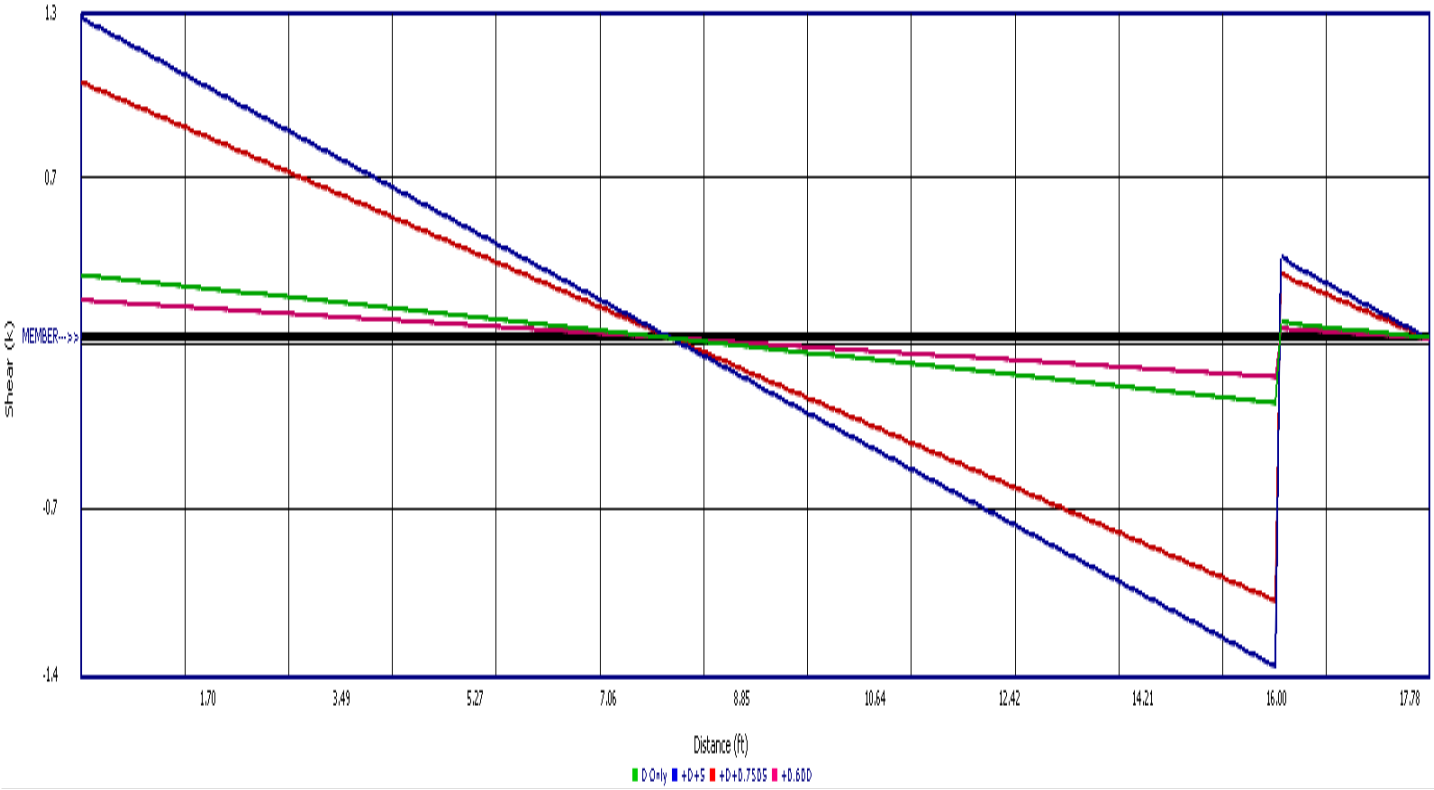


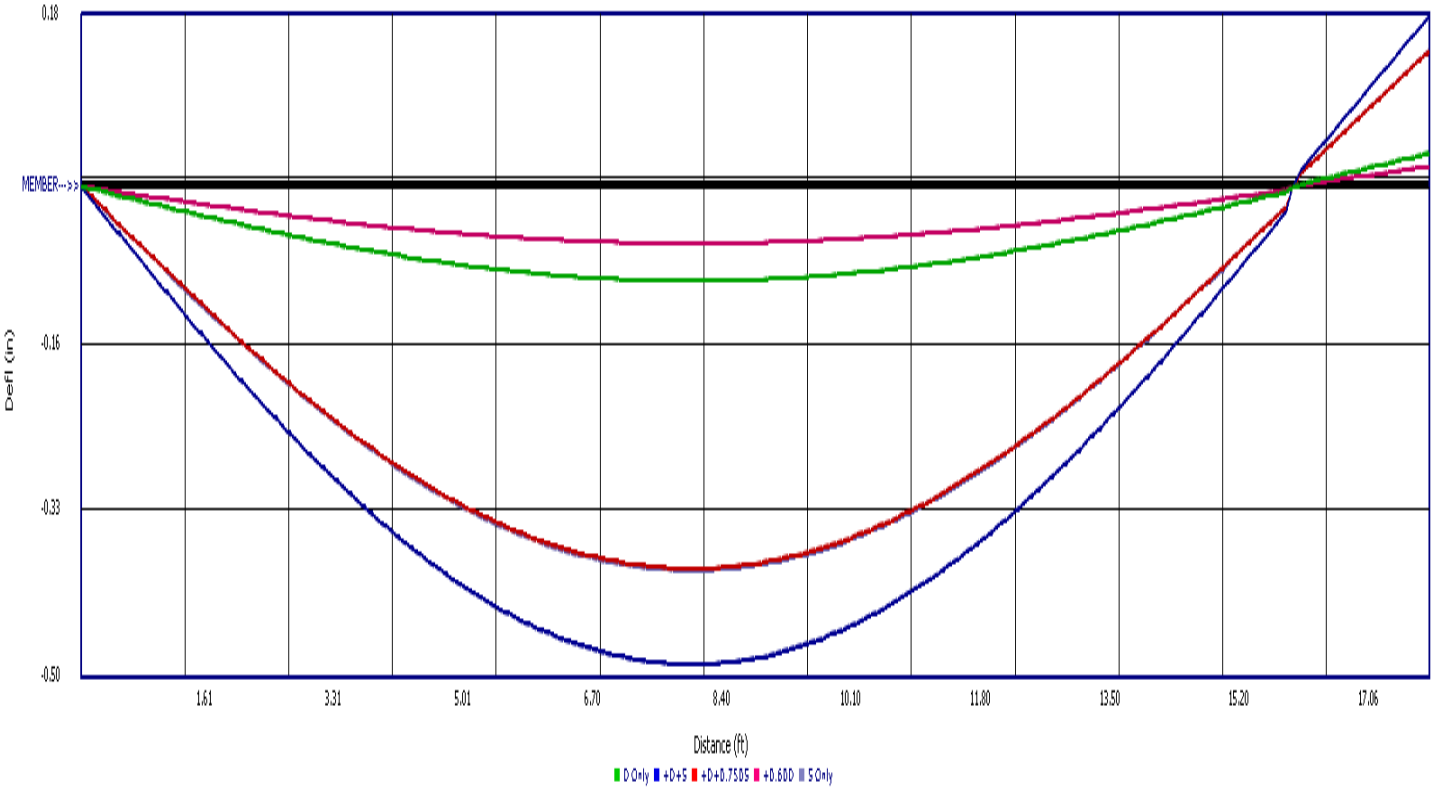
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RJ1





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

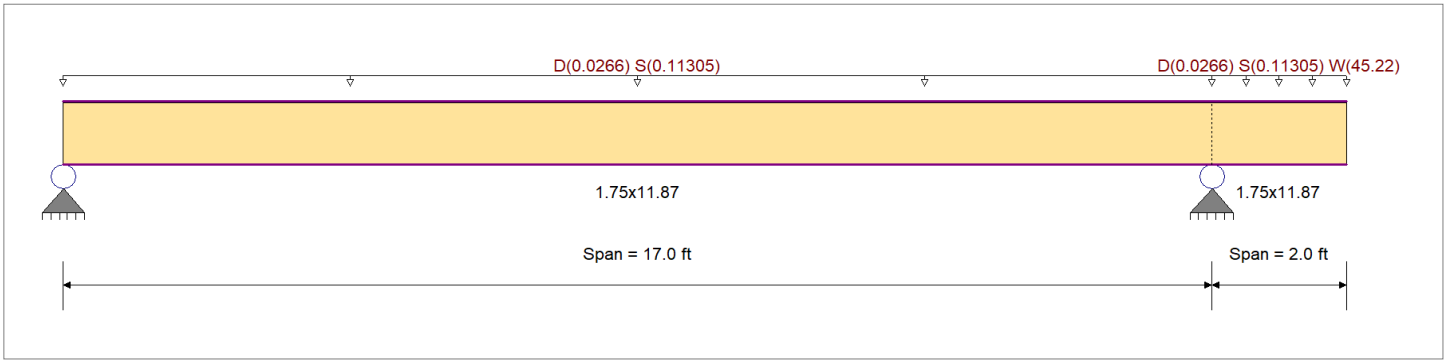
DESCRIPTION: RJ2 - STAIR RAFTER

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,600.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2,600.0 psi	Ebend- xx	2,000.0 ksi
		Fc - Prll	2,510.0 psi	Eminbend - xx	1,016.54 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade :	MicroLam LVL 2.0 E	Fv	285.0 psi		
		Ft	1,555.0 psi	Density	42.010 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling			Repetitive Member Stress Increase	



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.020, S = 0.0850 ksf, Tributary Width = 1.330 ft, (ROOF)
Load for Span Number 2
Uniform Load : D = 0.020, S = 0.0850, W = 34.0 ksf, Tributary Width = 1.330 ft, (ROOF)

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	3.659 : 1	Maximum Shear Stress Ratio	=	4.372 : 1
Section used for this span		**1.75x11.87**	Section used for this span		**1.75x11.87**
fb: Actual	=	15,851.18 psi	fv: Actual	=	1,993.62 psi
F'b	=	4,332.57 psi	F'v	=	456.00 psi
Load Combination		+D+0.60W	Load Combination		+D+0.60W
Location of maximum on span	=	17.000 ft	Location of maximum on span	=	17.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	3.945 in	Ratio =	12 <360	Span: 2 : W Only
Max Upward Transient Deflection	-5.975 in	Ratio =	34 <360	Span: 2 : S Only
Max Downward Total Deflection	2.340 in	Ratio =	20 <240	Span: 2 : +0.60D+0.60W
Max Upward Total Deflection	-3.514 in	Ratio =	58 <240	Span: 2 : +D+S

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 17.0 ft	1	0.137	0.070	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.04	1.15	334.8	2,437.1	0.25	18.1	256.5
Length = 2.0 ft	2	0.008	0.070	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.04	0.07	19.1	2,437.1	0.03	18.1	256.5
+D+S					1.00	1.00	1.00	1.001	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 17.0 ft	1	0.552	0.283	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.04	5.12	1,493.6	2,707.9	1.12	80.6	285.0
Length = 2.0 ft	2	0.031	0.283	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.04	0.29	85.0	2,707.9	0.15	80.6	285.0
+D+0.750S					1.00	1.00	1.00	1.001	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 17.0 ft	1	0.445	0.228	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.04	4.13	1,203.9	2,707.9	0.90	65.0	285.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RJ2 - STAIR RAFTER

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 2.0 ft	**2**	0.025	0.228	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.04	0.23	68.5	2,707.9	0.12	65.0	285.0
+D+0.60W					1.00	1.00	1.00	1.001	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 17.0 ft	**1**	3.659	4.372	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.04	54.33	15,851.2	4,332.6	27.62	1,993.6	456.0
Length = 2.0 ft	**2**	3.659	4.372	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.04	54.33	15,851.2	4,332.6	27.62	1,993.6	456.0
+D+0.450W					1.00	1.00	1.00	1.001	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 17.0 ft	**1**	2.745	3.280	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.04	40.76	11,893.1	4,332.6	20.72	1,495.8	456.0
Length = 2.0 ft	**2**	2.745	3.280	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.04	40.76	11,893.1	4,332.6	20.72	1,495.8	456.0
+D+0.750S+0.450W					1.00	1.00	1.00	1.001	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 17.0 ft	**1**	2.756	3.294	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.04	40.93	11,942.6	4,332.6	20.81	1,502.0	456.0
Length = 2.0 ft	**2**	2.756	3.294	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.04	40.93	11,942.6	4,332.6	20.81	1,502.0	456.0
+0.60D+0.60W					1.00	1.00	1.00	1.001	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 17.0 ft	**1**	3.657	4.370	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.04	54.30	15,843.6	4,332.6	27.61	1,992.7	456.0
Length = 2.0 ft	**2**	3.657	4.370	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.04	54.30	15,843.6	4,332.6	27.61	1,992.7	456.0
+0.60D					1.00	1.00	1.00	1.001	1.00	1.00	1.04			0.0	0.00	0.0	0.0
Length = 17.0 ft	**1**	0.046	0.024	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.04	0.69	200.9	4,332.6	0.15	10.8	456.0
Length = 2.0 ft	**2**	0.003	0.024	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.04	0.04	11.4	4,332.6	0.02	10.8	456.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	W Only	-5.9752	9.877
W Only	2	3.9452	2.000		0.0000	9.877

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

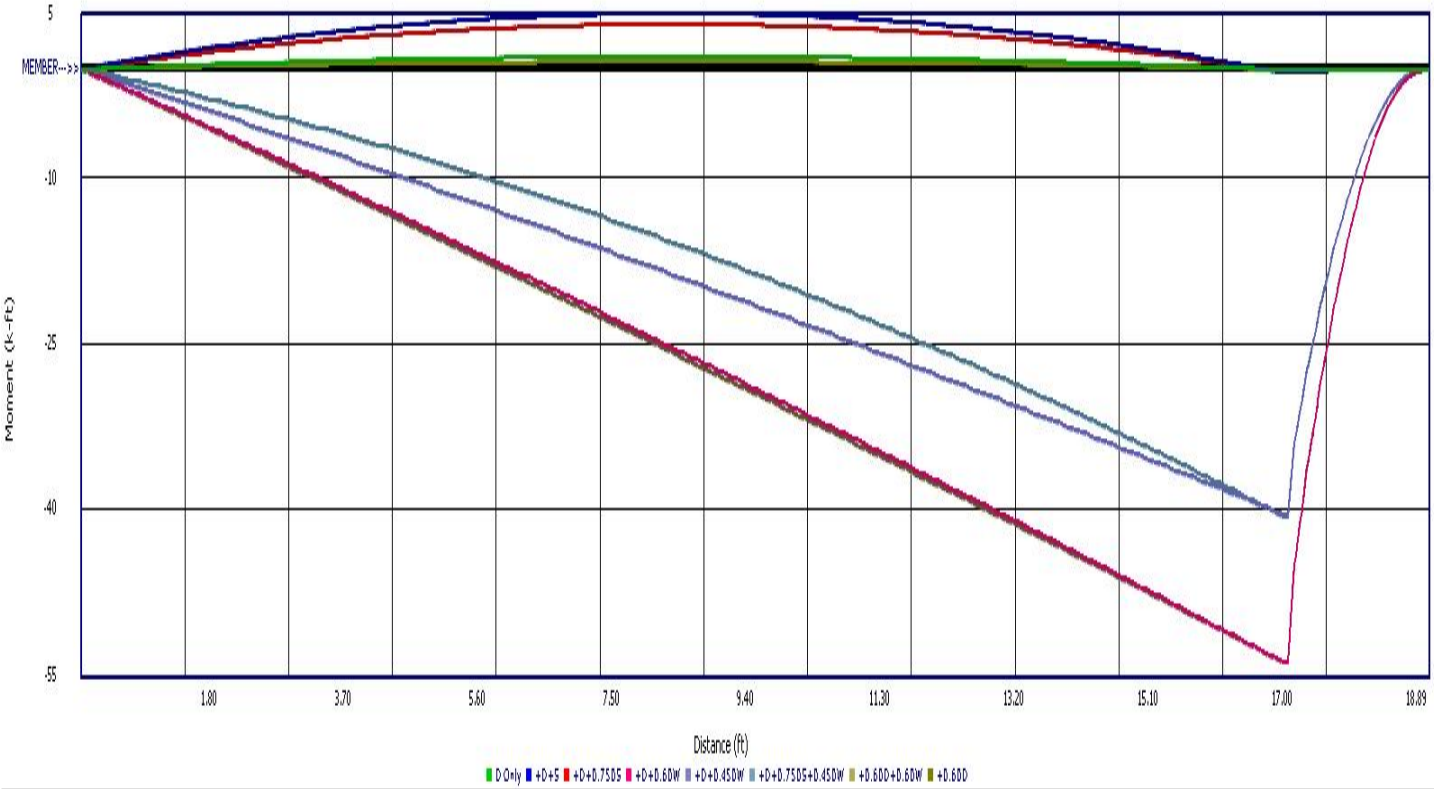
Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	1.221	95.760	
Max Upward from Load Combinations	1.221	57.803	
Max Upward from Load Cases	0.948	95.760	
Max Downward from all Load Conditio	-5.320		
Max Downward from Load Combinations	-3.028		
Max Downward from Load Cases (Resis	-5.320		
D Only	0.274	0.347	
+D+S	1.221	1.547	
+D+0.750S	0.985	1.247	
+D+0.60W	-2.918	57.803	
+D+0.450W	-2.120	43.439	
+D+0.750S+0.450W	-1.409	44.339	
+0.60D+0.60W	-3.028	57.664	
+0.60D	0.164	0.208	
S Only	0.948	1.200	
W Only	-5.320	95.760	

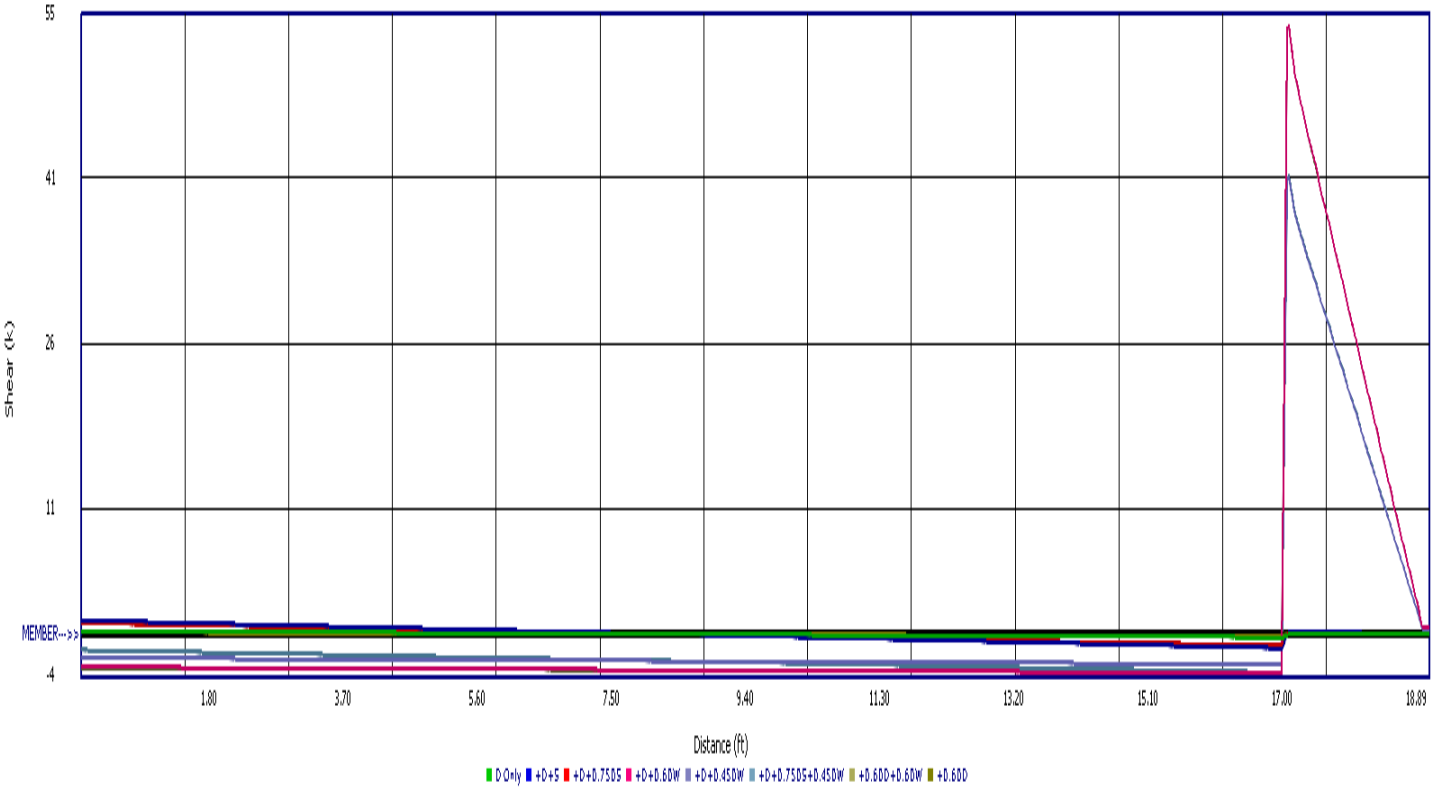
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RJ2 - STAIR RAFTER



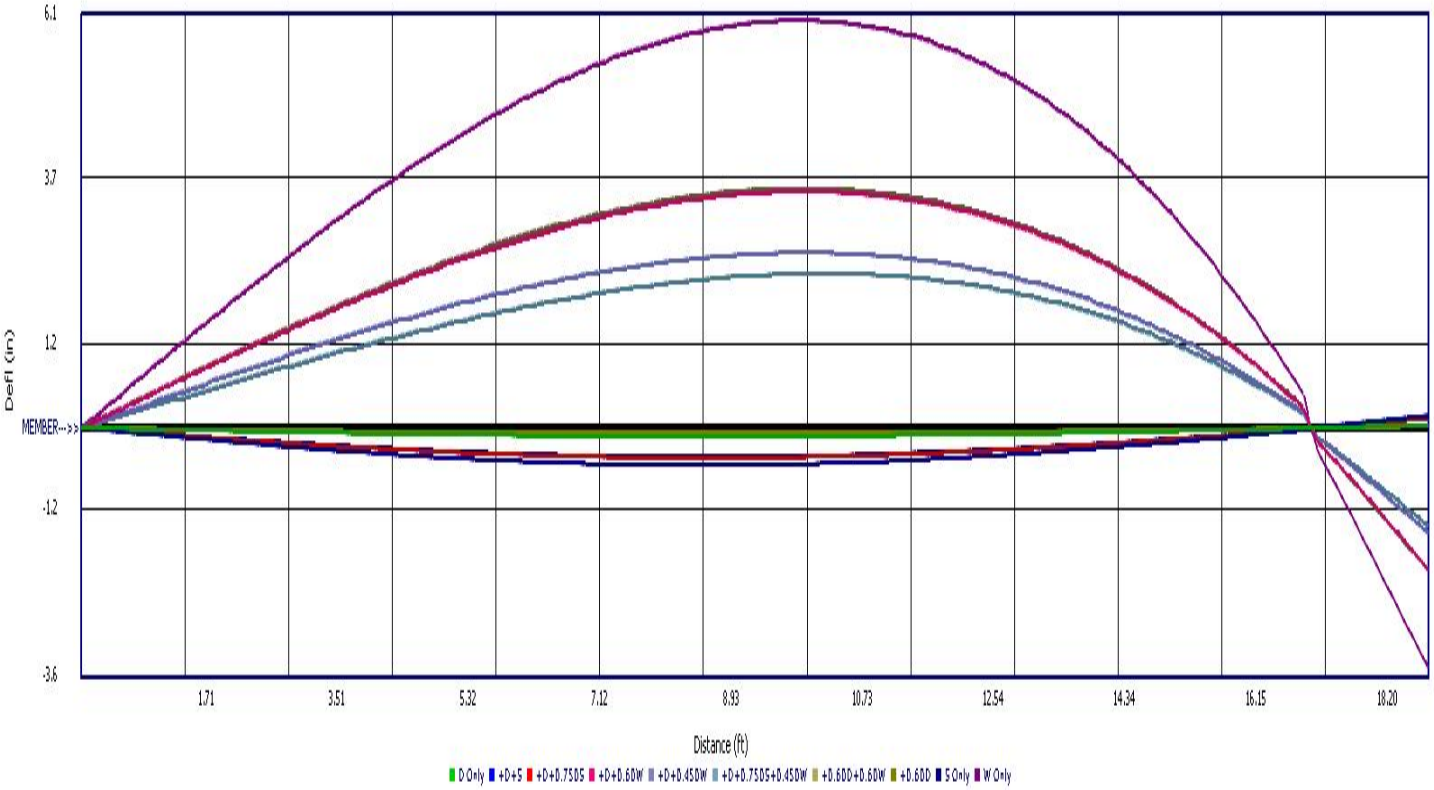


Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RJ2 - STAIR RAFTER



Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

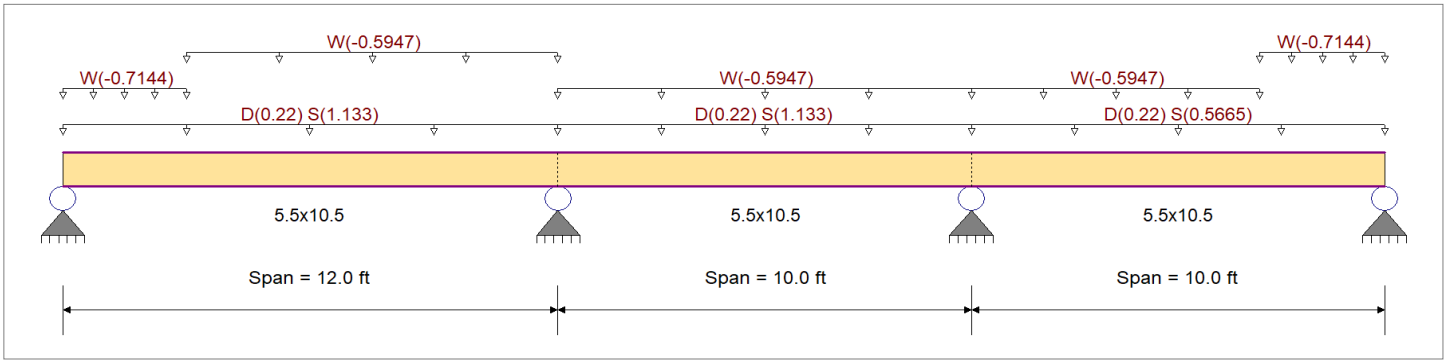
DESCRIPTION: RB3 (WOOD)

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,000.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2,000.0 psi	Ebend- xx	1,500.0 ksi
		Fc - Prll	1,550.0 psi	Eminbend - xx	790.0 ksi
Wood Species :	AC/AC	Fc - Perp	560.0 psi	Ebend- yy	1,400.0 ksi
Wood Grade :	20F-V13	Fv	265.0 psi	Eminbend - yy	740.0 ksi
		Ft	950.0 psi	Density	28.720 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.020, S = 0.1030 ksf, Tributary Width = 11.0 ft, (ROOF)
Uniform Load : W = -0.07520 ksf, Extent = 0.0 -->> 3.0 ft, Tributary Width = 9.50 ft, (Wind (3e))
Uniform Load : W = -0.06260 ksf, Extent = 3.0 -->> 12.0 ft, Tributary Width = 9.50 ft, (Wind (3e))
Load for Span Number 2
Uniform Load : D = 0.020, S = 0.1030 ksf, Tributary Width = 11.0 ft, (ROOF)
Uniform Load : W = -0.06260 ksf, Tributary Width = 9.50 ft, (Wind (1&2e))
Load for Span Number 3
Uniform Load : D = 0.020, S = 0.05150 ksf, Tributary Width = 11.0 ft, (ROOF)
Uniform Load : W = -0.06260 ksf, Extent = 0.0 -->> 7.0 ft, Tributary Width = 9.50 ft, (Wind (1&2e))
Uniform Load : W = -0.07520 ksf, Extent = 7.0 -->> 10.0 ft, Tributary Width = 9.50 ft, (Wind (1&2e))

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.990 : 1	Maximum Shear Stress Ratio	=	0.740 : 1
Section used for this span		**5.5x10.5**	Section used for this span		**5.5x10.5**
fb: Actual	=	2,275.89 psi	fv: Actual	=	225.55 psi
F'b	=	2,300.00 psi	F'v	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	12.000 ft	Location of maximum on span	=	11.193 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.361 in	Ratio =	398	>=360	Span: 3 : S Only
Max Upward Transient Deflection	-0.206 in	Ratio =	697	>=360	Span: 3 : W Only
Max Downward Total Deflection	0.439 in	Ratio =	328	>=180	Span: 3 : +D+S+H
Max Upward Total Deflection	-0.078 in	Ratio =	1857	>=180	Span: 3 : +0.60D+0.60W+0.60H

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
+D+H														0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.205	0.159	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	1,800.0	1.46	38.0	238.5

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RB3 (WOOD)

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 10.0 ft	**2**	0.205	0.159	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	1,800.0	1.17	38.0	238.5
Length = 10.0 ft	**3**	0.140	0.159	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	1,800.0	1.17	38.0	238.5
+D+L+H, LL Comb Run (**L)					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.184	0.143	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,000.0	1.46	38.0	265.0
Length = 10.0 ft	**2**	0.184	0.143	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,000.0	1.17	38.0	265.0
Length = 10.0 ft	**3**	0.126	0.143	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	2,000.0	1.17	38.0	265.0
+D+L+H, LL Comb Run (*L*)					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.184	0.143	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,000.0	1.46	38.0	265.0
Length = 10.0 ft	**2**	0.184	0.143	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,000.0	1.17	38.0	265.0
Length = 10.0 ft	**3**	0.126	0.143	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	2,000.0	1.17	38.0	265.0
+D+L+H, LL Comb Run (*LL)					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.184	0.143	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,000.0	1.46	38.0	265.0
Length = 10.0 ft	**2**	0.184	0.143	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,000.0	1.17	38.0	265.0
Length = 10.0 ft	**3**	0.126	0.143	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	2,000.0	1.17	38.0	265.0
+D+L+H, LL Comb Run (L**)					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.184	0.143	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,000.0	1.46	38.0	265.0
Length = 10.0 ft	**2**	0.184	0.143	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,000.0	1.17	38.0	265.0
Length = 10.0 ft	**3**	0.126	0.143	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	2,000.0	1.17	38.0	265.0
+D+L+H, LL Comb Run (L*L)					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.184	0.143	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,000.0	1.46	38.0	265.0
Length = 10.0 ft	**2**	0.184	0.143	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,000.0	1.17	38.0	265.0
Length = 10.0 ft	**3**	0.126	0.143	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	2,000.0	1.17	38.0	265.0
+D+L+H, LL Comb Run (LL*)					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.184	0.143	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,000.0	1.46	38.0	265.0
Length = 10.0 ft	**2**	0.184	0.143	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,000.0	1.17	38.0	265.0
Length = 10.0 ft	**3**	0.126	0.143	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	2,000.0	1.17	38.0	265.0
+D+L+H, LL Comb Run (LLL)					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.184	0.143	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,000.0	1.46	38.0	265.0
Length = 10.0 ft	**2**	0.184	0.143	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,000.0	1.17	38.0	265.0
Length = 10.0 ft	**3**	0.126	0.143	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	2,000.0	1.17	38.0	265.0
+D+Lr+H, LL Comb Run (**L)					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.46	38.0	331.3
Length = 10.0 ft	**2**	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.17	38.0	331.3
Length = 10.0 ft	**3**	0.101	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	2,500.0	1.17	38.0	331.3
+D+Lr+H, LL Comb Run (*L*)					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.46	38.0	331.3
Length = 10.0 ft	**2**	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.17	38.0	331.3
Length = 10.0 ft	**3**	0.101	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	2,500.0	1.17	38.0	331.3
+D+Lr+H, LL Comb Run (*LL)					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.46	38.0	331.3
Length = 10.0 ft	**2**	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.17	38.0	331.3
Length = 10.0 ft	**3**	0.101	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	2,500.0	1.17	38.0	331.3
+D+Lr+H, LL Comb Run (L**)					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.46	38.0	331.3
Length = 10.0 ft	**2**	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.17	38.0	331.3
Length = 10.0 ft	**3**	0.101	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	2,500.0	1.17	38.0	331.3
+D+Lr+H, LL Comb Run (L*L)					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0

DESCRIPTION: RB3 (WOOD)

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 12.0 ft	1	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.46	38.0	331.3
Length = 10.0 ft	2	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.17	38.0	331.3
Length = 10.0 ft	3	0.101	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	2,500.0	1.17	38.0	331.3
+D+Lr+H, LL Comb Run (LL*)					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.46	38.0	331.3
Length = 10.0 ft	2	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.17	38.0	331.3
Length = 10.0 ft	3	0.101	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	2,500.0	1.17	38.0	331.3
+D+Lr+H, LL Comb Run (LLL					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.46	38.0	331.3
Length = 10.0 ft	2	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.17	38.0	331.3
Length = 10.0 ft	3	0.101	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	2,500.0	1.17	38.0	331.3
+D+S+H					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.990	0.740	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	19.17	2,275.9	2,300.0	8.68	225.5	304.8
Length = 10.0 ft	2	0.990	0.740	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	19.17	2,275.9	2,300.0	6.72	225.5	304.8
Length = 10.0 ft	3	0.450	0.740	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	8.72	1,035.9	2,300.0	4.19	225.5	304.8
+D+0.750Lr+0.750L+H, LL Co					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.46	38.0	331.3
Length = 10.0 ft	2	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.17	38.0	331.3
Length = 10.0 ft	3	0.101	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	2,500.0	1.17	38.0	331.3
+D+0.750Lr+0.750L+H, LL Co					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.46	38.0	331.3
Length = 10.0 ft	2	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.17	38.0	331.3
Length = 10.0 ft	3	0.101	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	2,500.0	1.17	38.0	331.3
+D+0.750Lr+0.750L+H, LL Co					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.46	38.0	331.3
Length = 10.0 ft	2	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.17	38.0	331.3
Length = 10.0 ft	3	0.101	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	2,500.0	1.17	38.0	331.3
+D+0.750Lr+0.750L+H, LL Co					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.46	38.0	331.3
Length = 10.0 ft	2	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.17	38.0	331.3
Length = 10.0 ft	3	0.101	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	2,500.0	1.17	38.0	331.3
+D+0.750Lr+0.750L+H, LL Co					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.46	38.0	331.3
Length = 10.0 ft	2	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.17	38.0	331.3
Length = 10.0 ft	3	0.101	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	2,500.0	1.17	38.0	331.3
+D+0.750Lr+0.750L+H, LL Co					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.46	38.0	331.3
Length = 10.0 ft	2	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.17	38.0	331.3
Length = 10.0 ft	3	0.101	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	2,500.0	1.17	38.0	331.3
+D+0.750Lr+0.750L+H, LL Co					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.46	38.0	331.3
Length = 10.0 ft	2	0.148	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	2,500.0	1.17	38.0	331.3
Length = 10.0 ft	3	0.101	0.115	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	2,500.0	1.17	38.0	331.3
+D+0.750L+0.750S+H, LL Co					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.782	0.586	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	2,300.0	6.88	178.6	304.8
Length = 10.0 ft	2	0.782	0.586	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	2,300.0	5.31	178.6	304.8
Length = 10.0 ft	3	0.365	0.586	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.07	839.8	2,300.0	3.44	178.6	304.8

DESCRIPTION: RB3 (WOOD)

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
+D+0.750L+0.750S+H, LL Co					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.782	0.586	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	2,300.0	6.88	178.6	304.8
Length = 10.0 ft	2	0.782	0.586	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	2,300.0	5.31	178.6	304.8
Length = 10.0 ft	3	0.365	0.586	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.07	839.8	2,300.0	3.44	178.6	304.8
+D+0.750L+0.750S+H, LL Co					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.782	0.586	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	2,300.0	6.88	178.6	304.8
Length = 10.0 ft	2	0.782	0.586	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	2,300.0	5.31	178.6	304.8
Length = 10.0 ft	3	0.365	0.586	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.07	839.8	2,300.0	3.44	178.6	304.8
+D+0.750L+0.750S+H, LL Co					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.782	0.586	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	2,300.0	6.88	178.6	304.8
Length = 10.0 ft	2	0.782	0.586	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	2,300.0	5.31	178.6	304.8
Length = 10.0 ft	3	0.365	0.586	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.07	839.8	2,300.0	3.44	178.6	304.8
+D+0.750L+0.750S+H, LL Co					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.782	0.586	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	2,300.0	6.88	178.6	304.8
Length = 10.0 ft	2	0.782	0.586	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	2,300.0	5.31	178.6	304.8
Length = 10.0 ft	3	0.365	0.586	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.07	839.8	2,300.0	3.44	178.6	304.8
+D+0.750L+0.750S+H, LL Co					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.782	0.586	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	2,300.0	6.88	178.6	304.8
Length = 10.0 ft	2	0.782	0.586	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	2,300.0	5.31	178.6	304.8
Length = 10.0 ft	3	0.365	0.586	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.07	839.8	2,300.0	3.44	178.6	304.8
+D+0.750L+0.750S+H, LL Co					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.782	0.586	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	2,300.0	6.88	178.6	304.8
Length = 10.0 ft	2	0.782	0.586	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	2,300.0	5.31	178.6	304.8
Length = 10.0 ft	3	0.365	0.586	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.07	839.8	2,300.0	3.44	178.6	304.8
+D+0.60W+H					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.065	0.050	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.75	208.2	3,200.0	0.82	21.4	424.0
Length = 10.0 ft	2	0.065	0.050	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.75	208.2	3,200.0	0.67	21.4	424.0
Length = 10.0 ft	3	0.045	0.050	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.22	144.7	3,200.0	0.67	21.4	424.0
+D+0.70E+H					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.115	0.090	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	3,200.0	1.46	38.0	424.0
Length = 10.0 ft	2	0.115	0.090	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.11	369.0	3,200.0	1.17	38.0	424.0
Length = 10.0 ft	3	0.079	0.090	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.12	251.4	3,200.0	1.17	38.0	424.0
+D+0.750Lr+0.750L+0.450W-					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.021	0.015	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.56	66.5	3,200.0	0.25	6.6	424.0
Length = 10.0 ft	2	0.020	0.015	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.54	63.9	3,200.0	0.21	6.6	424.0
Length = 10.0 ft	3	0.016	0.015	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.44	52.0	3,200.0	0.21	6.6	424.0
+D+0.750Lr+0.750L+0.450W-					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.021	0.015	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.56	66.5	3,200.0	0.25	6.6	424.0
Length = 10.0 ft	2	0.020	0.015	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.54	63.9	3,200.0	0.21	6.6	424.0
Length = 10.0 ft	3	0.016	0.015	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.44	52.0	3,200.0	0.21	6.6	424.0
+D+0.750Lr+0.750L+0.450W-					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.021	0.015	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.56	66.5	3,200.0	0.25	6.6	424.0
Length = 10.0 ft	2	0.020	0.015	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.54	63.9	3,200.0	0.21	6.6	424.0
Length = 10.0 ft	3	0.016	0.015	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.44	52.0	3,200.0	0.21	6.6	424.0
+D+0.750Lr+0.750L+0.450W-					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.021	0.015	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.56	66.5	3,200.0	0.25	6.6	424.0
Length = 10.0 ft	2	0.020	0.015	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.54	63.9	3,200.0	0.21	6.6	424.0

DESCRIPTION: RB3 (WOOD)

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 10.0 ft	**3**	0.016	0.015	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.44	52.0	3,200.0	0.21	6.6	424.0
+D+0.750Lr+0.750L+0.450W-					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.021	0.015	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.56	66.5	3,200.0	0.25	6.6	424.0
Length = 10.0 ft	**2**	0.020	0.015	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.54	63.9	3,200.0	0.21	6.6	424.0
Length = 10.0 ft	**3**	0.016	0.015	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.44	52.0	3,200.0	0.21	6.6	424.0
+D+0.750Lr+0.750L+0.450W-					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.021	0.015	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.56	66.5	3,200.0	0.25	6.6	424.0
Length = 10.0 ft	**2**	0.020	0.015	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.54	63.9	3,200.0	0.21	6.6	424.0
Length = 10.0 ft	**3**	0.016	0.015	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.44	52.0	3,200.0	0.21	6.6	424.0
+D+0.750Lr+0.750L+0.450W-					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.021	0.015	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.56	66.5	3,200.0	0.25	6.6	424.0
Length = 10.0 ft	**2**	0.020	0.015	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.54	63.9	3,200.0	0.21	6.6	424.0
Length = 10.0 ft	**3**	0.016	0.015	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.44	52.0	3,200.0	0.21	6.6	424.0
+D+0.750L+0.750S+0.450W+					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.427	0.316	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.51	1,366.3	3,200.0	5.16	134.1	424.0
Length = 10.0 ft	**2**	0.427	0.316	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.51	1,366.3	3,200.0	4.08	134.1	424.0
Length = 10.0 ft	**3**	0.170	0.316	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.58	543.9	3,200.0	2.05	134.1	424.0
+D+0.750L+0.750S+0.450W+					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.427	0.316	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.51	1,366.3	3,200.0	5.16	134.1	424.0
Length = 10.0 ft	**2**	0.427	0.316	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.51	1,366.3	3,200.0	4.08	134.1	424.0
Length = 10.0 ft	**3**	0.170	0.316	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.58	543.9	3,200.0	2.05	134.1	424.0
+D+0.750L+0.750S+0.450W+					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.427	0.316	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.51	1,366.3	3,200.0	5.16	134.1	424.0
Length = 10.0 ft	**2**	0.427	0.316	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.51	1,366.3	3,200.0	4.08	134.1	424.0
Length = 10.0 ft	**3**	0.170	0.316	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.58	543.9	3,200.0	2.05	134.1	424.0
+D+0.750L+0.750S+0.450W+					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.427	0.316	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.51	1,366.3	3,200.0	5.16	134.1	424.0
Length = 10.0 ft	**2**	0.427	0.316	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.51	1,366.3	3,200.0	4.08	134.1	424.0
Length = 10.0 ft	**3**	0.170	0.316	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.58	543.9	3,200.0	2.05	134.1	424.0
+D+0.750L+0.750S+0.450W+					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.427	0.316	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.51	1,366.3	3,200.0	5.16	134.1	424.0
Length = 10.0 ft	**2**	0.427	0.316	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.51	1,366.3	3,200.0	4.08	134.1	424.0
Length = 10.0 ft	**3**	0.170	0.316	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.58	543.9	3,200.0	2.05	134.1	424.0
+D+0.750L+0.750S+0.450W+					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.427	0.316	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.51	1,366.3	3,200.0	5.16	134.1	424.0
Length = 10.0 ft	**2**	0.427	0.316	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.51	1,366.3	3,200.0	4.08	134.1	424.0
Length = 10.0 ft	**3**	0.170	0.316	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.58	543.9	3,200.0	2.05	134.1	424.0
+D+0.750L+0.750S+0.450W+					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.427	0.316	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.51	1,366.3	3,200.0	5.16	134.1	424.0
Length = 10.0 ft	**2**	0.427	0.316	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.51	1,366.3	3,200.0	4.08	134.1	424.0
Length = 10.0 ft	**3**	0.170	0.316	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.58	543.9	3,200.0	2.05	134.1	424.0
+D+0.750L+0.750S+0.5250E-					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.562	0.421	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	3,200.0	6.88	178.6	424.0
Length = 10.0 ft	**2**	0.562	0.421	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	3,200.0	5.31	178.6	424.0
Length = 10.0 ft	**3**	0.262	0.421	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.07	839.8	3,200.0	3.44	178.6	424.0
+D+0.750L+0.750S+0.5250E-					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.562	0.421	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	3,200.0	6.88	178.6	424.0

DESCRIPTION: RB3 (WOOD)

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 10.0 ft	2	0.562	0.421	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	3,200.0	5.31	178.6	424.0
Length = 10.0 ft	3	0.262	0.421	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.07	839.8	3,200.0	3.44	178.6	424.0
+D+0.750L+0.750S+0.5250E-					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.562	0.421	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	3,200.0	6.88	178.6	424.0
Length = 10.0 ft	2	0.562	0.421	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	3,200.0	5.31	178.6	424.0
Length = 10.0 ft	3	0.262	0.421	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.07	839.8	3,200.0	3.44	178.6	424.0
+D+0.750L+0.750S+0.5250E-					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.562	0.421	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	3,200.0	6.88	178.6	424.0
Length = 10.0 ft	2	0.562	0.421	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	3,200.0	5.31	178.6	424.0
Length = 10.0 ft	3	0.262	0.421	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.07	839.8	3,200.0	3.44	178.6	424.0
+D+0.750L+0.750S+0.5250E-					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.562	0.421	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	3,200.0	6.88	178.6	424.0
Length = 10.0 ft	2	0.562	0.421	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	3,200.0	5.31	178.6	424.0
Length = 10.0 ft	3	0.262	0.421	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.07	839.8	3,200.0	3.44	178.6	424.0
+D+0.750L+0.750S+0.5250E-					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.562	0.421	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	3,200.0	6.88	178.6	424.0
Length = 10.0 ft	2	0.562	0.421	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	3,200.0	5.31	178.6	424.0
Length = 10.0 ft	3	0.262	0.421	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.07	839.8	3,200.0	3.44	178.6	424.0
+D+0.750L+0.750S+0.5250E-					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.562	0.421	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	3,200.0	6.88	178.6	424.0
Length = 10.0 ft	2	0.562	0.421	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.15	1,799.2	3,200.0	5.31	178.6	424.0
Length = 10.0 ft	3	0.262	0.421	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.07	839.8	3,200.0	3.44	178.6	424.0
+0.60D+0.60W+0.60H					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.111	0.086	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.00	355.8	3,200.0	1.41	36.6	424.0
Length = 10.0 ft	2	0.111	0.086	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.00	355.8	3,200.0	1.14	36.6	424.0
Length = 10.0 ft	3	0.076	0.086	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.05	243.6	3,200.0	1.14	36.6	424.0
+0.60D+0.70E+0.60H					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.069	0.054	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.86	221.4	3,200.0	0.88	22.8	424.0
Length = 10.0 ft	2	0.069	0.054	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.86	221.4	3,200.0	0.70	22.8	424.0
Length = 10.0 ft	3	0.047	0.054	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.27	150.8	3,200.0	0.70	22.8	424.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.4385	5.445		0.0000	0.000
W Only	2	0.0239	2.941	+D+S+H	-0.0345	1.681
+D+S+H	3	0.1101	5.630	W Only	-0.0686	2.941

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Max Upward from all Load Conditions	6.590	17.651	10.641	3.118
Max Upward from Load Combinations	6.590	17.651	10.641	3.118
Max Upward from Load Cases	5.460	14.747	8.213	2.172
Max Downward from all Load Conditio	-3.207	-7.518	-6.298	-2.725
Max Downward from Load Combinations	-1.246	-2.768	-2.322	-1.068
Max Downward from Load Cases (Resis	-3.207	-7.518	-6.298	-2.725
+D+H	1.130	2.905	2.428	0.946
+D+L+H, LL Comb Run (**L)	1.130	2.905	2.428	0.946
+D+L+H, LL Comb Run (*L*)	1.130	2.905	2.428	0.946
+D+L+H, LL Comb Run (*LL)	1.130	2.905	2.428	0.946
+D+L+H, LL Comb Run (L**)	1.130	2.905	2.428	0.946
+D+L+H, LL Comb Run (L*L)	1.130	2.905	2.428	0.946
+D+L+H, LL Comb Run (LL*)	1.130	2.905	2.428	0.946

DESCRIPTION: RB3 (WOOD)

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
+D+L+H, LL Comb Run (LLL)	1.130	2.905	2.428	0.946
+D+Lr+H, LL Comb Run (**L)	1.130	2.905	2.428	0.946
+D+Lr+H, LL Comb Run (*L*)	1.130	2.905	2.428	0.946
+D+Lr+H, LL Comb Run (*LL)	1.130	2.905	2.428	0.946
+D+Lr+H, LL Comb Run (L**)	1.130	2.905	2.428	0.946
+D+Lr+H, LL Comb Run (L*L)	1.130	2.905	2.428	0.946
+D+Lr+H, LL Comb Run (LL*)	1.130	2.905	2.428	0.946
+D+Lr+H, LL Comb Run (LLL)	1.130	2.905	2.428	0.946
+D+S+H	6.590	17.651	10.641	3.118
+D+0.750Lr+0.750L+H, LL Comb Run (*	1.130	2.905	2.428	0.946
+D+0.750Lr+0.750L+H, LL Comb Run (*	1.130	2.905	2.428	0.946
+D+0.750Lr+0.750L+H, LL Comb Run (*	1.130	2.905	2.428	0.946
+D+0.750Lr+0.750L+H, LL Comb Run (L	1.130	2.905	2.428	0.946
+D+0.750Lr+0.750L+H, LL Comb Run (L	1.130	2.905	2.428	0.946
+D+0.750Lr+0.750L+H, LL Comb Run (L	1.130	2.905	2.428	0.946
+D+0.750Lr+0.750L+H, LL Comb Run (L	1.130	2.905	2.428	0.946
+D+0.750L+0.750S+H, LL Comb Run (**	5.225	13.965	8.588	2.575
+D+0.750L+0.750S+H, LL Comb Run (*L	5.225	13.965	8.588	2.575
+D+0.750L+0.750S+H, LL Comb Run (*L	5.225	13.965	8.588	2.575
+D+0.750L+0.750S+H, LL Comb Run (L*	5.225	13.965	8.588	2.575
+D+0.750L+0.750S+H, LL Comb Run (L*	5.225	13.965	8.588	2.575
+D+0.750L+0.750S+H, LL Comb Run (LL	5.225	13.965	8.588	2.575
+D+0.750L+0.750S+H, LL Comb Run (LL	5.225	13.965	8.588	2.575
+D+0.60W+H	-0.794	-1.606	-1.351	-0.689
+D+0.70E+H	1.130	2.905	2.428	0.946
+D+0.750Lr+0.750L+0.450W+H, LL Comb	-0.313	-0.479	-0.406	-0.280
+D+0.750Lr+0.750L+0.450W+H, LL Comb	-0.313	-0.479	-0.406	-0.280
+D+0.750Lr+0.750L+0.450W+H, LL Comb	-0.313	-0.479	-0.406	-0.280
+D+0.750Lr+0.750L+0.450W+H, LL Comb	-0.313	-0.479	-0.406	-0.280
+D+0.750Lr+0.750L+0.450W+H, LL Comb	-0.313	-0.479	-0.406	-0.280
+D+0.750Lr+0.750L+0.450W+H, LL Comb	-0.313	-0.479	-0.406	-0.280
+D+0.750Lr+0.750L+0.450W+H, LL Comb	-0.313	-0.479	-0.406	-0.280
+D+0.750L+0.750S+0.450W+H, LL Comb	3.782	10.581	5.753	1.348
+D+0.750L+0.750S+0.450W+H, LL Comb	3.782	10.581	5.753	1.348
+D+0.750L+0.750S+0.450W+H, LL Comb	3.782	10.581	5.753	1.348
+D+0.750L+0.750S+0.450W+H, LL Comb	3.782	10.581	5.753	1.348
+D+0.750L+0.750S+0.450W+H, LL Comb	3.782	10.581	5.753	1.348
+D+0.750L+0.750S+0.450W+H, LL Comb	3.782	10.581	5.753	1.348
+D+0.750L+0.750S+0.450W+H, LL Comb	3.782	10.581	5.753	1.348
+D+0.750L+0.750S+0.5250E+H, LL Comb	5.225	13.965	8.588	2.575
+D+0.750L+0.750S+0.5250E+H, LL Comb	5.225	13.965	8.588	2.575
+D+0.750L+0.750S+0.5250E+H, LL Comb	5.225	13.965	8.588	2.575
+D+0.750L+0.750S+0.5250E+H, LL Comb	5.225	13.965	8.588	2.575
+D+0.750L+0.750S+0.5250E+H, LL Comb	5.225	13.965	8.588	2.575
+D+0.750L+0.750S+0.5250E+H, LL Comb	5.225	13.965	8.588	2.575
+D+0.750L+0.750S+0.5250E+H, LL Comb	5.225	13.965	8.588	2.575
+0.60D+0.60W+0.60H	-1.246	-2.768	-2.322	-1.068
+0.60D+0.70E+0.60H	0.678	1.743	1.457	0.568
D Only	1.130	2.905	2.428	0.946
S Only	5.460	14.747	8.213	2.172
W Only	-3.207	-7.518	-6.298	-2.725
H Only				

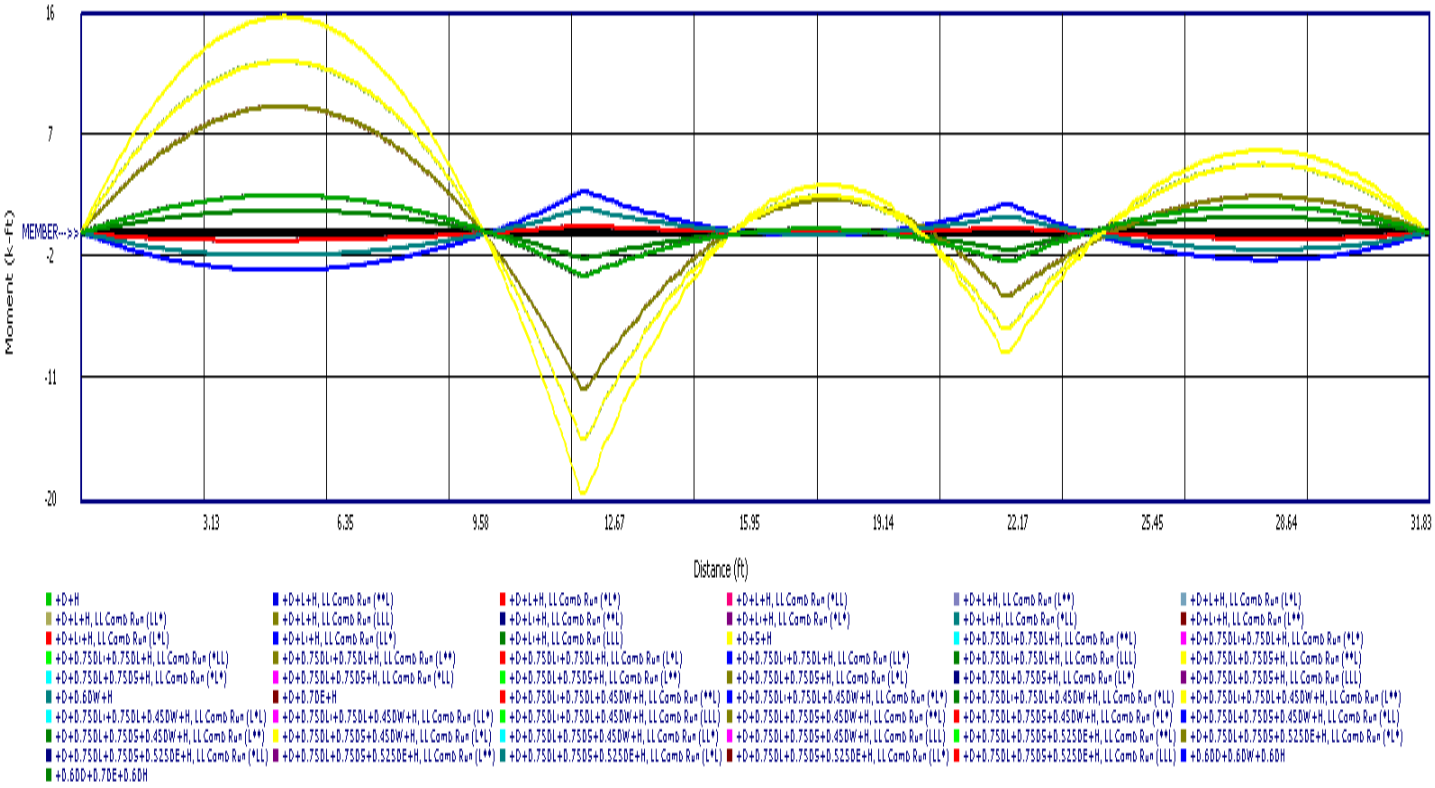
Project Title:
Engineer:
Project ID:
Project Descr:

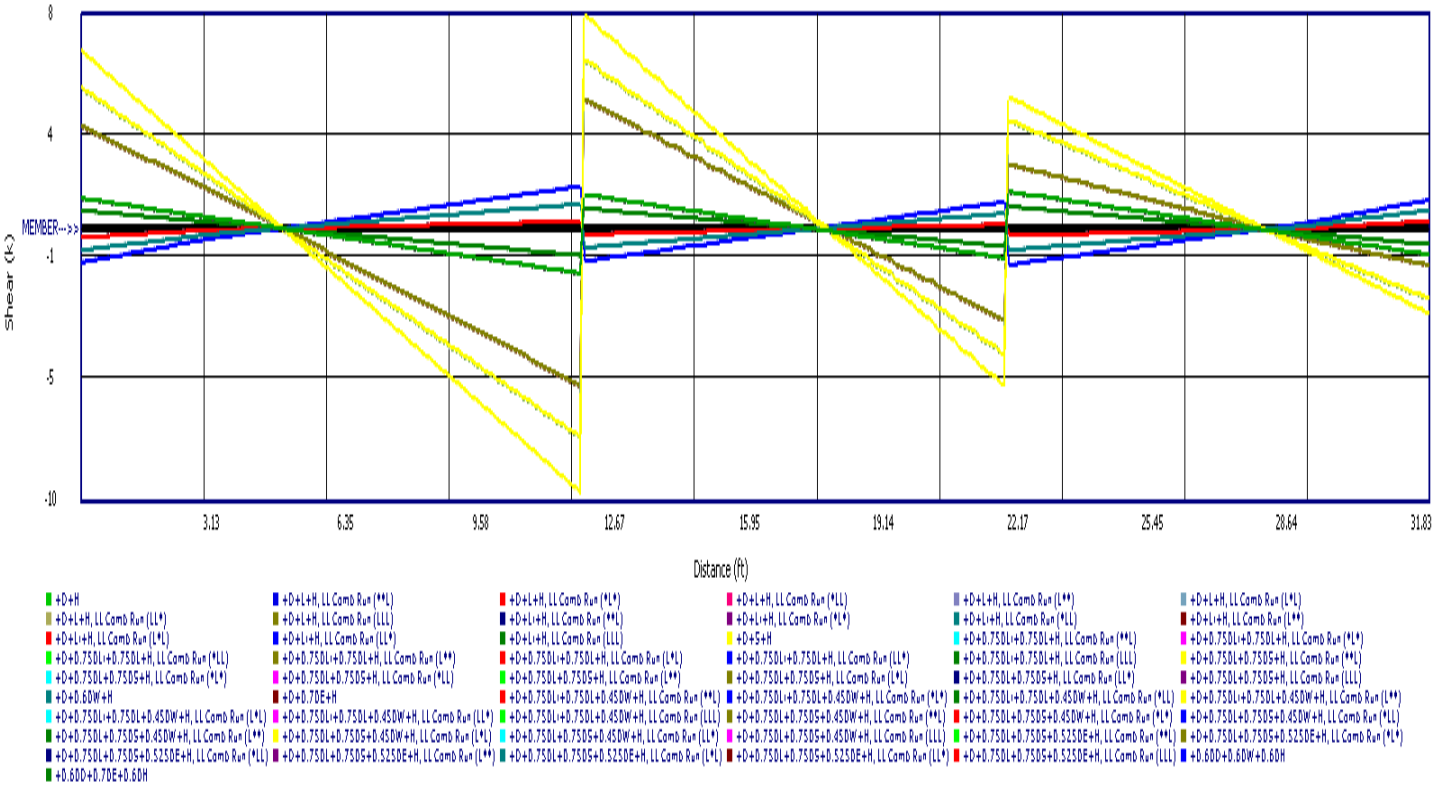
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RB3 (WOOD)



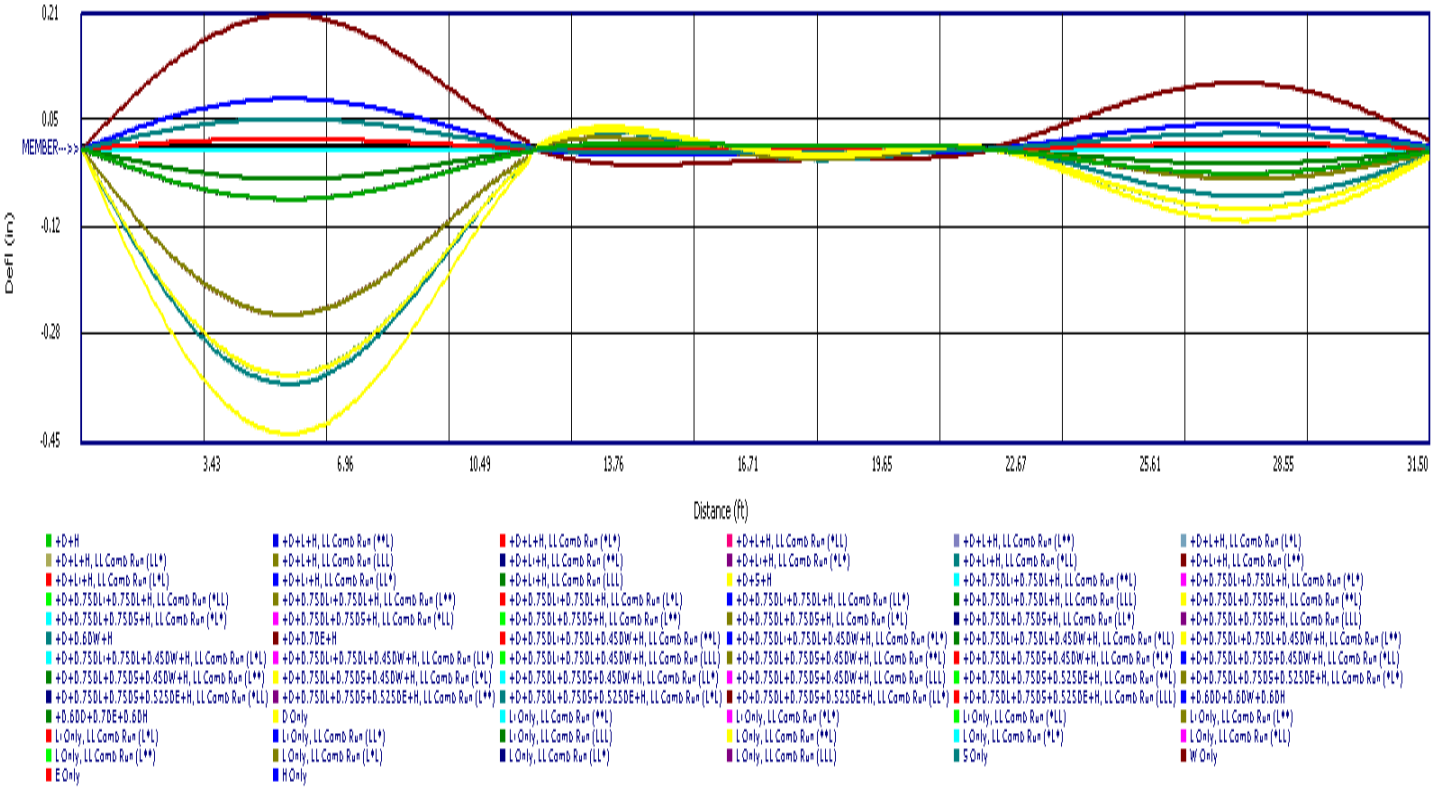


Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RB3 (WOOD)



Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: COL_A2.5 added deck col

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2021

General Information

Analysis Method	Allowable Stress Design	Wood Section Name	**8.75x9**
End Fixities	Top & Bottom Pinned	Wood Grading/Manuf.	Western
Overall Column Height	5.5 ft	Wood Member Type	GLB
(Used for non-slender calculations)			
Wood Species	GluLam Column, Species: AC	Exact Width	**8.750** in
Wood Grade	L2, >= 4 Laminations	Exact Depth	**9.0** in

Fb +	1400 psi	Fv	230 psi
Fb -	1350 psi	Ft	975 psi
Fc - Prll	1450 psi	Density	pcf
Fc - Perp	470 psi		

Area	78.750 in^2
Ix	531.56 in^4
Iy	502.44 in^4

Allow Stress Modification Factors

Cf or Cv for Bending	N/A
Cf or Cv for Compressio	N/A
Cf or Cv for Tension	N/A
Cm : Wet Use Factor	1.0
Ct : Temperature Fact	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0
Use Cr : Repetitive ?	No

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial
Basic	1300	1300	1300 ksi
Minimum	690	690	

Column Buckling Condition:
ABOUT X-X Axis: Lux = 5.5 ft, Kx = 1.0
ABOUT Y-Y Axis: Luy = 5.5 ft, Ky = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 0.0 lbs * Dead Load Factor
AXIAL LOADS . . .
deck: Axial Load at 5.50 ft, D = 6.260, S = 23.170 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.2285 : 1**

Load Combination	+D+S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are .	
Applied Axial	29.430 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,635.41 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	5.50 ft
Applied Design Shear	0.0 psi
Allowable Shear	368.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a

Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.985	0.06182	PASS	0.0 ft	0.0	PASS	5.50 ft
+D+S	1.150	0.981	0.2285	PASS	0.0 ft	0.0	PASS	5.50 ft
+D+0.750S	1.150	0.981	0.1835	PASS	0.0 ft	0.0	PASS	5.50 ft
+0.60D	1.600	0.972	0.02116	PASS	5.50 ft	0.0	PASS	5.50 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					6.260				
+D+S					29.430				
+D+0.750S					23.638				

Wood Column

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: COL_A2.5 added deck col

Maximum Reactions

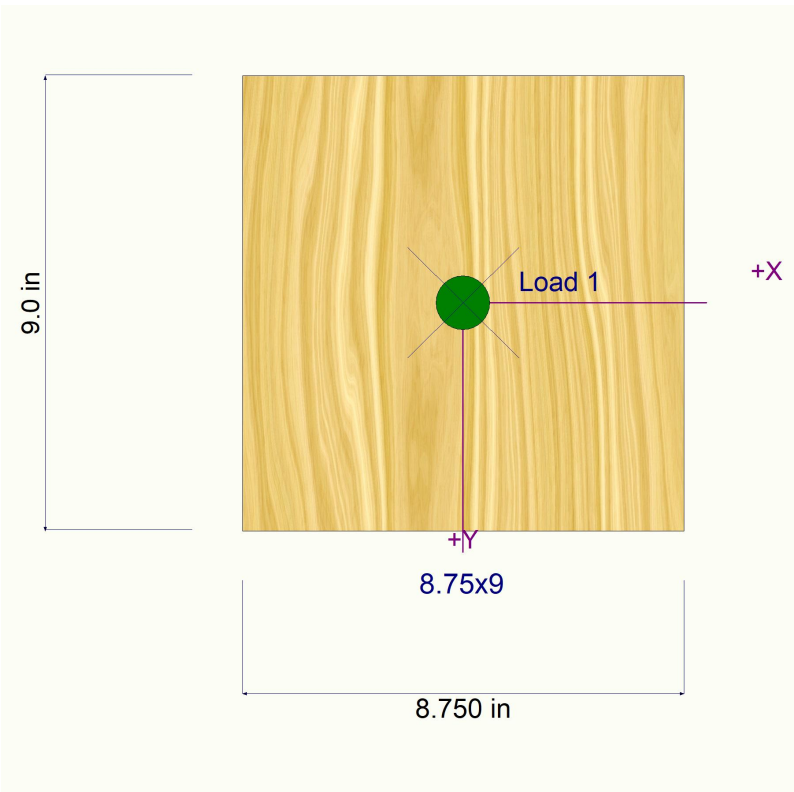
Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
+0.60D						3.756					
S Only						23.170					

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750S	0.0000 in	0.000ft	0.000 in	0.000 ft
+0.60D	0.0000 in	0.000ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000ft	0.000 in	0.000 ft

Sketches



Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

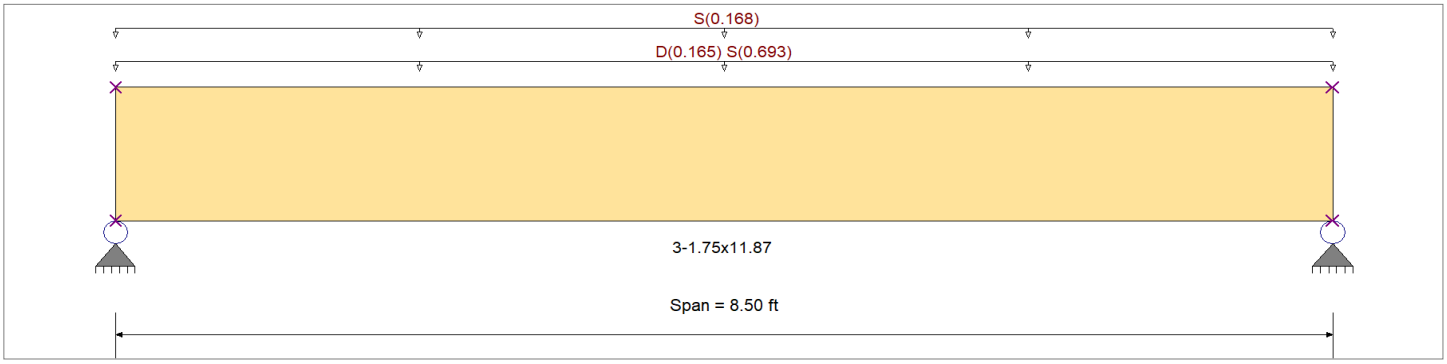
DESCRIPTION: RB4

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2600 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2600 psi	Ebend- xx	2000 ksi
		Fc - Prll	2510 psi	Eminbend - xx	1016.535 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750 psi		
Wood Grade :	MicroLam LVL 2.0 E	Fv	285 psi		
		Ft	1555 psi	Density	42.01 pcf
Beam Bracing :	Completely Unbraced				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.020, S = 0.0840 ksf, Tributary Width = 8.250 ft, (ROOF)
Uniform Load : S = 0.1680 , Tributary Width = 1.0 ft, (ICE)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.305** : 1	Maximum Shear Stress Ratio	=	**0.248** : 1
Section used for this span		**3-1.75x11.87**	Section used for this span		**3-1.75x11.87**
fb: Actual	=	901.16 psi	fv: Actual	=	81.17 psi
F'b	=	2,954.82 psi	F'v	=	327.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	4.250 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.069 in	Ratio =	1469	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.083 in	Ratio =	1233	>=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 8.50 ft	1	0.062	0.051	0.90	1.00	1.00	0.99	1.001	1.00	1.00	1.00	1.49	144.9	2,320.3	0.54	13.1	256.5
+D+S					1.00	1.00	0.99	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.50 ft	1	0.305	0.248	1.15	1.00	1.00	0.99	1.001	1.00	1.00	1.00	9.27	901.2	2,954.8	3.37	81.2	327.8
+D+0.750S					1.00	1.00	0.99	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.50 ft	1	0.241	0.196	1.15	1.00	1.00	0.99	1.001	1.00	1.00	1.00	7.32	712.1	2,954.8	2.67	64.1	327.8
+0.60D					1.00	1.00	0.99	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.50 ft	1	0.021	0.017	1.60	1.00	1.00	0.98	1.001	1.00	1.00	1.00	0.89	87.0	4,082.1	0.33	7.8	456.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RB4

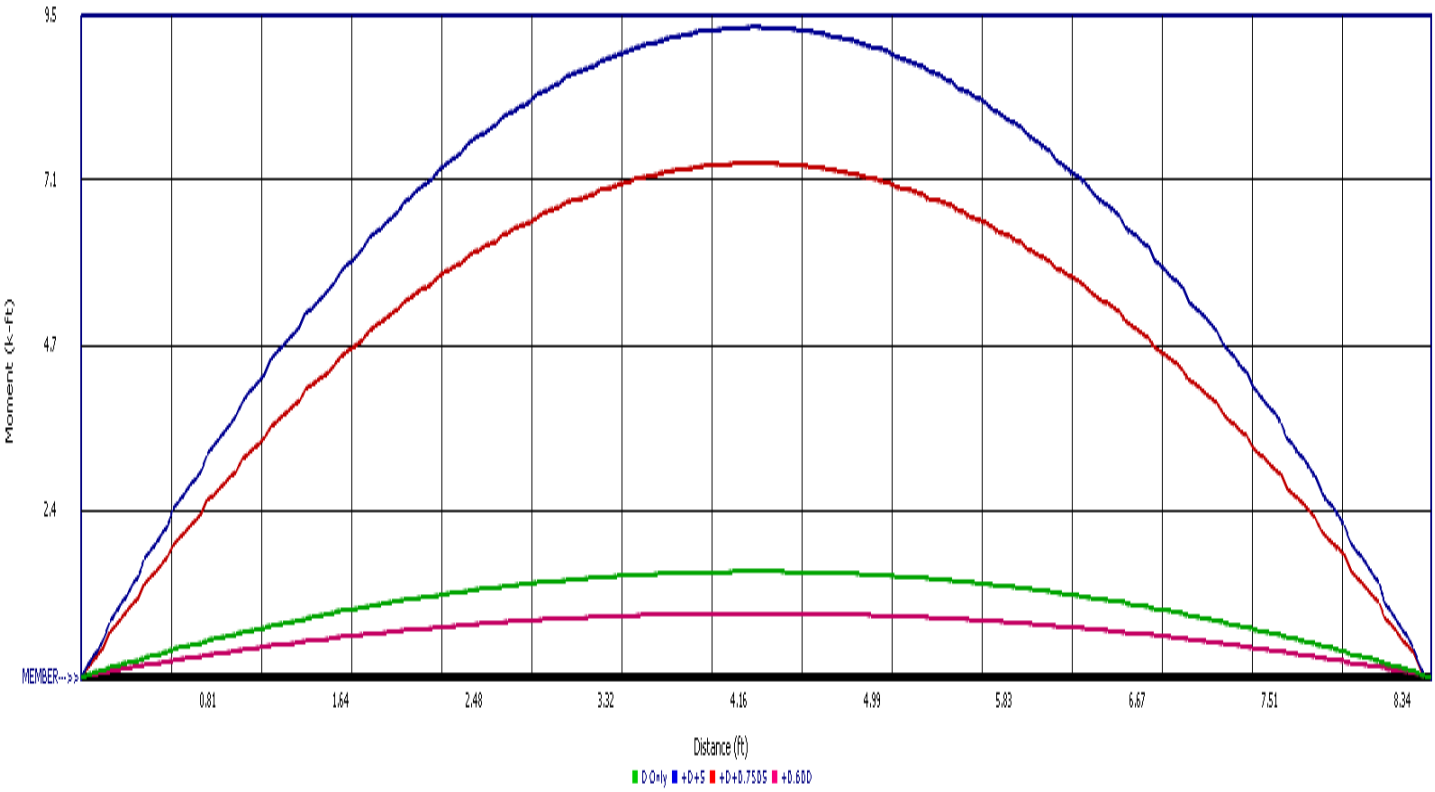
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0827	4.281		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	4.361	4.361
Max Upward from Load Combinations	4.361	4.361
Max Upward from Load Cases	3.659	3.659
D Only	0.701	0.701
+D+S	4.361	4.361
+D+0.750S	3.446	3.446
+0.60D	0.421	0.421
S Only	3.659	3.659

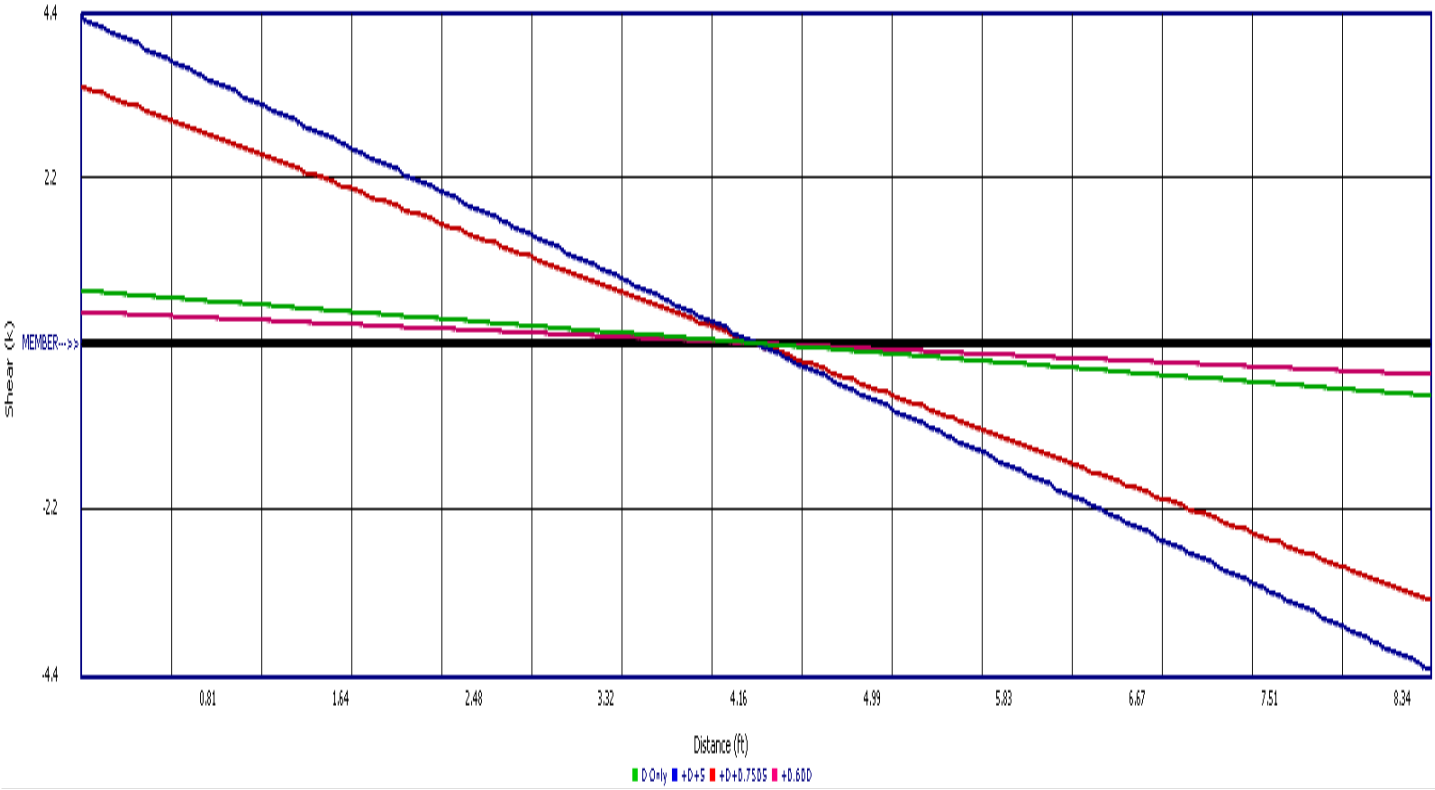


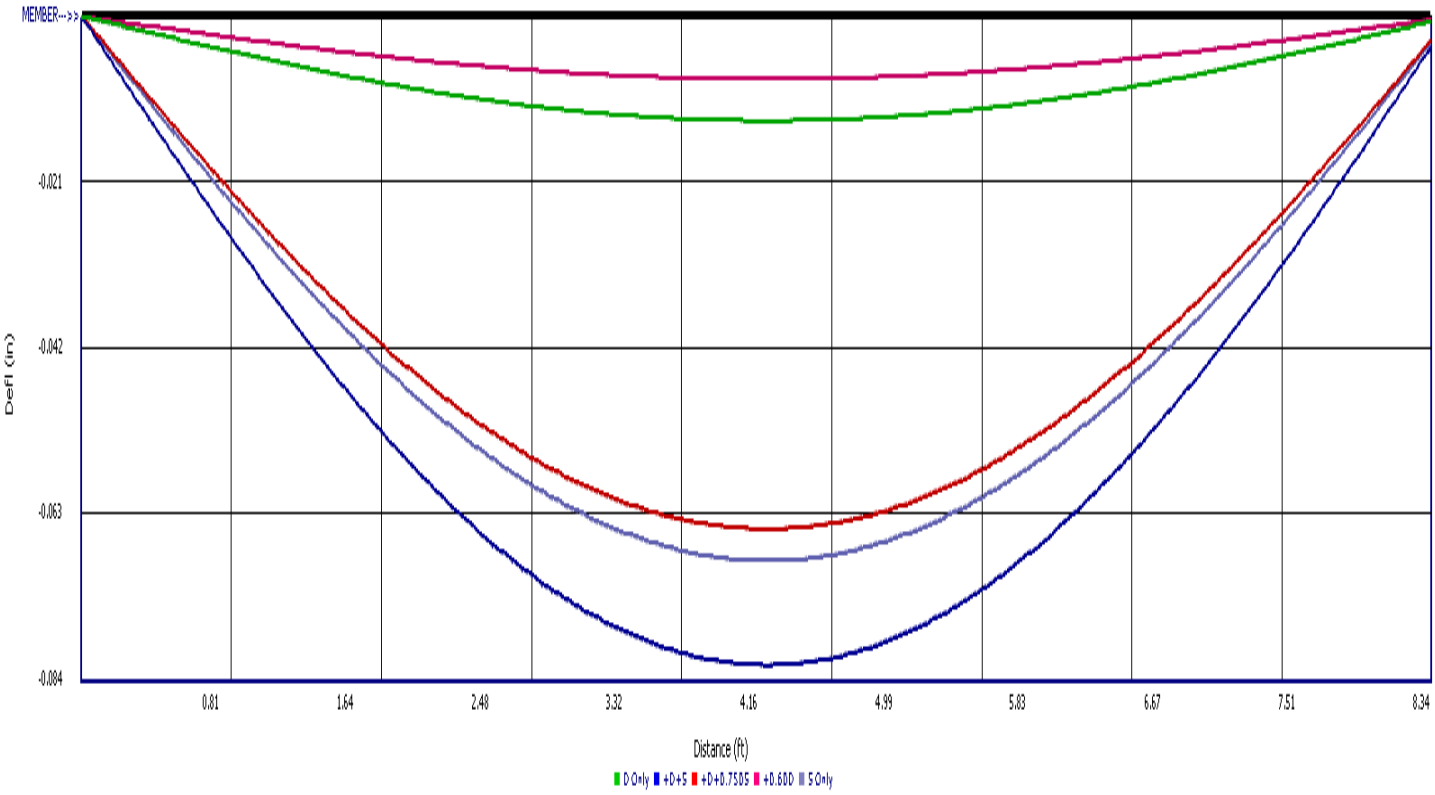
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RB4





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

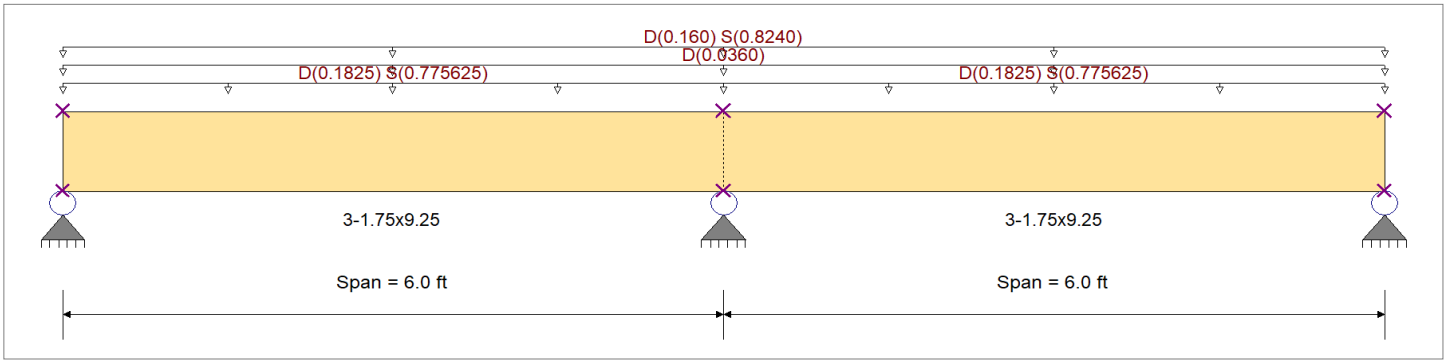
DESCRIPTION: RB5

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,600.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2,600.0 psi	Ebend- xx	2,000.0 ksi
		Fc - Prll	2,510.0 psi	Eminbend - xx	1,016.54 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade :	MicroLam LVL 2.0 E	Fv	285.0 psi		
		Ft	1,555.0 psi	Density	42.010 pcf
Beam Bracing :	Completely Unbraced				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Loads on all spans...
Uniform Load on ALL spans : D = 0.00450 ksf, Tributary Width = 8.0 ft
Uniform Load on ALL spans : D = 0.020, S = 0.1030 ksf, Tributary Width = 8.0 ft
Load for Span Number 1
Uniform Load : D = 0.020, S = 0.0850 ksf, Tributary Width = 9.125 ft, (ROOF)
Load for Span Number 2
Uniform Load : D = 0.020, S = 0.0850 ksf, Tributary Width = 9.125 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.467 : 1	Maximum Shear Stress Ratio	=	0.566 : 1
Section used for this span		**3-1.75x9.25**	Section used for this span		**3-1.75x9.25**
fb: Actual	=	1,437.00 psi	fv: Actual	=	185.39 psi
F'b	=	3,076.20 psi	F'v	=	327.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	6.000 ft	Location of maximum on span	=	5.263 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.028 in	Ratio =	2542	>=360	Span: 2 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.035 in	Ratio =	2041	>=240	Span: 2 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.117	0.142	0.90	1.00	1.00	0.99	1.036	1.00	1.00	1.00	1.77	283.2	2,411.5	1.18	36.5	256.5
Length = 6.0 ft	2	0.117	0.142	0.90	1.00	1.00	0.99	1.036	1.00	1.00	1.00	1.77	283.2	2,411.5	1.18	36.5	256.5
+D+S					1.00	1.00	0.99	1.036	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.467	0.566	1.15	1.00	1.00	0.99	1.036	1.00	1.00	1.00	8.97	1,437.0	3,076.2	6.00	185.4	327.8

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RB5

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 6.0 ft	**2**	0.467	0.566	1.15	1.00	1.00	0.99	1.036	1.00	1.00	1.00	8.97	1,437.0	3,076.2	6.00	185.4	327.8
+D+0.750S					1.00	1.00	0.99	1.036	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.0 ft	**1**	0.373	0.452	1.15	1.00	1.00	0.99	1.036	1.00	1.00	1.00	7.17	1,148.6	3,076.2	4.80	148.2	327.8
Length = 6.0 ft	**2**	0.373	0.452	1.15	1.00	1.00	0.99	1.036	1.00	1.00	1.00	7.17	1,148.6	3,076.2	4.80	148.2	327.8
+0.60D					1.00	1.00	0.99	1.036	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.0 ft	**1**	0.040	0.048	1.60	1.00	1.00	0.99	1.036	1.00	1.00	1.00	1.06	169.9	4,266.1	0.71	21.9	456.0
Length = 6.0 ft	**2**	0.040	0.048	1.60	1.00	1.00	0.99	1.036	1.00	1.00	1.00	1.06	169.9	4,266.1	0.71	21.9	456.0

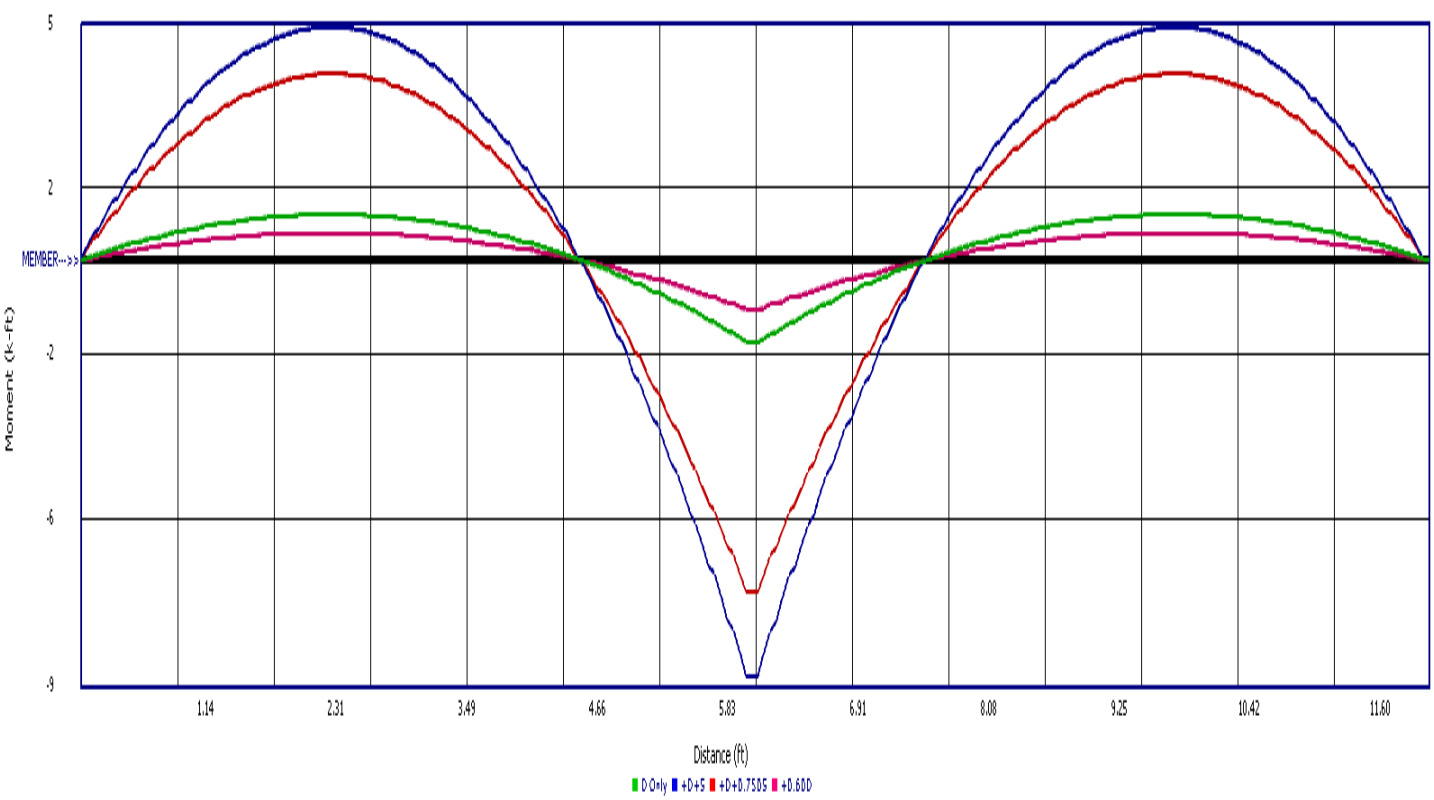
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0353	2.547		0.0000	0.000
+D+S	2	0.0349	3.486		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	4.483	14.942	4.483
Max Upward from Load Combinations	4.483	14.942	4.483
Max Upward from Load Cases	3.599	11.997	3.599
D Only	0.884	2.945	0.884
+D+S	4.483	14.942	4.483
+D+0.750S	3.583	11.943	3.583
+0.60D	0.530	1.767	0.530
S Only	3.599	11.997	3.599

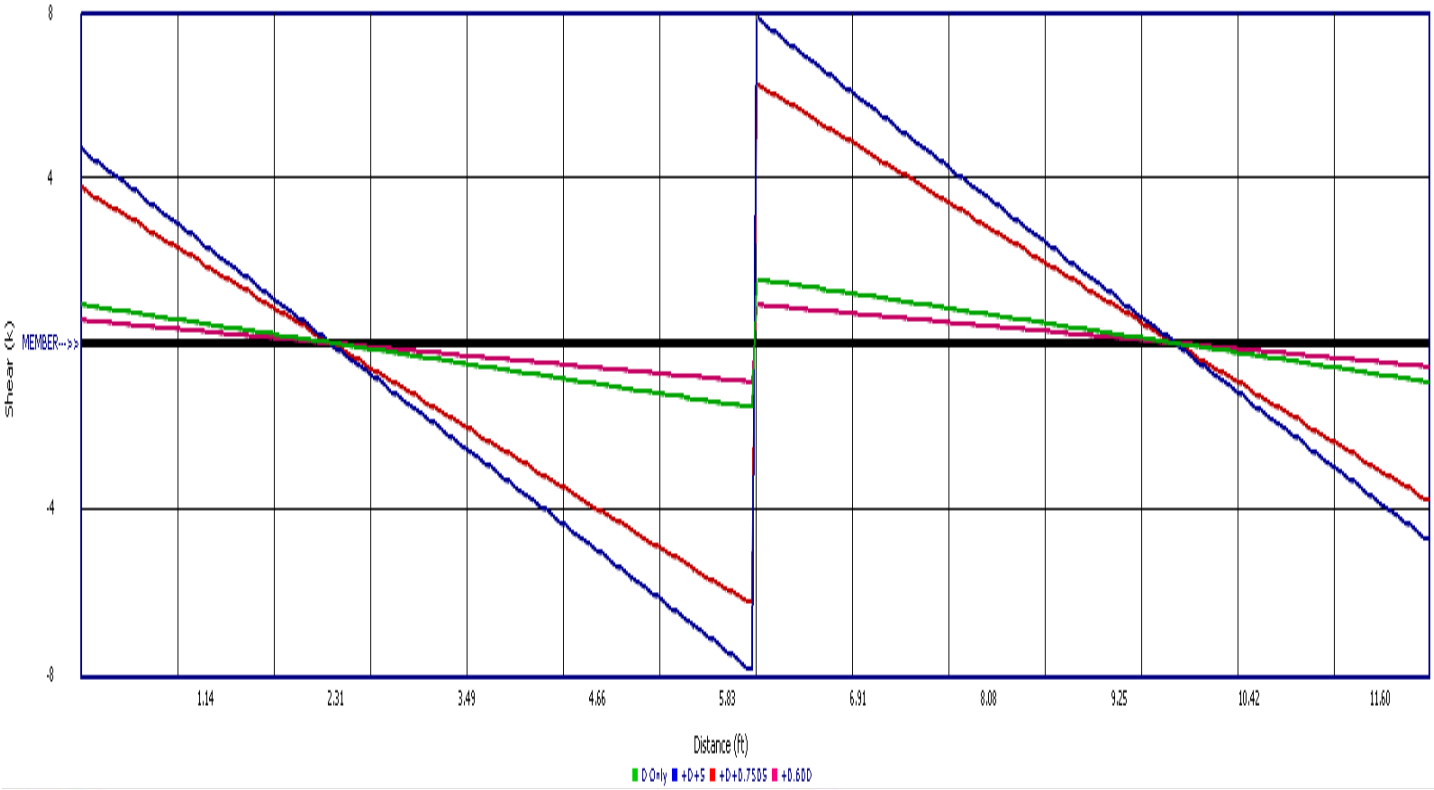


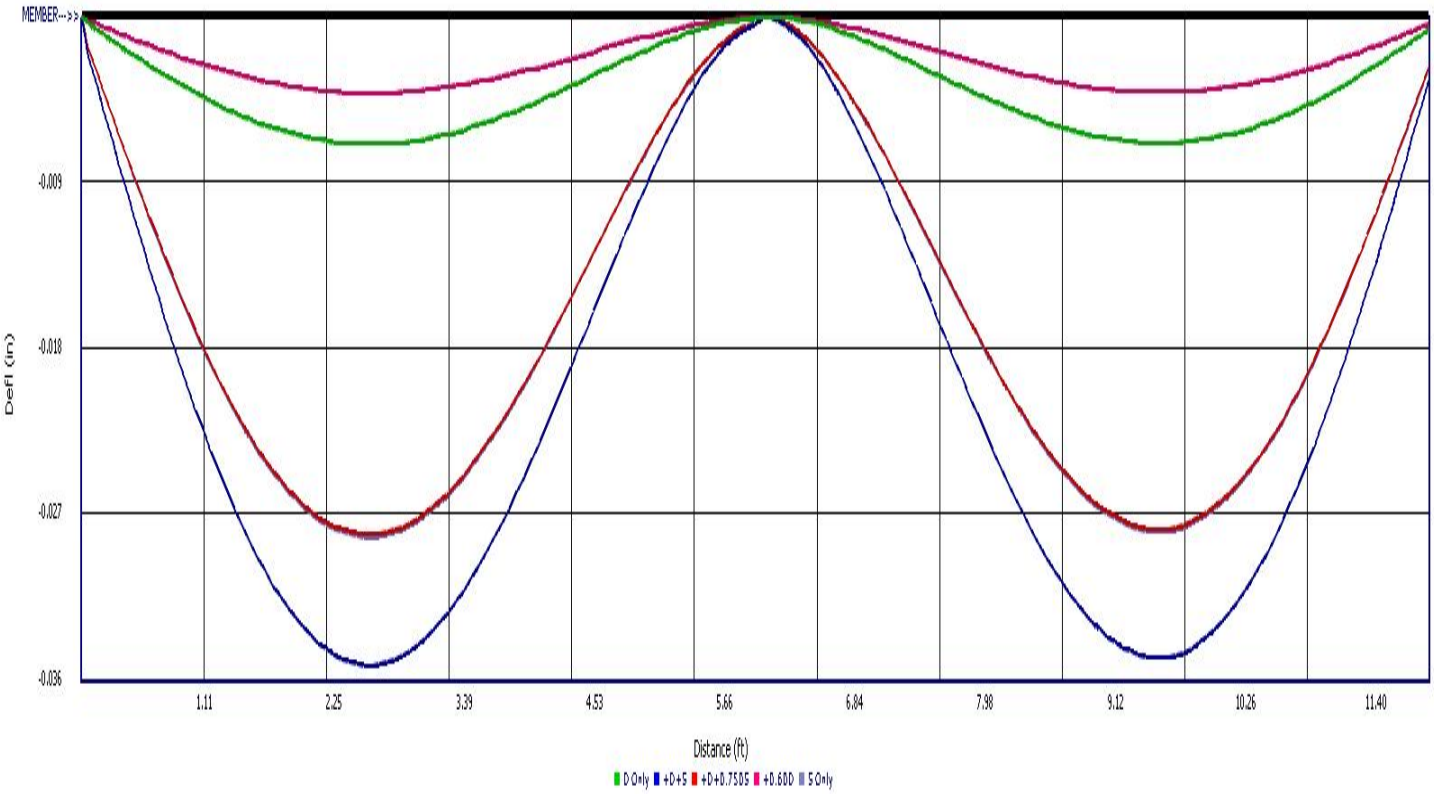
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RB5





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

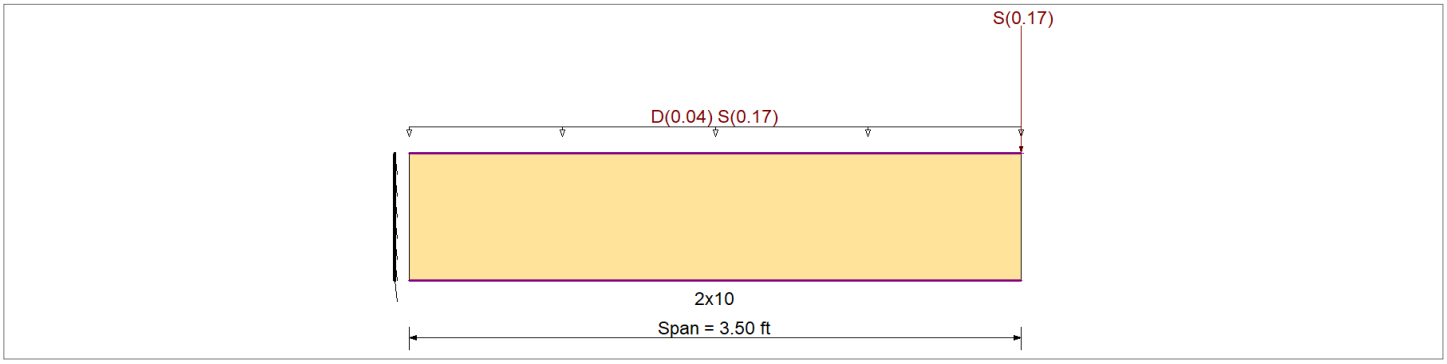
DESCRIPTION: typ lookouts 3'-6" high roof

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	900 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	900 psi	Ebend- xx	1600 ksi
		Fc - Prll	1350 psi	Eminbend - xx	580 ksi
Wood Species :	Douglas Fir-Larch	Fc - Perp	625 psi		
Wood Grade :	No.2	Fv	180 psi		
		Ft	575 psi	Density	31.21 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.020, S = 0.0850 ksf, Tributary Width = 2.0 ft, (roof)
Point Load : S = 0.170 k @ 3.50 ft, (ice)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.521 : 1	Maximum Shear Stress Ratio	=	0.220 : 1
Section used for this span		**2x10**	Section used for this span		**2x10**
fb: Actual	=	825.89 psi	fv: Actual	=	63.28 psi
F'b	=	1,584.00 psi	F'v	=	288.00 psi
Load Combination		+D+0.750S	Load Combination		+D+0.750S
Location of maximum on span	=	0.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.061 in	Ratio =	1372	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.069 in	Ratio =	1210	>=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 3.50 ft	1	0.154	0.073	0.90	1.00	1.00	1.00	1.100	1.00	1.00	1.00	0.25	137.4	891.0	0.11	11.8	162.0
+D+0.750S					1.00	1.00	1.00	1.100	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.50 ft	1	0.521	0.220	1.60	1.00	1.00	1.00	1.100	1.00	1.00	1.00	1.47	825.9	1,584.0	0.59	63.3	288.0
+0.60D					1.00	1.00	1.00	1.100	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.50 ft	1	0.052	0.025	1.60	1.00	1.00	1.00	1.100	1.00	1.00	1.00	0.15	82.5	1,584.0	0.07	7.1	288.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0693	3.500		0.0000	0.000

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

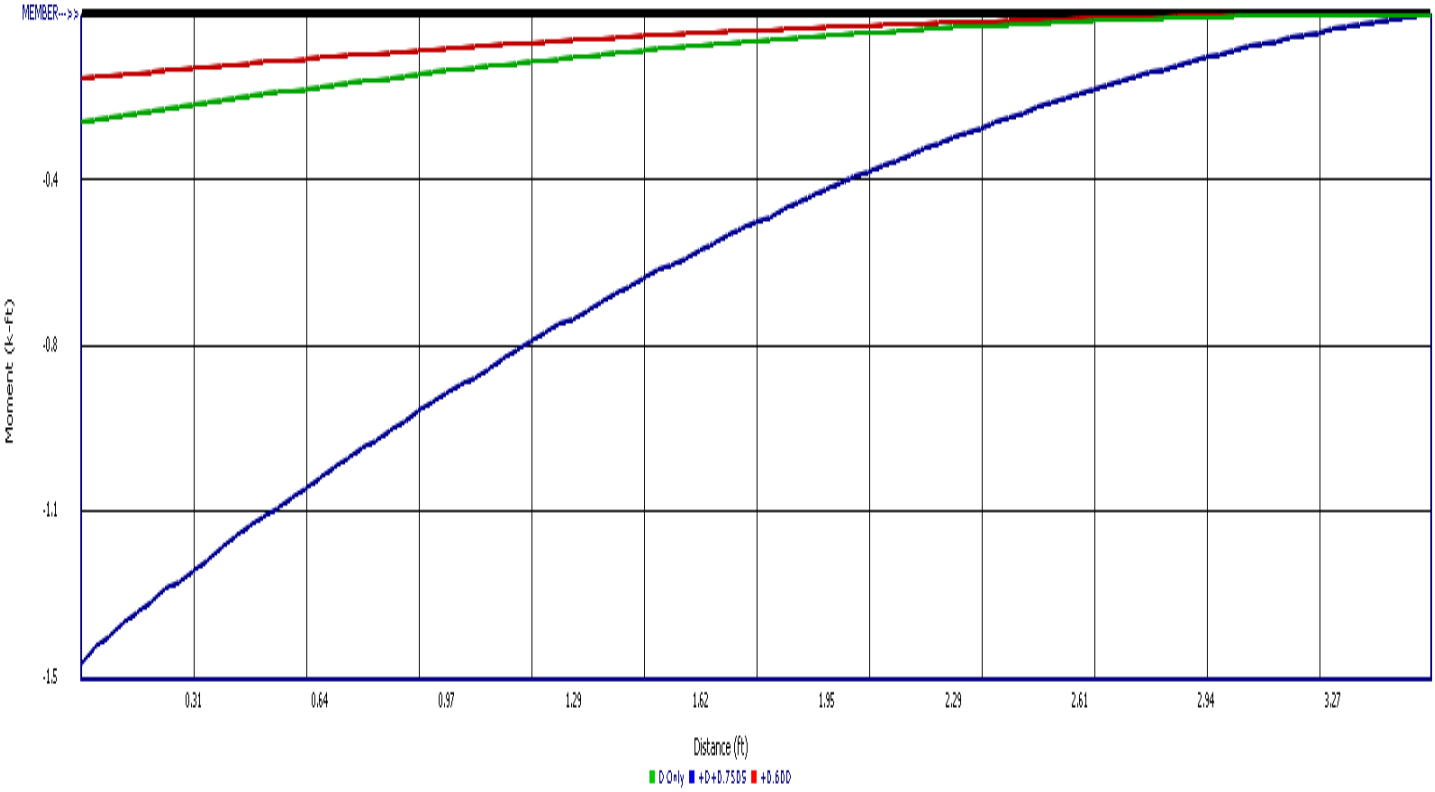
LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: typ lookouts 3'-6" high roof

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.905	
Max Upward from Load Combinations	0.905	
Max Upward from Load Cases	0.765	
D Only	0.140	
+D+S	0.905	
+D+0.750S	0.714	
+0.60D	0.084	
S Only	0.765	

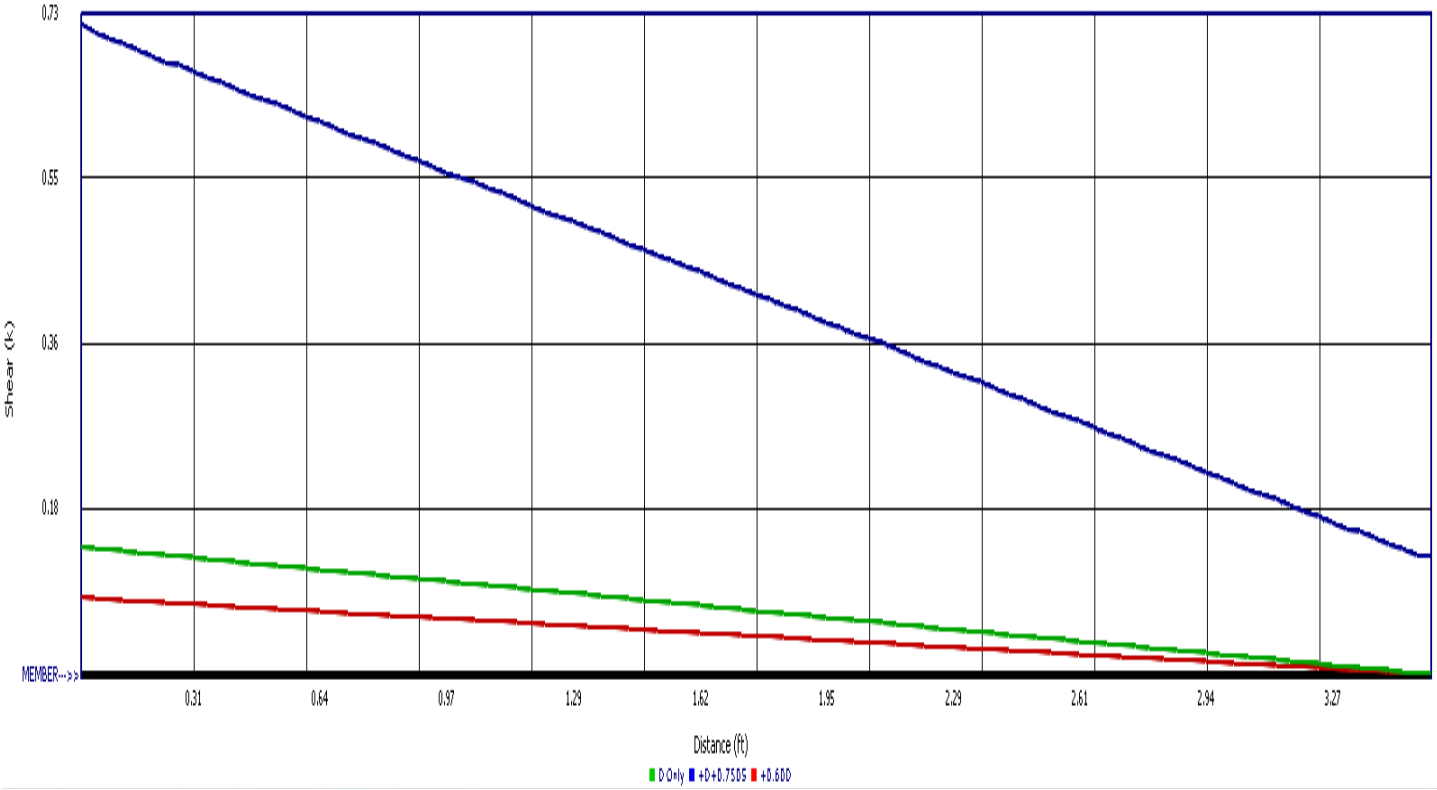


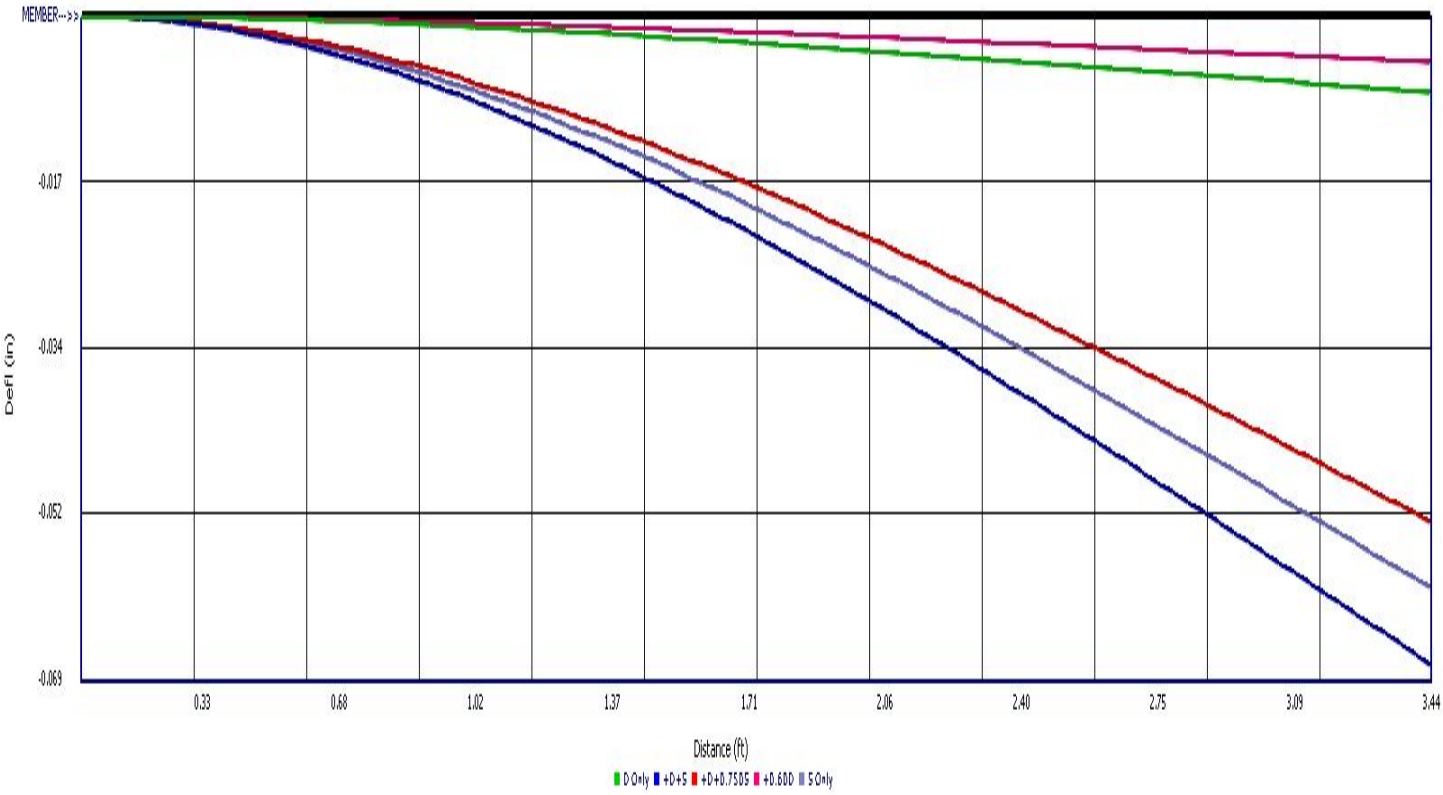
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: typ lookouts 3'-6" high roof





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

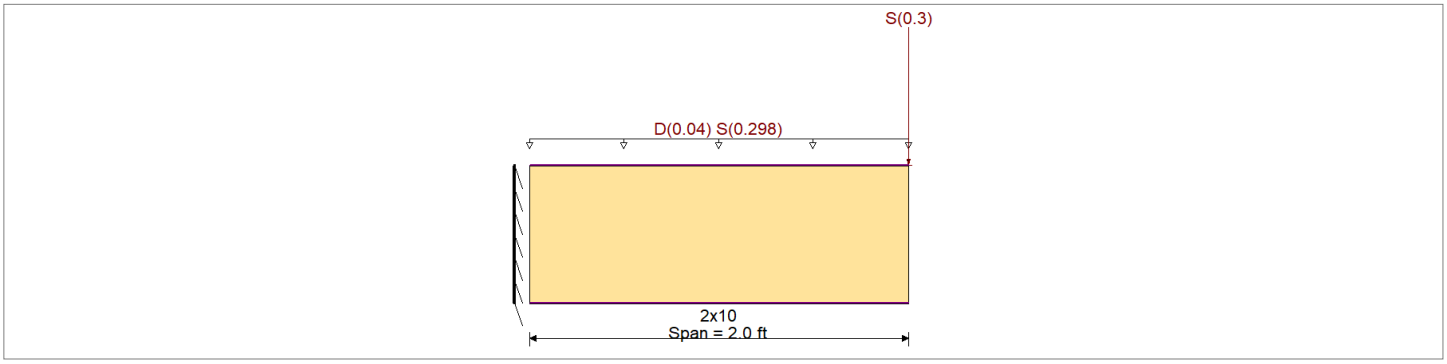
DESCRIPTION: typ lookouts 2'-0" low roof

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	900.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	900.0 psi	Ebend- xx	1,600.0 ksi
		Fc - Prll	1,350.0 psi	Eminbend - xx	580.0 ksi
Wood Species :	Douglas Fir-Larch	Fc - Perp	625.0 psi		
Wood Grade :	No.2	Fv	180.0 psi		
		Ft	575.0 psi	Density	31.210 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.020, S = 0.1490 ksf, Tributary Width = 2.0 ft, (roof)
Point Load : S = 0.30 k @ 2.0 ft, (ice)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.346 : 1	Maximum Shear Stress Ratio	=	0.206 : 1
Section used for this span		**2x10**	Section used for this span		**2x10**
fb: Actual	=	548.09 psi	fv: Actual	=	59.46 psi
F'b	=	1,584.00 psi	F'v	=	288.00 psi
Load Combination		+D+0.750S	Load Combination		+D+0.750S
Location of maximum on span	=	0.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.015 in	Ratio =	3156	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.016 in	Ratio =	2986	>=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 2.0 ft	1	0.050	0.033	0.90	1.00	1.00	1.00	1.100	1.00	1.00	1.00	0.08	44.9	891.0	0.05	5.3	162.0
+D+0.750S					1.00	1.00	1.00	1.100	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.0 ft	1	0.346	0.206	1.60	1.00	1.00	1.00	1.100	1.00	1.00	1.00	0.98	548.1	1,584.0	0.55	59.5	288.0
+0.60D					1.00	1.00	1.00	1.100	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.0 ft	1	0.017	0.011	1.60	1.00	1.00	1.00	1.100	1.00	1.00	1.00	0.05	26.9	1,584.0	0.03	3.2	288.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0161	2.000		0.0000	0.000

Wood Beam

Project File: 22025 Astrid Building 7.ec6

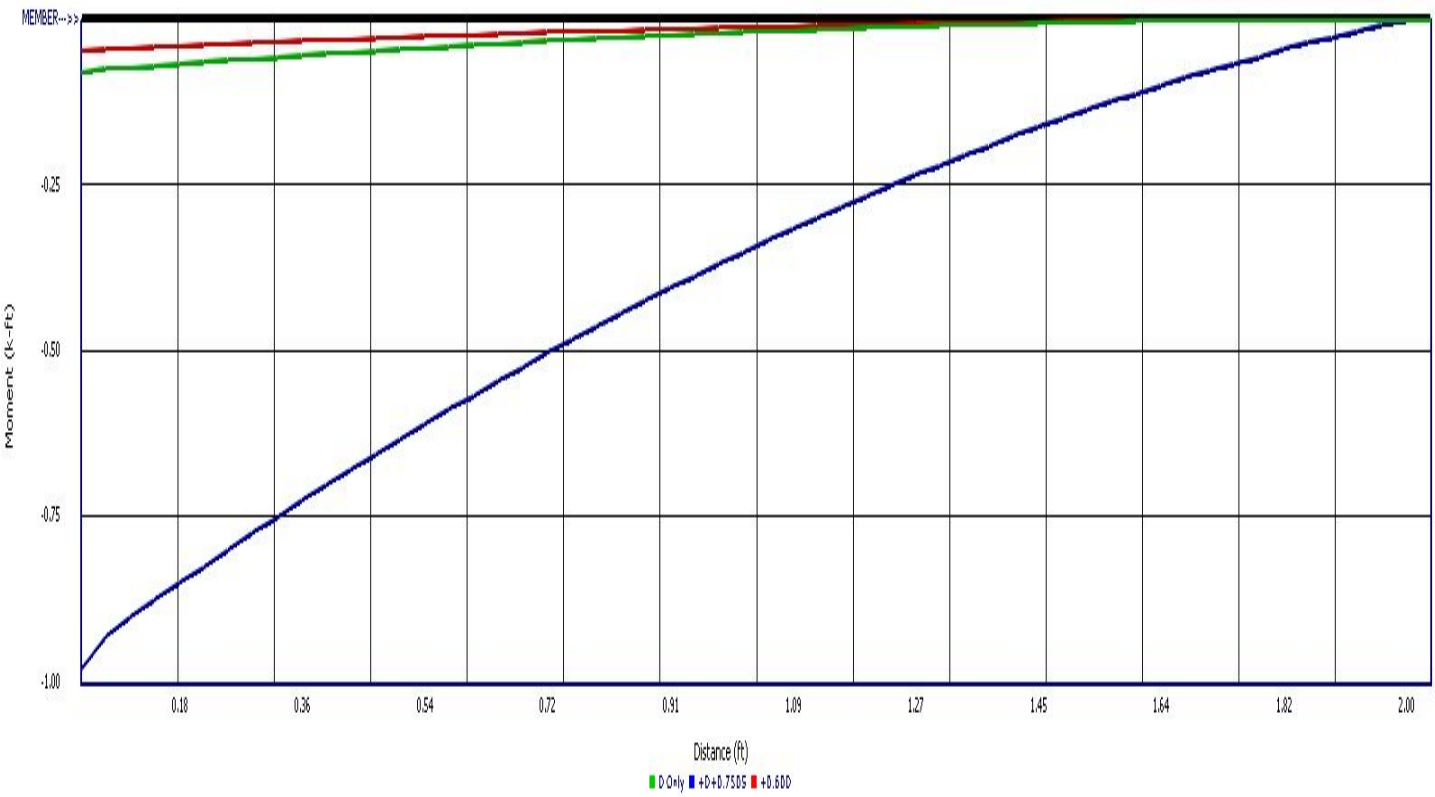
LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: typ lookouts 2'-0" low roof

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.976	
Max Upward from Load Combinations	0.976	
Max Upward from Load Cases	0.896	
D Only	0.080	
+D+S	0.976	
+D+0.750S	0.752	
+0.60D	0.048	
S Only	0.896	

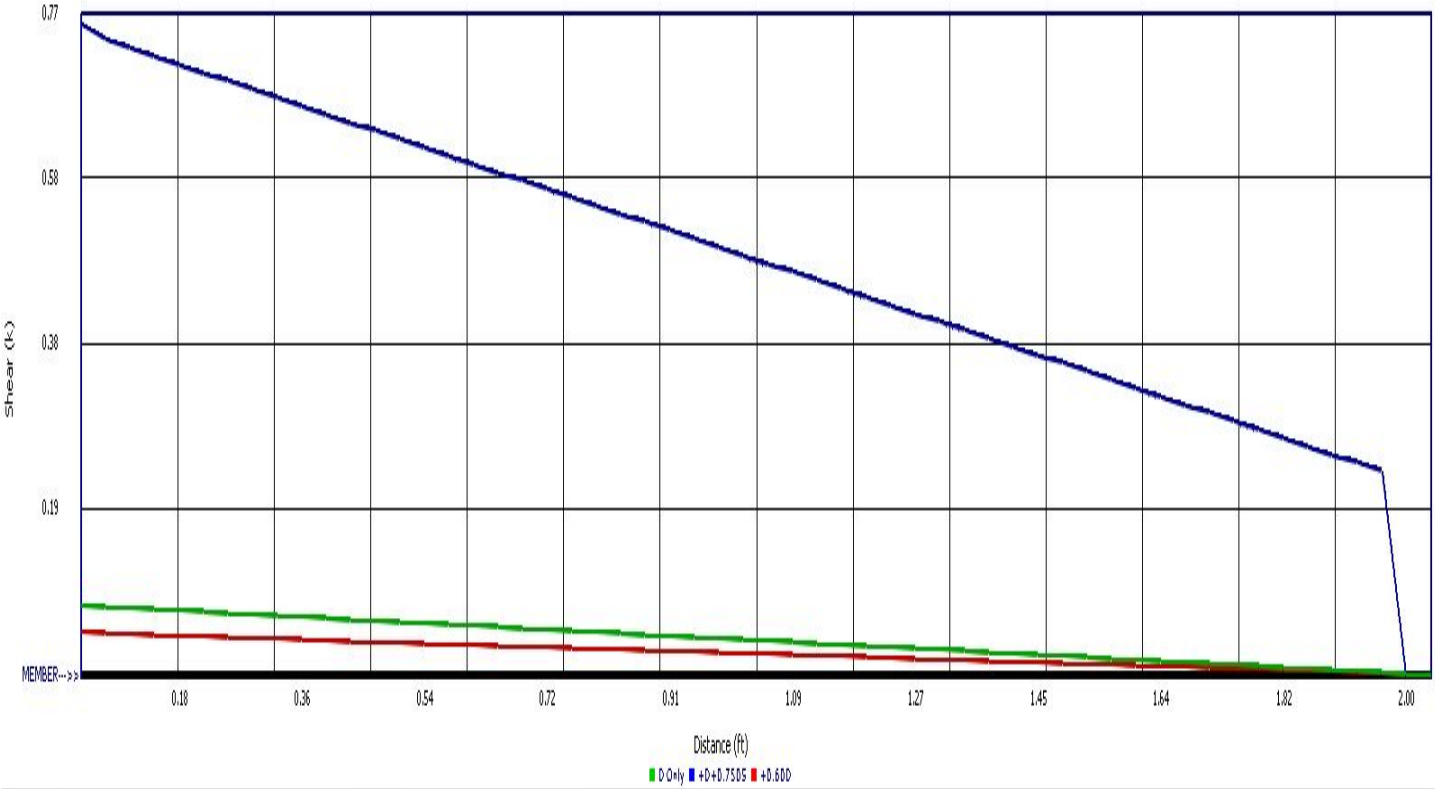


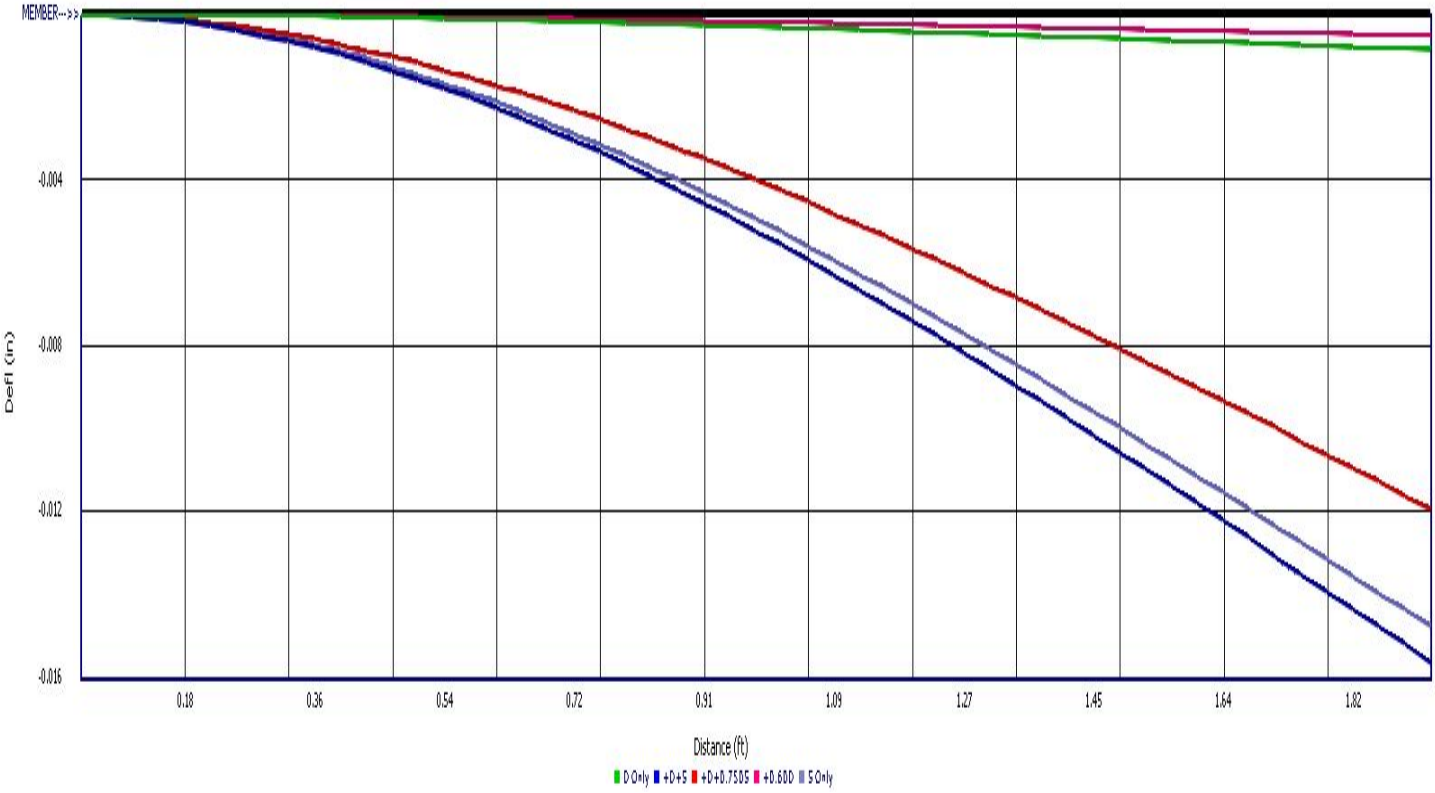
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: typ lookouts 2'-0" low roof





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

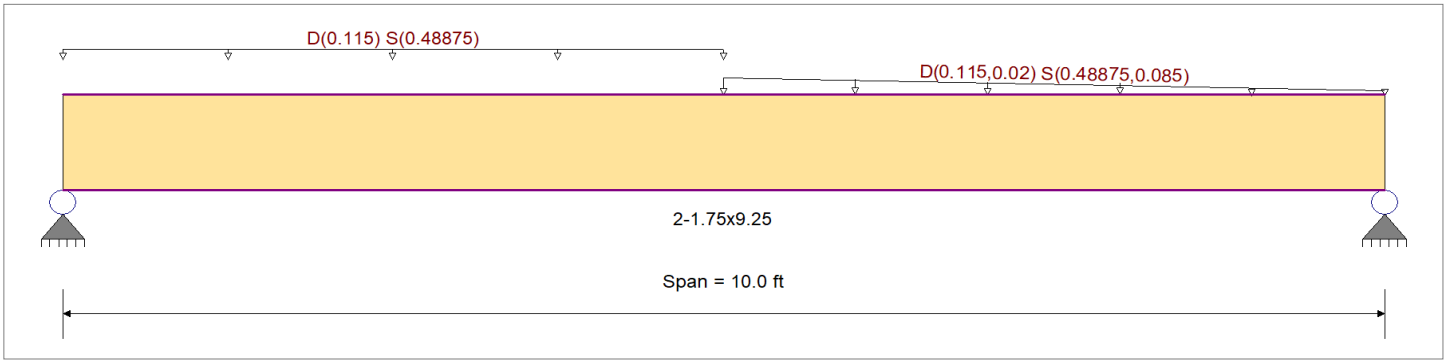
DESCRIPTION: bunk ridge beam 1

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,600.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2,600.0 psi	Ebend- xx	2,000.0 ksi
		Fc - Prll	2,510.0 psi	Eminbend - xx	1,016.54 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade :	MicroLam LVL 2.0 E	Fv	285.0 psi		
		Ft	1,555.0 psi	Density	42.010 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Load for Span Number 1
Varying Uniform Load : D= 0.020->0.020, S= 0.0850->0.0850 ksf, Extent = 5.0 -->> 10.0 ft, Trib Width = 5.750->1.0 ft, (roof)

Uniform Load : D = 0.020, S = 0.0850 ksf, Extent = 0.0 -->> 5.0 ft, Tributary Width = 5.750 ft, (roof)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.291 : 1	Maximum Shear Stress Ratio	=	0.190 : 1
Section used for this span		**2-1.75x9.25**	Section used for this span		**2-1.75x9.25**
fb: Actual	=	1,254.84 psi	fv: Actual	=	86.78 psi
F'b	=	4,309.90 psi	F'v	=	456.00 psi
Load Combination		+D+0.750S	Load Combination		+D+0.750S
Location of maximum on span	=	4.672 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.204 in	Ratio =	588	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.252 in	Ratio =	476	>=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.124	0.081	0.90	1.00	1.00	1.00	1.036	1.00	1.00	1.00	1.25	299.7	2,424.3	0.45	20.7	256.5
+D+0.750S					1.00	1.00	1.00	1.036	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.291	0.190	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.00	5.22	1,254.8	4,309.9	1.87	86.8	456.0
+0.60D					1.00	1.00	1.00	1.036	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.042	0.027	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.00	0.75	179.8	4,309.9	0.27	12.4	456.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: bunk ridge beam 1

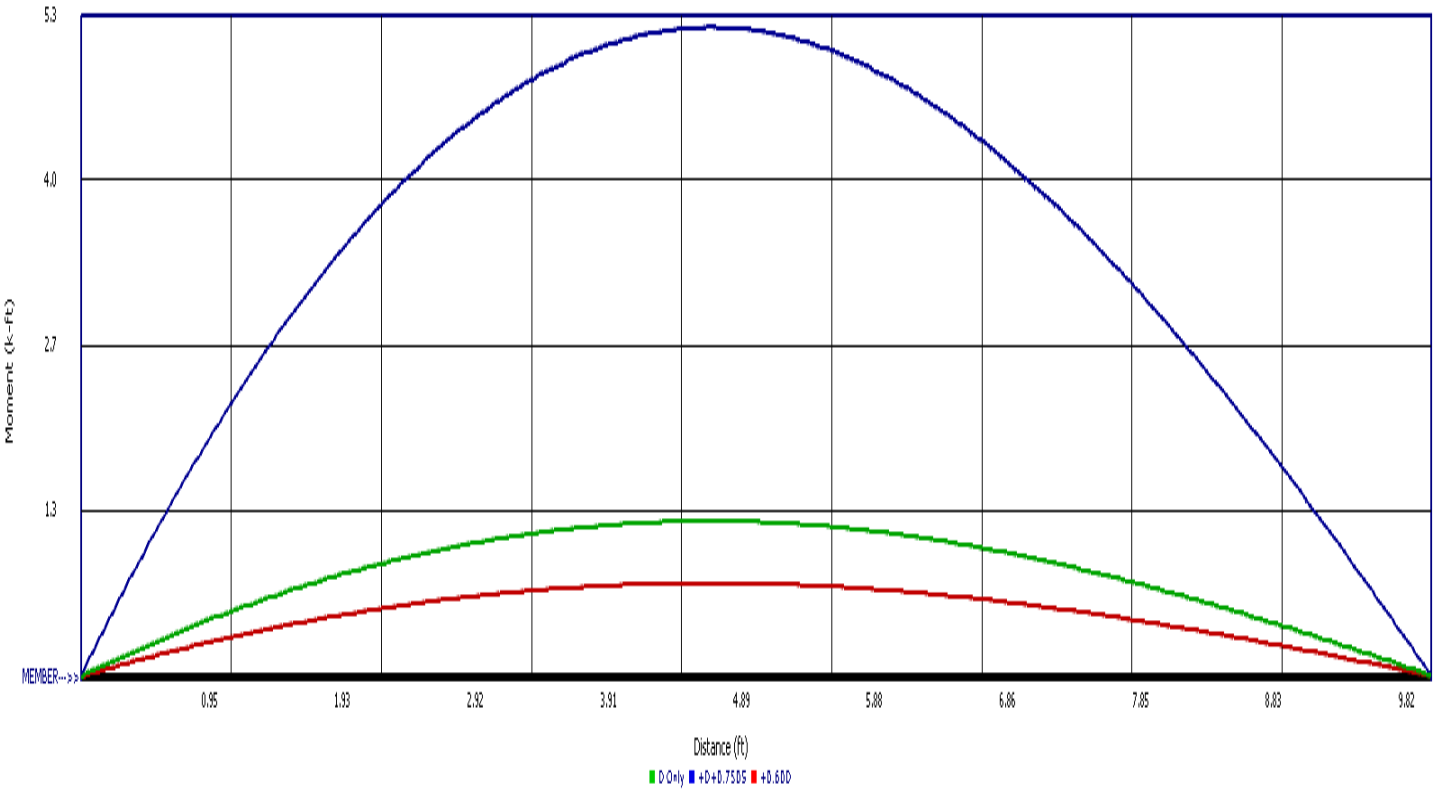
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.2521	4.927		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.811	1.980
Max Upward from Load Combinations	2.811	1.980
Max Upward from Load Cases	2.276	1.603
D Only	0.535	0.377
+D+S	2.811	1.980
+D+0.750S	2.242	1.579
+0.60D	0.321	0.226
S Only	2.276	1.603

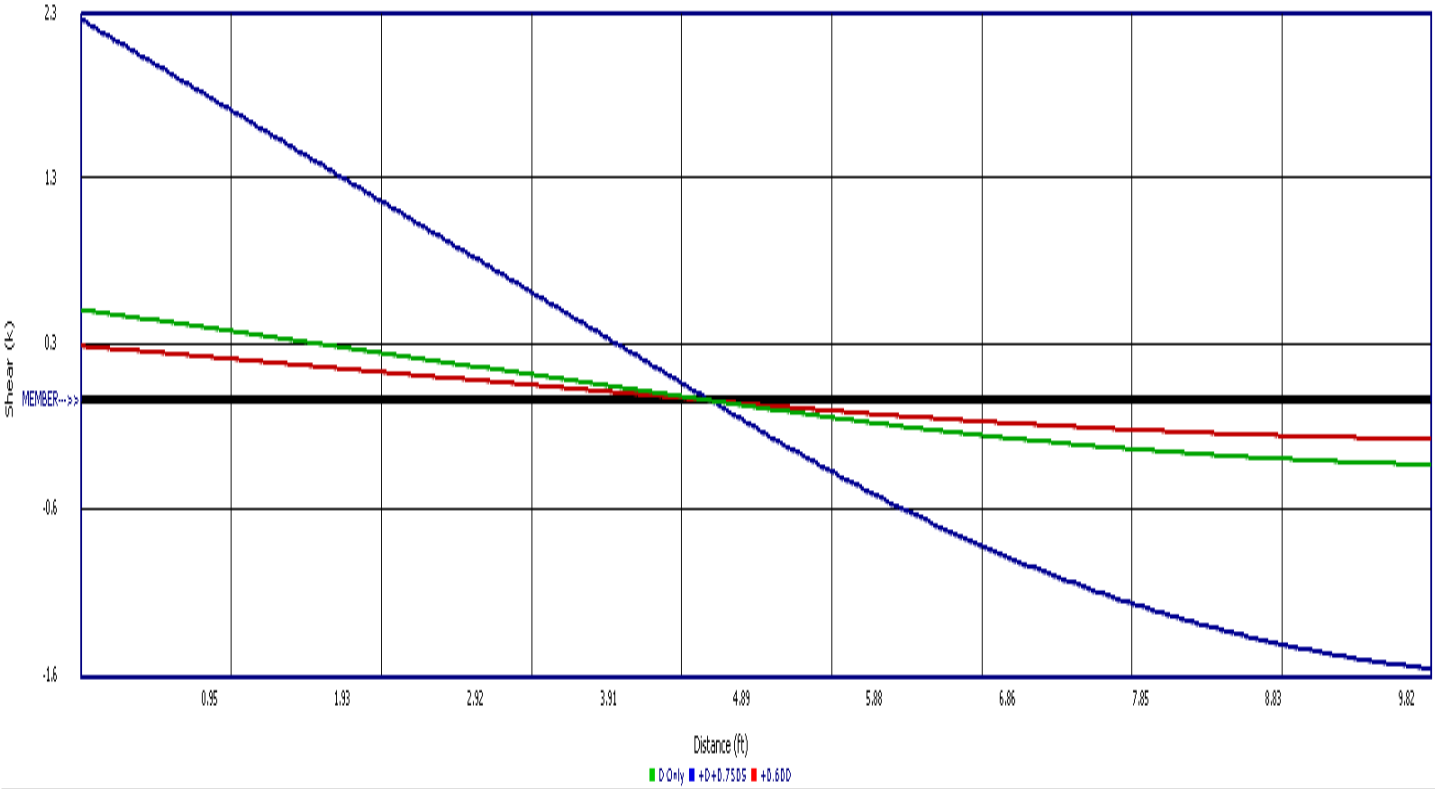


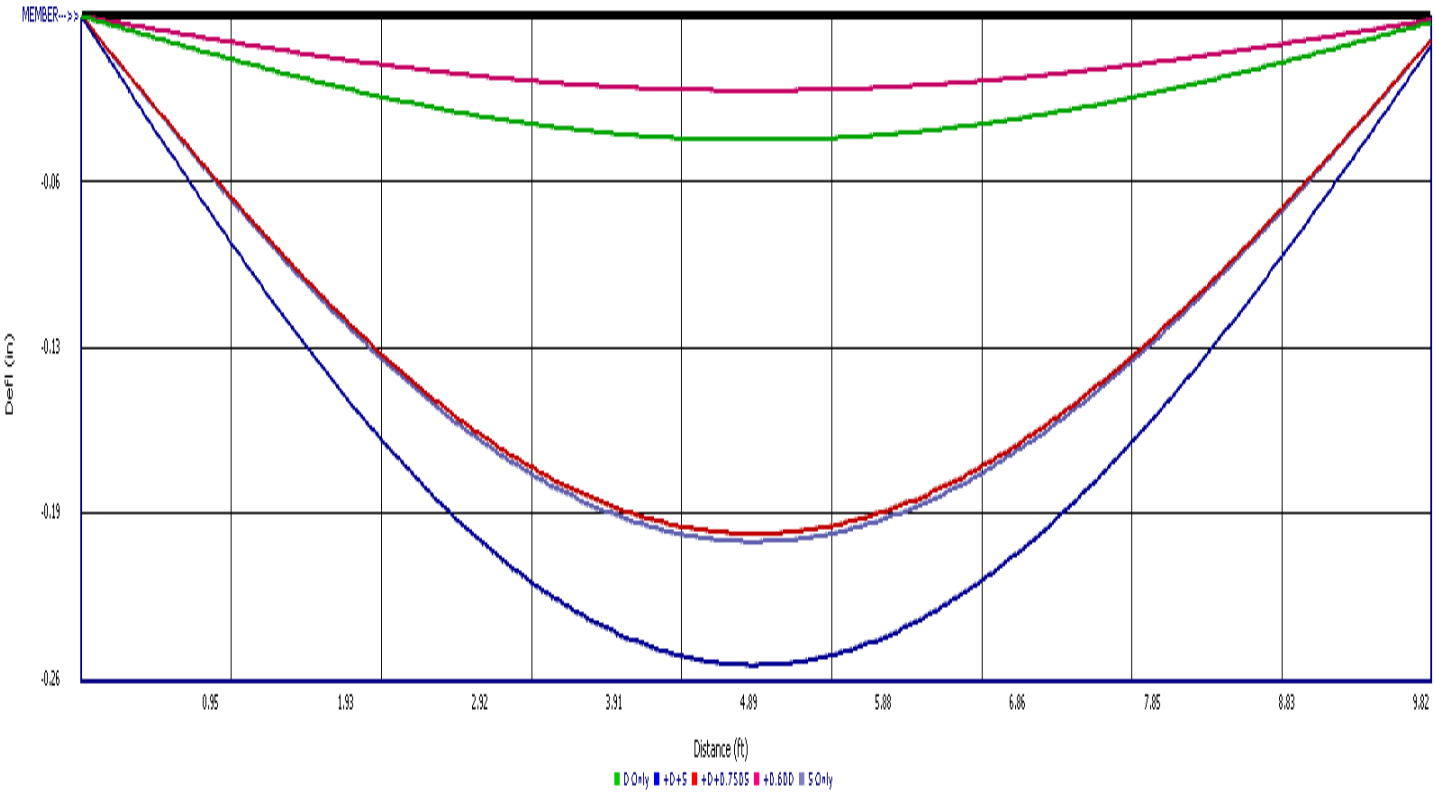
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: bunk ridge beam 1





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

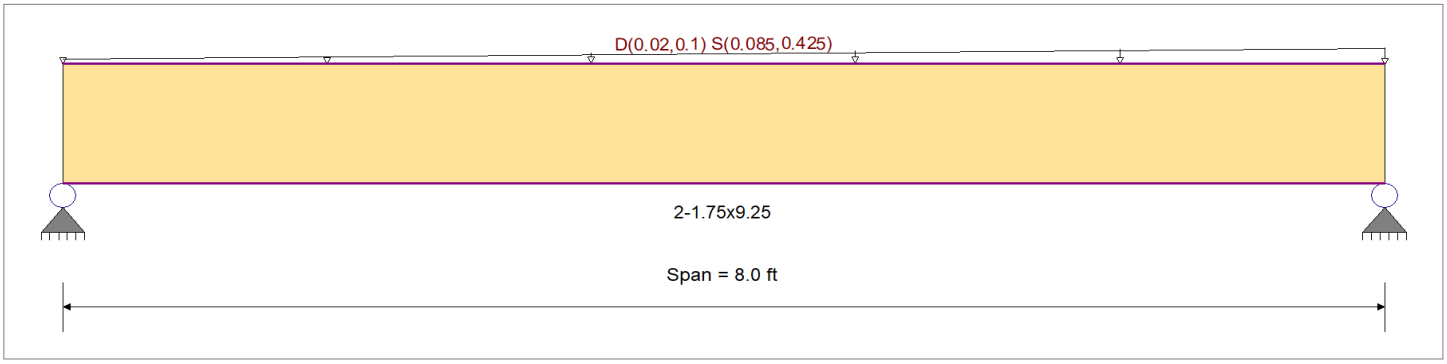
DESCRIPTION: BUNK VALLEY BEAM 1

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,600.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2,600.0 psi	Ebend- xx	2,000.0 ksi
		Fc - Prll	2,510.0 psi	Eminbend - xx	1,016.54 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade :	MicroLam LVL 2.0 E	Fv	285.0 psi		
		Ft	1,555.0 psi	Density	42.010 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Varying Uniform Load : D= 0.020->0.020, S= 0.0850->0.0850 ksf, Extent = 0.0 -->> 8.0 ft, Trib Width = 1.0->5.0 ft, (roof)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.118 : 1	Maximum Shear Stress Ratio	=	0.097 : 1
Section used for this span		**2-1.75x9.25**	Section used for this span		**2-1.75x9.25**
fb: Actual	=	507.05 psi	fv: Actual	=	44.16 psi
F'b	=	4,309.90 psi	F'v	=	456.00 psi
Load Combination		+D+0.750S	Load Combination		+D+0.750S
Location of maximum on span	=	4.409 ft	Location of maximum on span	=	7.241 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.051 in	Ratio =	1873	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.065 in	Ratio =	1472	>=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 8.0 ft	1	0.056	0.045	0.90	1.00	1.00	1.00	1.036	1.00	1.00	1.00	0.56	134.8	2,424.3	0.25	11.6	256.5
+D+0.750S					1.00	1.00	1.00	1.036	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.0 ft	1	0.118	0.097	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.00	2.11	507.0	4,309.9	0.95	44.2	456.0
+0.60D					1.00	1.00	1.00	1.036	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.0 ft	1	0.019	0.015	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.00	0.34	80.9	4,309.9	0.15	7.0	456.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: BUNK VALLEY BEAM 1

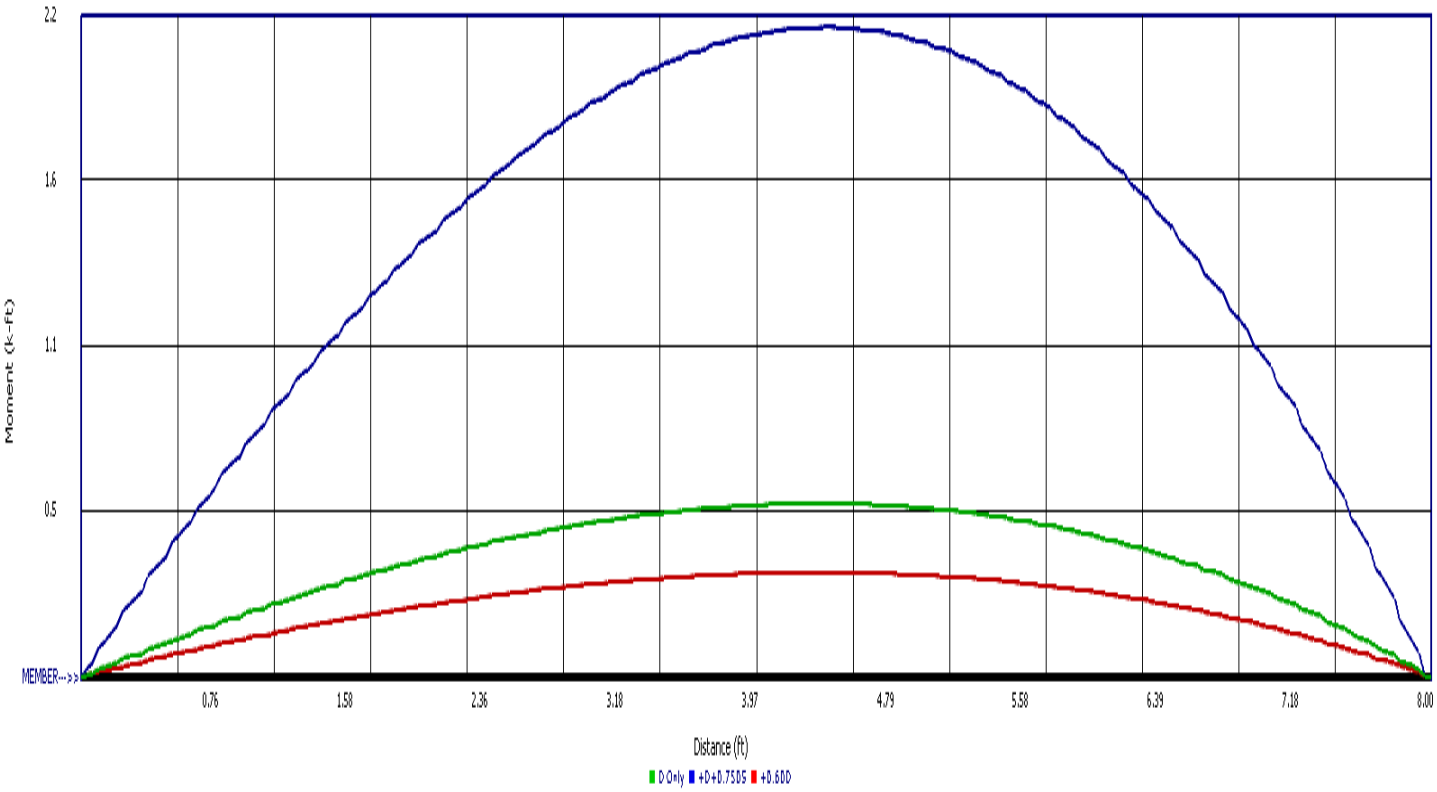
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0652	4.117		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.018	1.578
Max Upward from Load Combinations	1.018	1.578
Max Upward from Load Cases	0.793	1.247
D Only	0.224	0.331
+D+S	1.018	1.578
+D+0.750S	0.819	1.266
+0.60D	0.135	0.199
S Only	0.793	1.247

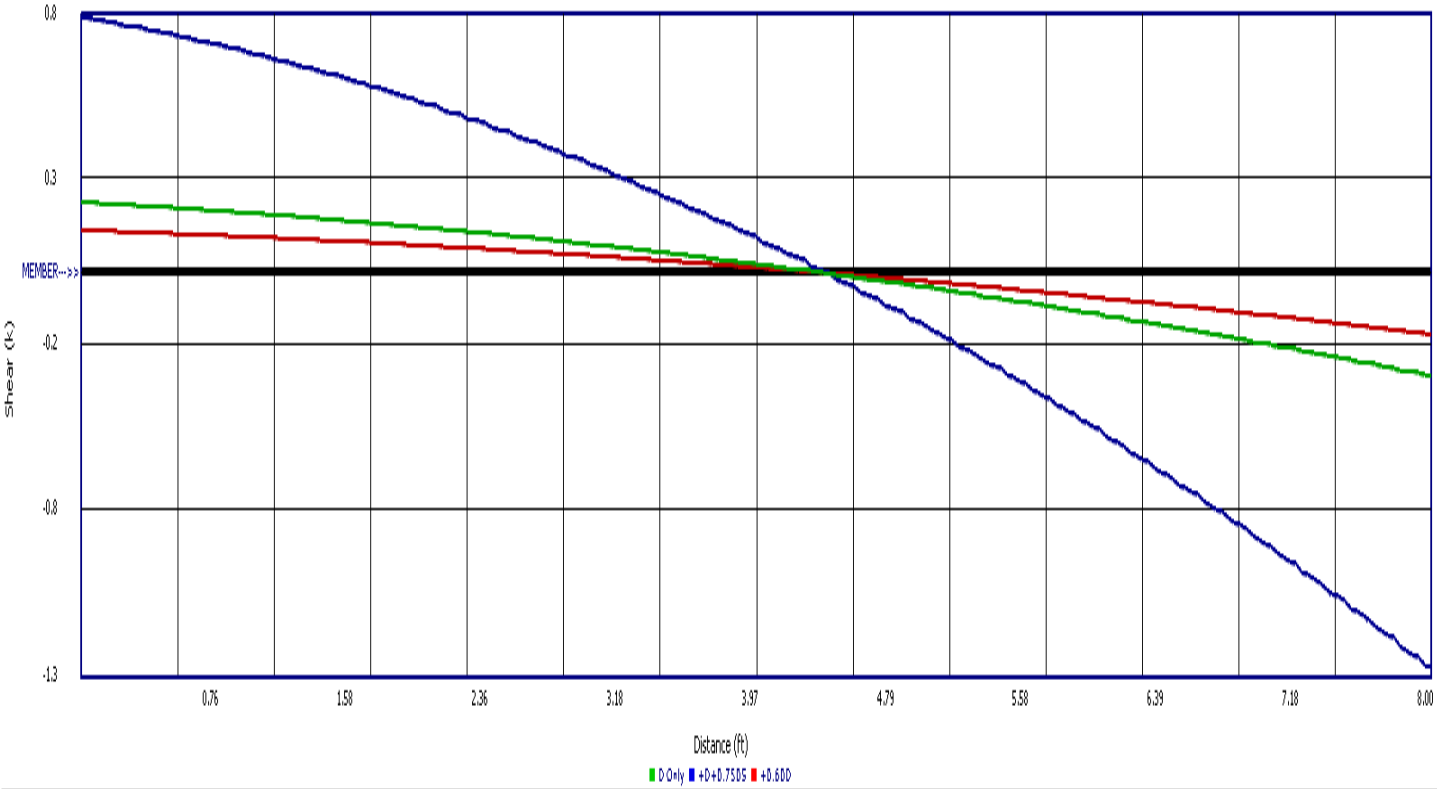


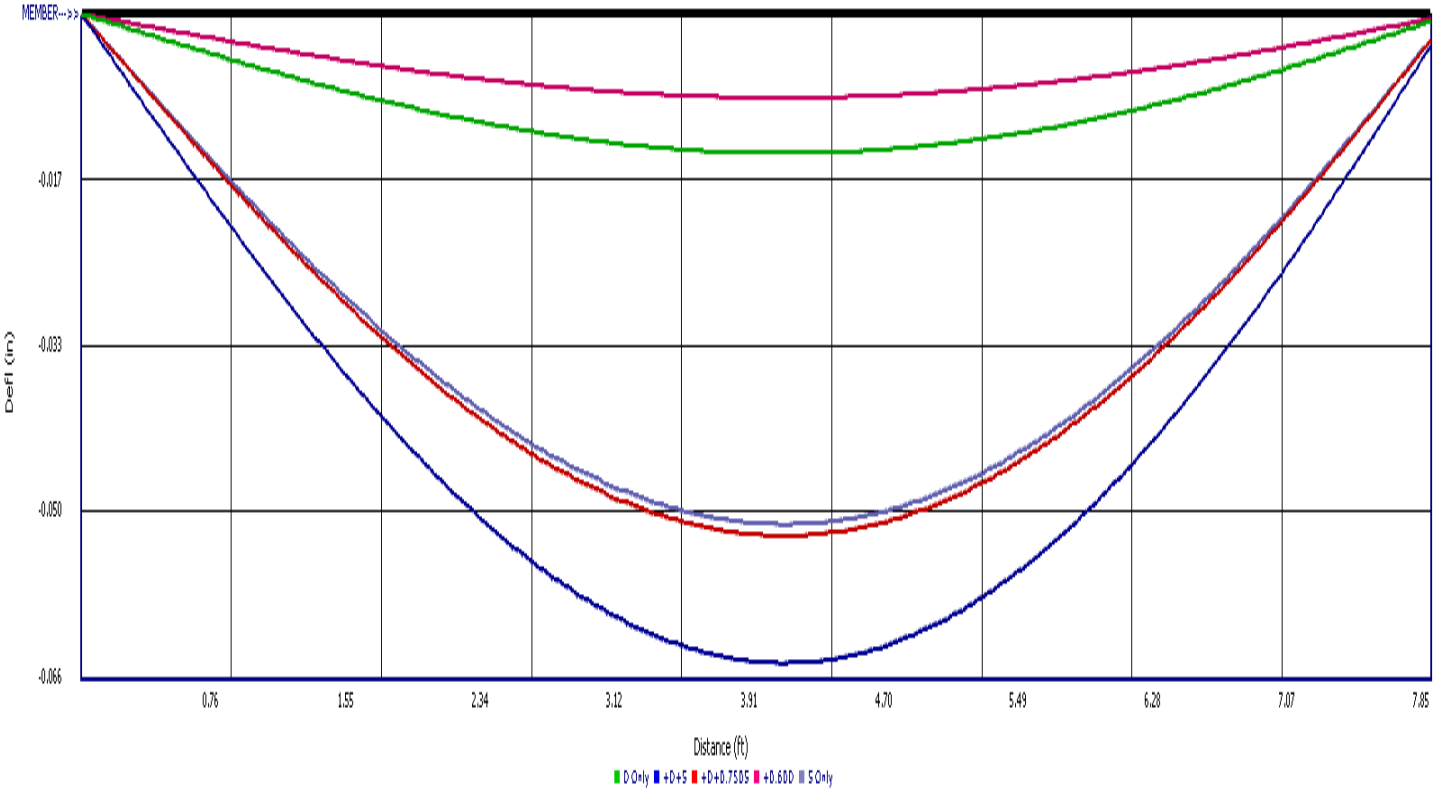
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: BUNK VALLEY BEAM 1





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

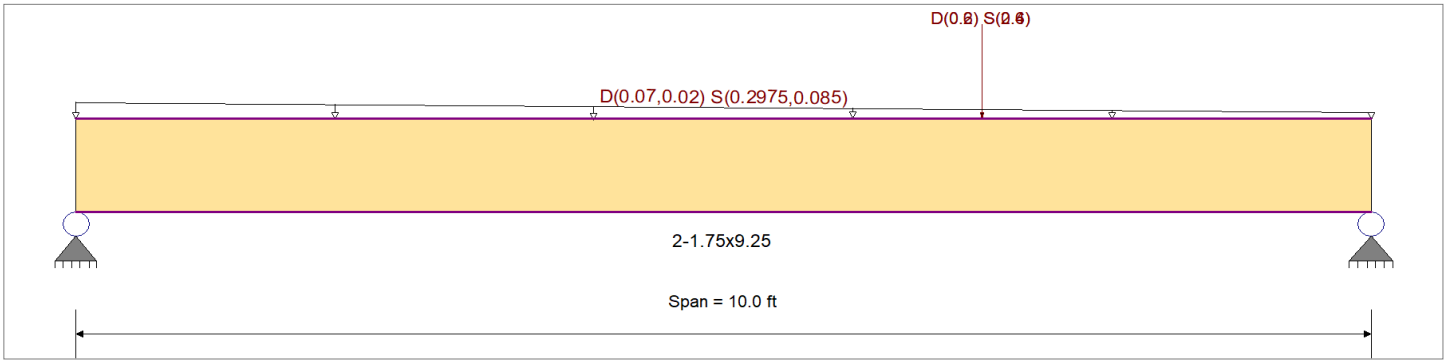
DESCRIPTION: BUNK VALLEY BEAM 2

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,600.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2,600.0 psi	Ebend- xx	2,000.0 ksi
		Fc - Prll	2,510.0 psi	Eminbend - xx	1,016.54 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade :	MicroLam LVL 2.0 E	Fv	285.0 psi		
		Ft	1,555.0 psi	Density	42.010 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Varying Uniform Load : D= 0.020->0.020, S= 0.0850->0.0850 ksf, Extent = 0.0 -->> 10.0 ft, Trib Width = 3.50->1.0 ft, (roof)

Point Load : D = 0.60, S = 2.40 k @ 7.0 ft, (RIDGE BEAM 1)
Point Load : D = 0.20, S = 0.60 k @ 7.0 ft, (VALLEY BEAM 1)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.464** : 1	Maximum Shear Stress Ratio	=	**0.292** : 1
Section used for this span		**2-1.75x9.25**	Section used for this span		**2-1.75x9.25**
fb: Actual	=	2,000.90 psi	fv: Actual	=	133.08 psi
F'b	=	4,309.90 psi	F'v	=	456.00 psi
Load Combination		+D+0.750S	Load Combination		+D+0.750S
Location of maximum on span	=	6.971 ft	Location of maximum on span	=	9.234 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.281 in	Ratio =	426	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.358 in	Ratio =	335	>=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.219	0.138	0.90	1.00	1.00	1.00	1.036	1.00	1.00	1.00	2.21	532.1	2,424.3	0.77	35.5	256.5
+D+0.750S					1.00	1.00	1.00	1.036	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.464	0.292	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.00	8.32	2,000.9	4,309.9	2.87	133.1	456.0
+0.60D					1.00	1.00	1.00	1.036	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.074	0.047	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.00	1.33	319.3	4,309.9	0.46	21.3	456.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: BUNK VALLEY BEAM 2

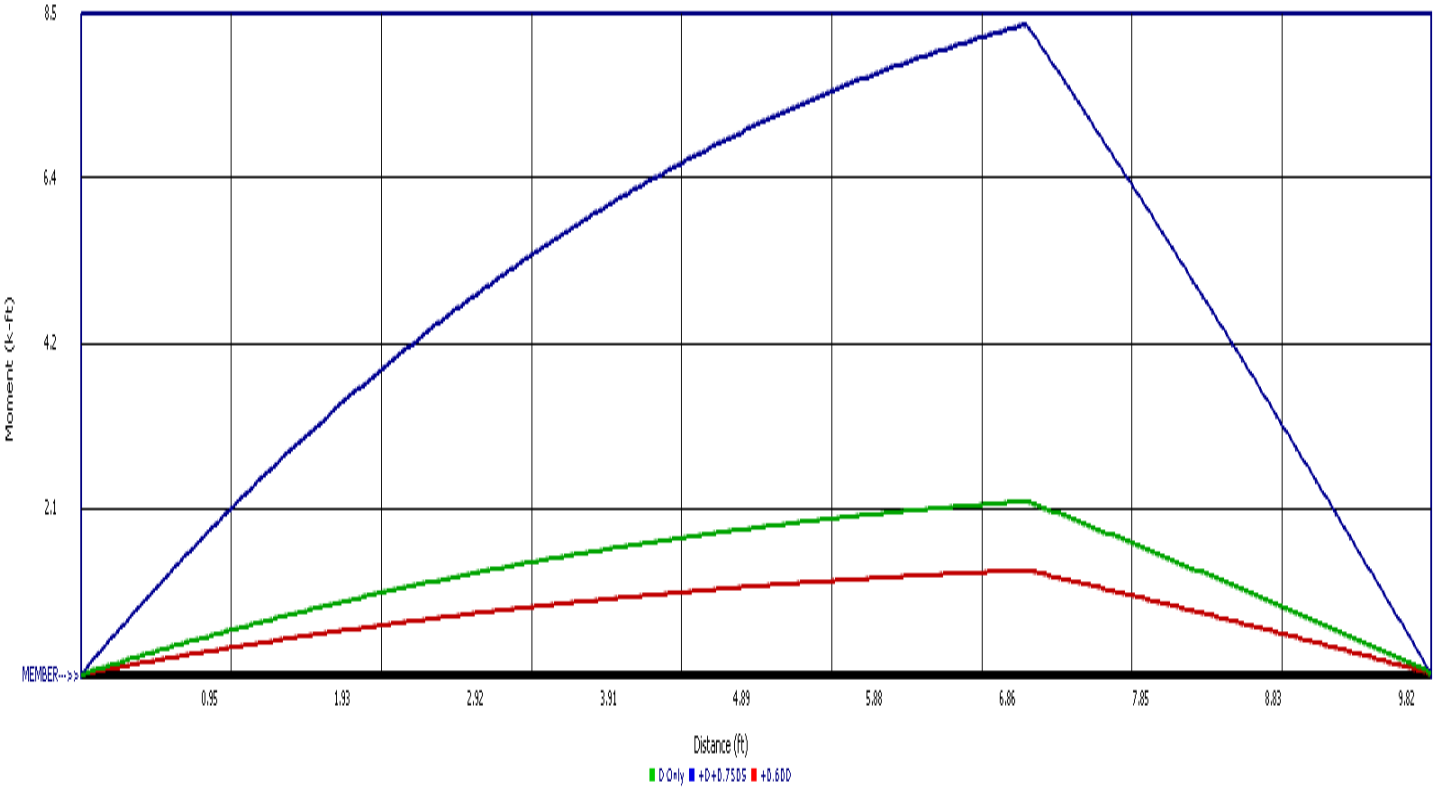
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.3579	5.328		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.587	3.670
Max Upward from Load Combinations	2.587	3.670
Max Upward from Load Cases	2.033	2.879
D Only	0.554	0.791
+D+S	2.587	3.670
+D+0.750S	2.079	2.950
+0.60D	0.332	0.474
S Only	2.033	2.879

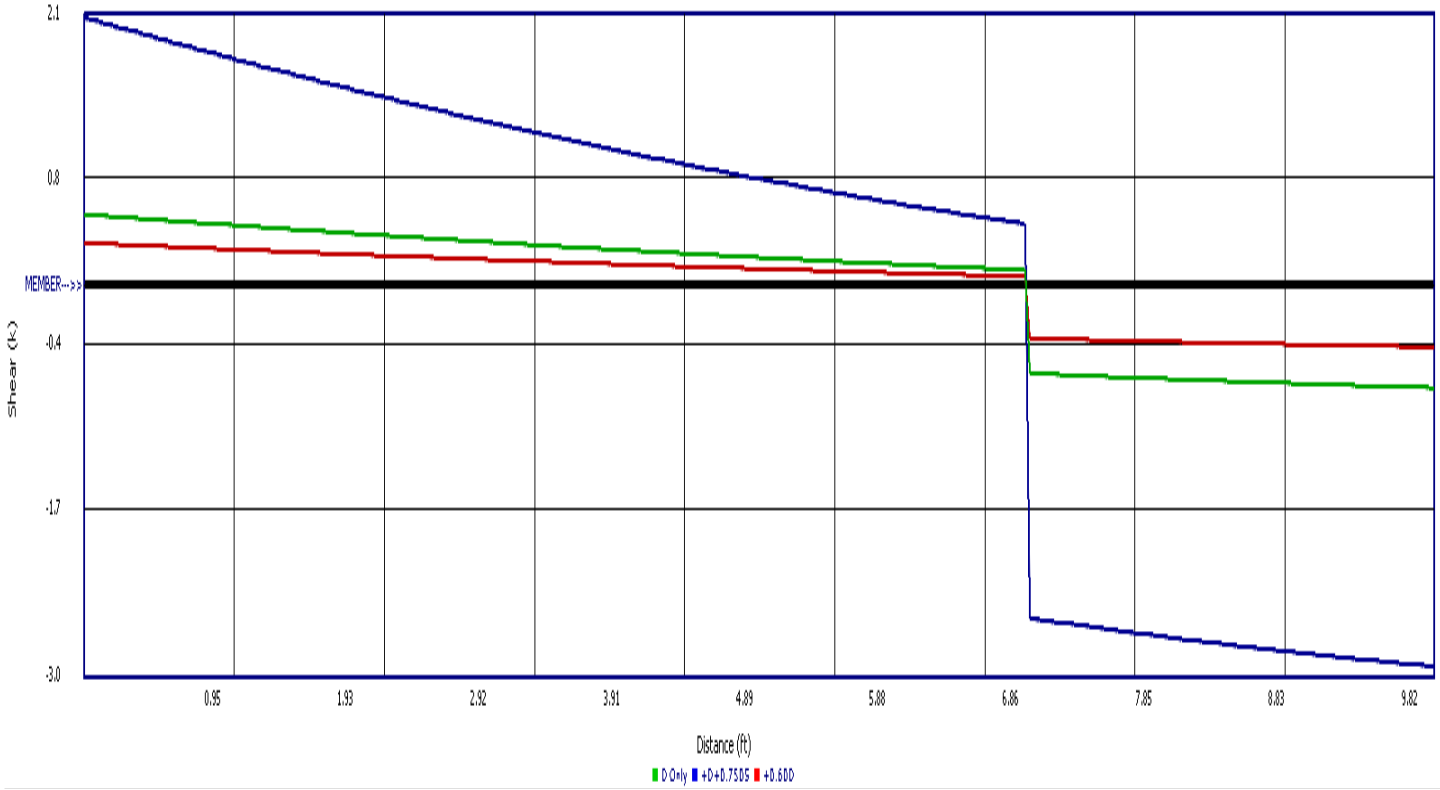


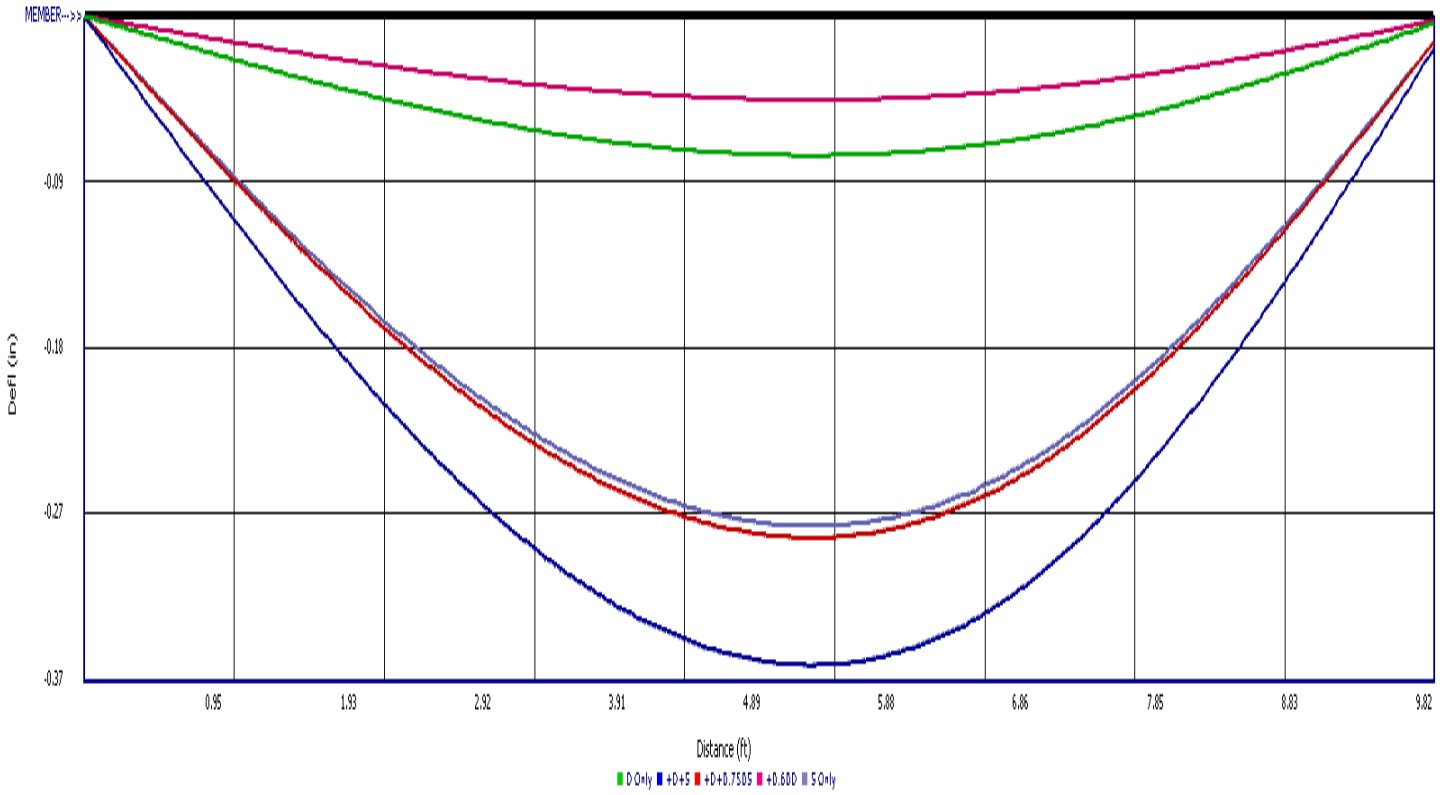
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: BUNK VALLEY BEAM 2





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

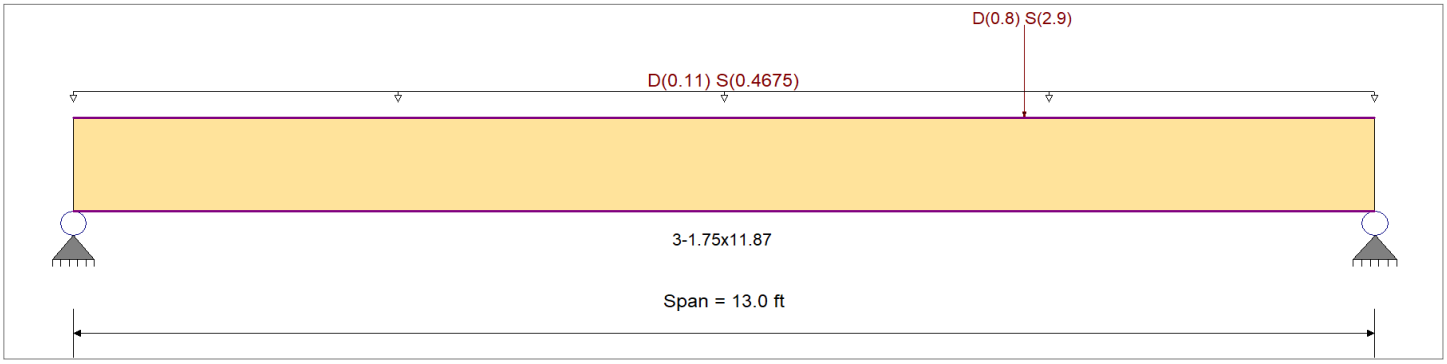
DESCRIPTION: BUNK RIDGE BEAM 2

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,600.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2,600.0 psi	Ebend- xx	2,000.0 ksi
		Fc - Prll	2,510.0 psi	Eminbend - xx	1,016.54 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade :	MicroLam LVL 2.0 E	Fv	285.0 psi		
		Ft	1,555.0 psi	Density	42.010 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, S = 0.0850 ksf, Tributary Width = 5.50 ft, (roof)
Point Load : D = 0.80, S = 2.90 k @ 9.50 ft, (VALLEY BEAM 2)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.373 : 1	Maximum Shear Stress Ratio	=	0.255 : 1
Section used for this span		**3-1.75x11.87**	Section used for this span		**3-1.75x11.87**
fb: Actual	=	1,555.19 psi	fv: Actual	=	116.26 psi
F'b	=	4,165.93 psi	F'v	=	456.00 psi
Load Combination		+D+0.750S	Load Combination		+D+0.750S
Location of maximum on span	=	8.161 ft	Location of maximum on span	=	12.051 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.322 in	Ratio =	485	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.410 in	Ratio =	380	>=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 13.0 ft	1	0.178	0.122	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	4.29	417.1	2,343.3	1.30	31.2	256.5
+D+0.750S					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 13.0 ft	1	0.373	0.255	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	15.99	1,555.2	4,165.9	4.83	116.3	456.0
+0.60D					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 13.0 ft	1	0.060	0.041	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	2.57	250.3	4,165.9	0.78	18.7	456.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.4100	6.785		0.0000	0.000

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

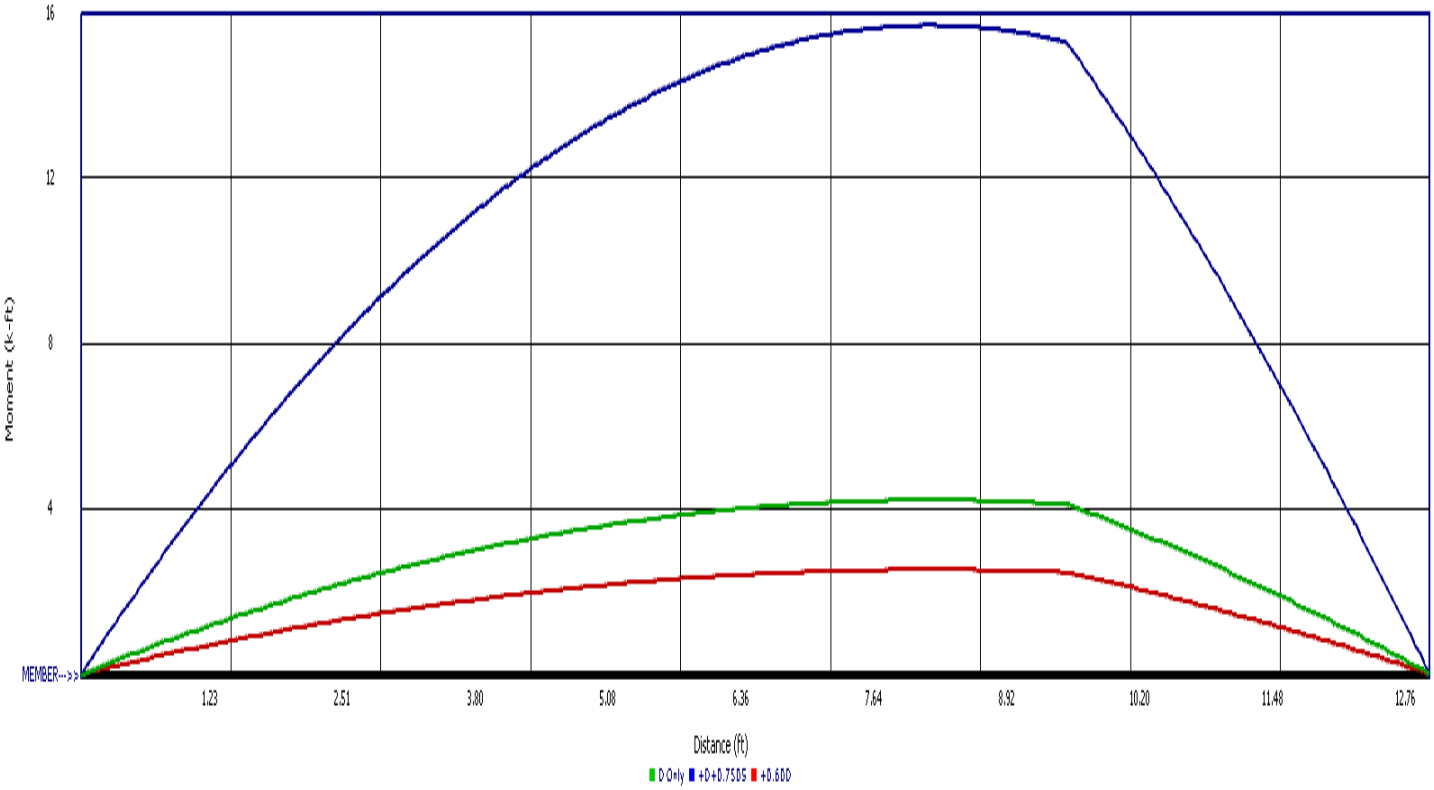
LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: BUNK RIDGE BEAM 2

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	4.868	6.576
Max Upward from Load Combinations	4.868	6.576
Max Upward from Load Cases	3.820	5.158
D Only	1.049	1.418
+D+S	4.868	6.576
+D+0.750S	3.913	5.286
+0.60D	0.629	0.851
S Only	3.820	5.158

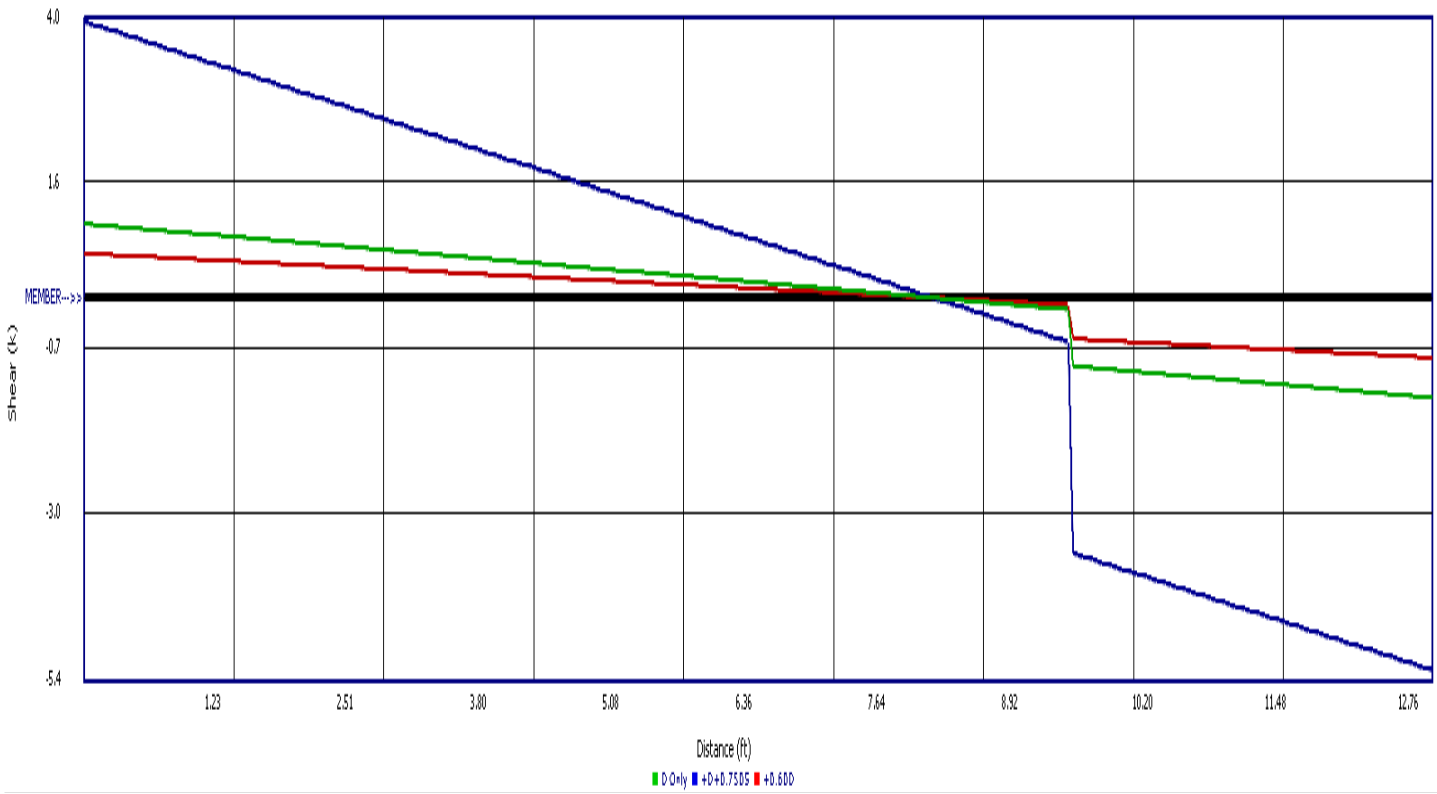


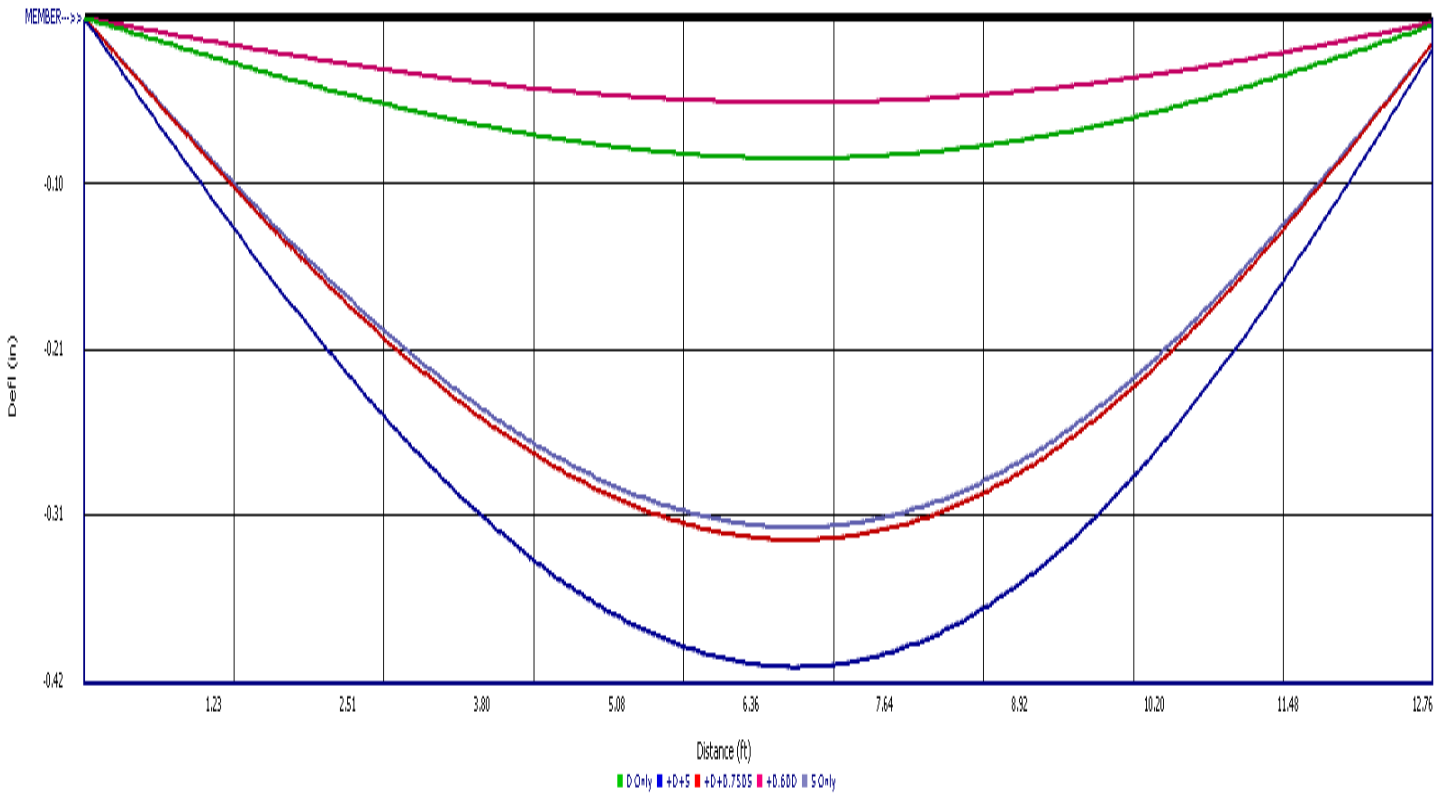
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: BUNK RIDGE BEAM 2





Project Title:
Engineer:
Project ID:
Project Descr:

Concrete Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

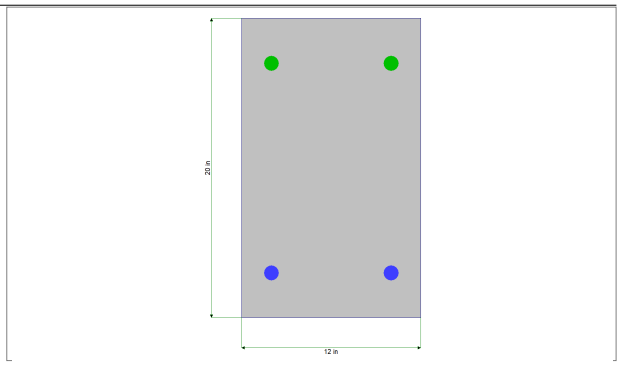
DESCRIPTION: RET WALL HORIZ SPAN

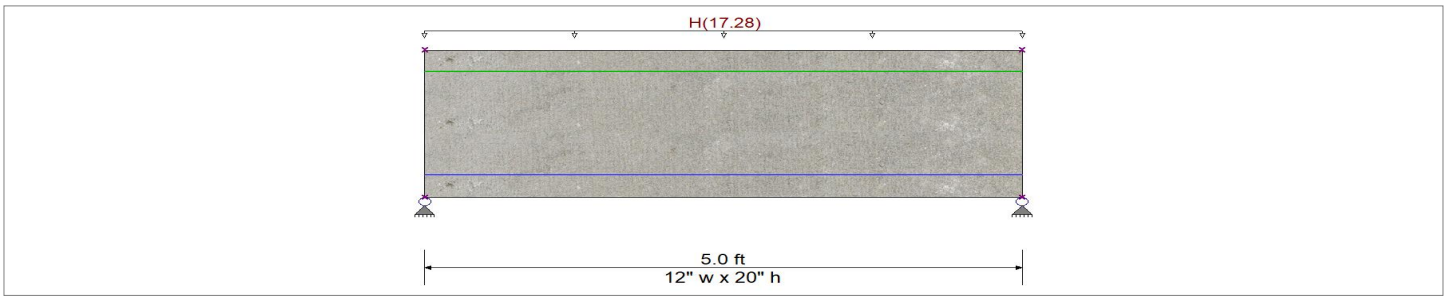
CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

General Information

f'c	=	4.0 ksi	ϕ Phi Values	Flexure :	0.90
fr = $f'c^{1/2}$ * 7.50	=	474.342 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups		40.0 ksi
fy - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #		3
			Number of Resisting Legs Per Stirrup	=	2





Cross Section & Reinforcing Details

Rectangular Section, Width = 12.0 in, Height = 20.0 in
Span #1 Reinforcing....
2-#8 at 3.0 in from Bottom, from 0.0 to 5.0 ft in this span 2-#8 at 3.0 in from Top, from 0.0 to 5.0 ft in this span

Load for Span Number 1
Uniform Load : H = 17.280 k/ft, Tributary Width = 1.0 ft, (EARTH)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio = **0.766** : 1

Section used for this span	**Typical Section**	
Mu : Applied	86.40	k-ft
Mn * Phi : Allowable	112.855	k-ft
Location of maximum on span	2.505	ft
Span # where maximum occurs	Span # 1	

Maximum Deflection

Max Downward Transient Deflection	0.000 in	Ratio =	0	<360.0	
Max Upward Transient Deflection	0.000 in	Ratio =	0	<360.0	
Max Downward Total Deflection	0.021 in	Ratio =	2921	>=240.0	Span: 1 : H Only
Max Upward Total Deflection	0.000 in	Ratio =	0	<240.0	Span: 1 : H Only

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	43.200	43.200
Max Upward from Load Combinations	25.920	25.920
Max Upward from Load Cases	43.200	43.200
H Only	43.200	43.200
+0.60H	25.920	25.920

Shear Stirrup Requirements

Between 0.00 to 1.79 ft, Phi*Vc < Vu, Req'd Vs = 0.09924, use #3 stirrups spaced at 2.000 in
Between 1.80 to 2.15 ft, Phi*Vc / 2 < Vu <= Phi*Vc, Req'd Vs = Min per 9.6.3.1, use #3 stirrups spaced at 8.000 in

Concrete Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RET WALL HORIZ SPAN

Shear Stirrup Requirements

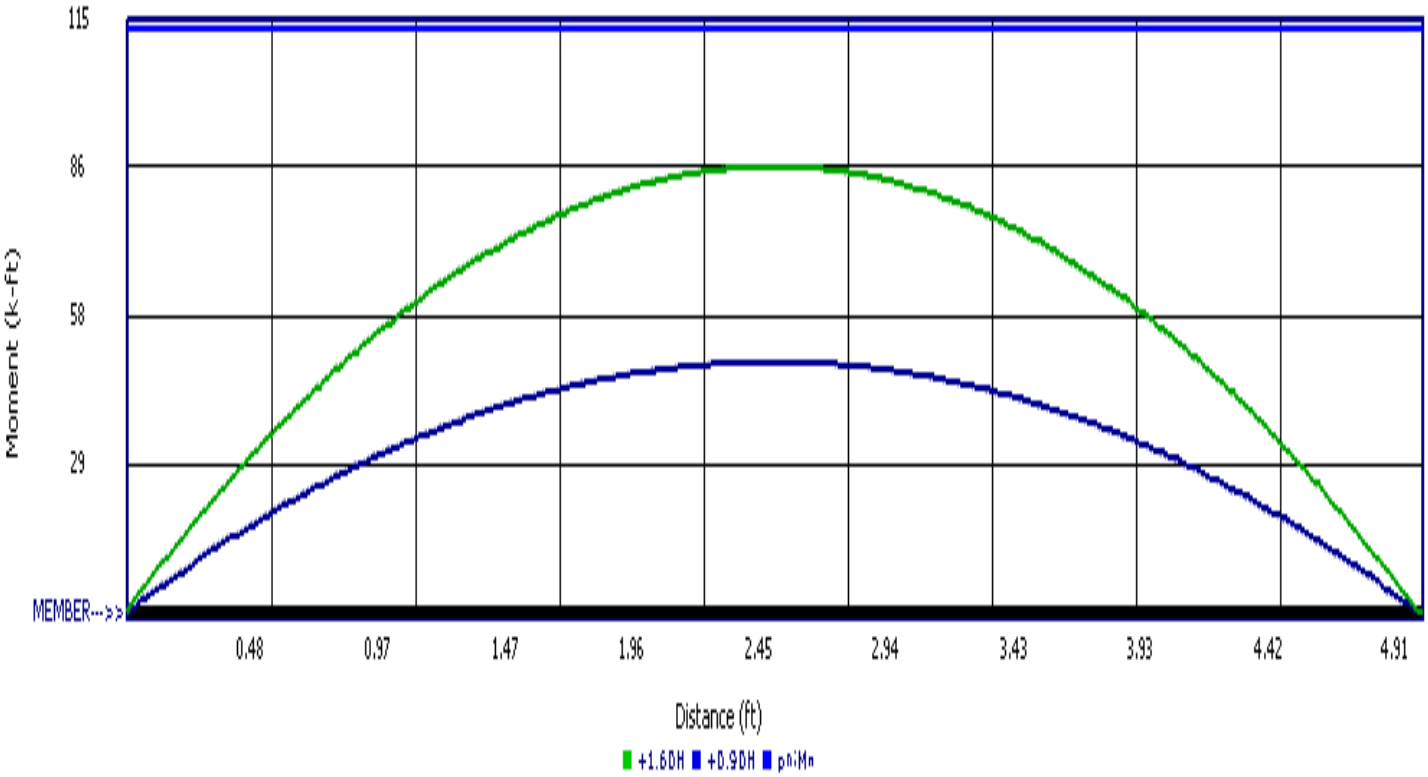
Between 2.16 to 2.84 ft, Vu < Phi*Vc / 2, Req'd Vs = Not Reqd per 9.6.3.1, Stirrups are not required.
Between 2.85 to 3.20 ft, Phi*Vc / 2 < Vu <= Phi*Vc, Req'd Vs = Min per 9.6.3.1, use #3 stirrups spaced at 8.000 in
Between 3.21 to 4.99 ft, Phi*Vc < Vu, Req'd Vs = 47.772, use #3 stirrups spaced at 2.000 in

Maximum Forces & Stresses for Load Combinations

Load Combination Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	5.000	86.40	112.85	0.77
+1.60H					
Span # 1	1	5.000	86.40	112.85	0.77
+0.90H					
Span # 1	1	5.000	48.60	112.85	0.43

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft	Load Combination	Max. "+" Defl (in)	Location in Span (ft
H Only	1	0.0205	2.500		0.0000	0.000

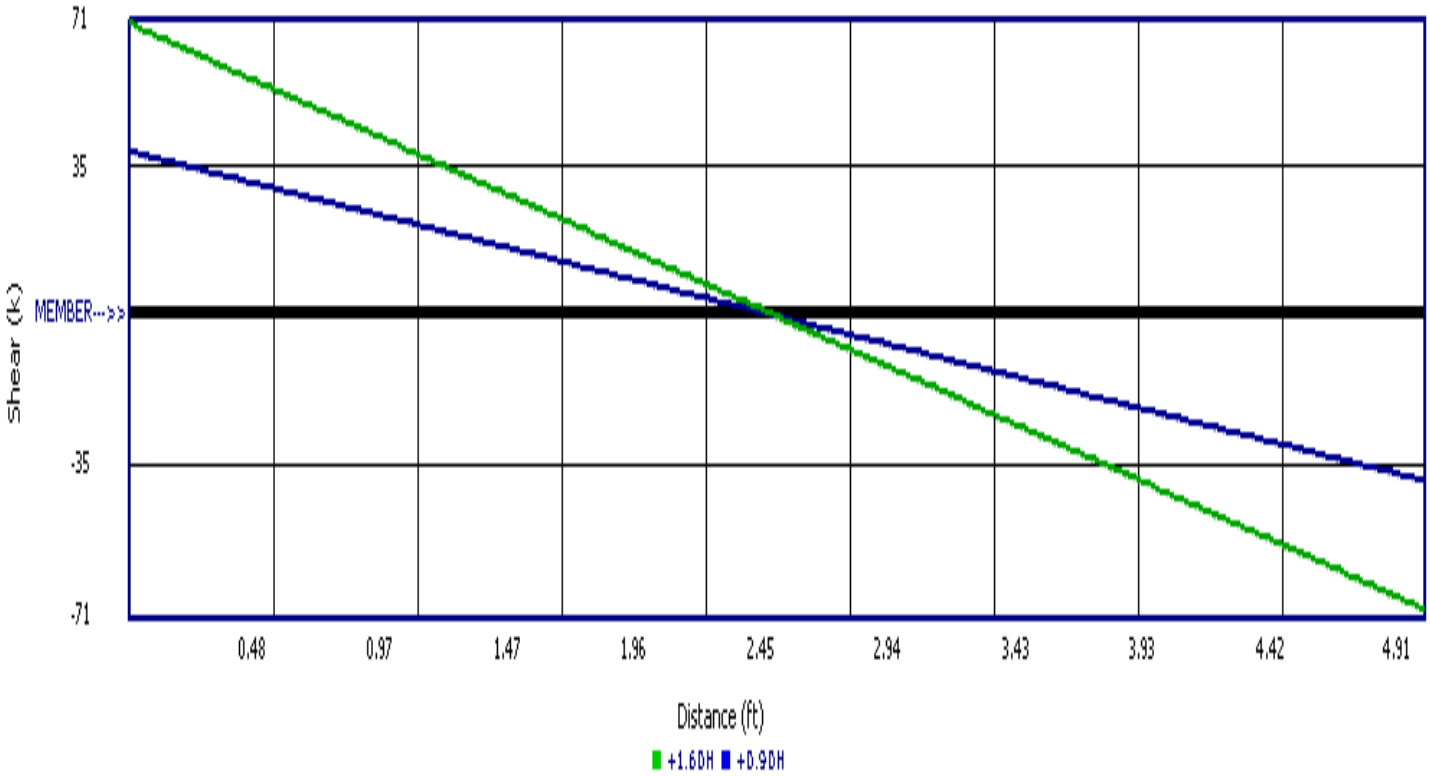


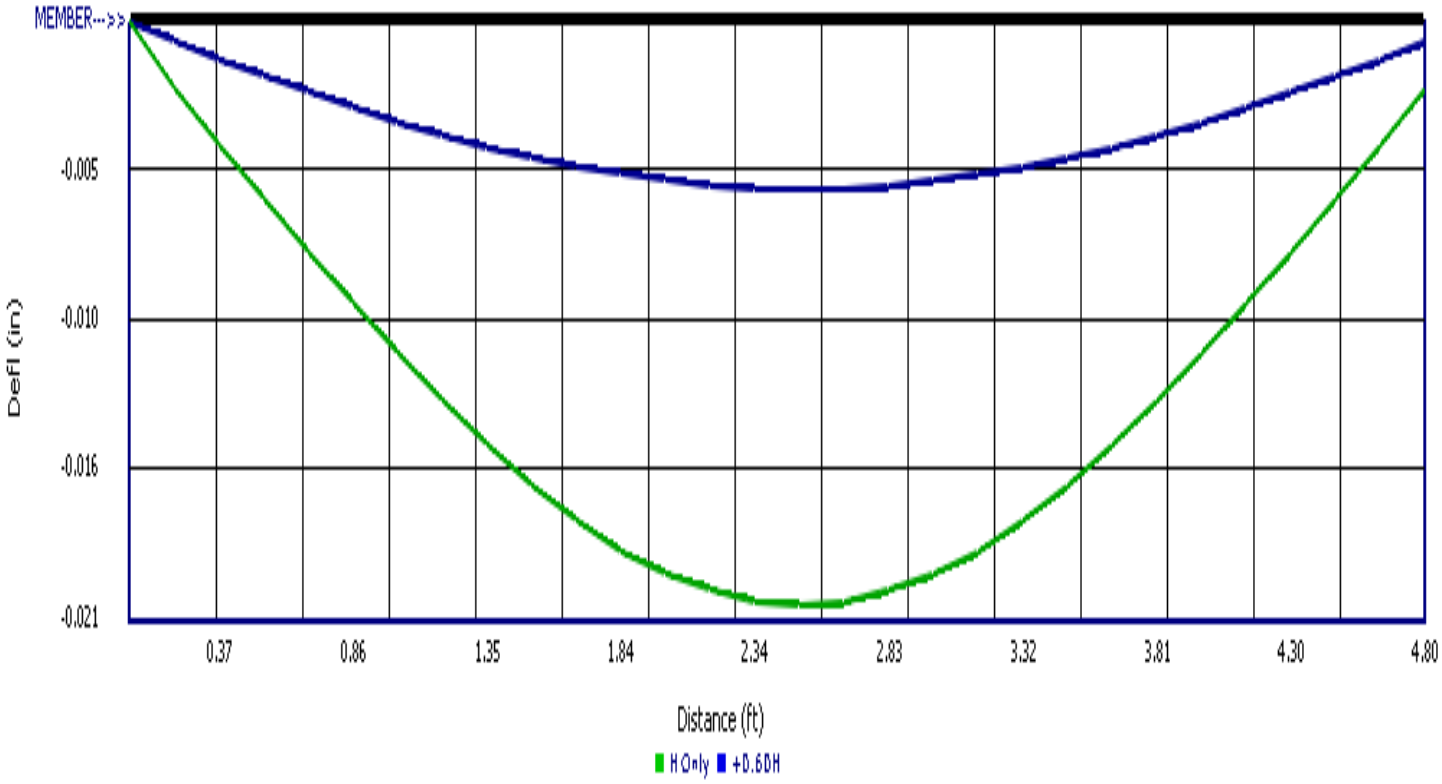
Concrete Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: RET WALL HORIZ SPAN





FLOOR 2 - LOWER LEVEL 2 FLOOR FRAMING

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

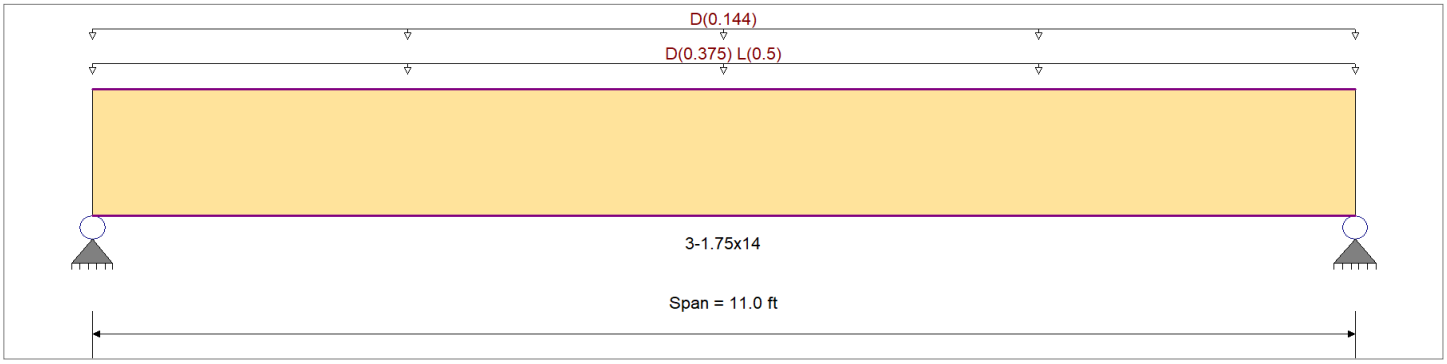
DESCRIPTION: 2b1

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2600 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2600 psi	Ebend- xx	2000 ksi
		Fc - Prll	2510 psi	Eminbend - xx	1016.535 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750 psi		
Wood Grade :	MicroLam LVL 2.0 E	Fv	285 psi		
		Ft	1555 psi	Density	42.01 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 12.50 ft, (floor)
Uniform Load : D = 0.1440 , Tributary Width = 1.0 ft, (wall)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.424 : 1	Maximum Shear Stress Ratio	=	0.316 : 1
Section used for this span		3-1.75x14	Section used for this span		3-1.75x14
fb: Actual	=	1,078.42 psi	fv: Actual	=	90.17 psi
F'b	=	2,546.06 psi	F'v	=	285.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	5.500 ft	Location of maximum on span	=	9.836 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.069 in	Ratio =	1912	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.141 in	Ratio =	938	>=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.240	0.179	0.90	1.00	1.00	1.00	0.979	1.00	1.00	1.00	7.85	549.3	2,291.5	2.25	45.9	256.5
+D+L					1.00	1.00	1.00	0.979	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.424	0.316	1.00	1.00	1.00	1.00	0.979	1.00	1.00	1.00	15.41	1,078.4	2,546.1	4.42	90.2	285.0
+D+0.750L					1.00	1.00	1.00	0.979	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.297	0.222	1.25	1.00	1.00	1.00	0.979	1.00	1.00	1.00	13.52	946.1	3,182.6	3.88	79.1	356.3
+0.60D					1.00	1.00	1.00	0.979	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.081	0.060	1.60	1.00	1.00	1.00	0.979	1.00	1.00	1.00	4.71	329.6	4,073.7	1.35	27.6	456.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 2b1

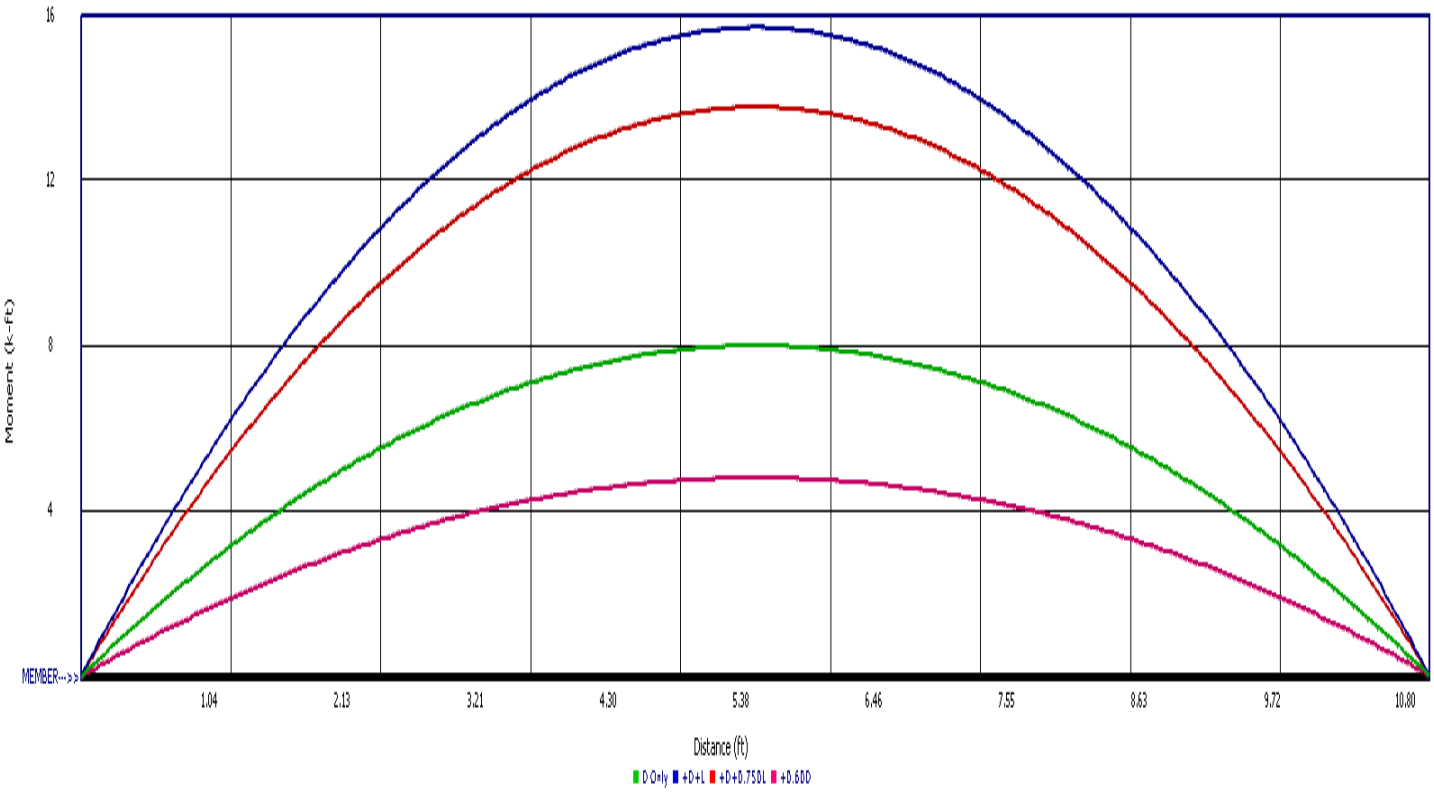
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1406	5.540		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	5.605	5.605
Max Upward from Load Combinations	5.605	5.605
Max Upward from Load Cases	2.855	2.855
D Only	2.855	2.855
+D+L	5.605	5.605
+D+0.750L	4.917	4.917
+0.60D	1.713	1.713
L Only	2.750	2.750

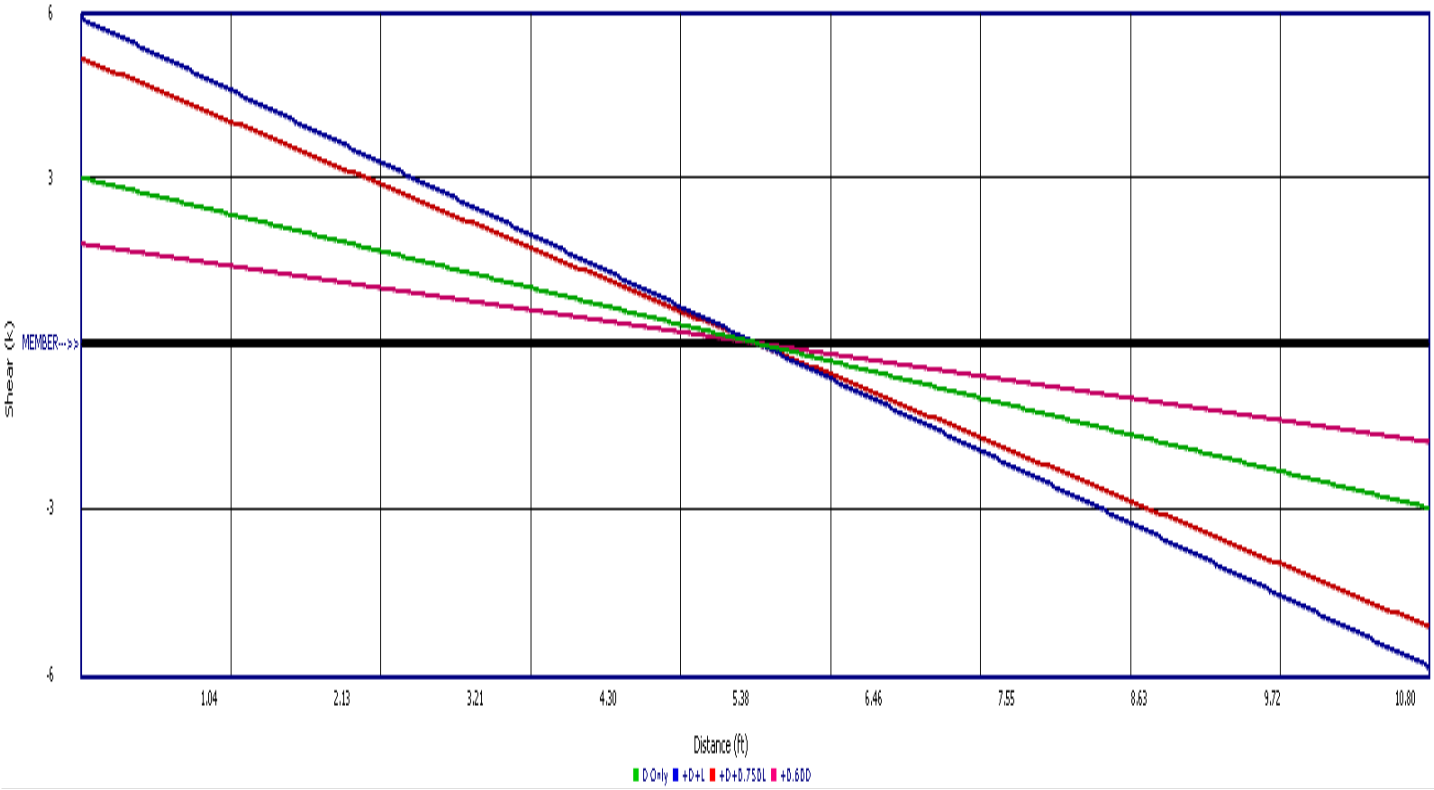


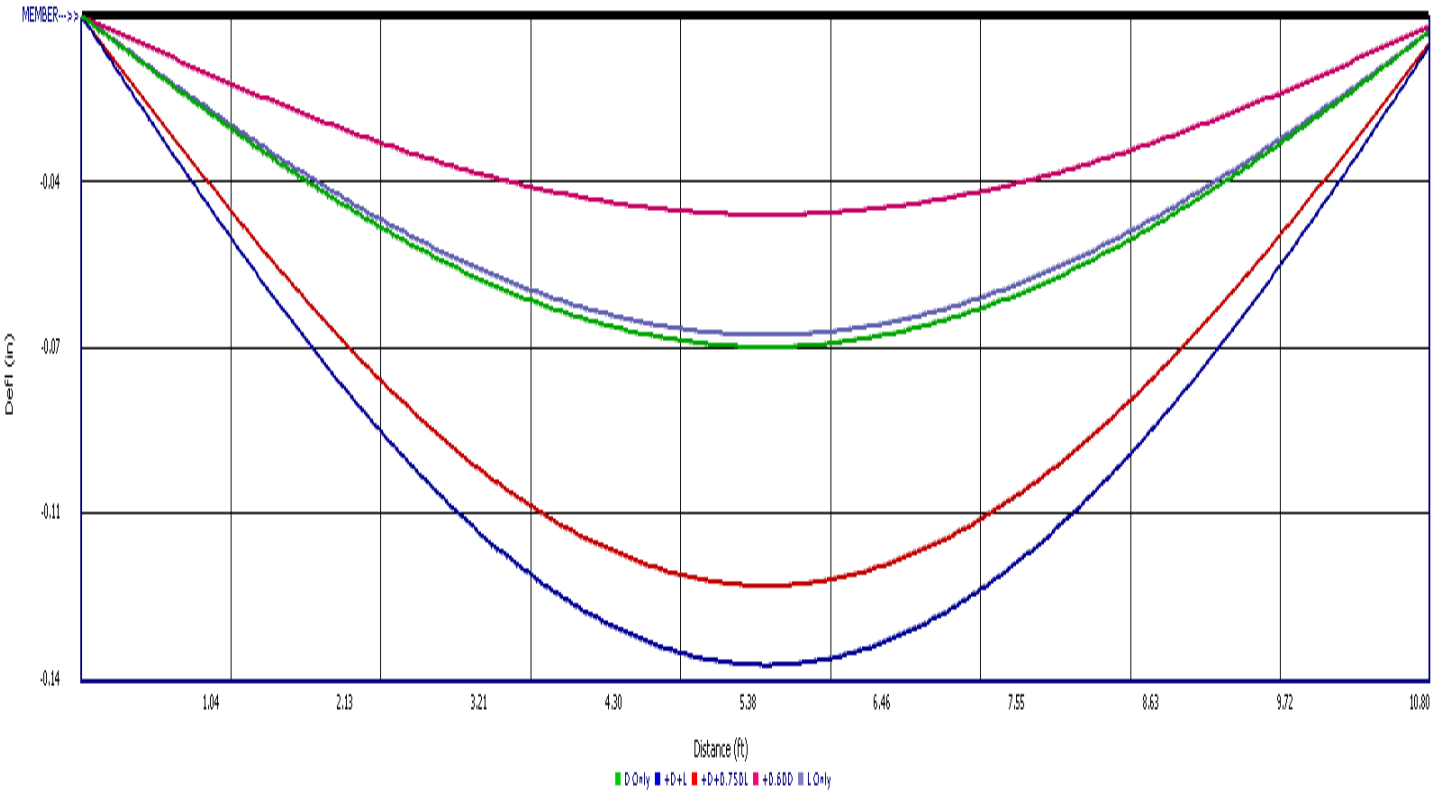
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 2b1





Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

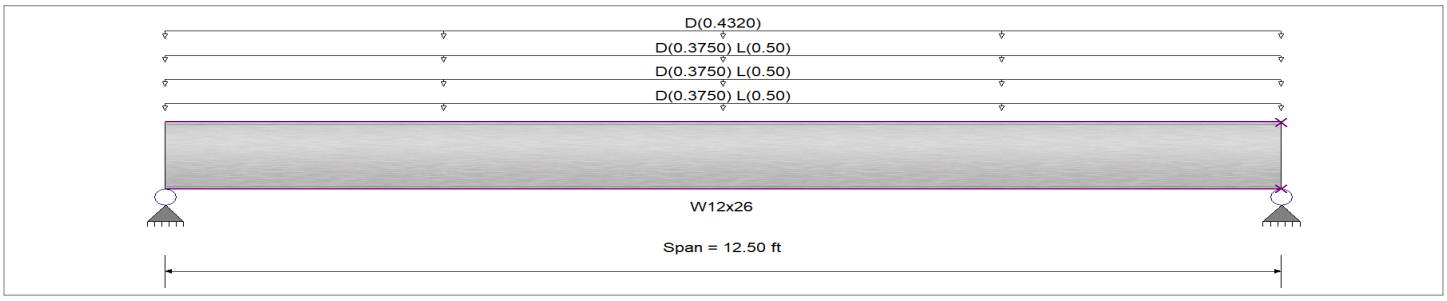
DESCRIPTION: 2B2

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 12.50 ft, (FLOOR 4)

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 12.50 ft, (FLOOR 3)

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 12.50 ft, (FLOOR 2)

Uniform Load : D = 0.4320 k/ft, Tributary Width = 1.0 ft, (WALLS)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.649** : 1	Maximum Shear Stress Ratio =	**0.343** : 1
Section used for this span	**W12x26**	Section used for this span	**W12x26**
Ma : Applied	60.215 k-ft	Va : Applied	19.269 k
Mn / Omega : Allowable	92.814 k-ft	Vn/Omega : Allowable	56.120 k
Load Combination	+D+L	Load Combination	+D+L
		Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.140 in	Ratio =	1,072	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.288 in	Ratio =	522	>=240.	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	<240.0	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values						Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	VnxVnx/Omega
D Only												
Dsgn. L = 12.50 ft	1	0.333	0.176	30.92		30.92	155.00	92.81	1.00	1.00	9.89	84.18	56.12
+D+L												
Dsgn. L = 12.50 ft	1	0.649	0.343	60.21		60.21	155.00	92.81	1.00	1.00	19.27	84.18	56.12
+D+0.750L												
Dsgn. L = 12.50 ft	1	0.570	0.302	52.89		52.89	155.00	92.81	1.00	1.00	16.93	84.18	56.12
+0.60D												
Dsgn. L = 12.50 ft	1	0.200	0.106	18.55		18.55	155.00	92.81	1.00	1.00	5.94	84.18	56.12

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.2876	6.286		0.0000	0.000

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 2B2

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Span	Max. Upward Defl	Location in Span
D Only	1	0.1477	6.286		0.0000	0.000
+D+L	1	0.2876	6.286		0.0000	0.000
+D+0.750L	1	0.2526	6.286		0.0000	0.000
+0.60D	1	0.0886	6.286		0.0000	0.000
L Only	1	0.1399	6.286		0.0000	0.000

Vertical Reactions

Support notation : Far left is #: Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	19.269	19.269
Max Upward from Load Combinations	19.269	19.269
Max Upward from Load Cases	9.894	9.894
D Only	9.894	9.894
+D+L	19.269	19.269
+D+0.750L	16.925	16.925
+0.60D	5.936	5.936
L Only	9.375	9.375

Steel Section Properties : W12x26

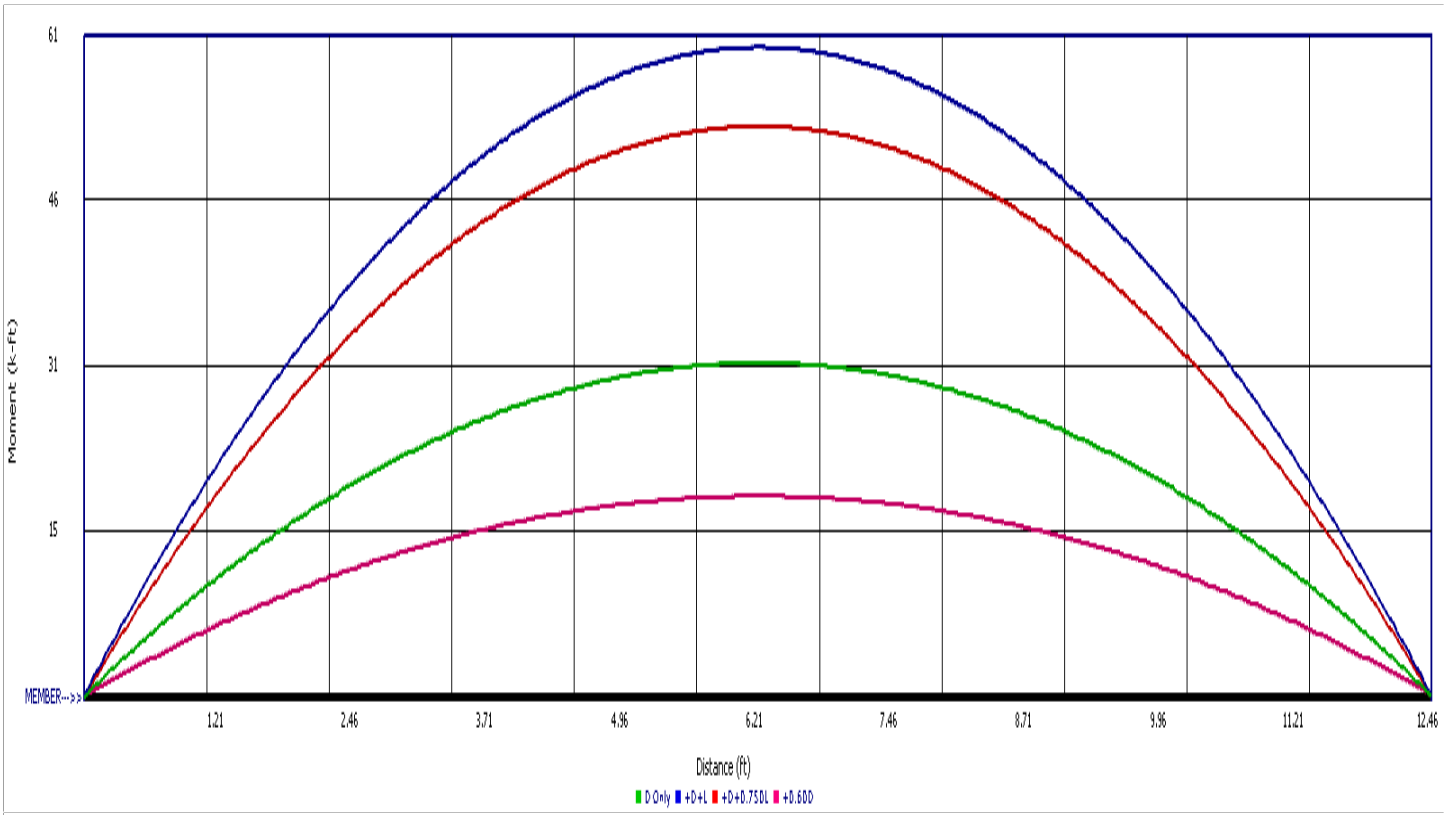
Depth	=	12.200	in	I xx	=	204.00	in^4	J	=	0.300	in^4
Web Thick	=	0.230	in	S xx		33.40	in^3	Cw	=	607.00	in^6
Flange Width	=	6.490	in	R xx	=	5.170	in				
Flange Thick	=	0.380	in	Zx	=	37.200	in^3				
Area	=	7.650	in^2	I yy	=	17.300	in^4				
Weight	=	26.000	plf	S yy	=	5.340	in^3	Wno	=	19.200	in^2
Kdesign	=	0.680	in	R yy	=	1.510	in	Sw	=	11.800	in^4
K1	=	0.750	in	Zy	=	8.170	in^3	Qf	=	7.030	in^3
rts	=	1.750	in					Qw	=	18.300	in^3
Ycg	=	6.100	in								

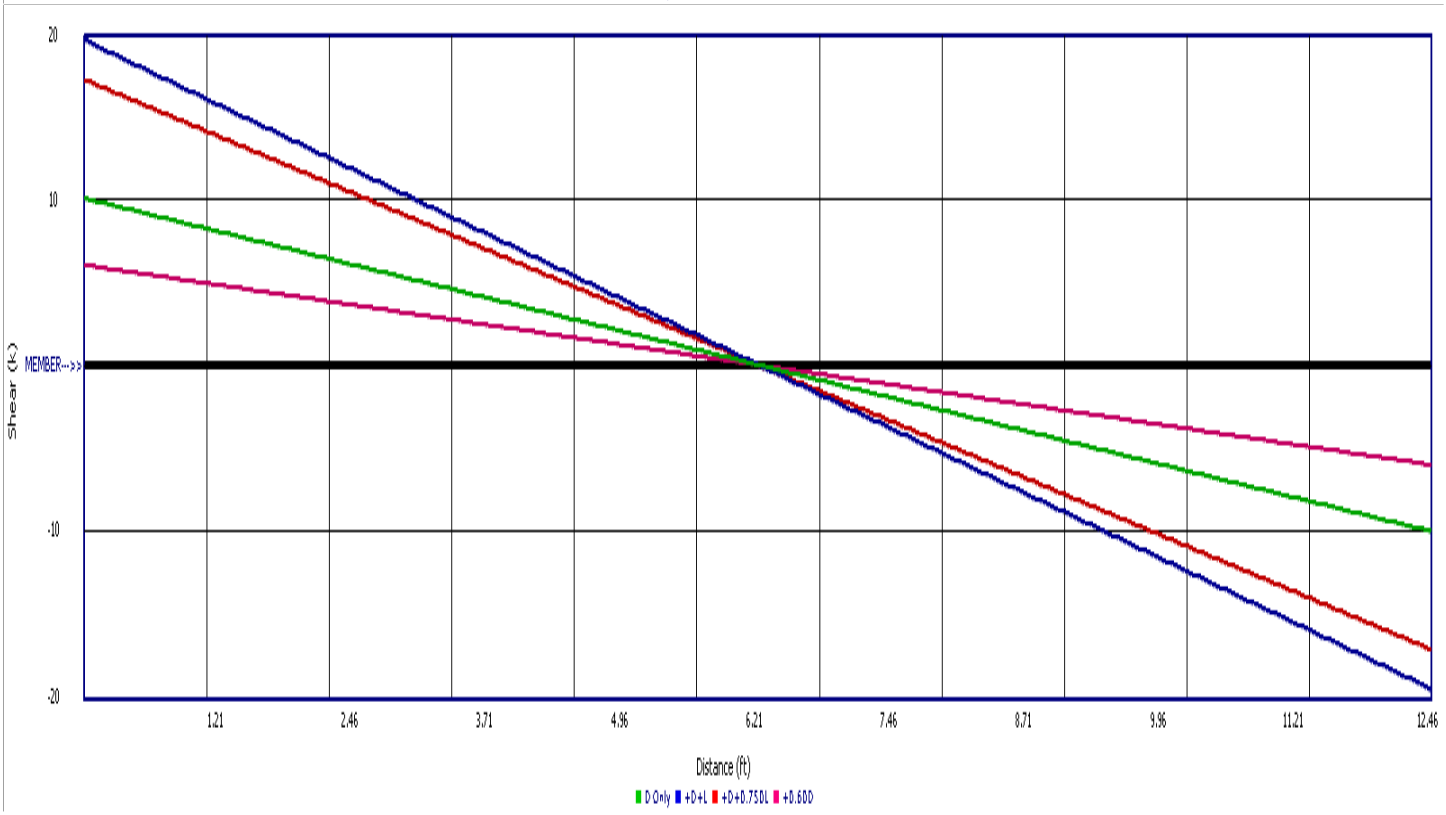
Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 2B2



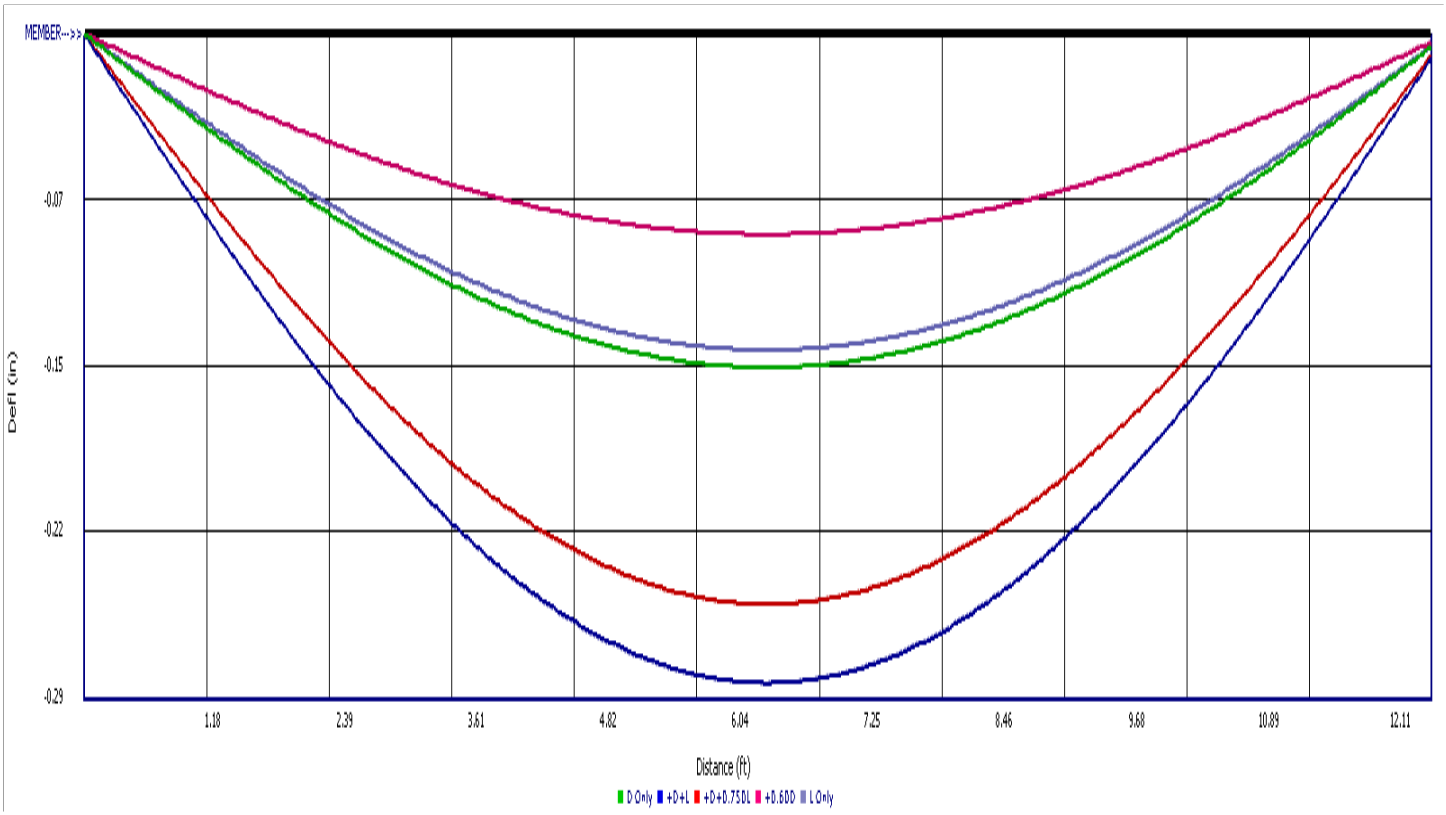


Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 2B2



Project Title:
Engineer:
Project ID:
Project Descr:

Concrete Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

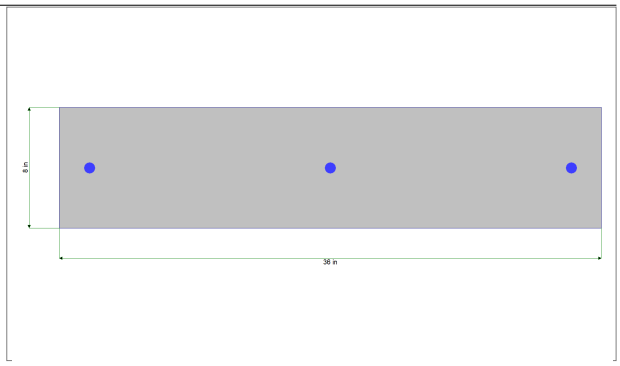
DESCRIPTION: ONE-WAY GARAGE SLAB (Point Loads)

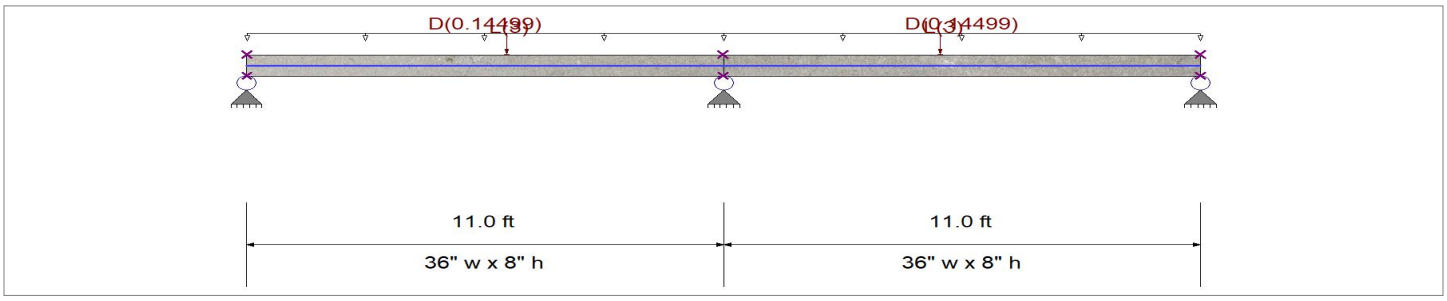
CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

General Information

f'c	=	5.0 ksi	ϕ Phi Values	Flexure :	0.90
fr = $f'c^{1/2}$ * 7.50	=	530.33 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.80
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups		40.0 ksi
fy - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #		3
			Number of Resisting Legs Per Stirrup	=	2





Cross Section & Reinforcing Details

Rectangular Section, Width = 36.0 in, Height = 8.0 in
Span #1 Reinforcing....
3-#6 at 4.0 in from Top, from 0.0 to 11.0 ft in this span
Span #2 Reinforcing....
3-#6 at 4.0 in from Bottom, from 0.0 to 11.0 ft in this span

Beam self weight calculated and added to loads
Load for Span Number 1
Point Load : L = 3.0 k @ 6.0 ft, (Car Jack)
Uniform Load : D = 0.04833 ksf, Tributary Width = 3.0 ft, (4" Topping Slab)
Load for Span Number 2
Uniform Load : D = 0.04833 ksf, Tributary Width = 3.0 ft, (4" Topping Slab)
Point Load : L = 3.0 k @ 5.0 ft, (Car Jack)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio = **0.810** : 1

Section used for this span	**Typical Section**	
Mu : Applied	-18.011	k-ft
Mn * Phi : Allowable	22.223	k-ft
Location of maximum on span	0.000	ft
Span # where maximum occurs	Span # 2	

Maximum Deflection

Max Downward Transient Deflection	0.021 in	Ratio =	6293	>=360.0	L Only, LL Comb Run (L*)
Max Upward Transient Deflection	-0.009 in	Ratio =	14947	>=360.0	L Only, LL Comb Run (*L)
Max Downward Total Deflection	0.033 in	Ratio =	3985	>=180.0	Span: 2 : +D+L+H, LL Comb Run (*L)
Max Upward Total Deflection	0.000 in	Ratio =	0	<180.0	Span: 2 : +D+L+H, LL Comb Run (*L)

Concrete Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: ONE-WAY GARAGE SLAB (Point Loads)

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	2.871	10.403	2.871
Max Upward from Load Combinations	2.871	10.403	2.871
Max Upward from Load Cases	1.794	5.981	1.794
Max Downward from all Load Conditions (Resisting Uplift	-0.287		-0.287
Max Downward from Load Cases (Resisting Uplift)	-0.287		-0.287
+D+H	1.794	5.981	1.794
+D+L+H, LL Comb Run (*L)	1.507	8.192	2.871
+D+L+H, LL Comb Run (L*)	2.871	8.192	1.507
+D+L+H, LL Comb Run (LL)	2.583	10.403	2.583
+D+Lr+H, LL Comb Run (*L)	1.794	5.981	1.794
+D+Lr+H, LL Comb Run (L*)	1.794	5.981	1.794
+D+Lr+H, LL Comb Run (LL)	1.794	5.981	1.794
+D+S+H	1.794	5.981	1.794
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	1.579	7.639	2.602
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	2.602	7.639	1.579
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	2.386	9.298	2.386
+D+0.750L+0.750S+H, LL Comb Run (*L)	1.579	7.639	2.602
+D+0.750L+0.750S+H, LL Comb Run (L*)	2.602	7.639	1.579
+D+0.750L+0.750S+H, LL Comb Run (LL)	2.386	9.298	2.386
+D+0.60W+H	1.794	5.981	1.794
+D+0.70E+H	1.794	5.981	1.794
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*L)	1.579	7.639	2.602
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*)	2.602	7.639	1.579
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LL)	2.386	9.298	2.386
+D+0.750L+0.750S+0.450W+H, LL Comb Run (*L)	1.579	7.639	2.602
+D+0.750L+0.750S+0.450W+H, LL Comb Run (L*)	2.602	7.639	1.579
+D+0.750L+0.750S+0.450W+H, LL Comb Run (LL)	2.386	9.298	2.386
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (*L)	1.579	7.639	2.602
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (L*)	2.602	7.639	1.579
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL)	2.386	9.298	2.386
+0.60D+0.60W+0.60H	1.077	3.589	1.077
+0.60D+0.70E+0.60H	1.077	3.589	1.077
D Only	1.794	5.981	1.794
L Only, LL Comb Run (*L)	-0.287	2.211	1.076
L Only, LL Comb Run (L*)	1.076	2.211	-0.287
L Only, LL Comb Run (LL)	0.789	4.422	0.789
H Only			

Shear Stirrup Requirements

Entire Beam Span Length : Vu < Phi*Vc / 2, Req'd Vs = Not Reqd per 9.6.3.1, Stirrups are not required.

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	11.000	-17.69	22.22	0.80
Span # 2	2	11.000	-18.01	22.22	0.81
+1.40D+1.60H					
Span # 1	1	11.000	-9.02	22.22	0.41
Span # 2	2	11.000	-9.21	22.22	0.41
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*L)					
Span # 1	1	11.000	-12.77	22.22	0.57
Span # 2	2	11.000	13.83	22.22	0.62
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L*)					
Span # 1	1	11.000	13.83	22.22	0.62
Span # 2	2	11.000	-12.95	22.22	0.58
+1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LL)					
Span # 1	1	11.000	-17.69	22.22	0.80
Span # 2	2	11.000	-18.01	22.22	0.81
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L)					
Span # 1	1	11.000	-12.77	22.22	0.57
Span # 2	2	11.000	13.83	22.22	0.62
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*)					

Concrete Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: ONE-WAY GARAGE SLAB (Point Loads)

Load Combination Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
Span # 1	1	11.000	13.83	22.22	0.62
Span # 2	2	11.000	-12.95	22.22	0.58
+1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL)					
Span # 1	1	11.000	-17.69	22.22	0.80
Span # 2	2	11.000	-18.01	22.22	0.81
+1.20D+1.60Lr+0.50L+1.60H, LL Comb Run (*L)					
Span # 1	1	11.000	-9.31	22.22	0.42
Span # 2	2	11.000	-9.48	22.22	0.43
+1.20D+1.60Lr+0.50L+1.60H, LL Comb Run (L*)					
Span # 1	1	11.000	-9.27	22.22	0.42
Span # 2	2	11.000	-9.48	22.22	0.43
+1.20D+1.60Lr+0.50L+1.60H, LL Comb Run (LL)					
Span # 1	1	11.000	-10.85	22.22	0.49
Span # 2	2	11.000	-11.06	22.22	0.50
+1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*L)					
Span # 1	1	11.000	-7.73	22.22	0.35
Span # 2	2	11.000	-7.90	22.22	0.36
+1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L*)					
Span # 1	1	11.000	-7.73	22.22	0.35
Span # 2	2	11.000	-7.90	22.22	0.36
+1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LL)					
Span # 1	1	11.000	-7.73	22.22	0.35
Span # 2	2	11.000	-7.90	22.22	0.36
+1.20D+0.50L+1.60S+1.60H, LL Comb Run (*L)					
Span # 1	1	11.000	-9.31	22.22	0.42
Span # 2	2	11.000	-9.48	22.22	0.43
+1.20D+0.50L+1.60S+1.60H, LL Comb Run (L*)					
Span # 1	1	11.000	-9.27	22.22	0.42
Span # 2	2	11.000	-9.48	22.22	0.43
+1.20D+0.50L+1.60S+1.60H, LL Comb Run (LL)					
Span # 1	1	11.000	-10.85	22.22	0.49
Span # 2	2	11.000	-11.06	22.22	0.50
+1.20D+1.60S+0.50W+1.60H					
Span # 1	1	11.000	-7.73	22.22	0.35
Span # 2	2	11.000	-7.90	22.22	0.36
+1.20D+0.50Lr+0.50L+W+1.60H, LL Comb Run (*L)					
Span # 1	1	11.000	-9.31	22.22	0.42
Span # 2	2	11.000	-9.48	22.22	0.43
+1.20D+0.50Lr+0.50L+W+1.60H, LL Comb Run (L*)					
Span # 1	1	11.000	-9.27	22.22	0.42
Span # 2	2	11.000	-9.48	22.22	0.43
+1.20D+0.50Lr+0.50L+W+1.60H, LL Comb Run (LL)					
Span # 1	1	11.000	-10.85	22.22	0.49
Span # 2	2	11.000	-11.06	22.22	0.50
+1.20D+0.50L+0.50S+W+1.60H, LL Comb Run (*L)					
Span # 1	1	11.000	-9.31	22.22	0.42
Span # 2	2	11.000	-9.48	22.22	0.43
+1.20D+0.50L+0.50S+W+1.60H, LL Comb Run (L*)					
Span # 1	1	11.000	-9.27	22.22	0.42
Span # 2	2	11.000	-9.48	22.22	0.43
+1.20D+0.50L+0.50S+W+1.60H, LL Comb Run (LL)					
Span # 1	1	11.000	-10.85	22.22	0.49
Span # 2	2	11.000	-11.06	22.22	0.50
+1.20D+0.50L+0.70S+E+1.60H, LL Comb Run (*L)					
Span # 1	1	11.000	-9.31	22.22	0.42
Span # 2	2	11.000	-9.48	22.22	0.43
+1.20D+0.50L+0.70S+E+1.60H, LL Comb Run (L*)					
Span # 1	1	11.000	-9.27	22.22	0.42
Span # 2	2	11.000	-9.48	22.22	0.43
+1.20D+0.50L+0.70S+E+1.60H, LL Comb Run (LL)					
Span # 1	1	11.000	-10.85	22.22	0.49
Span # 2	2	11.000	-11.06	22.22	0.50
+0.90D+W+0.90H					
Span # 1	1	11.000	-5.80	22.22	0.26
Span # 2	2	11.000	-5.92	22.22	0.27
+0.90D+E+0.90H					
Span # 1	1	11.000	-5.80	22.22	0.26
Span # 2	2	11.000	-5.92	22.22	0.27

Project Title:
Engineer:
Project ID:
Project Descr:

Concrete Beam

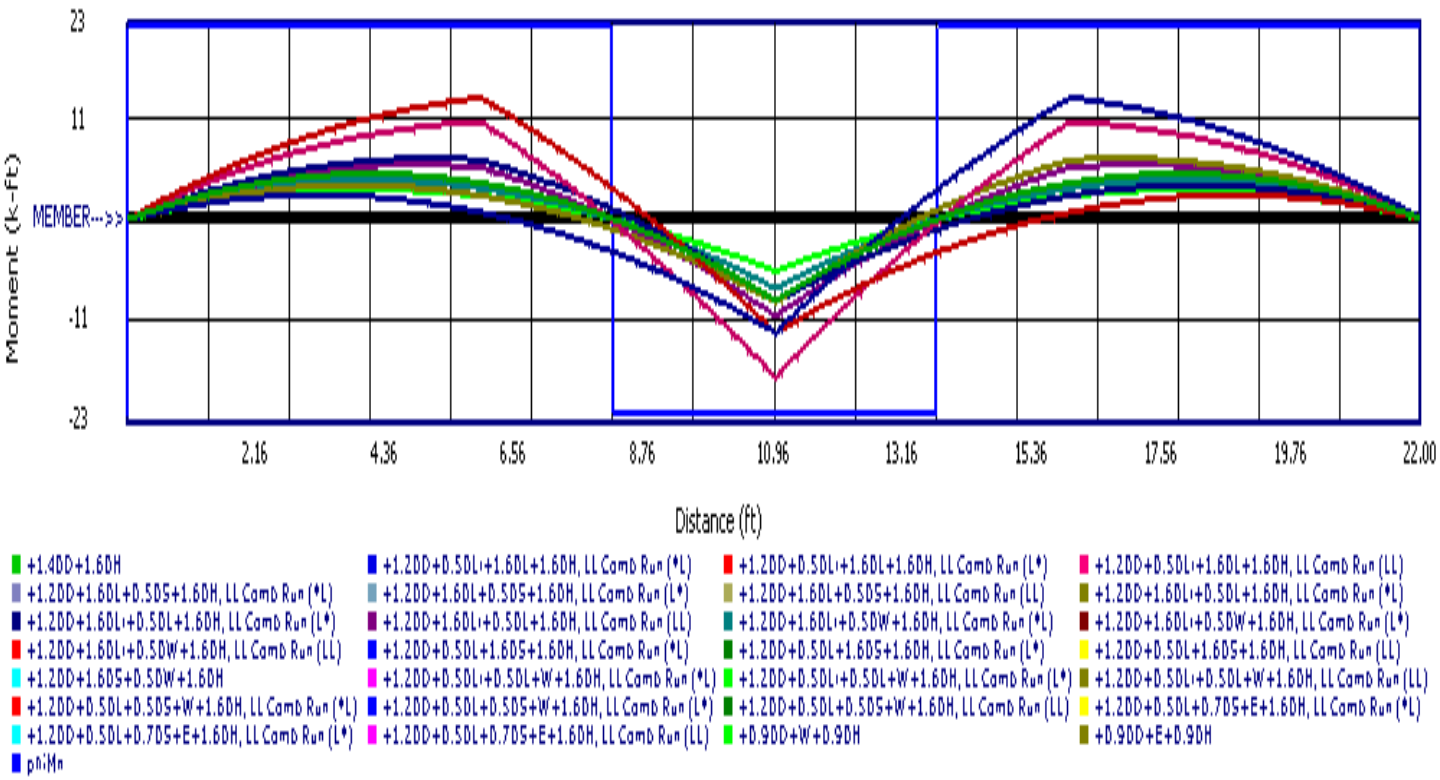
Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: ONE-WAY GARAGE SLAB (Point Loads)

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft	Load Combination	Max. "+" Defl (in)	Location in Span (ft
+D+L+H, LL Comb Run (L*)	1	0.0331	5.186		0.0000	0.000
+D+L+H, LL Comb Run (*L)	2	0.0331	5.814		0.0000	0.000

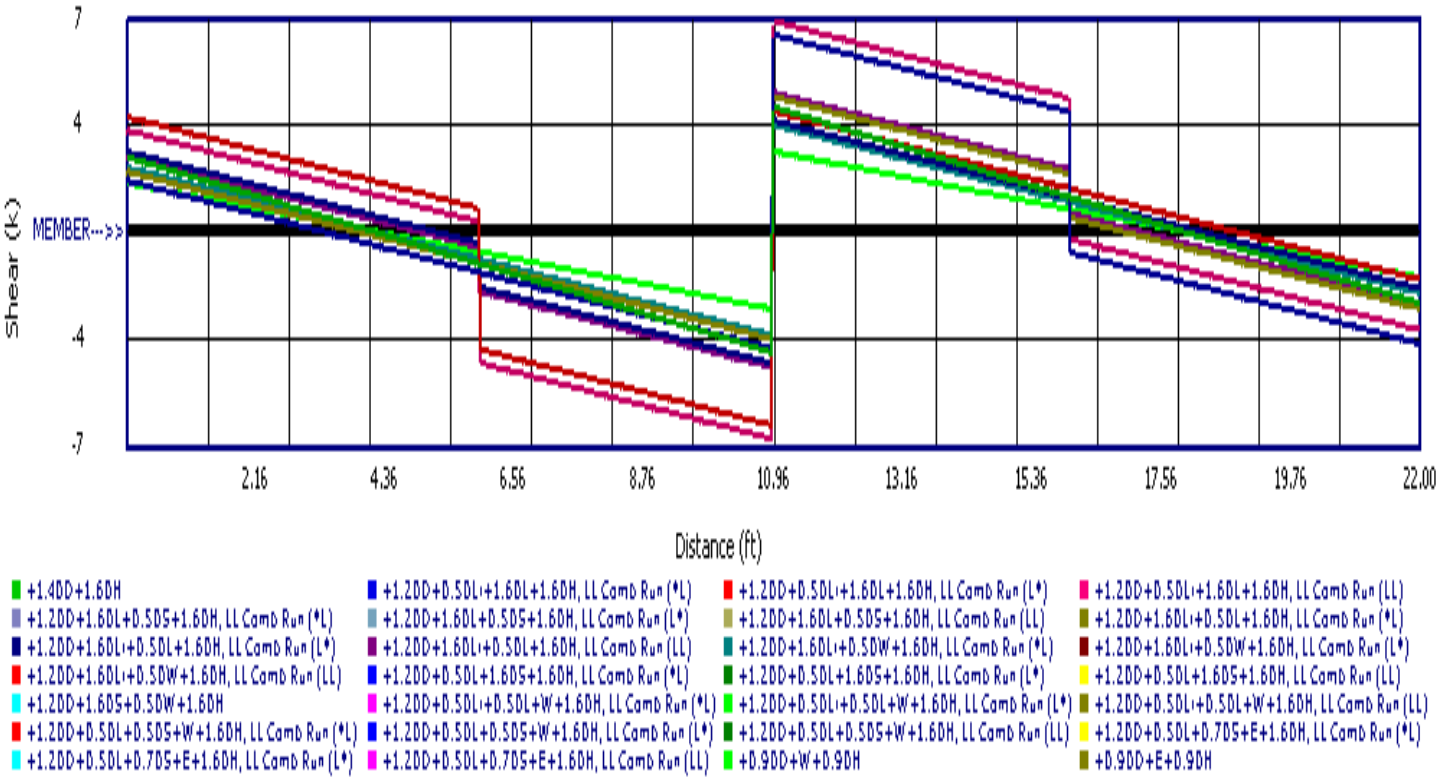


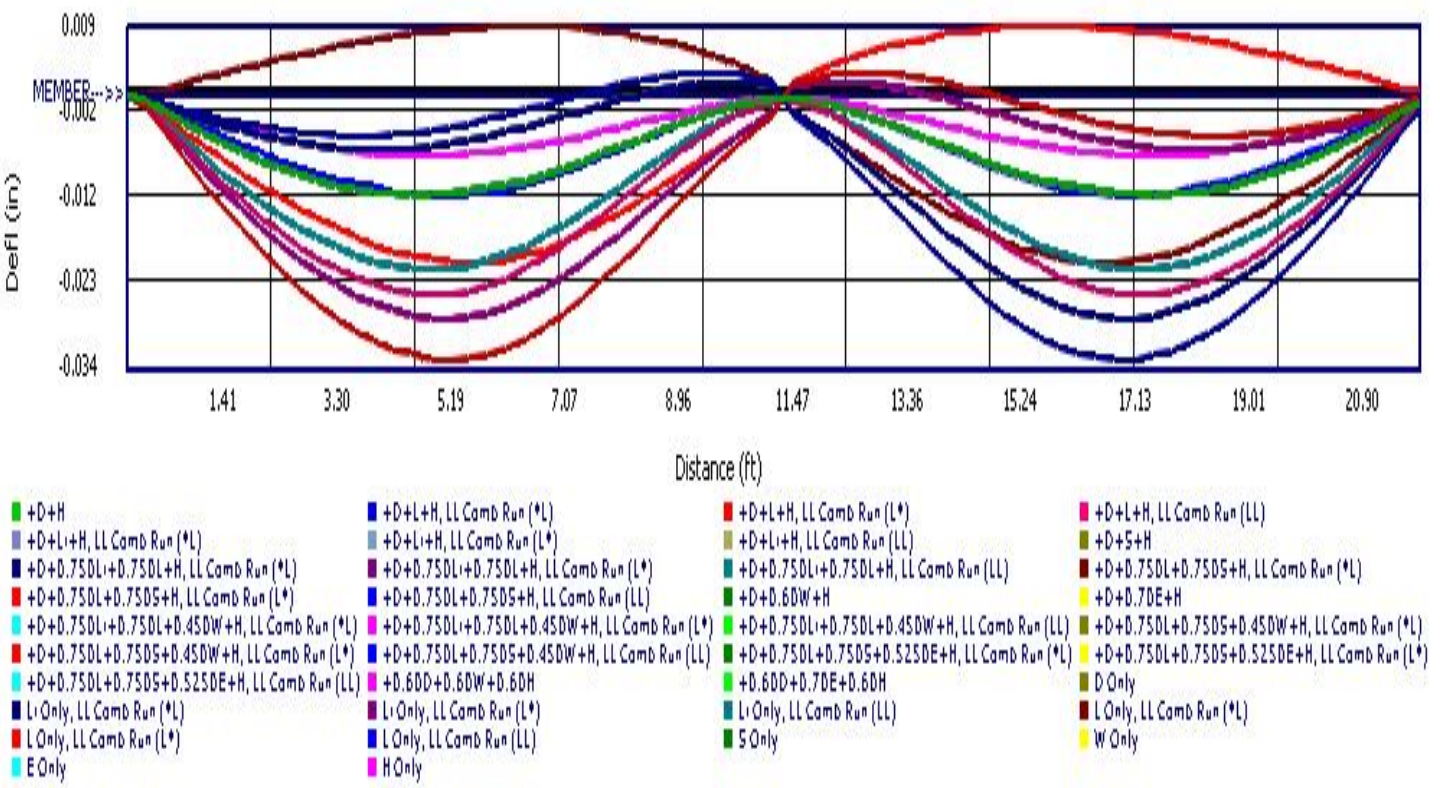
Concrete Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: ONE-WAY GARAGE SLAB (Point Loads)





Project Title:
Engineer:
Project ID:
Project Descr:

Concrete Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

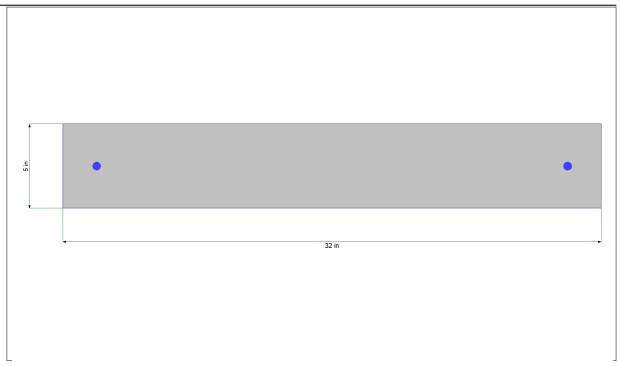
DESCRIPTION: ONE-WAY GARAGE SLAB ON GEOFOAM (Point Loads)

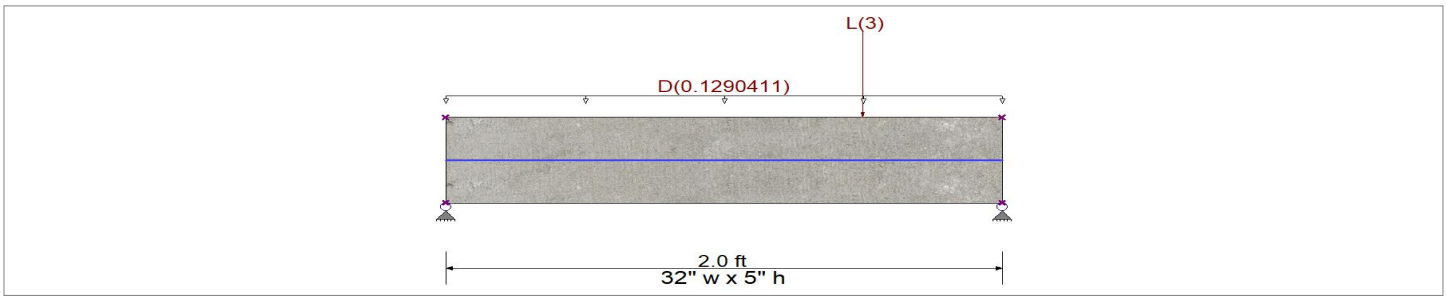
CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

General Information

f'c =	5.0 ksi	ϕ Phi Values	Flexure :	0.90
fr = $f'c^{1/2}$ * 7.50 =	530.33 psi		Shear :	0.750
ψ Density =	145.0 pcf	β_1 =		0.80
λ LtWt Factor =	1.0			
Elastic Modulus =	3,122.0 ksi	Fy - Stirrups		40.0 ksi
fy - Main Rebar =	60.0 ksi	E - Stirrups =		29,000.0 ksi
E - Main Rebar =	29,000.0 ksi	Stirrup Bar Size #		3
		Number of Resisting Legs Per Stirrup =		2





Cross Section & Reinforcing Details

Rectangular Section, Width = 32.0 in, Height = 5.0 in
Span #1 Reinforcing....
2-#4 at 2.50 in from Bottom, from 0.0 to 2.0 ft in this span

Beam self weight calculated and added to loads
Point Load : L = 3.0 k @ 1.50 ft, (Car Jack)
Uniform Load : D = 0.04833 ksf, Tributary Width = 2.670 ft, (4" Topping Slab)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.444**	: 1
Section used for this span	**Typical Section**	
Mu : Applied	1.928	k-ft
Mn * Phi : Allowable	4.341	k-ft
Location of maximum on span	1.497	ft
Span # where maximum occurs	Span # 1	

Maximum Deflection

Max Downward Transient Deflection	0.000 in	Ratio =	0	<360.0	L Only
Max Upward Transient Deflection	0.000 in	Ratio =	0	<360.0	L Only
Max Downward Total Deflection	0.000 in	Ratio =	0	<180.0	Span: 1 : +D+L+H
Max Upward Total Deflection	0.000 in	Ratio =	0	<180.0	Span: 1 : +D+L+H

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.040	2.540
Max Upward from Load Combinations	1.040	2.540
Max Upward from Load Cases	0.750	2.250
+D+H	0.290	0.290
+D+L+H	1.040	2.540
+D+Lr+H	0.290	0.290
+D+S+H	0.290	0.290

Concrete Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: ONE-WAY GARAGE SLAB ON GEOFOAM (Point Loads)

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
+D+0.750Lr+0.750L+H	0.853	1.978
+D+0.750L+0.750S+H	0.853	1.978
+D+0.60W+H	0.290	0.290
+D+0.70E+H	0.290	0.290
+D+0.750Lr+0.750L+0.450W+H	0.853	1.978
+D+0.750L+0.750S+0.450W+H	0.853	1.978
+D+0.750L+0.750S+0.5250E+H	0.853	1.978
+0.60D+0.60W+0.60H	0.174	0.174
+0.60D+0.70E+0.60H	0.174	0.174
D Only	0.290	0.290
L Only	0.750	2.250
H Only		

Shear Stirrup Requirements

Entire Beam Span Length : Vu < Phi*Vc / 2, Req'd Vs = Not Reqd per 9.6.3.1, Stirrups are not required.

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	2.000	1.93	4.34	0.44
+1.40D+1.60H					
Span # 1	1	2.000	0.20	4.34	0.05
+1.20D+0.50Lr+1.60L+1.60H					
Span # 1	1	2.000	1.93	4.34	0.44
+1.20D+1.60L+0.50S+1.60H					
Span # 1	1	2.000	1.93	4.34	0.44
+1.20D+1.60Lr+0.50L+1.60H					
Span # 1	1	2.000	0.69	4.34	0.16
+1.20D+1.60Lr+0.50W+1.60H					
Span # 1	1	2.000	0.17	4.34	0.04
+1.20D+0.50L+1.60S+1.60H					
Span # 1	1	2.000	0.69	4.34	0.16
+1.20D+1.60S+0.50W+1.60H					
Span # 1	1	2.000	0.17	4.34	0.04
+1.20D+0.50Lr+0.50L+W+1.60H					
Span # 1	1	2.000	0.69	4.34	0.16
+1.20D+0.50L+0.50S+W+1.60H					
Span # 1	1	2.000	0.69	4.34	0.16
+1.20D+0.50L+0.70S+E+1.60H					
Span # 1	1	2.000	0.69	4.34	0.16
+0.90D+W+0.90H					
Span # 1	1	2.000	0.13	4.34	0.03
+0.90D+E+0.90H					
Span # 1	1	2.000	0.13	4.34	0.03

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft	Load Combination	Max. "+" Defl (in)	Location in Span (ft
+D+L+H	1	0.0007	1.098		0.0000	0.000

Concrete Beam

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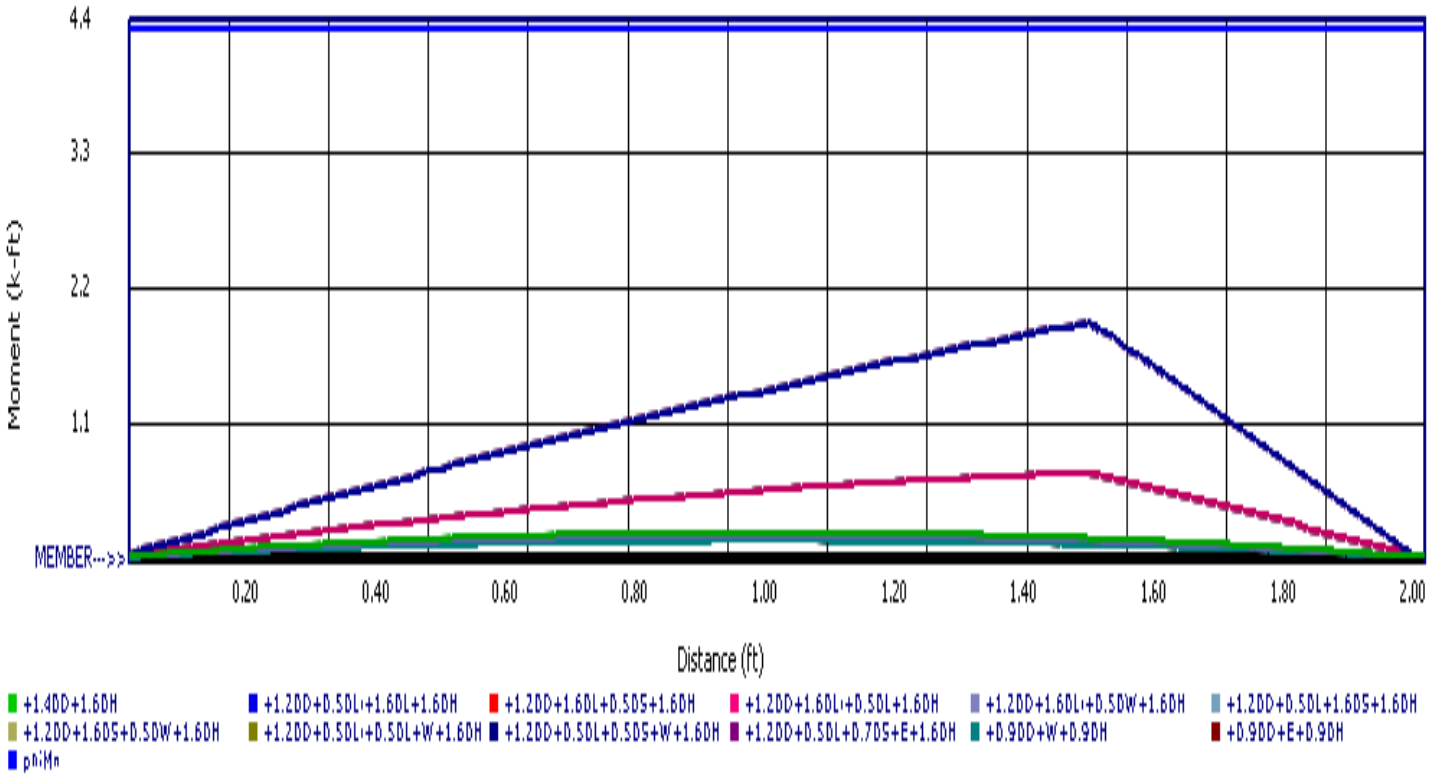
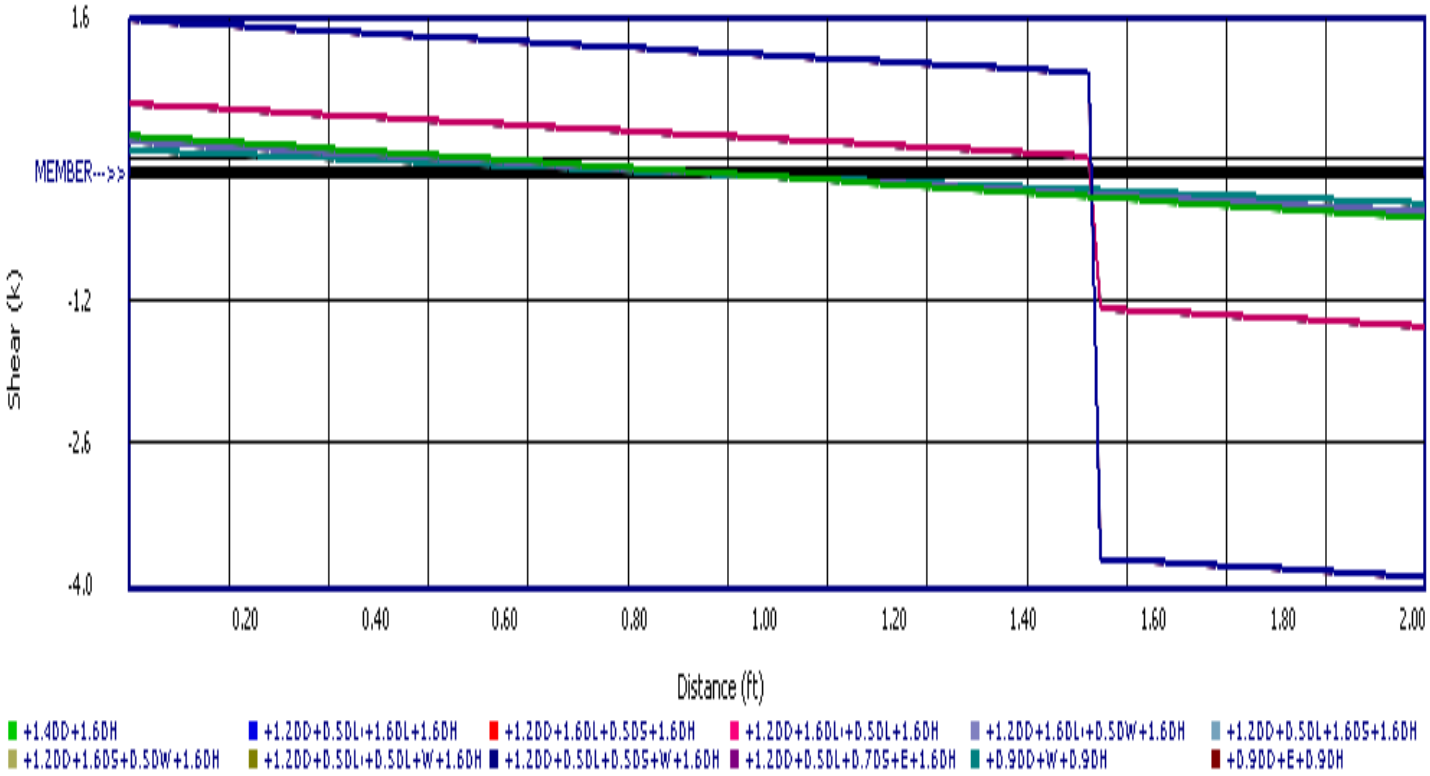
DESCRIPTION: ONE-WAY GARAGE SLAB ON GEOFOAM (Point Loads)





Concrete Beam

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DESCRIPTION: ONE-WAY GARAGE SLAB ON GEOFOAM (Point Loads)