



# Project Definition

## Project Scope Definition

The purpose of this design is to perform a life safety analysis in the event of a fire for the new A/B terminal connector at BWI Marshall airport. Occupant egress is limited to the landside of the airport and egress through security checkpoints is restricted to minimize delays.

## Project Goals

The goals of this project consider the clients original concerns of life safety, property protection, and mission continuity. There needs to be sufficient time for occupants to egress and a tenable environment for egress must be maintained. Additionally, there needs to be minimal impact to the the airport's structure and technologies. Finally, flights need to stay largely on schedule, and occupants should be restricted from egressing through security checkpoints or airside exits.

## Design Objectives

The ultimate objective of this project is to establish sufficient egress methods for all occupants, maintain airport security in an emergency situation, minimize flight delays during egress, maintain a positive reputation for the airport and airlines involved, and limit construction cost while ensuring occupant safety.

# Design Criteria

## Design Assumptions

- All existing fire protection and suppression systems will be installed in the A/B connection and will activate and work as intended
- All occupants egress once they have entered a fire-rated enclosure
- BWI Marshall has its own fire department; response times are assumed to be reduced

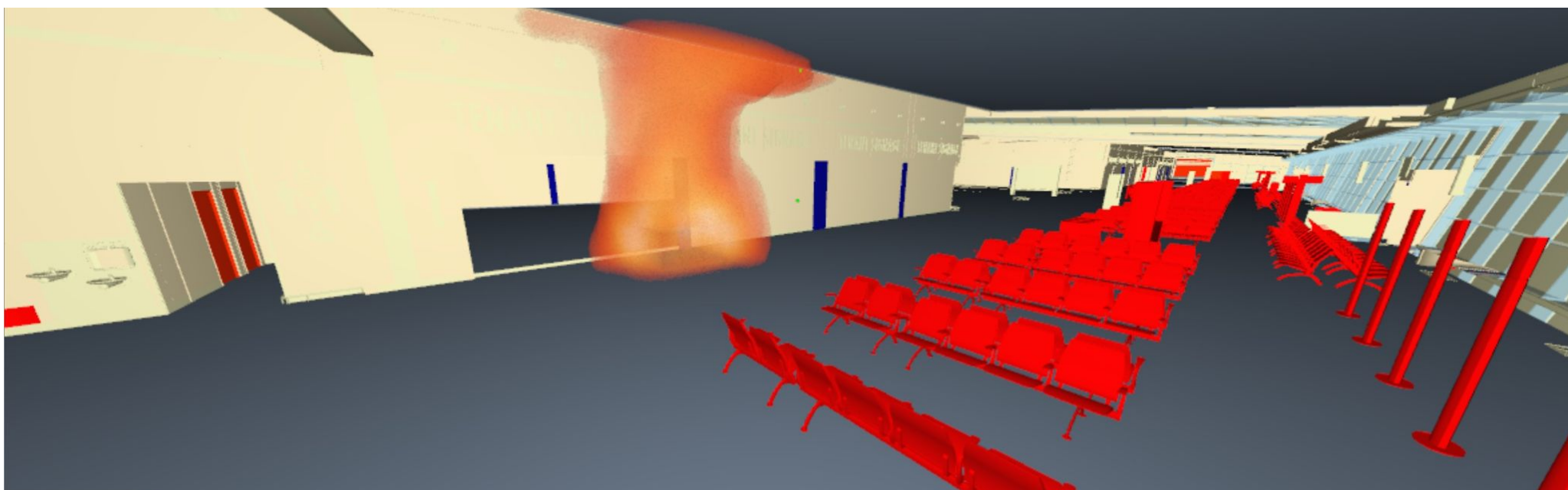
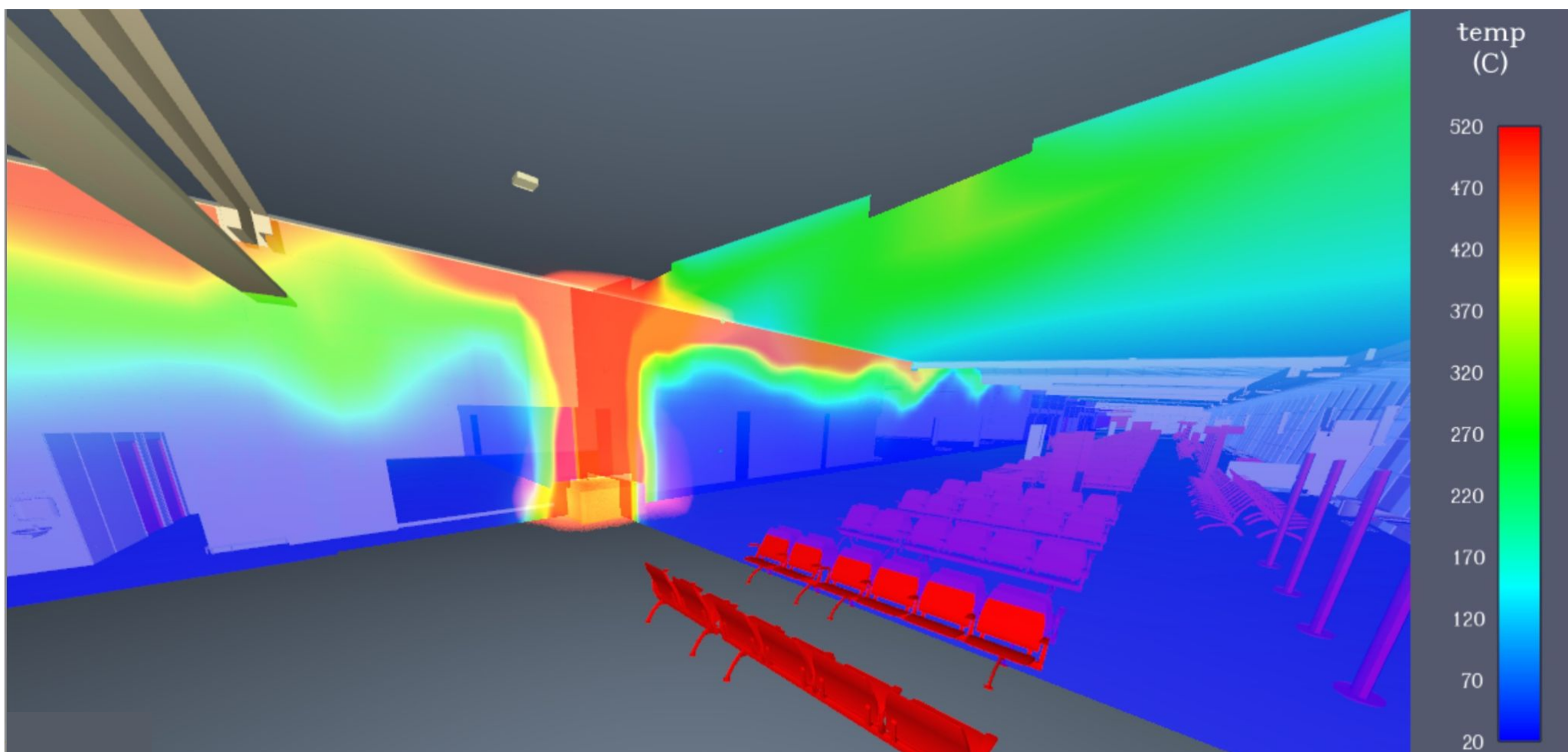
## Methods of Evaluation

- Occupants safely egress to designated areas of refuge in the airport given a fire scenario
- Available Safe Egress Time (ASET) must be greater than the Required Safe Egress Time (RSET)
- Computational fire modeling to calculate the ASET
- Egress modeling to calculate the RSET
- Safety factors will be taken into consideration for both calculations



## Pathfinder Criteria

- Estimated 1,777 occupants in the A/B connection
- Higher density of occupants assumed in gate hold rooms, mercantile and restaurant spaces
- 70% of occupants are alert and begin to evacuate upon notification, moving at 40 seconds
- 30% of occupants are "distracted," beginning evacuation at 55 seconds
- 18.6% of adults 18 and older have difficulty walking or climbing steps [3]
- Children and the elderly with limited physical and cognitive abilities make up 48% of occupants



## PyroSim Model

- Fuel is ethylene, which is found in polyester, to simulate clothing
- Simulation ASET is **200 seconds** due to temperature exceeding 60°C

## Pathfinder Model

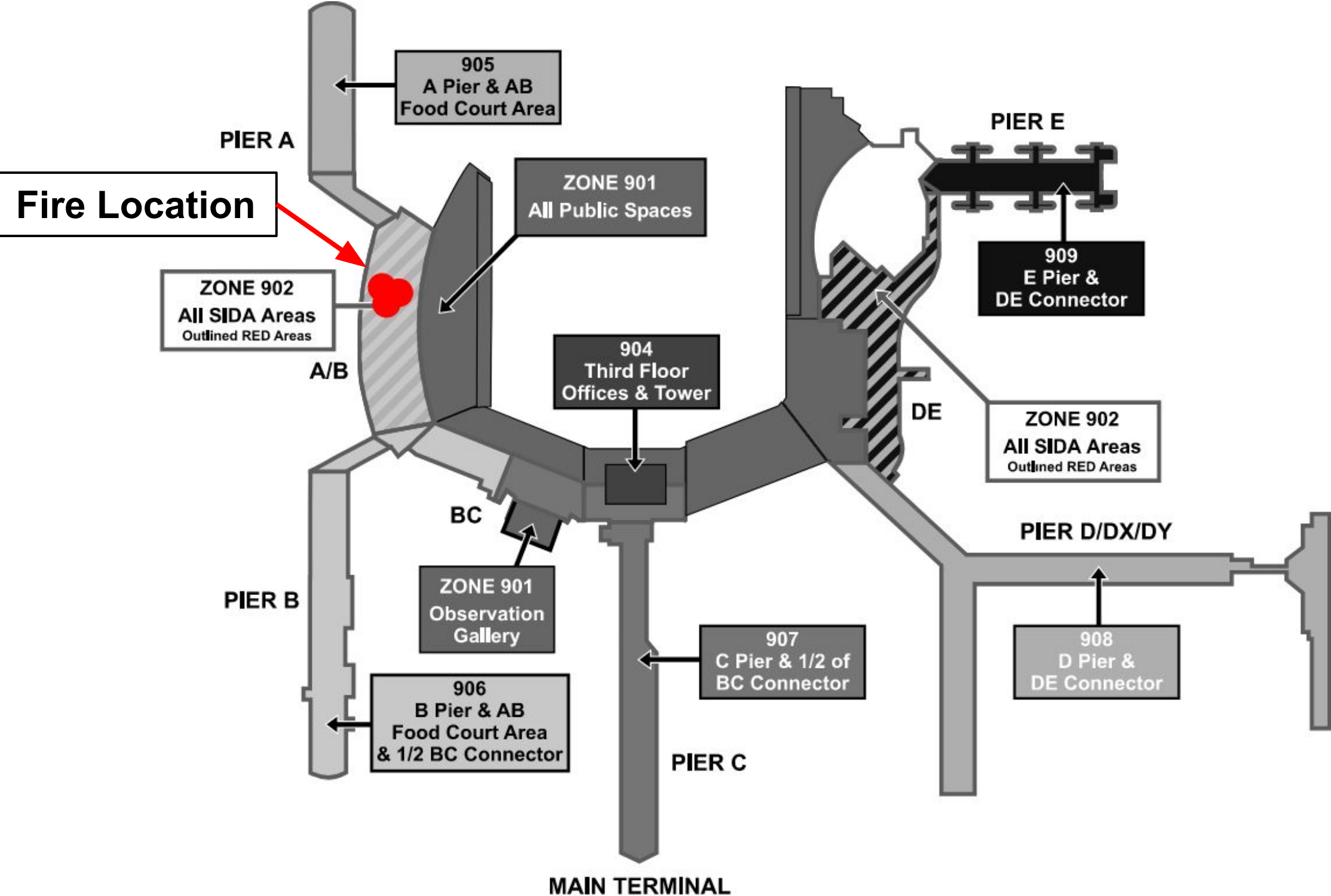
- RSET of affected area is **145 seconds**
- Simulation complete evacuation occurs at 274 seconds

## Final Conclusion

- ASET>RSET by a factor greater than 1.3
- Occupants will egress safely with the newly added design elements

# Fire Scenario

- An electrical fire starts in a mercantile storefront in the new A/B connector
- The fire ignites a clothing rack before spreading to a nearby magazine rack
- Magazine and clothes racks are fully-developed after 300 seconds [4]
- Peak heat release rate: 3,000 kW [4]



# Final Design

## Design Elements Added

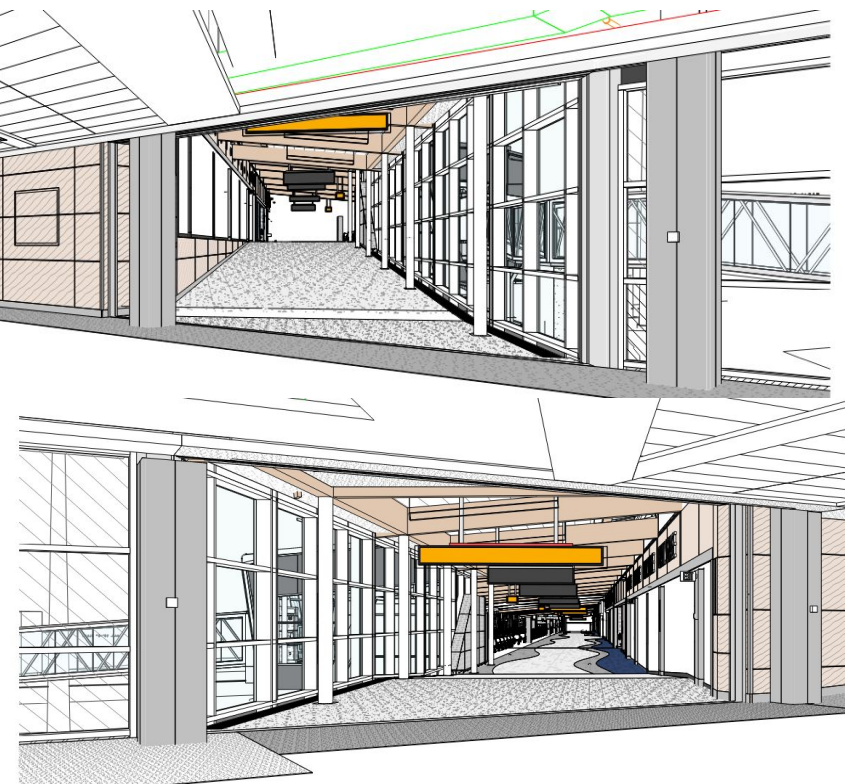
- 2-hour fire-rated walls extend to the entire length of the dividing walls between the A/B connector renovation space and the existing A and B Terminals
- Automatically closing fire doors at each terminal/connection opening
- Major egress routes have minimum 2-hour rated ceilings

## Price Estimate

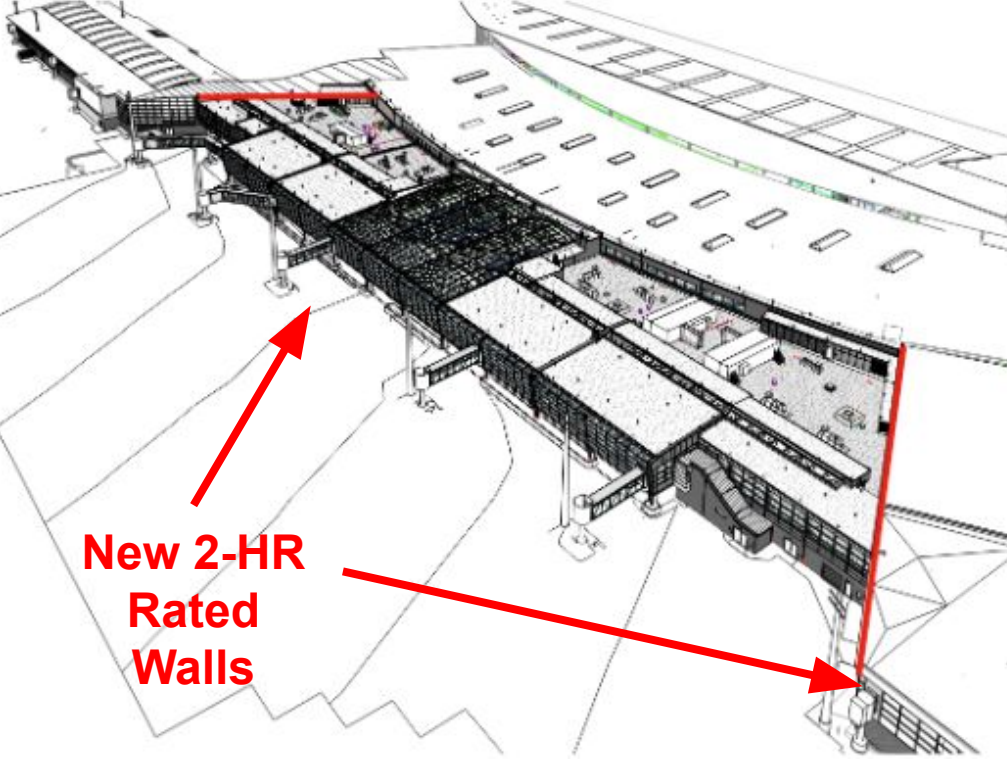
- Added construction costs of design elements should cost approximately \$80,000,000



Proposed sliding fire door to be installed in openings



Existing open connections between terminals and connector



A/B connector renovation isometric view