

SKIPPING AND REDUCTION OF LIVE LOAD¹

(Patterning of Live Load)

This Technical Note describes the options for skipping and/or reduction of live load in ADAPT-Floor Pro program.

Skipping of live load, also referred to as pattern loading is the process of selectively applying portions of a load to different locations on a structure, in order to determine the maximum, and/or minimum effects of the load on the structure. This applies to loads that can be either present or absent at specified locations on the structure, such as live load. ADAPT-Floor Pro allows you to define as many arrangements (patterns) of live load as required. The program analyzes each load pattern separately, and in addition to the outcome of each load pattern, it reports an envelope of the maximum and minimum values for use in design.

Live load values specified in the code are determined statistically, using a notional floor area. For floor areas larger than the notional value used in the building codes, there is less likelihood of live load covering the entire area with the code specified intensity. For this reason, building codes generally allow a reduction in the intensity of the specified live load, when the load covers a large area. ADAPT-Floor Pro can automatically determine the reduction in the specified intensity of live load, and account for it in its analysis. The program reports the reduction factors used for each specified area, allowing you to view and edit the values.

The following are the steps for skipping of live load. Refer to **Figs. 1** and **2**

- Define the structure. **Figure 1a** shows symbolically the floor plan of a structure. Supports and other features of the floor are not shown, since these are neither required for the definition of skip loading, nor reduction of live load.
- From the *Loading* pull down menu select “Skip Loading” (**Fig. 3**). The same menu item is used for the reduction of live load.
- Create “skip division lines” (**Fig. 4**) following the instruction at the bottom of the screen (hint line). This consists of using the mouse and drawing “division lines” to subdivide the floor plan into “skip regions” (**Fig. 1b**).
- Identify the “skip subregions” that form a load pattern, by selecting the “Load Pattern Definition” option in **Fig. 4** and the dialog box of **Fig. 5**
- Define a skip factor, and/or request reduction of live loading through the dialog box of **Fig. 4**.
- Open the properties box (**Fig. 6**) of each skip subregion by double clicking on its hot spot (circle displayed in its middle). Alternatively, select a skip region and then invoke its properties box by

clicking on “*Item’s Properties*” tool. ()

The value used for the reduction of live load is calculated for each skip region. Hence, each skip region has its own live load reduction coefficient. The area used for the calculation of the live load reduction in

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each skip region is strictly the area covered by the live load in that region. This is shown graphically by the hatched regions in **Fig. 2-a**. The concentrated (point) loads and the line loads that are part of the live load being reduced, and fall within the skip region under consideration are reduced with the same reduction factor that is calculated for the area loads of the subregion.

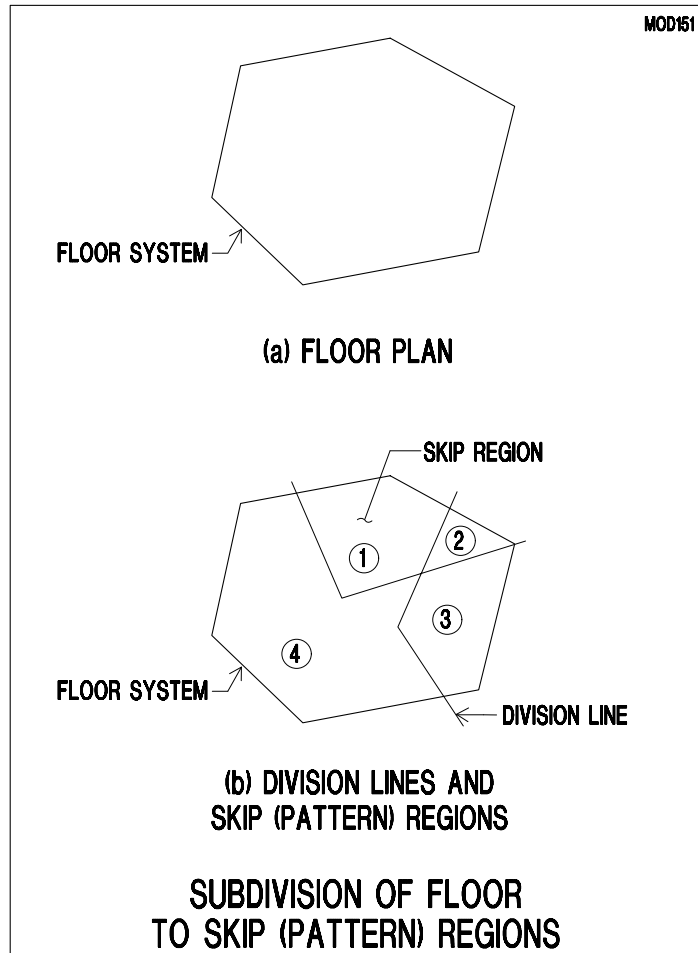


FIGURE 1

For the reduction of live load, the program uses the recommendations of the IBC-2003 (International Building Code), as detailed below:

$$R = 0.08(A - 150)$$

Where,

R = reduction factor, not to exceed 40%; and
 A = tributary in square feet (where the live load is applied.)

Nor more than

$$R = 23.1 (1 + D/L_0) = < 40\%$$

Where,

D is the dead load, and L_0 the applicable live load.

Once the skipping of live load is defined and saved, the program automatically generates a load case for each of the skip patterns along with two load case envelopes, one describing the maximum and the other the minimum value obtained from the skipping of live load.

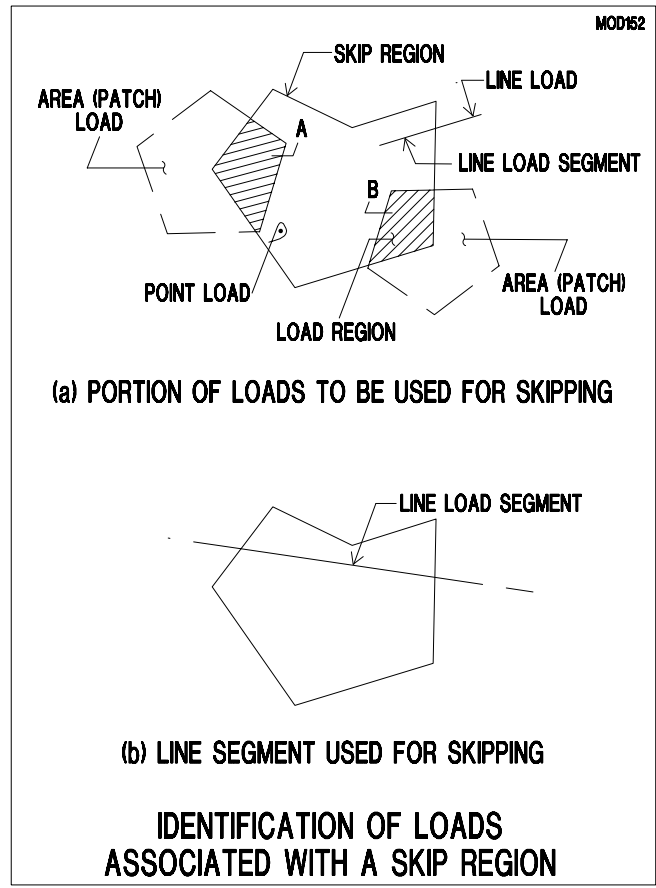


FIGURE 2

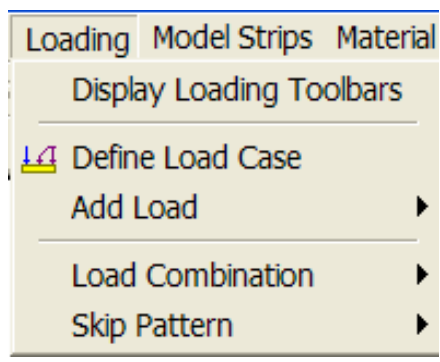


FIGURE 3 MENU FOR SKIP (PATTERN) LOADING



FIGURE 4 SKIP PATTERN PROCESSES

For example in the floor plan shown in **Fig. 1**, four skip subregions are identified. If you select three skip patterns, the program will generate the following load cases and load envelopes.

- Pattern_1
- Pattern_2
- Pattern_3
- Skip_####_Max
- Skip_####_Min

The solution of each of the load cases can be viewed individually, reported individually and combined with other load cases.

The symbol #### represents the label you will select for the load you skip, such as “Liveload.” The Skip_####_Max and Skjp_####_Min represent an envelope of the maximum and minimum values for all the patterns defined by you. In this example, these will be the envelope of the load cases Pattern_1, Pattern_2 and Pattern_3.

For additional details and the application of the live load skipping and reduction refer to the numerical example FP_EX5_SI for the SI version, or the example FP_EX5_US for the US units.

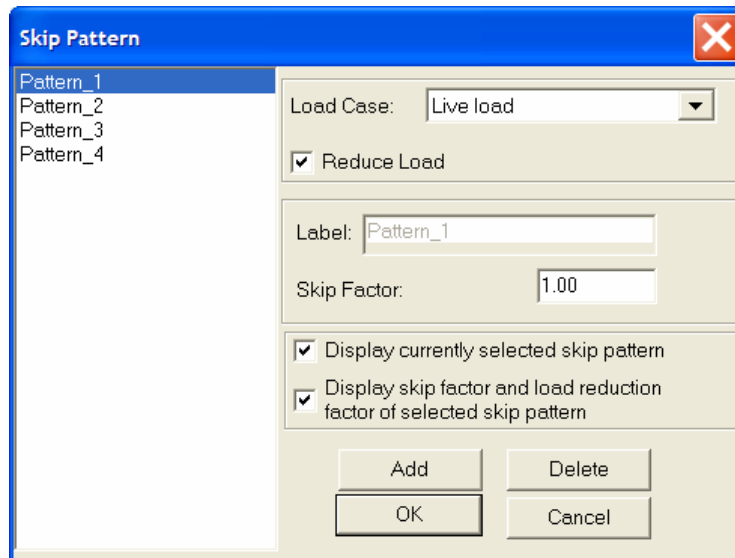


FIGURE 5 SKIP PATTERN SELECTION

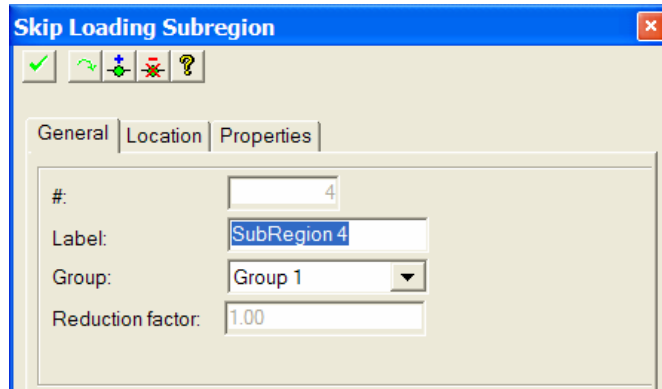


FIGURE 6 SKIP LOADING SUBREGION PROPERTIES BOX