

## **Assessment of Total Evacuation Systems for Tall Buildings**

This report focuses on the use of egress models to assess the optimal strategy in the case of total evacuation in high-rise buildings. A model case study made of two identical twin towers linked with two sky-bridges at different heights has been simulated. The towers are 50 floor high-rise buildings including both vertical and horizontal egress components, namely stairs, occupant evacuation elevators (OEEs), service elevators, transfer floors and sky-bridges. The total evacuation of the single tower has been simulated employing seven possible strategies.

The configuration of the egress components is depending on the evacuation strategy under consideration. The strategies include either the use of only one type of vertical egress components (stairs or elevators), or a combination of vertical components (stairs and elevators) or a combination of vertical and horizontal components (stairs, elevators, transfer floors, and sky-bridges).

This report presents the general characteristics of the model case study, i.e. the layout of the building and the available egress components in relation to the strategy employed. The evacuation strategies have been simulated employing a continuous model (Pathfinder). In order to provide a cross validation of the results produced by Pathfinder, a fine network model (STEPS) has been employed to simulate the base case (only stairs available for the evacuation) and one scenario including the use of OEEs.

The comparison between the models has been made employing specified calculations, i.e. the configuration of the inputs of the models is based on complete information about the model geometry, occupant characteristics, etc. Results show that the range of variability of the results between the two sub-models for stair and elevator modelling allows performing a relative comparison between the evacuation strategies.

Differences are dependent on the modelling approaches and the sub-models for stairs and elevators employed by the models. The relative comparison between the strategies has been made using Pathfinder. Strategies involving the use of Occupant Evacuation Elevators (OEEs) are not effective if not linked to appropriate information to occupants about elevator usage, i.e. the accepted waiting time for elevators is lower than 10 minutes. The strategy employing only OEEs for the evacuation is the most efficient strategy. If occupants use sky-bridges to evacuate the building, evacuation times would be significantly lower than the strategies involving the use of stairs only or a combination of elevators and stairs without appropriate information to the evacuees.