

Wiwat Assawasuee 2009: A Numerical Study of Fire Evacuation in an Underground Train Station. Master of Engineering (Fire Protection Engineering), Major Field: Fire Protection Engineering, Interdisciplinary Graduate Program. Thesis Advisor: Mr. Nathasak Boonmee, Ph.D. 180 pages.

This thesis presents a numerical simulation of a fire evacuation in an underground train station by using a computer program called FDS + EVAC (Fire Dynamics Simulator with Evacuation). The study performs for a fire evacuation of Ratchadapisek underground train station. The simulation occupant densities are depicted during the morning rush hour interval (7:00 – 8:00 am). The Ratchadapisek station is 25 m wide, 228 m long and has 3 underground floors where each floor height is approximately 5.1 m. In order to simulate a worst case scenario, a 7 MW fire is placed on the 1st floor. The simulations are performed for 3 cases where the occupant waiting times are 4, 16, and 30 minutes, respectively. In each waiting time, the calculations are carried for 2 cases: with smoke ventilation system and without smoke ventilation system.

The study shows that when the waiting time is 4 minutes the evacuation times are 6 minutes (with smoke ventilation) and 8.9 minutes (without smoke ventilation), when the waiting time is 16 minutes the evacuation times are 9.4 minutes (with smoke ventilation) and 8.8 minutes (without smoke ventilation), and when the waiting time is 30 minutes the evacuation times are 12.5 minutes (with smoke ventilation) and 11.3 minutes (without smoke ventilation), respectively. In all cases, with and without smoke ventilation system, the simulations show that the smoke temperature and carbon-monoxide concentration are well below the hazardous level.

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Thesis Advisor's signature

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