Design Example: Restaurant on the Topmost Floor

The following is the hotel with restaurant problem.

A hotel has an under-ground car park (B1), a main entrance G, above which there are 10 floors of guest-rooms, and a topmost floor (11th floor) with a restaurant. Each guest room floor has 30 rooms. Assume 1.5 guests per room. This gives a total floor population of 30 x 1.5 = 45 guests per floor. The total population is 450 guests.

The floor heights are unequal: B1: 3.2 m; G: 6 m; L1 to L10: 4.3 m (L11 the restaurant floor height is irrelevant). We shall assume that the entrance floors are: B1, G and L11 (Restaurant) with percentage arrivals of: 10%: 60%: 30% for B1:G:L11 respectively.

Carry out the design for two traffic cases:
Case 1: incoming traffic only (i.e., 100% incoming).
Case 2: two way traffic (i.e., incoming 50% and outgoing 50%).
Note that interfloor traffic is very limited in hotel (as opposed to offices).

Other parameters:

Arrival rate: 12.5% (AR%)
Target interval: 40 seconds.

Let the software select the speed automatically and find the best speed.
\[ a = 1 \text{ m/s/s} \]
\[ j = 1 \text{ m/s/s/s} \]

\[ t_{do} = 2 \text{ s} \]
\[ t_{dc} = 3 \text{ s} \]
\[ t_{pi} = t_{po} = 1.2 \text{ s} \]

Do the design with and without the restaurant and comment on the difference that the restaurant makes to the design.