

FIRE EVACUATION SAFETY ANALYSIS OF TYPICAL HIGH-RISE BUILDINGS IN BANGLADESH

-An Analysis based on lessons learnt from Japan Fire Incidents and concerned rules and regulations applying to building plans of Bangladesh-

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Fire safety of high-rise buildings has been an important issue for over 100 years. High-rise buildings are always a major concern to the evacuation safety of occupants due to the elevated height, extended vertical travel distance for the egress and means of access, density of occupants, fuel load, complex vertical utility services, the forces of nature and multi occupancies etc. This study focuses on the various aspects of evacuation safety of high-rise buildings.

The main purpose of this study is to address the main problems of evacuation safety of high-rise buildings particularly in high-rise building fire issues in Bangladesh. It is an analysis based on lessons learnt from past fire incidents in Japan and concerned rules and regulations applying to the existing building plans of Bangladesh.

To do the analysis of evacuation safety, 35 major past building fire incidents report of Japan, building construction related rules and regulations of Japan and Bangladesh, 30 different occupancies high-rise building plans of Bangladesh, were collected.

35 major past building fire incident reports of Japan were analyzed to address the main problems of fatalities and the changes of laws and regulations related to evacuation safety. The most common problems concerning the evacuation safety of the fire incidents was the lack of fire compartmentation which includes many factors. Update of rules and regulations was done based on the investigation and analysis of the fire incidents which had great impact on the fatality of the building fire in Japan. It was a great challenge to implement the amended rules on the new buildings in Japan since it was only applied to new buildings and thus the fire service law was strengthened which was comparatively easier to implement and found effective also.

The rules and regulations related to evacuation safety of Japan and Bangladesh were also analyzed to highlight the important comparison between these two laws which might have great impact on the evacuation safety. Consideration of bed movement for the width of corridor in the hospital, occupancy load for number of exits, specific requirements for specific occupancies are very significant factors in Bangladesh National Building Code where as the consideration of interior finish materials and floor height to reduce/increase the traveling distance to exit, fire walls in wooden building, fire compartmentation for specific area for specific floor are also very significant factors in Building Standard Law Enforcement Order of Japan.

30 high-rise building plans of different occupancies were reviewed to address the common problems of evacuation safety of those building plans specially in the building design perspectives. Review of 30 building plans of Bangladesh revealed that the most important problems of the building plans concerning evacuation safety is the risky fire compartmentation which includes many factors.

Fire room and fire floor evacuation safety of 04 high-rise building plans of Bangladesh were evaluated as a case study using the performance based verification methods: calculation method and Fire Escape Simulator. Both the evacuation safety verification results using the calculation method and Fire Escape Simulator under case study indicate that the 04 case study high-rise buildings fire room and fire floor evacuation were unsafe which indicate the evacuation safety conditions of high-rise building plans in Bangladesh.

This study results focused on various aspects of the evacuation safety of high-rise buildings of Japan and Bangladesh both in terms of historical and present aspects. This study indicates lack/risky fire compartmentation specially in the vertical shafts such as staircase, escalator, duct shafts; were one of the most common problems of the evacuation safety in both the past building fire incidents in Japan and in the review of building plans in Bangladesh. Comparison of rules and regulations of Japan and Bangladesh reveals the important aspects of evacuation safety which might be considered during the update of building code in Bangladesh. The performance based verification methods might be included in the update of BNBC in Bangladesh in near future to evaluate the evacuation safety of the building. This study results might be used as a tool by the concerned professionals and authorities for future improvement of evacuation safety not only in Japan and Bangladesh but also anywhere in the world following the local context.