



## Column Variance Application 800 Williamson Street Grocery Store Amendment dated 1.14.2015

WholeTrees Structures submitted a variance application on Tuesday, January 6<sup>th</sup>, 2015. The purpose of this amendment is to correct minor inaccuracies in that application.

A summary of the application and its documentation was included on the cover page of the variance petition:

"Type IIB construction allows a 0 fire rating on all primary structural systems (IBC Section 601, Table 601). To counter this lack of prescribed fire resistance, Type IIB construction must minimize the use of combustible fuels allowed in construction. WholeTrees Structures (located in Madison, WI) will provide 12 heavy timber columns that meet and EXCEED the degree of health, safety, and welfare addressed by the Type IIB rule for 3 reasons: 1) Heavy Timber Columns perform better in fire than the fire resistance rating required in Type IIB construction (0 hours required). These 12 Heavy Timber Columns will have a fire resistance rating of >1.5 hours, which EXCEEDS Type IIB column requirements by 1.5 hours (see attached documentation); 2) Heavy Timber Columns do not provide the fuel for fires that Type IIB construction is trying to avoid when it prohibits combustible materials (see attached documentation); 3) These 12 columns will improve health and welfare of forests and the economies they support because they build a market for the use of superior structural systems sourced regionally, and from sustainably-managed urban and rural forests (See attached documentation)."

This is the stanza WholeTrees wishes to amend with more accuracy:

"This building will have 2 heavy timber columns with > 1.5hr fire resistance rating supporting the roof system, and 10 heavy timber columns with > 1.5hr fire resistance rating supporting a mezzanine."

- WholeTrees is supplying 6 columns that will support roof loads, and 6 columns supporting floor loads for office space above.
- All floor-load columns will have minimum diameters of 18", which calculates to 1.5 hour fire-resistance rating using the documentation in our variance application.
- 2 roof load columns will have mid span diameters of 18" with minimum top diameters of 15" or greater. Top diameters will be 20' or more above the floor. 15" minimum diameters at the top of the column will calculate to a 76 minute fire-resistance rating at the top of the column. (see documentation in original variance). *These 2 columns could be oversized to meet any concerns from the fire department or inspections department, but are not structurally required to be any larger.*
- 4 roof-load columns will support their loads with symmetrical structural branches. These columns will have an 18" diameter at midspan, where structural loads are at their strongest. Branches will occur 20' or more above the floor and will have minimum diameters of 9". This equates to a fire resistance rating of 46 minutes at the top-most portion of the column. *These 4 branched columns could be oversized to meet any concerns from the fire department or inspections department, but are not structurally required to be any larger.*
- In the calculations we used in our Variance, we chose a conservative "z" of 1.0 for this equation (z= load on columns as percent of design load):  
Columns:  $2.54Zb [3-(d/b)]$  for columns which may be exposed to fire on four sides (Equation 7-20)

We have since learned that our initial z at time of installation will be between 80-93%, and as material seasons in situ, will decrease to between 60%-70%. This diminishing z INCREASES all fire-resistance ratings listed in the initial variance application, as well as all ratings listed above.