



JENSEN HUGHES

Advancing the Science of Safety

DESIGN OF FIRE AND LIFE SAFETY TO FACILITATE AIRSIDE AND LANDSIDE AIRPORT OPERATIONS

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Safety Design in Buildings



Riyadh Conference

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Course Description

In the design of modern airport facilities in the Middle East, fire life safety consideration of fundamental concepts is required to limit the impact of a fire incident, avoid breach of the boundary between airport landside and airside, and minimize interruption to airport operations. This presentation details the critical aspects of airport facility fire and life safety design in the context of zoning selection and the security division between airside and landside.

Presenter

Adam Olomon, P.E.

Project Director, JENSEN HUGHES

Adam Olomon graduated from Oklahoma State University with a Bachelor's of Science in Mechanical Engineering. He began working in fire protection engineering design right out of school with one of the largest fire protection consulting firms in the United States (Aon Fire Protection Engineer formerly Schirmer Engineering, now merged with JENSEN HUGHES).

Adam has designed and tested automatic sprinkler systems, deluge systems, fire pumps, water storage tanks and private undergrounds.

Mr. Olomon is a Professionally Registered Engineer in the field of fire protection in the USA. He has worked on fire protection engineering projects in the United States, Mexico, Afghanistan, United Arab Emirates, Qatar, Kenya, Serbia, Ukraine, Azerbaijan, Belarus, Turkey and Saudi Arabia.

Adam has designed fire pump arrangements, sprinkler systems and private fire mains for a variety of projects. He has worked closely with voting members of NFPA and was on the NFPA Technical Committee on Private Water Supply Piping Systems. Adam serves as a project manager overseeing the Fire and Life Safety design and construction at the Abu Dhabi Airport Midfield Terminal Project for JENSEN HUGHES in the United Arab Emirates.

Learning Objectives

- 1. Review complex fire and life safety design issues associated with airport facilities.***
- 2. Understand the airside-landside boundary and its impact on zoning of airport facilities.***
- 3. Recognize the importance of early coordination of airport zones among various airport operations will limit area of impact and minimum business interruption to the facility.***

The purpose of this presentation is to convey technical knowledge to the conference participants.

The presentation also contains slides with text that summarises the content of the presentation and the main learning objectives.

These may be used to update CPD records for relevant organisations including the Chartered Institute of Building (CIOB).

OVERVIEW

DESIGN OF FIRE AND LIFE SAFETY TO FACILITATE AIRSIDE AND LANDSIDE AIRPORT OPERATIONS

- Airport Facilities in the Middle East
- Challenges and Considerations
 - Codes and Standards
 - Multiple Occupancies
 - Stakeholders
- Early Stage Planning of Zoning
 - Airside Landside Boundary
 - Incident Response/ Civil Defense
 - Coordination/ Challenges
 - Egress
 - Smoke Control
 - Notification/ Evacuation
 - Automatic Sprinkler Protection
 - Fire Alarm and Detection
- Conclusion & Questions



AIRPORT FACILITIES IN THE MIDDLE EAST

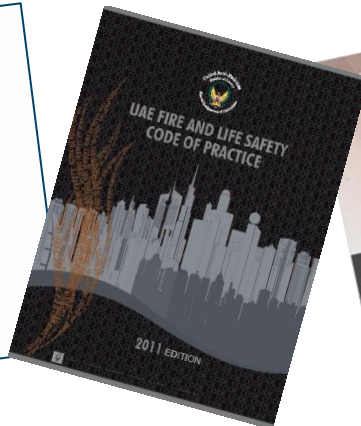
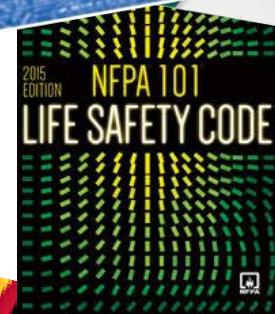


- King Fahd International Airport Dammam
 - Largest worldwide in size by land mass area
- King Abdulaziz International Airport Jeddah
- Kuwait International Airport
- Abu Dhabi Midfield Terminal
 - World's Third Largest Terminal
- Dubai International Airport – Terminal 3
 - World's Largest Terminal
- Maktoum International Airport
- Hamad International Airport Doha
- Muscat International Airport
- Salalah International Airport



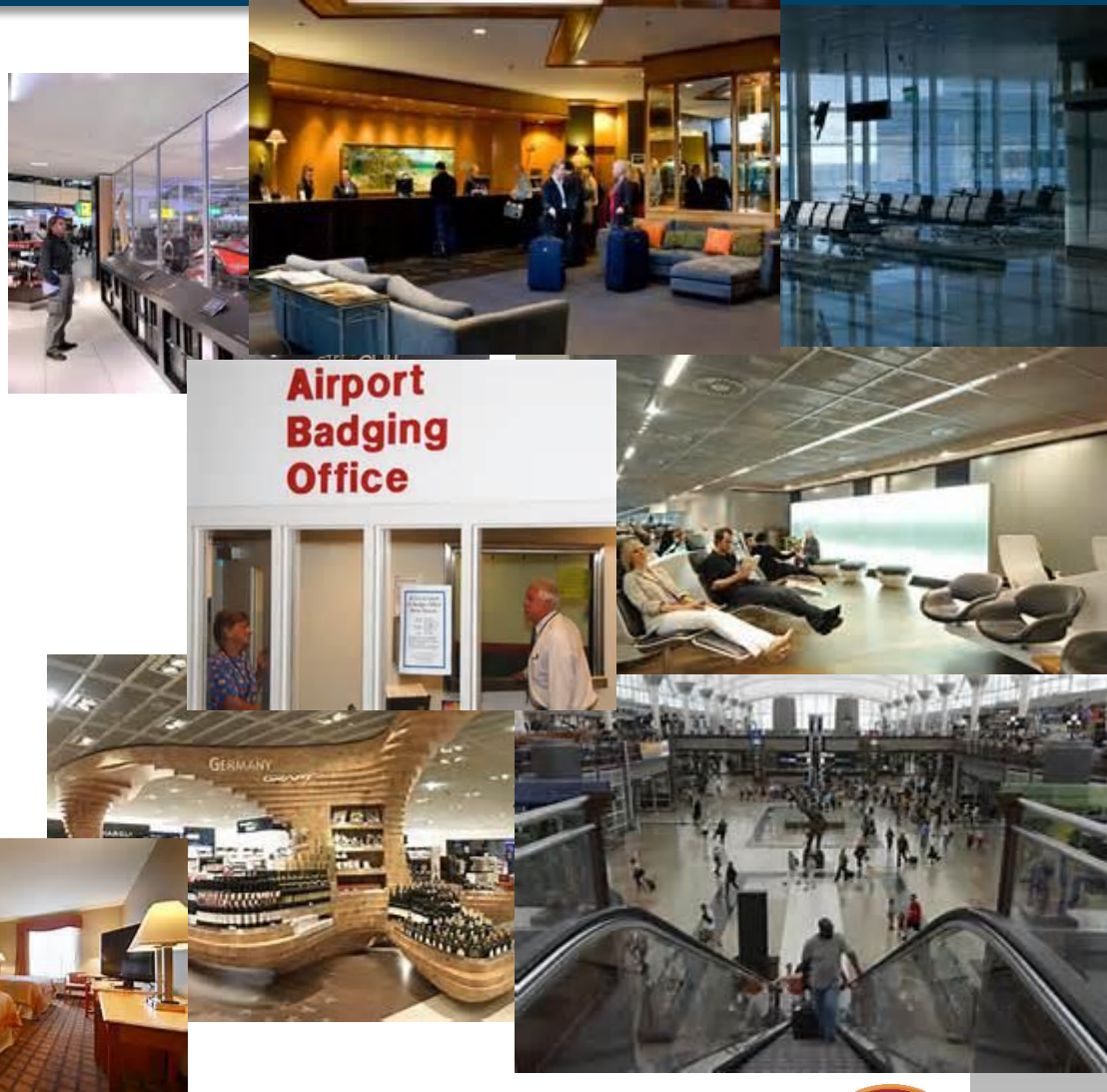
CHALLENGES – MULTIPLE CODES

- Adopted Building Code/ Building Code of Record
 - IBC, NFPA 5000, GCC Code, UAE Code
 - Often supplemented by NFPA 101
- Adopted Fire Code
 - (IFC, NFPA 1)
- Referenced Codes and Standards
 - (NFPA 415, NFPA 13, NFPA 72, etc.)
- Local Civil Defense Requirements



CHALLENGES – MULTIPLE USES

- Mix of Occupancies
 - Large Assembly (A)
 - Business Space (B)
 - Retail (M)
 - Hotels (R)
 - Institutional
 - Detention/Interrogation
- Implement the code based on both requirements for occupancy and intended operations



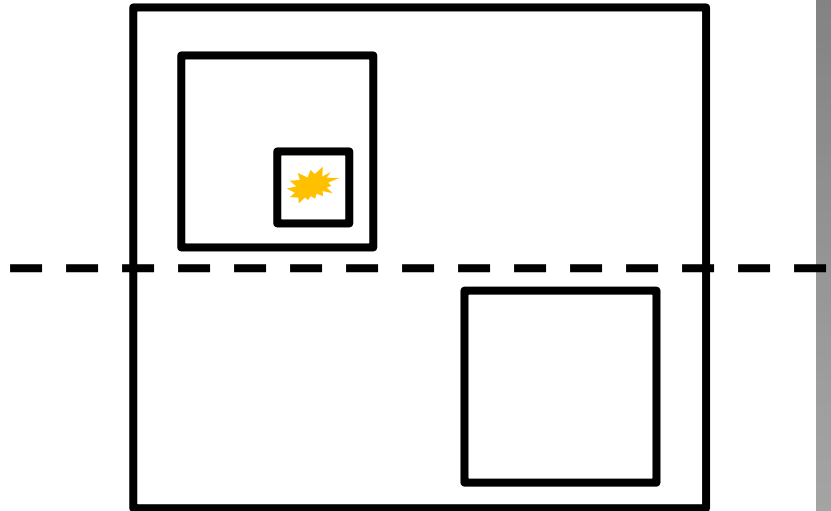
CONSIDERATIONS - STAKEHOLDERS



EARLY ZONING CONCEPT

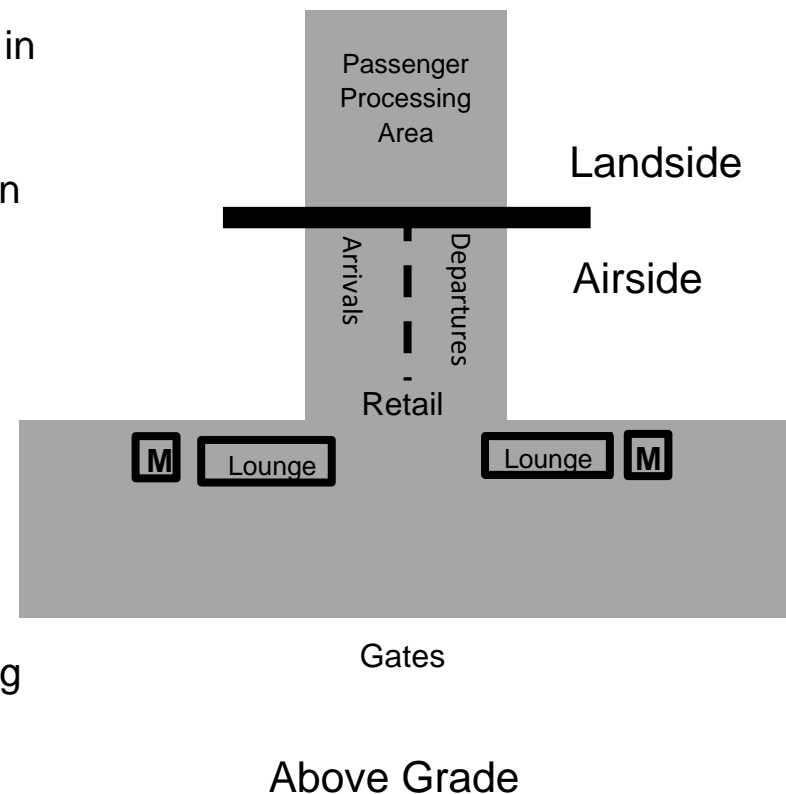
■ ZONES

- Large Zones
- Sub Zones (Box within a Box)
- Determine actual airside/landside boundary
 - Needs to be coordinated
 - Security
 - Operations
 - Design Team
- Design Intent
 - Keep incident controlled within Zone of Incident
 - Avoid evacuation of full airport



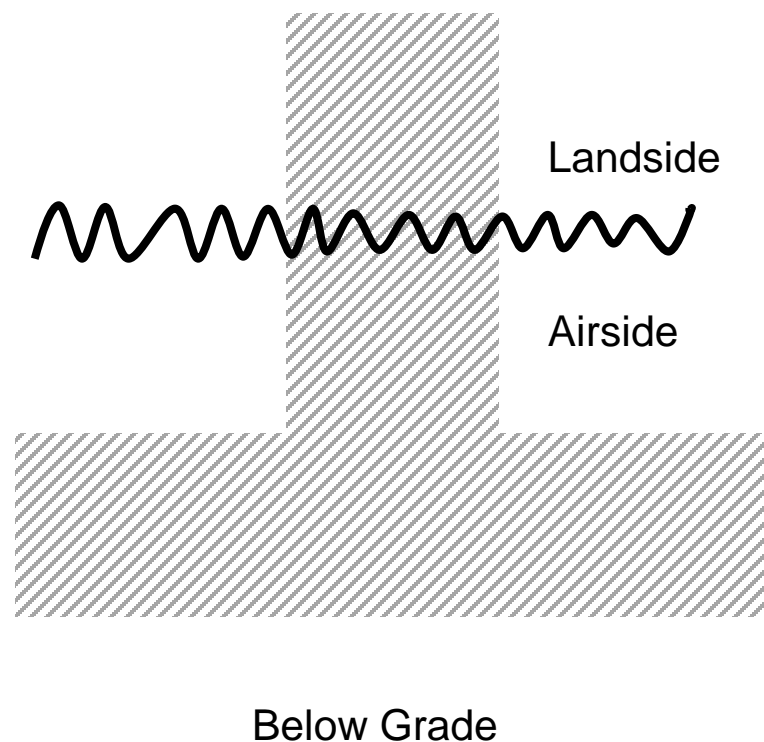
AIRSIDE-LANDSIDE BOUNDARY

- **Airside**
 - Part of the airport used by aircraft for passenger loading and unloading; takeoffs and landings, directly involved in the arrival and departure of aircraft
 - Represents the area beyond security checks, passport and customs control in an airport terminal
- **Landside**
 - Part of the airport to which the general public has unrestricted access
- **Airside-Landside Boundary**
 - Boundary formed by security check, customs, passport control, etc.
 - Should not evacuate across this boundary, equivalent of illegally entering or exiting a country
 - Security problem as well as legal/regulatory issue



AIRSIDE-LANDSIDE BOUNDARY: BACK OF HOUSE AREAS/ BELOW GRADE

- Increased Challenges Determining Location Of Airside/ Landside Barrier
 - Mechanical rooms
 - Baggage Handling
 - Goods Shipping/ Receiving
 - Flight Catering
 - Aircraft Equipment
 - Goods and Waste
- Coordination With Security/ Operations
 - Airport staff often pass boundary below grade or other “Back of House” areas



MAINTAINING AIRSIDE/ LANDSIDE BOUNDARY

■ DESIGN INTENT

- Reduce amount of time required for persons to cross airside-landside boundary while maintaining necessary security levels

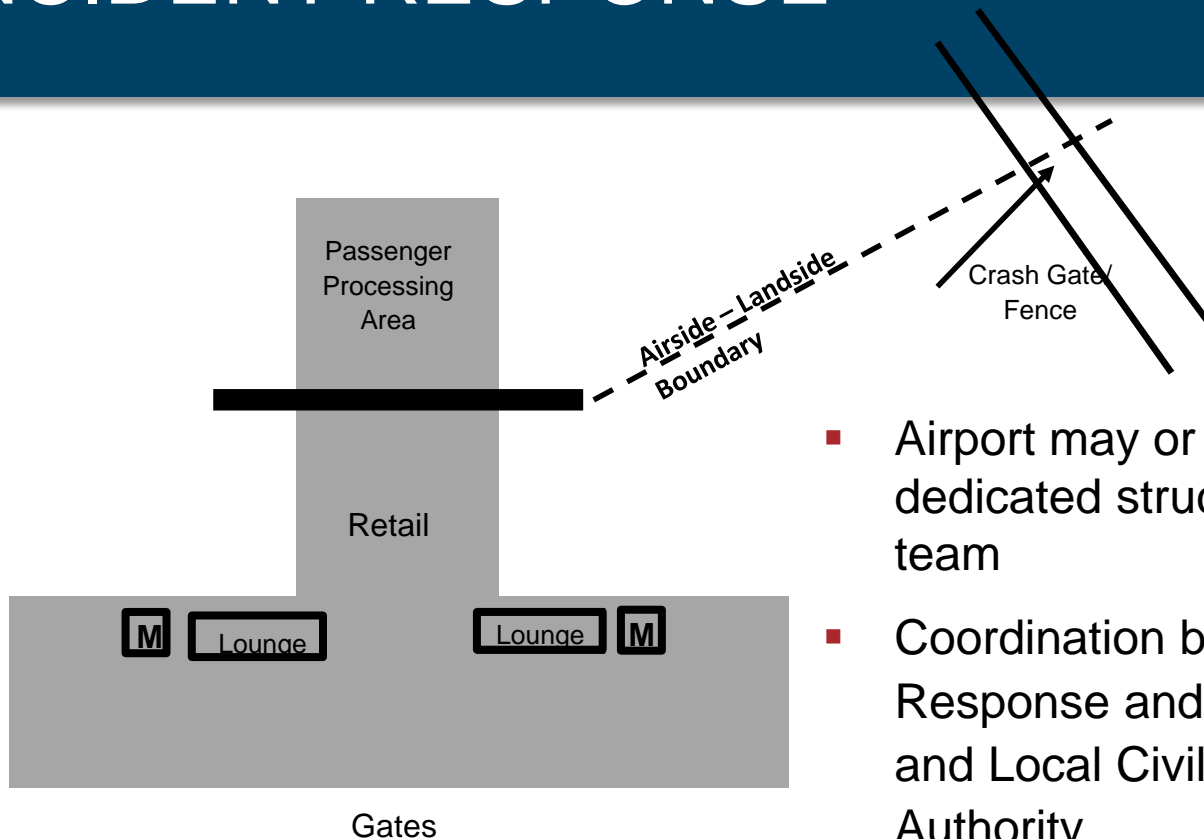


■ IMPLICATIONS

- Supervision of all incidences of crossing airside-landside boundary
- CCTV, ID verification and screening of all persons and materials crossing boundary
 - E.g. Goods and Waste Facility
- Non-authorized breach of boundary
 - Visa processing/ verification
 - Quarantine
 - Re-processing through passport control upon discharge
- Ensuring the Fire and Life Safety systems align with boundary



INCIDENT RESPONSE



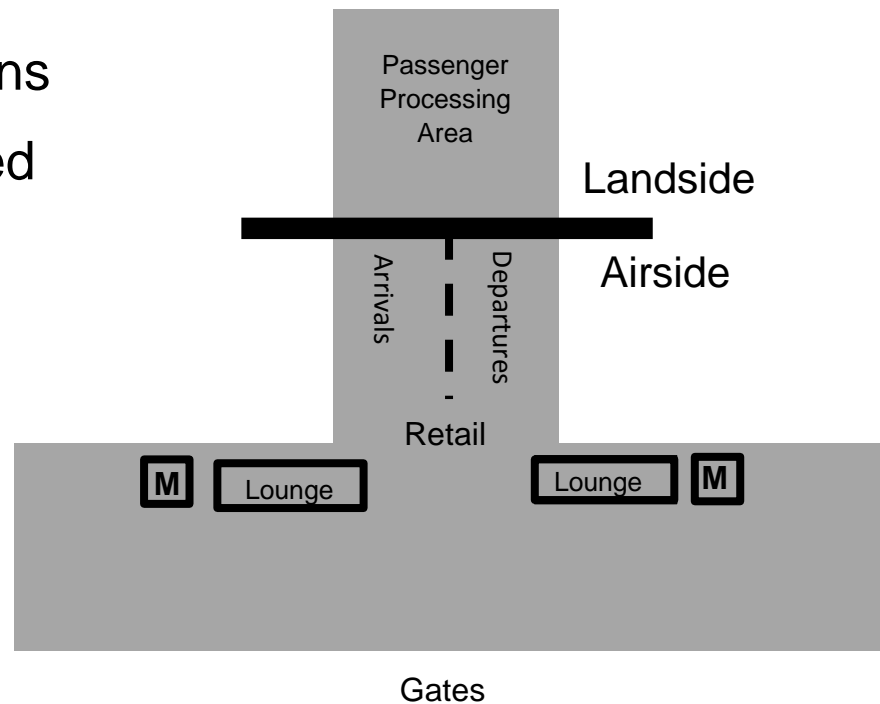
- Airport may or may not have dedicated structural response team
- Coordination between Airport Response and Security Teams and Local Civil Defense Authority
- Local Civil Defense arrival via “Crash Gate”
 - Must cross this airside-landside boundary to respond to incidents on airside



ZONING – COORDINATING ZONES

HIERARCHY OF ZONES

- Based on Evacuation OR Notional Zones for Operations
- Must be carefully coordinated for facility functionality with:
 - Security
 - Operations
 - Design team
- May want to consider Retail Areas (M – Mercantile) as their own zone



ZONES

- Passenger Areas
 - Hold rooms/ gates
 - Restrooms
 - Prayer rooms
 - Circulation areas
 - Passenger processing areas (ticketing)
 - Transferring areas
 - Baggage reclaim
- Retail Areas
 - Traditional mercantile
 - Food and beverage areas
 - Lounges
- Residential Areas
 - Hotel (airside and landside)
 - Sleeping pods
- Business Occupancies
 - Airline offices
 - Ticketing/ Customer service
 - Operational offices (airport staff, various)
- Which Are Airside, Landside, Or Both???



ZONES (Cont'd)



**Airport
Badging
Office**



- Back Of House Areas
 - Mechanical
 - Food Preparation Areas
 - Security Areas (Institutional)
 - Operational
 - BMS
 - Cleaning
 - Maintenance
 - Sensitive Equipment
- How Do These Areas Interact?
- Design Intent
 - Avoid crossing airside-landside boundary
 - Avoid FOH breach of BOH and entry to secured areas
 - Can be achieved through coordination with airport security and operations



ZONES (Cont'd)

- Challenges

- Egressing through BOH areas may not be feasible because these areas are secured
- Mixing departing and arriving passengers
- Incident in a retail unit necessitating discharge of an entire passenger circulation area is undesirable



ZONING – COORDINATING FIRE/ LIFE SAFETY SYSTEMS

HIERARCHY OF ZONES

- Egress Zones
- Smoke Control Zones
- Notification/ Evacuation Zones
- Automatic Sprinkler Zones
- Fire Alarm and Detection Zones



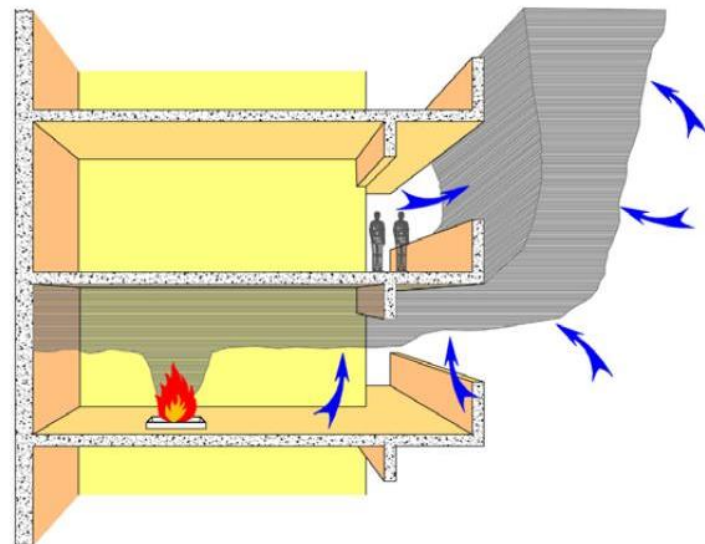
ZONING - EGRESS

- Egress zoning is most critical as it relies on core architecture
 - Very difficult to change
 - Impacts:
 - Doors
 - Exits
 - Stairs
 - Horizontal Exits
- Where will occupants go and how will they get there?
 - Shelter in place?
 - Eventually move people if emergency event continues

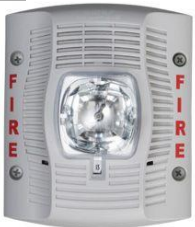


ZONING – SMOKE CONTROL

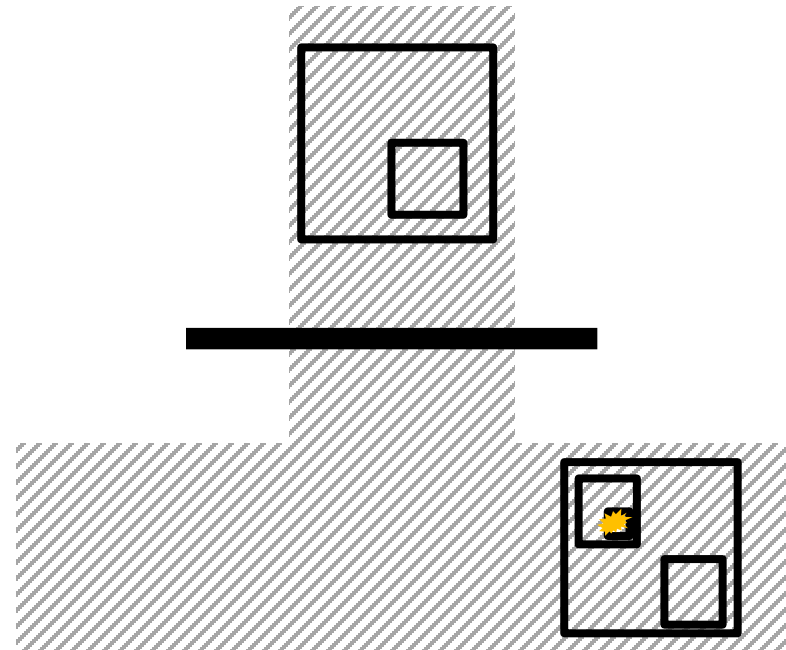
- Difficult to change in later design stages
 - Also dependent on building architecture
- If not coordinated early, may require:
 - Downstands
 - Smoke Curtains



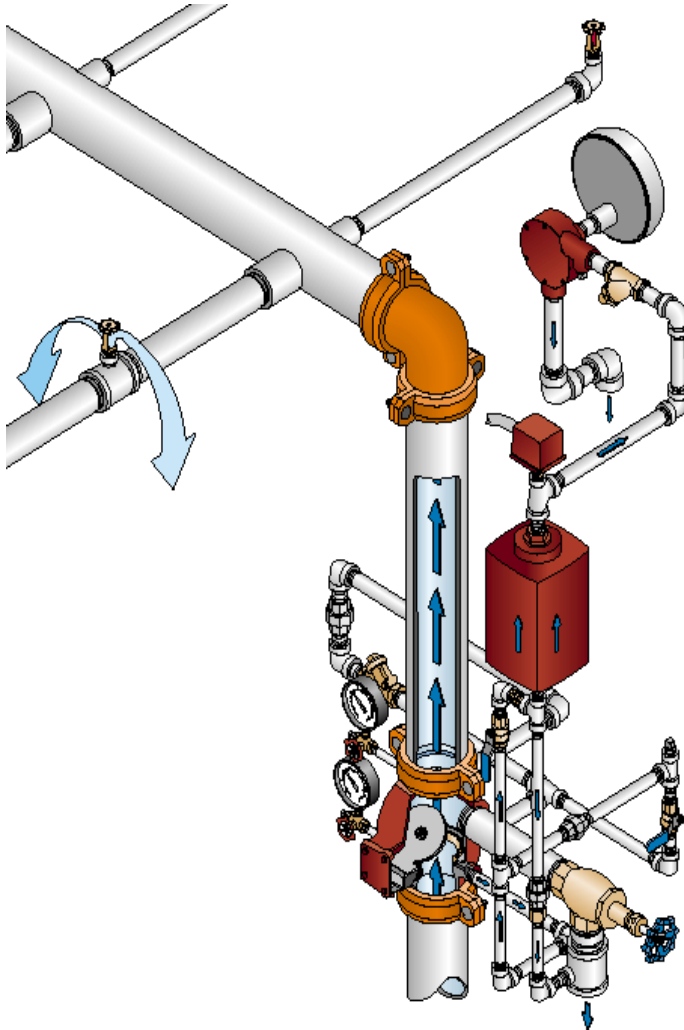
ZONING – EVACUATION (NOTIFICATION)



- Zone and Sub-Zone
 - Independent panels or intelligent detection?
 - BOH
 - Special Suppression with independent zones
- Business Continuity
 - Interruption of operations due to a minimal incident is not desired
 - Avoid loss of multiple gates because of one incident



ZONING – SPRINKLER SYSTEMS



- Automatic sprinkler zoning
 - Hard to change later because it is based on water flow switches and zone control valves
 - Entire zone is activated under positive water flow switch condition
 - Each retail area in an airport facility typically is its own water flow zone, similar to a covered mall building

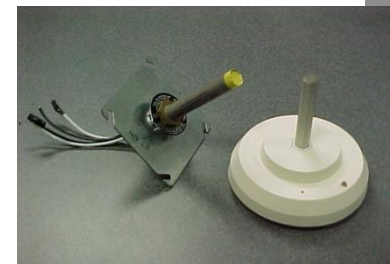
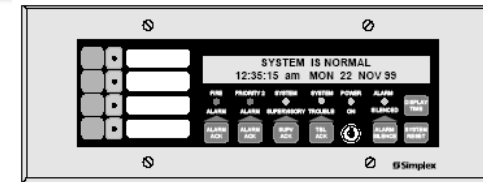
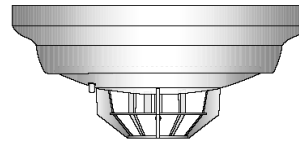


ZONING – FIRE ALARM AND DETECTION

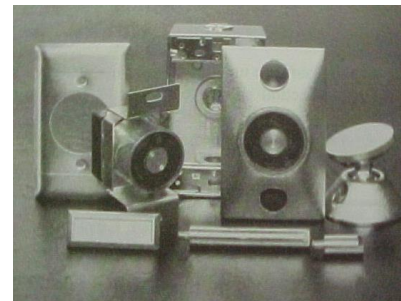
- Easiest to change with modern addressable fire alarm control panels

- Initiating Devices

- Smoke Detectors
- Heat Detectors
- Aspirating Smoke Detection (e.g. VESDA)
- Linear Heat Detection
 - Travellators
 - Long Corridors
 - Tunnels
- Beam Detection
- Open-area Smoke Imaging Detection (OSID)
- Video Smoke Detection
- Manual Call Points*
- Water Flow Switches



*contested issue



CONCLUSION

SUMMARY OF PRESENTATION

- Modern airports are complex facilities with multiple uses
- Early coordination of zone arrangement amongst facility uses facilitates stakeholder operations
 - Security, Operations, Design Team
 - Emergency/ Crisis Response Team
 - Must liaise with local and international police force(s)
- Understand the airside-landside boundary and its impact on zoning
- Minimize business interruption from an incident by reducing impact on multiple zones



QUESTIONS?

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