DEPARTMENT OF FIRE PROTECTION ENGINEERING

Jacobs

TEAM NUMBER 5

KNSWW

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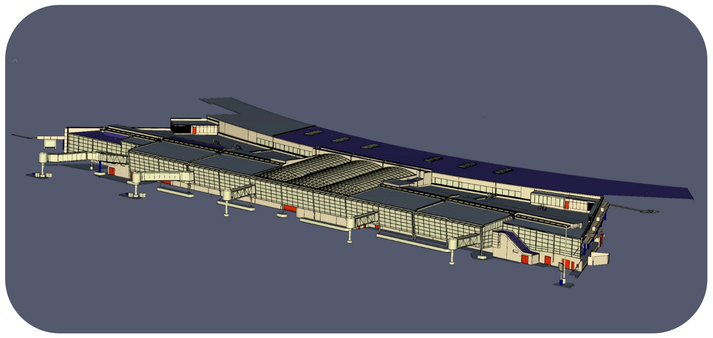
Problem Definition

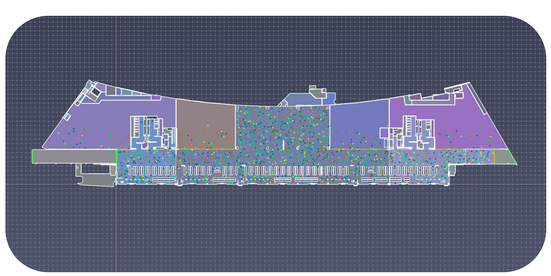
Baltimore Washington International Thurgood Marshall Airport (BWI) is currently constructing a $500 million expansion of the Concourse A/B Connector to enhance passenger movement, amenities, and general terminal capacity.

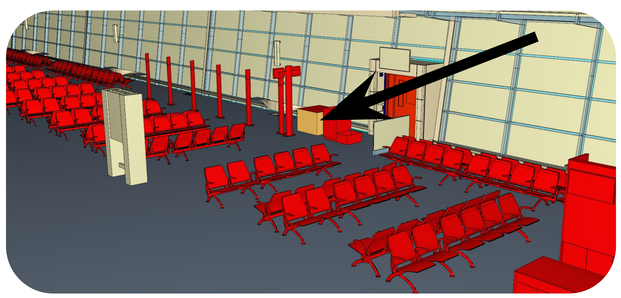


Design Calculations & Analysis

A two step analysis was used to account for multiple hazards created by a fire in the airport:

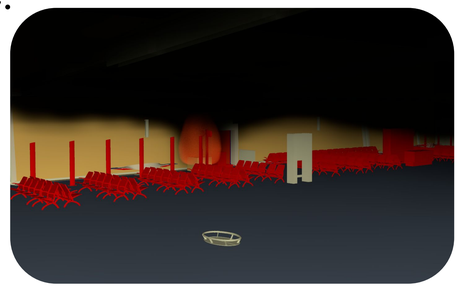
- A design fire was modeled in FDS based on NFPA design fire scenario 8
- Smoke control and time to egress was modeled using Pathfinder and Pyrosim.

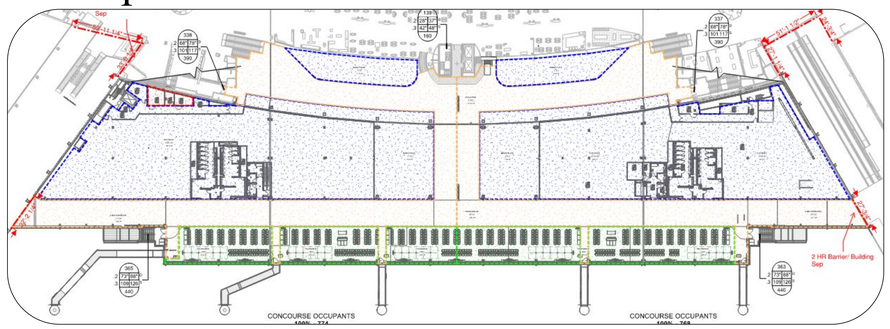




Final Design

- Design luggage fire at the boarding gate. Using data on luggage fires from Carlotti and Suzanne (2022), a baggage fire of several checked bags would have a peak heat release rate of 3 MW, and would burn as a steady 50 kW fire for a five minutes before functioning as an ultrafast t^2 fire with a peak HRR of 3 MW for the rest of the fire.
- Modeled conservatively as an ultrafast t^2 fire with no slow growth phase.
- Solution: complete a zoned egress analysis by creating fire barriers to separate the A/B connector from both Piers A and B.
  - Use two-hour rated fire barriers with various number of fire doors installed to allow for egress into these designated safe zones.
  - Implement use of the PA system to direct occupants to either the correct safe areas or to stay in place.





Test Results

- The total RSET was ~390 (1.2 SF) seconds

$$RSET = (T_N + T_{PM} + T_E) \times S.F.$$

- Four doors at each junction were required
- Smoke Layer at Ceiling height < Critical Temp of 550 ℃