sheet comes to a total weight of 1990 lbs. for each bent. Note that green timber can weigh up to 50% more than dry timber.

5.3 Vertical Center of Gravity

To raise each heavy frame we need to know its vertical center of gravity. Most heavy objects are picked up at a balance point in the middle, called the center of gravity (CG). The CG of our principal post is (168″÷ 2 = 84″/ 2134 mm).

When we stand the post up the 84″ center of gravity and its weight (288 lbs. becomes the vertical center of gravity (VCG). By adding more timber component CG and weights at different heights above ground, including diagonal members, the VCG changes. To figure out the bent VCG height, multiply each component weight by the height of its CG above ground (baseline), then add up those numbers (called moments of force), and divide the sum by the total bent weight.

Procedure:

1) Bent VCG = component wt. x ht. above ground ÷ bent wt.
Our project spreadsheet shows each bent weight to be 1990 lbs. and the total of the piece weight x height to be 313,924 in/lbs.
Bent VCG = 313,924 in/lbs ÷ 1990lbs
Bent VCG = 157.75″ or 13′ - 1¾″ above ground
2) According to these calculations, if we picked up our bent 13′ - 1¾″ (4007 mm) up from the base, it will be balanced. Since we will be tilting the bent up to vertical, we will move the point of attachment further up to the tops of the hammer posts where they connect to the rafters 19′ (5791 mm) from the base. By tilting versus lifting the frame less effort is required which is optimal for a crane that can lift straight up.

wt. = weight
ht. = height

5.4 Lifting Tackle Loads

So now we know if a crane were to pick up the frame bent at its VCG, then it would be lifting the entire bent weight and the VLF (Vertical Lifting Force) would be equal to the bent weight. By shifting the attachment point further up and tilting the bent up into position, less effort is required. As shown in our calculation the VLF is 1377 lbs.

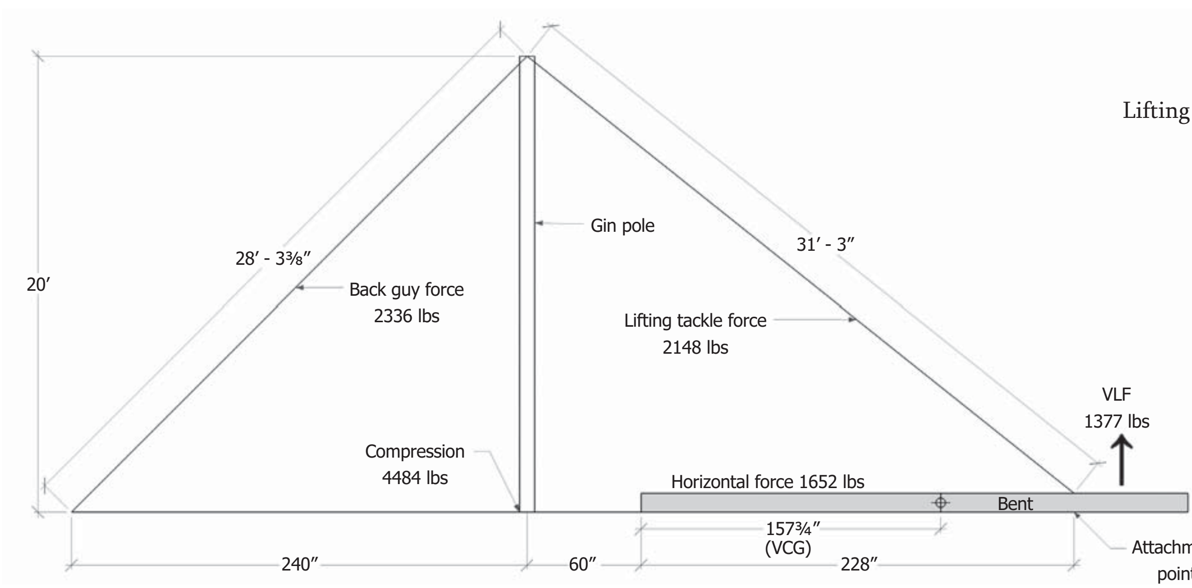

Figure 5-1
Lifting Tackle Loads