Built Environment : Air Flow Simulation in Multi-story Building

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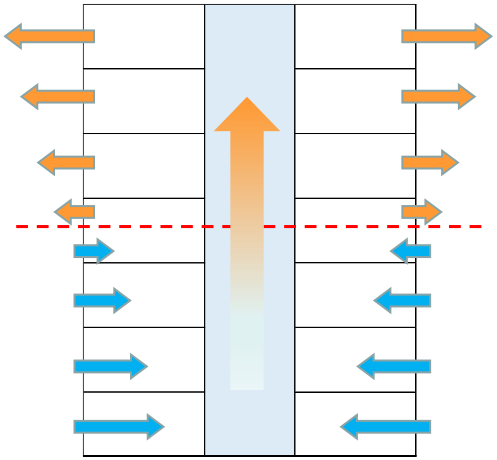
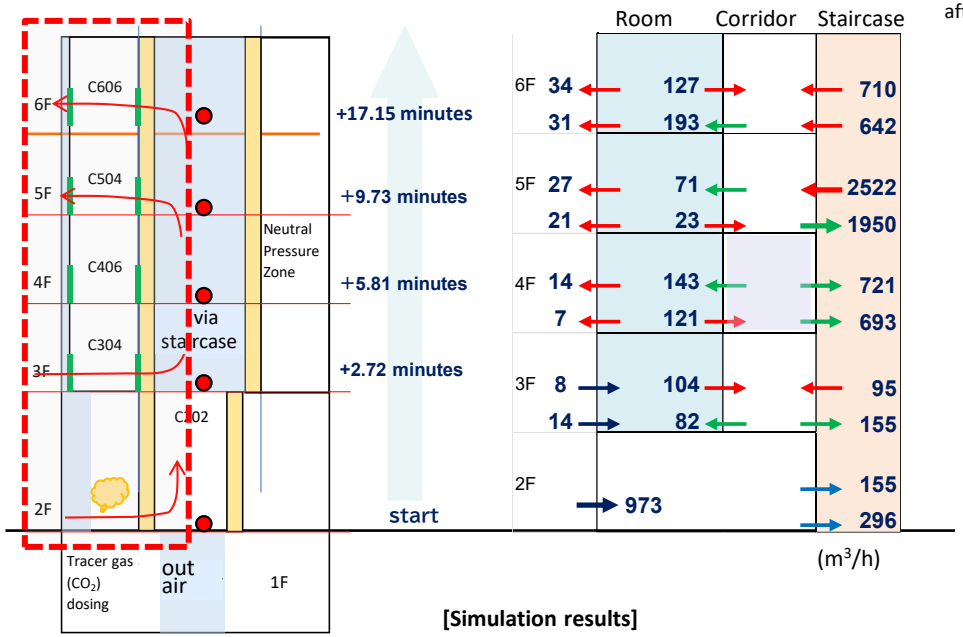
- When windows are opened for ventilation, chimney effect occurs based on the temperature difference between inside and outside.
- Since the opening patterns of "windows" and "common area doors" occur randomly, the location of the middle household is not constant.

Above the neutral pressure zone, air flows in from the corridor and out through the windows.



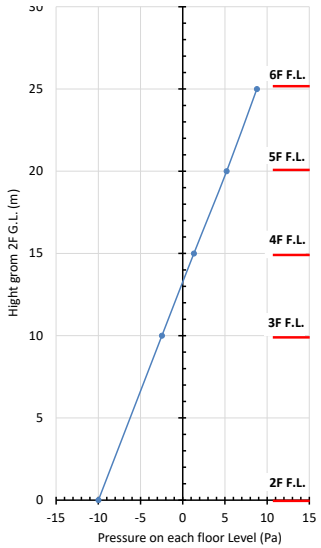
Below the neutral pressure zone, air flows in through the window and flows out into the corridor.



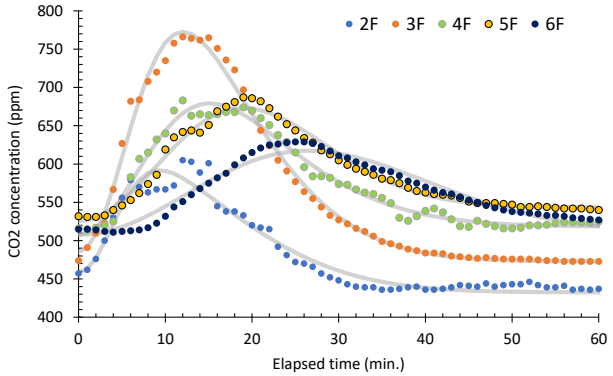
[Conceptual diagram]
Air Flow via Staircase

[Simulation results]
Airflow balance based on ventilation network simulation (dotted line on the left)

Neutral Pressure zone seems to be on the third floor, forth floors and above were affected by the air flow from the floors below.



[Simulation Results]
Pressure Simulation Results on each floor level



[Experimental Results] Concentration response on each floor when CO_2 was dosing on the second floor

- After the tracer gas was dosing, the concentration response on each floor was measured, and the airflow velocity via the stairwell was calculated.
- A ventilation network simulation was performed to quantitatively reproduce the amount of air flow.
- These results make it possible to quantify the air flow rate between different floors via the stairwell, and it is possible to clarify contaminant transmission from different floors.