As you have come to expect, MiTek engineering software is a very powerful tool. One more example of this is the wide range of options you have available when considering wind loads and wind load cases. Magnitudes of wind loads and their application on a structure are called out in the design standard ASCE-7, Minimum Design Loads for Building and Other Structures.

It cannot be emphasized enough that the Engineer of Record (EOR) or Building Designer (BD) is responsible to provide you all the criteria you need to design a truss component that will go into the final structure. Wind loading is the most complicated of the live loads considered on a truss component design and requires the most input to get the most accurate results.

Figure 1 shows a generic input screen of the Wind Loading fields. Within this screen there are fields that have drop down lists. Some of which will add more input fields.

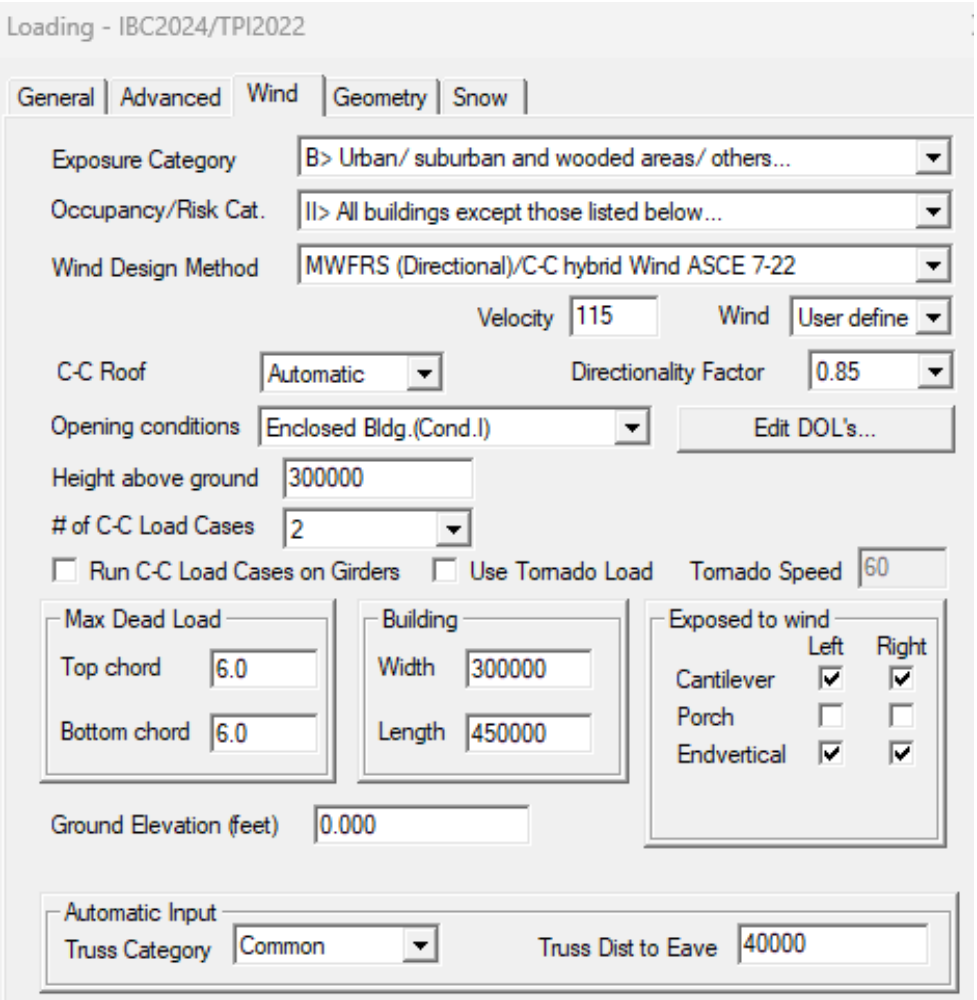

Figure 1 – General Wind Load Tab

Exposure Category – This is the same as the "Terrain Exposure" under the Snow Load tab. A change here will also change the "Terrain Exposure" in the Snow tab and vice versa when in the Snow tab. This factor considers the obstacles (trees and other structures) according to the

height and distance from the structure that could affect the wind loads on the truss component. There are three options.

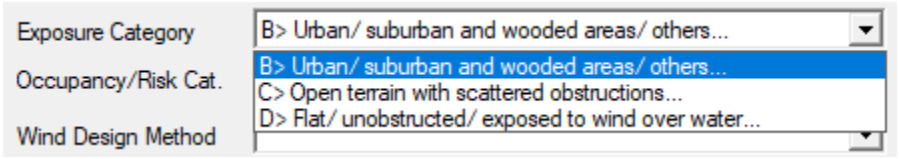

Figure 2 – Exposure Category Options

Occupancy/Risk Cat. - This is the same as the "Occupancy/Risk Category" under the Snow load tab. A change here will also change the "Occupancy/Risk Category" in the Snow tab and vice versa when in the Snow tab.

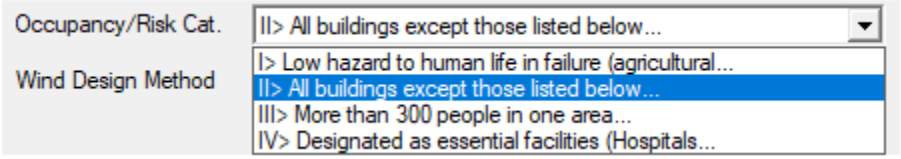

Figure 3 – Occupancy/Risk Category Options

Wind Design Method – See Figure 4 for options available. For your standard designing we recommend using either of the two methods that combines both MWFRS (The Main Wind Force Resisting System) and C-C (Components and Cladding). One of the MWFRS methods should be specified by the EOR or the BD. The Directional method is for buildings of all heights while the Envelope is for buildings with heights <= 60'-0".
When using one of these combined methods the design will be checked for both the MWFRS and C-C load conditions. The reactions reported will be from the MWFRS method, lower wind pressures, while the truss members and joints will be checked using the heavier C-C loads.

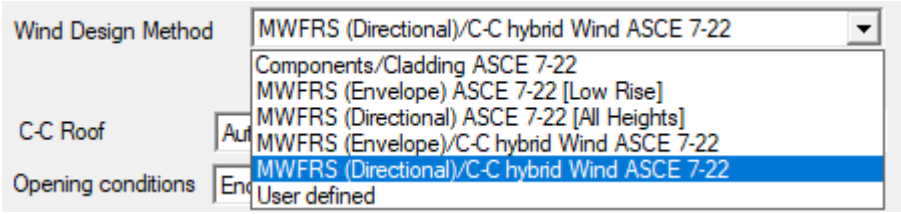

Figure 4 – Options for Wind Design Method

Velocity – The Design Wind Speed (mph) should be called out on the plans. The wind speed provided will be the "Ultimate" wind speed and the software will adjust this to the "Allowable" wind speed used with the Allowable Stress Design method we use today.

Wind – This should always be set to "User Defined".

C-C Roof – There are three options, see Figure 5. The location of the truss component within the roof system will dictate the winds loads that need to be considered. "Automatic" will load

the truss based on the additional information seen in Figure 6. Both Gable and Hip will load truss accordingly.

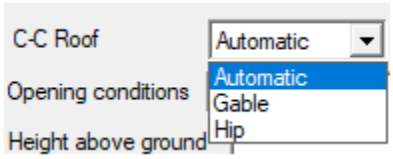

Figure 5 – C-C Roof Options

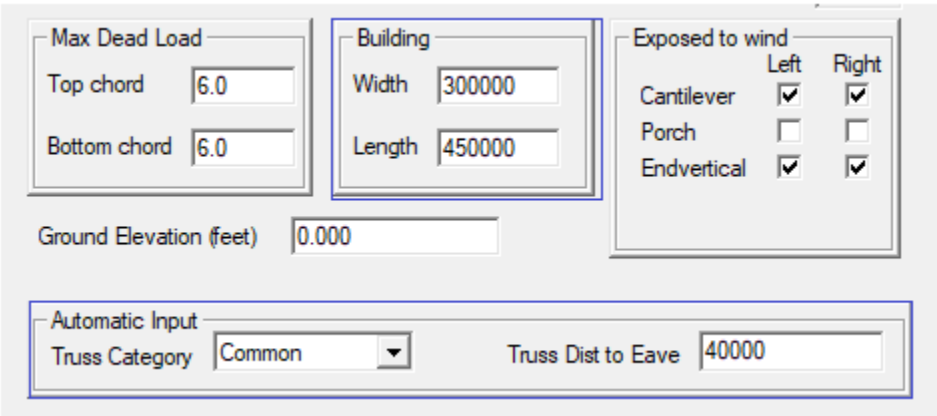

Figure 6 – C-C Extra Input for Automatic Roof

Directionality Factor – For Buildings, this factor is 0.85 per ASCE 7 and the program defaults to 0.85, use caution if you are changing this.

Opening Conditions – For all the procedures, the options available are "Enclosed Bldg (Cond. I)", "Partially Enclosed (Cond. II)", and "Partially Open (Cond. IV)". Under the Components/Cladding and MWFRS (Directional) procedures you will find "Open Bldg (Cond. III)". See Wind section of ASCE 7 for detailed explanation of opening condition or refer to construction documents for specifications.

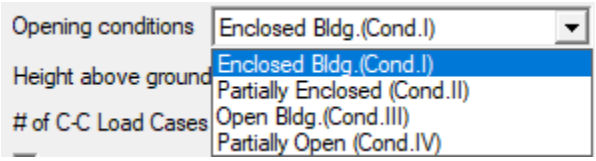

Figure 7 – Opening Conditions

Edit DOL's – Wind load cases are permitted to use duration of load factors of 1.6 for both lumber and plates per ASCE 7. Some jurisdictions may require the lower factor of 1.33.

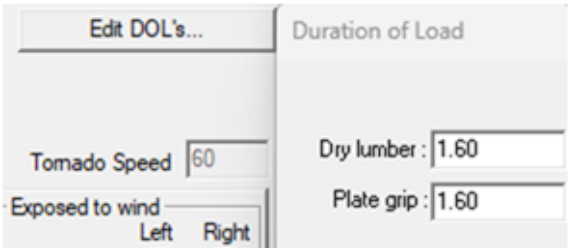

Figure 8 – Load Duration Factors

Height Above Ground – This is the Mean Height of the building, calculated by averaging the eave height and the height of the highest point of the roof. Mean roof height of the roof with parapet is the vertical distance between the ground surface adjacent to the building to the top of the parapet height.

# of C-C Load Cases – There are two options, "1" and "2". Always use the "2" option.

Run C-C Load Cases on Girders – It is recommended that this option be used only when the building designer specifies it. **Exception** all girder trusses with parapet(s) need to be checked with these C-C wind load cases.

Use Tornado Load – Tornado Loading is a new chapter in ASCE 7-22. Risk Category III or IV buildings that are located in a tornado prone region shall consider tornado loads in the design. When checking the "Use Tornado Load" on, the "Tornado Speed" property appears.

Max Dead Load –The program will allow a maximum of 0.6 times of the dead loads input under the "Loading General – Roof Load" section.

Building – Input, accordingly, Building Width is parallel with the truss and Building Length is perpendicular to the truss.

Exposed to wind – You can have the program apply loads for one or more of these conditions by checking the appropriate boxes to turn on the wind loads for these elements.

Ground Elevation (feet) – This is the elevation above sea level for the job site location. Leaving this set zero is slightly conservative.

Truss Category – See Figure 9 for the options and it should be selected accordingly.

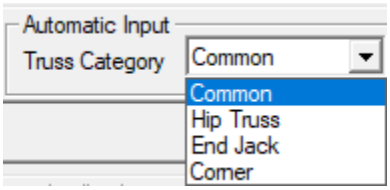

Figure 9 – Truss Category Options

Truss Dist to Eave – This dimension defines where the truss component is in relation to the closest end wall measured perpendicular to the truss.

The following will discuss the additional specific input fields required by MWFRS (Envelope) and User Defined Wind Design Methods.

MWFRS (Envelope)/C-C hybrid Wind – MWFRS (Envelope) procedure is for structures less than 60'-0" in height. There are some other stipulations and requirements that must be met before its use that we will not go into in this article. Hybrid procedure will develop the load cases for both CC and MWFRS. Only the MWFRS/Envelope loads will be used for the uplift reactions, but the design will be based on both the MWFRS/Envelope loads and the CC loads.

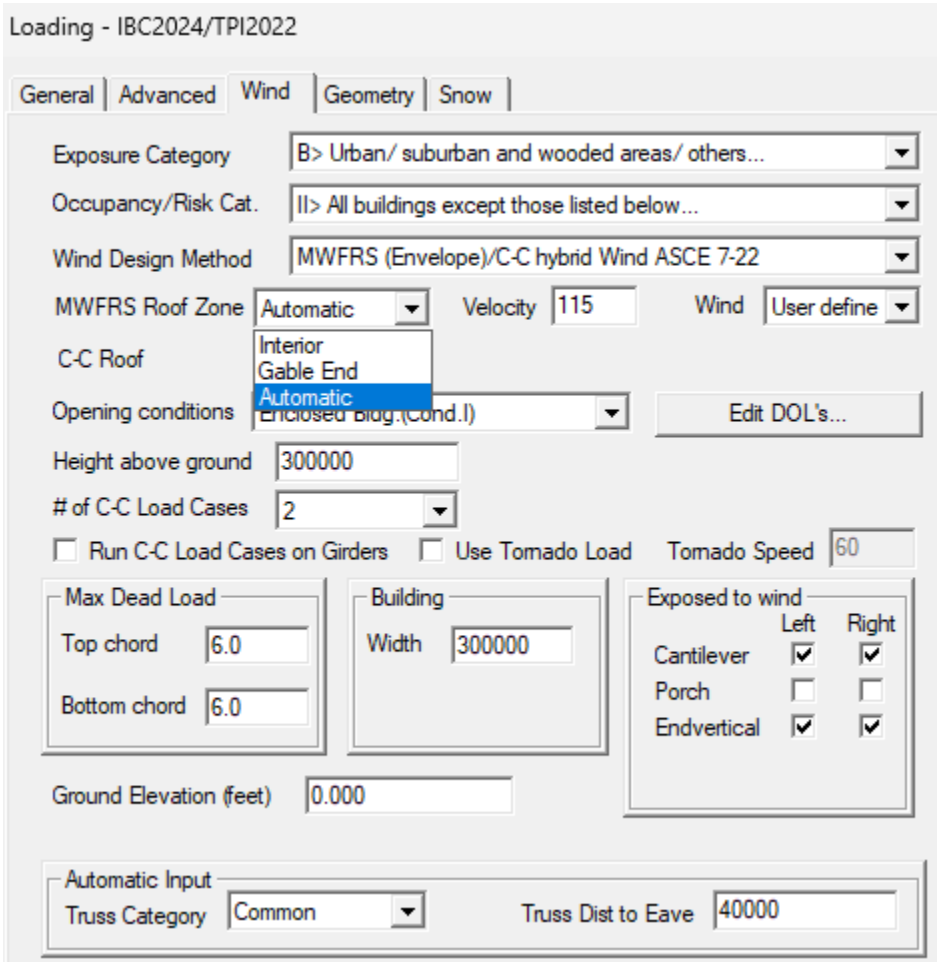

Figure 10 – MWFRS Roof Zones

MWFRS Roof Zone – If you know the specific zone within the roof system the truss component is to be placed, select that zone. Recognize that wind from all directions need to be considered. Otherwise, select "Automatic" and input the Building Width.

User Defined - This wind design method allows you to enter and design a truss component with a specific magnitude of load that the EOR (Engineer of Record) or BD (Building Designer) specifies.

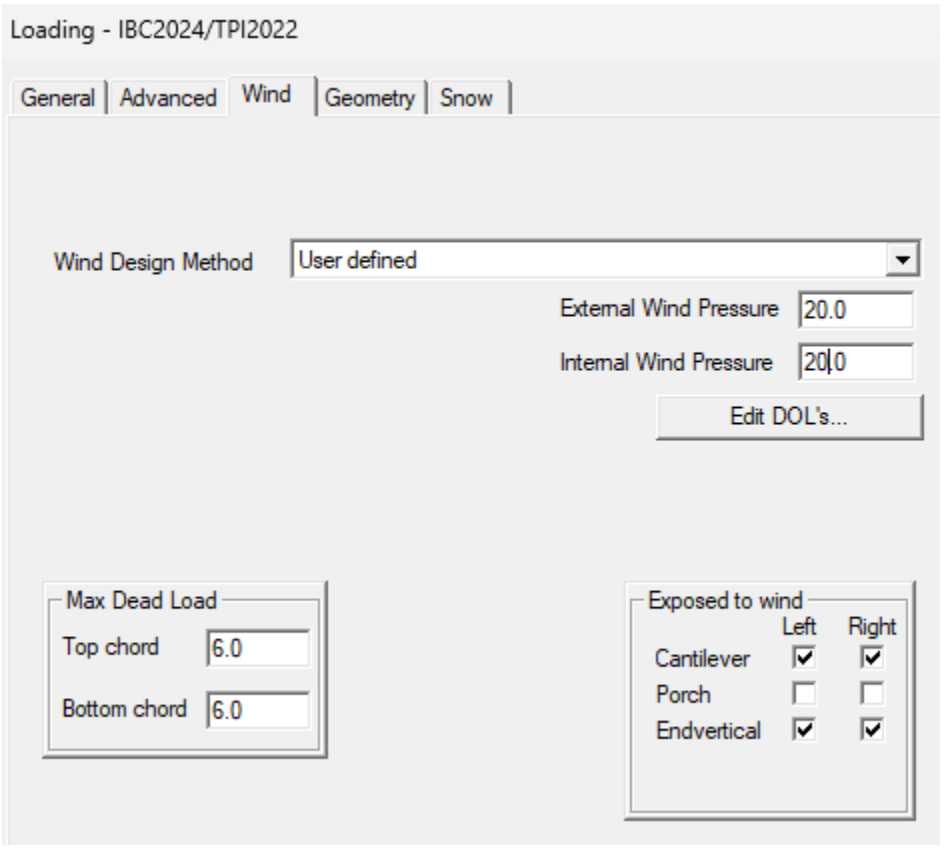

Figure 11 – User Defined Inputs

- **External Wind Pressure –** Enter the wind pressure given the EOR or the BD.
- **Internal Wind Pressure –** If given enter the wind pressure given by the EOR or the BD for the internal pressure.

For additional information or if you have questions, please contact the MiTek Engineering department.