A Guide for the inputs of the Building Information

Page under building information tab helps in creating building input file which defines the characteristics of the building to be analyzed. This building input file can be downloaded in CSV format later to cross check the characteristics of building initially used.

1. **Units:**

   Purpose is to define units used in the building input and output file of the results. All the units should follow same system. At present supported unit for *length*, *force* and *speed* are *ft*, *lb*, and *ft/sec*, respectively. At present radio button shown under UNITS are default selected to above units.
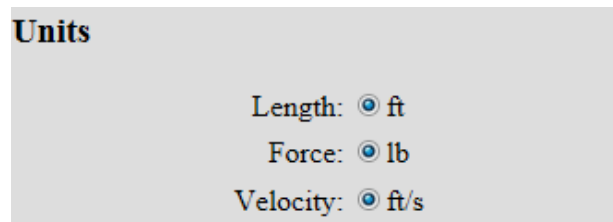

   Fig. 1. Screen shot of Units on first page

2. **Roof Type:**

   Software is capable of doing analysis for three different types of roofs, mainly Gable, Hip and Flat. Selection of radio button against any one type of roof ensures that analysis will be performed for that particular roof type. By changing the selection of radio button changes the sketch of roof type on right hand side. This ensures the selection of roof type.
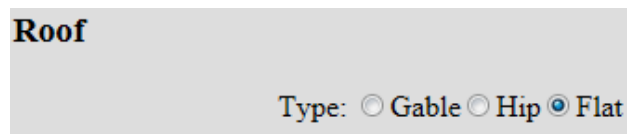

   Fig. 2. Screen shot of Roof type on first page

3. **Building Dimensions:**

   The building dimensions are defined by maximum four quantities. These are *width*, *length*, *height* and *roof rise*, respectively as show in figure 3. These four dimensions are valid for *Gable* and *Hip* type roofs. For *Flat* roof, *roof rise* is not required. Unit of length must be same as selected initially. At present default length unit is *ft*.
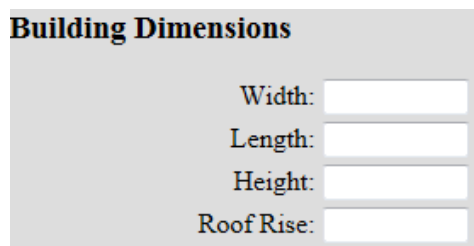

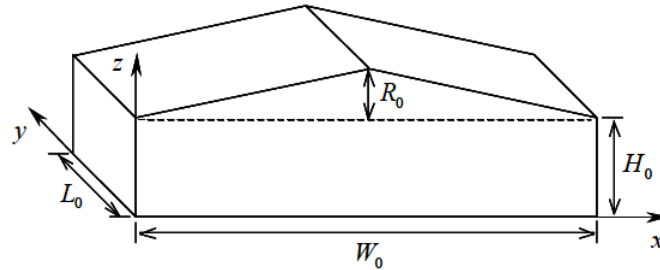   Fig. 3. Screen shot of Building dimensions on first page

Fig. 4. Description of building dimensions

4. **Terrain**
   (Note: Currently, only Suburban option is available because of the wind tunnel test condition of the wind pressure database. In the future, this terrain option with more database will be extended for all three cases as described below.)
   There are three options under terrain. These are *Open Country*, *Suburban* and *Directional*. Its purpose is to define roughness of the terrain surrounding the building. It may be different with wind direction. In case of Open Country or Suburban terrain roughness length will be taken as default value for direction of wind. Default roughness length for Open country and Suburban are 0.1ft and 1ft, respectively. In Directional terrain roughness in all eight directions are required. These directions begin from north and increase by 45^0 increments in clockwise direction. Unit of roughness length must be same as unit selected initially.
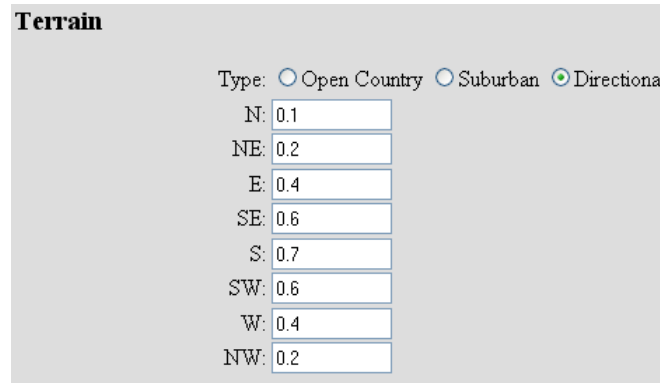

Fig. 5. Screen shot of different type of terrain on first page

   Program utilizes logarithmic law of wind profile. User can use any roughness length and program will give the result but it will affect the calculation of wind speed along the height

5. **Frame location**
   Frame locations are always defined from the first frame. In figure 6 four frames are shown. Assume that these frames are at equal distance of 10 ft. Format of entering coordinate of these frames should be 0,10,20,30, as shown in figure 7. Entry of 0,10,20,30 will analyze frames at 0, 10 and 20 only. If only first frame is required to be analyzed then minimum two consecutive frames locations should be entered, for example 0,10. Entry of 0,10 will analyze only first frame. If other than first frame is required to be

analyzed then minimum three frames locations are required, for example 0,10,20. Entry of 0,10,20 will analyze frames at 0 and 10 only.
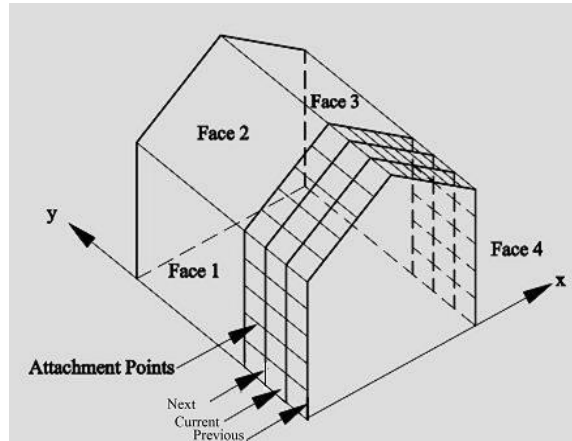

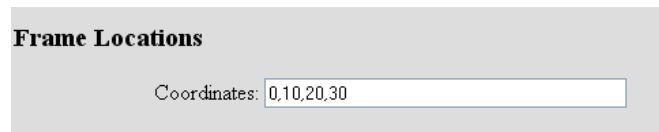Fig. 6. Figure showing frame locations

Frame Locations

Coordinates: 0,10,20,30

Fig. 7. Screen shot of frame location on first page

Table 1: Description of input file for main program for specific input

*FRAME_LOCATIONS			
Number	Previous y	Current y	Next y
1	0	0	10
2	0	10	20
3	10	20	30

Entry of 0,10,20,30 will prepare a part of input file for main program as shown in table 1. First column shows number of frames to be analyzed. For analyzing the frame 1 alone entry of 0,10 is enough, which will create an entry as shown in first row of table 1. For analysis of frame 1 and 2 entry of 0,10,20 is required which will create the row 1 and 2 of the table 1. Similarly, for analyzing frames 1, 2 and 3 entry of 0,10,20,30 is required which will create all three rows as shown in table 1.

6. **Attachment location**

Frames are attached to external sheet with the help of girts or purlins, shown in figure 8. These girt and purlins transfer the load on frames. Position of these girts and purlins are called attachment locations. A gable type roof is taken as example in figure 8, which have four faces. Position of attachment locations in each faces are defined separately. As shown in figure 9 (screen shot of entered values), attachment locations in face 1 are at 2, 4, 6 and 8. It means position of girts in face 1 are 2, 4, 6 and 8 ft from the bottom. For face 2 attachment locations are at 3, 6, 9 and 12. It means positions of purlins in face 2 are 3, 6, 9 and 12 ft from left. For face 3 attachment locations are at 3, 6, 9 and 12. It means positions of purlins are 3, 6, 9 and 12 ft from right in face 3. For face 4 attachment locations are at 2, 4, 6 and 8. It means

position of girts in face 4 are 2, 4, 6 and 8 ft from the bottom. In similar way attachment location coordinates are defined for flat roof.
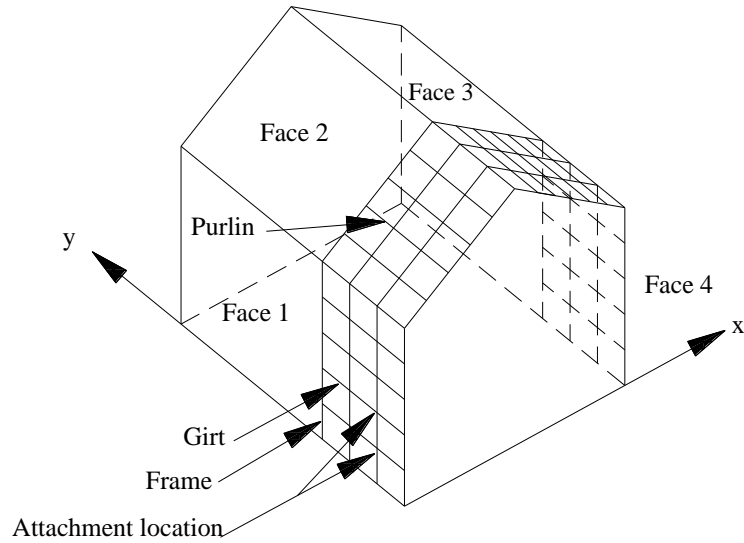

Fig. 8. Sketch of building with gable type roof sowing Girt and Purlins

Attachment Locations

Face 1 Attachments: 2,4,6,8
Face 2 Attachments: 3,6,9,12
Face 3 Attachments: 3,6,9,12
Face 4 Attachments: 2,4,6,8

Fig. 9. Screen shot of attachment location on first page

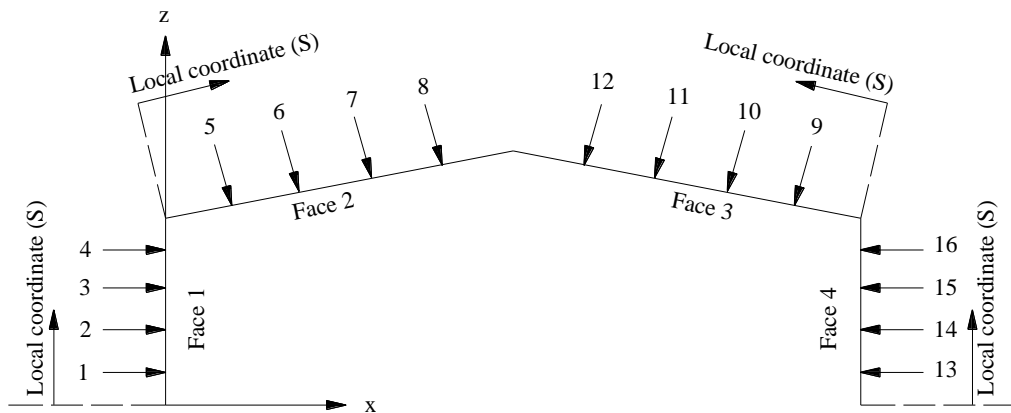Sequential numbering of girts and purlines in different faces are more clearly shown in figure 10 for more clarity

Fig. 10. Sketch of a frame showing girts and purlines sequential numbering in local coordinates.

7. **Responses and Influence Coefficients**

Different responses at different positions of current frame can be requested to be analyzed. The DEDM-LR offers two user-friendly input methods for the responses and influence coefficients. The first user interface is to input influence coefficients one-to-one as shown in Figure 11: note that the number of nodes (indexes) and Face numbers are automatically generated in the DEDM-LR based on the Attachment Location inputs. User can assign the name of responses and its units, e.g., *Moment at left knee* [*lb-ft*], *Moment at ridge* [*lb-ft*] etc. For each response name (requested) influence coefficients should be given. The influence coefficients define the value of each response quantity resulting from a unit force (e.g., moment) at each of the girt and purlin locations, defined in attachment location. Response (requested) value for unit load applied to a particular attachment location should be entered in the corresponding box, which such influence coefficients can be easily obtained from typical structural analysis software, e.g., SAP2000 etc. These unit loads act normal to corresponding face in the direction of positive pressure (towards the centre of building). Unit load used to obtain influence coefficients must have the same unit as selected previously.

Fig. 11. Screen shot of response and influence coefficients on first page

It is worth noting that the DEDM-LR also offers an attractive input style, Input Field. It is intended to alleviate user's efforts to input many influence coefficients one by one using the interface like Figure 11, especially in the case where the number of nodes/responses are large. If user presses the button, "Show CSV Input Field", then following text field is shown in Figure 12 instead of the interface in Figure 11. User can copy overall comma-separated influence coefficients (e.g., from ASCII file obtained from structural analysis software) and paste them to the field. Then, pressing "Parse" button will automatically lead to the same interface shown in Figure 11, however, values are automatically filled out based on user's contents by copy & paste: Figure 12 also shows an example of the user's contents

in the case of three responses, which each response is comma-separated. Note that error-checking function is internally implemented, thus any input errors will be noticed as a pop-up message if user makes a mistake to input.

Paste comma-separated (CSV) content into the box below and click 'Parse'.

```
0,0,0
4.671338512,2.453597819,-0.370198721
9.389759981,4.963137747,-0.676039265
1.889956502,0.999036979,-0.135932055
-4.498361784,6.298362179,-0.551380026
-11.58179296,1.996800459,0.921262805
```
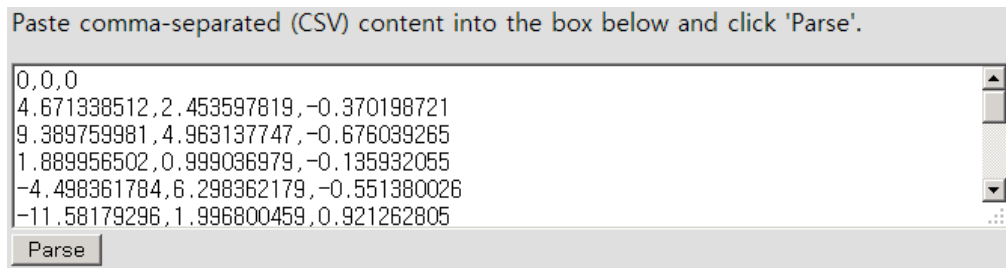
Parse

Fig. 12. Screen shot of response and influence coefficients based on the method of Input Field