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

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Course Description

In the design of modern airport facilities, 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/airside, secured/unsecure, sterile/unsterile 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

Jaime Paucar, P.E.
Project Director, JENSEN HUGHES

Jaime Paucar graduated from The City College of New York with a Bachelor of Science in Mechanical Engineering and holds a graduate certificate in Fire Protection Engineering from Worcester Polytechnic Institute. As a registered professional engineer in the United States with over 15 years of professional experience in the fire protection engineering industry, Mr. Paucar has applied his diverse design experience to several notable projects on a national and international level.

Mr. Paucar's design and management experience expands to a variety of fire suppression systems including special hazards for airports, hangars, semiconductor and military facilities, power generation plants, oil/gas refineries and pharmaceutical research and development laboratories

As Project Director, he is responsible for developing and monitoring project budgets, coaching and supervising teams, assisting with the coordination of staff workload, and managing client relationships. In addition to providing fire/life safety consultations, he has knowledge of the UAE and GCC Fire Codes, IBC, and NFPA standards.

Mr. Paucar currently serves as Project Director for Al Maktoum International Airport project for JENSEN HUGHES in the United Arab Emirates.

Learning Objectives

1. ***Review the 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 to minimize business interruption.***

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.

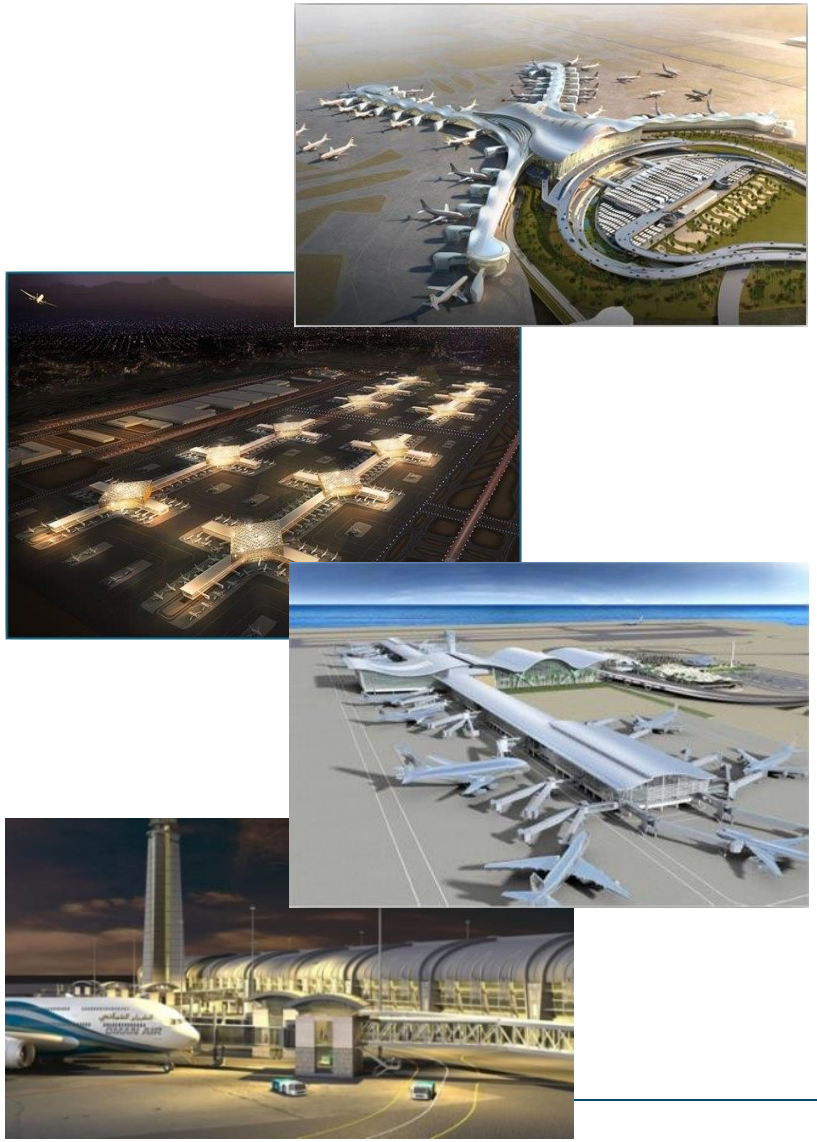
These may be used to update CPD records for relevant organisations including the Chartered Institute of Building (CIOB).

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
  - Goals/Stakeholders
- Early Stage Planning of Zoning
  - Airside Landside Boundary
  - Incident Response/ Civil Defense
  - Coordination/ Challenges
    - Egress
    - Smoke Control
    - Notification/ Evacuation
    - Fire Alarm and Detection
    - Automatic Sprinkler Protection
- Conclusion & Questions

AIRPORT FACILITIES IN THE MIDDLE EAST



- King Fahd International Airport Dammam
- King Abdulaziz International Airport Jeddah
- Abu Dhabi Midfield 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 – MULTPLE 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



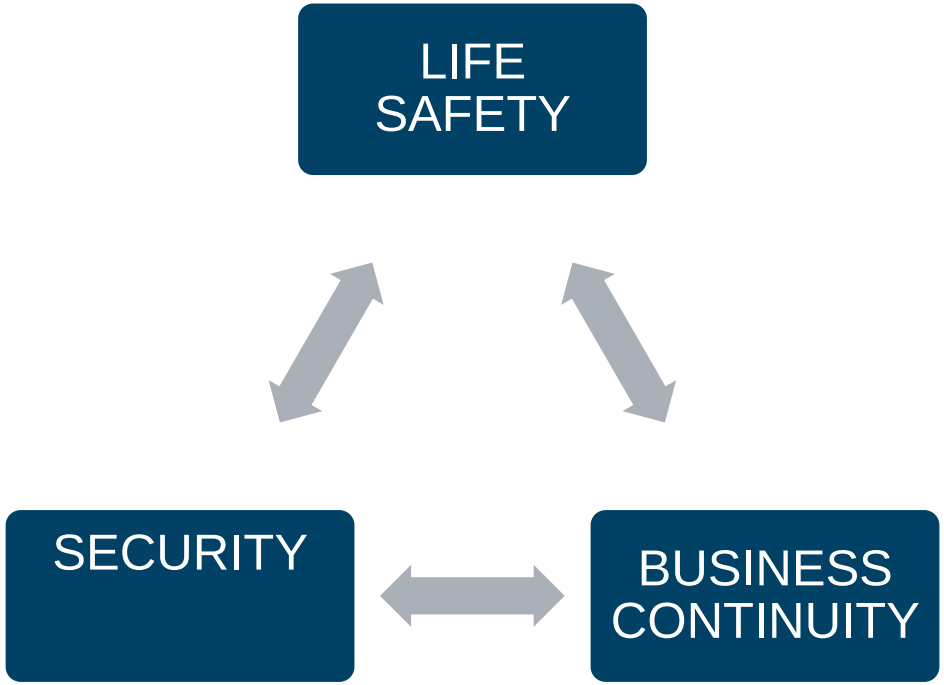



GOALS

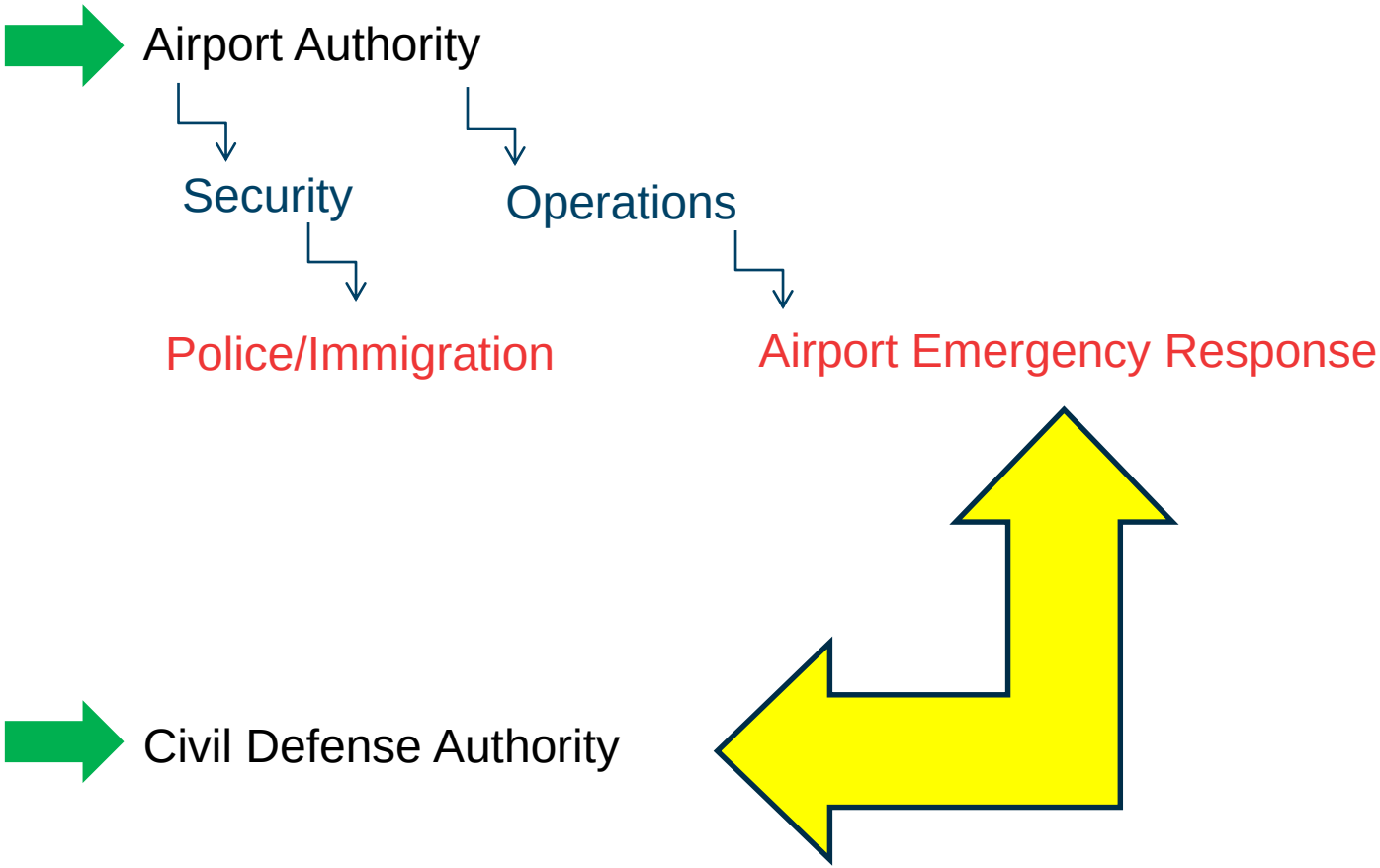
Limit the impact of a fire incident

Avoid security breach between landside/airside/sterile areas

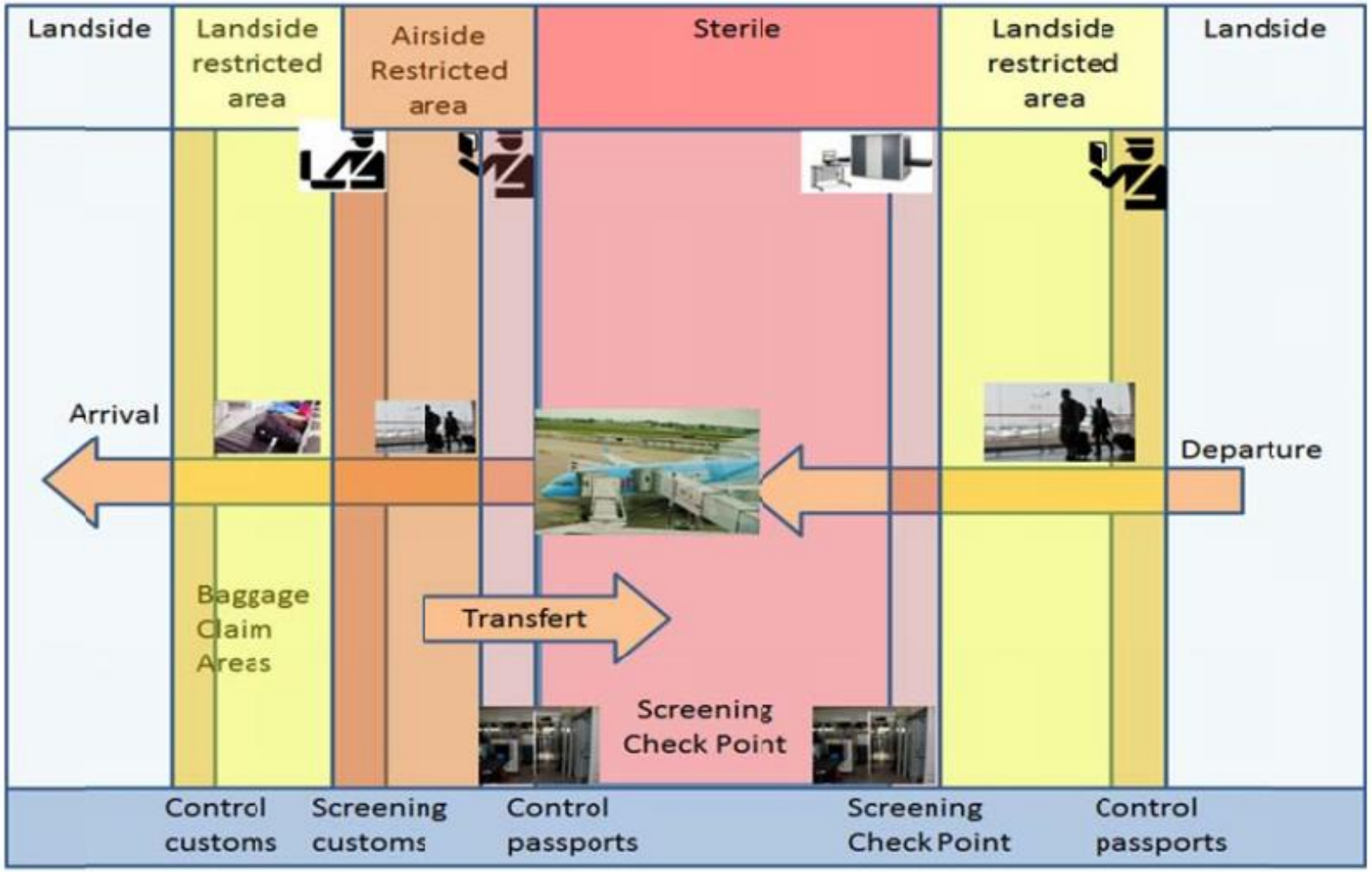
Minimize interruption to airport operations (Business continuity)



STAKEHOLDERS



AIRPORT LAYOUT AND BOUNDARIES



AIRPORT LAYOUT AND BOUNDARIES

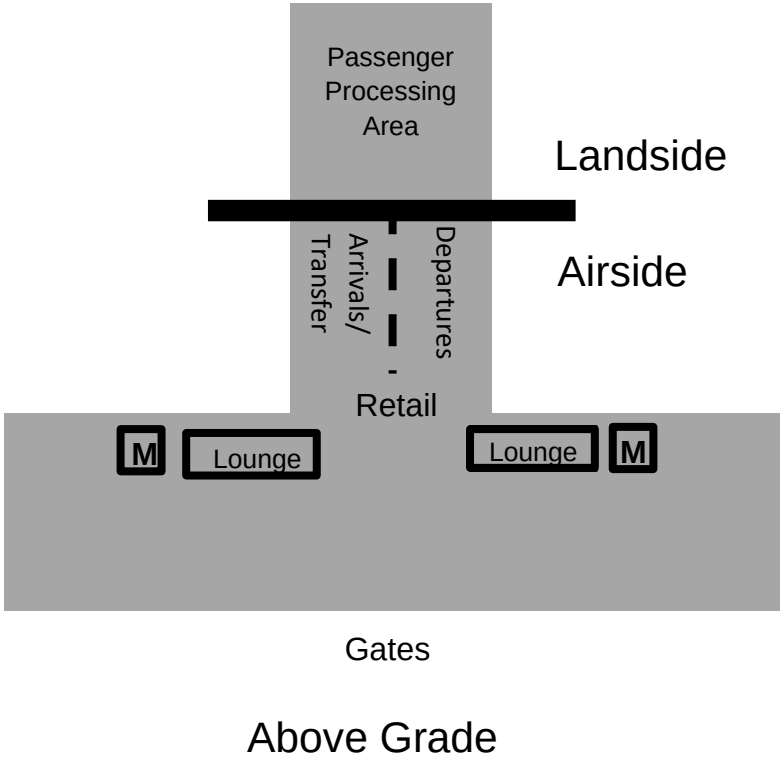
- **SECURITY RESTRICTED AREA (AIRSIDE RESTRICTED)**
  - PAX departure areas between the screening checkpoint and the aircraft, the ramp, etc.
- **STERILE AREA**
  - Area between any passenger inspection or screening control point and aircraft into which access is strictly controlled.
- **ARRIVALS/TRANSFERS**
  - Corridors used by arriving and transfer passengers to the transfer screening areas and APM. These areas are segregated from the sterile and security restricted areas by access control.
- **PUBLIC SPACES (LANDSIDE)**
  - Public spaces without needing authorized credentials, going through checkpoint screening, or keys.

AIRPORT LAYOUT AND BOUNDARIES

Zoning	Definition	Examples Areas
LANDSIDE PUBLIC	The area that includes all the facilities where the general public may enter without any special identification access	Car park, terminal, departure and arrival curbsides, taxi, etc.
LANDSIDE RESTRICTED AREAS	The area that includes all the facilities where the general public may enter with special identification access	Cargo, logistics, support facilities, reclaim baggage area, customs area
AIRSIDE RESTRICTED AREAS	Those areas of the airside of an airport which are identified as priority risk areas in addition to access control, with screening	Arrival corridor, airside cargo or facilities, runway, hold baggage area, apron
STERILE AREA	The area between any passenger inspection or screening checkpoint and aircraft, into which access is strictly controlled with screening for staff enter in the concourse level departure	Boarding room, bridges, concourse departure area

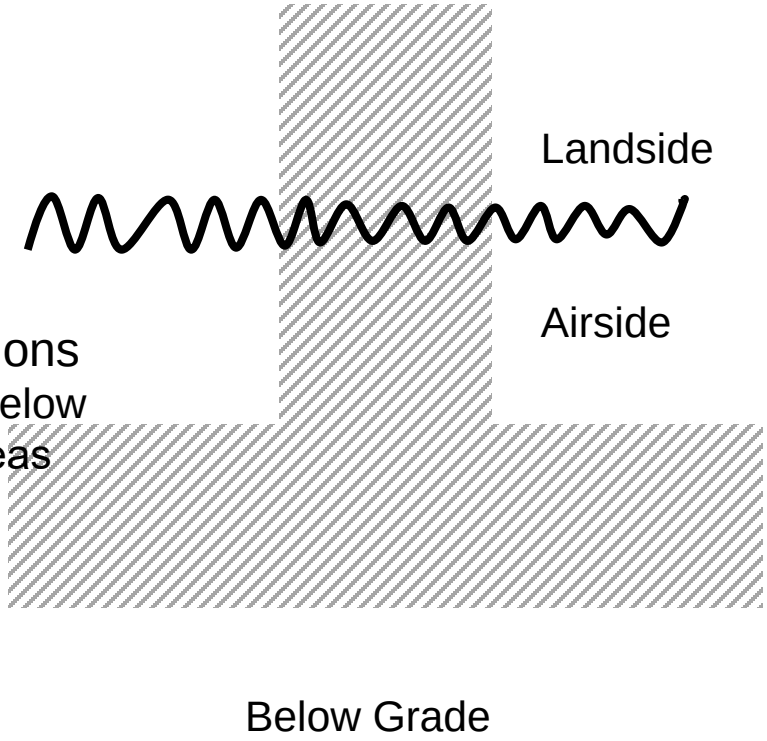
AIRSIDE-LANDSIDE BOUNDARY

- 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
  - Challenges determining location of airside/landside boundary



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
- Airside-Landside Boundary
  - Harder to define below grade



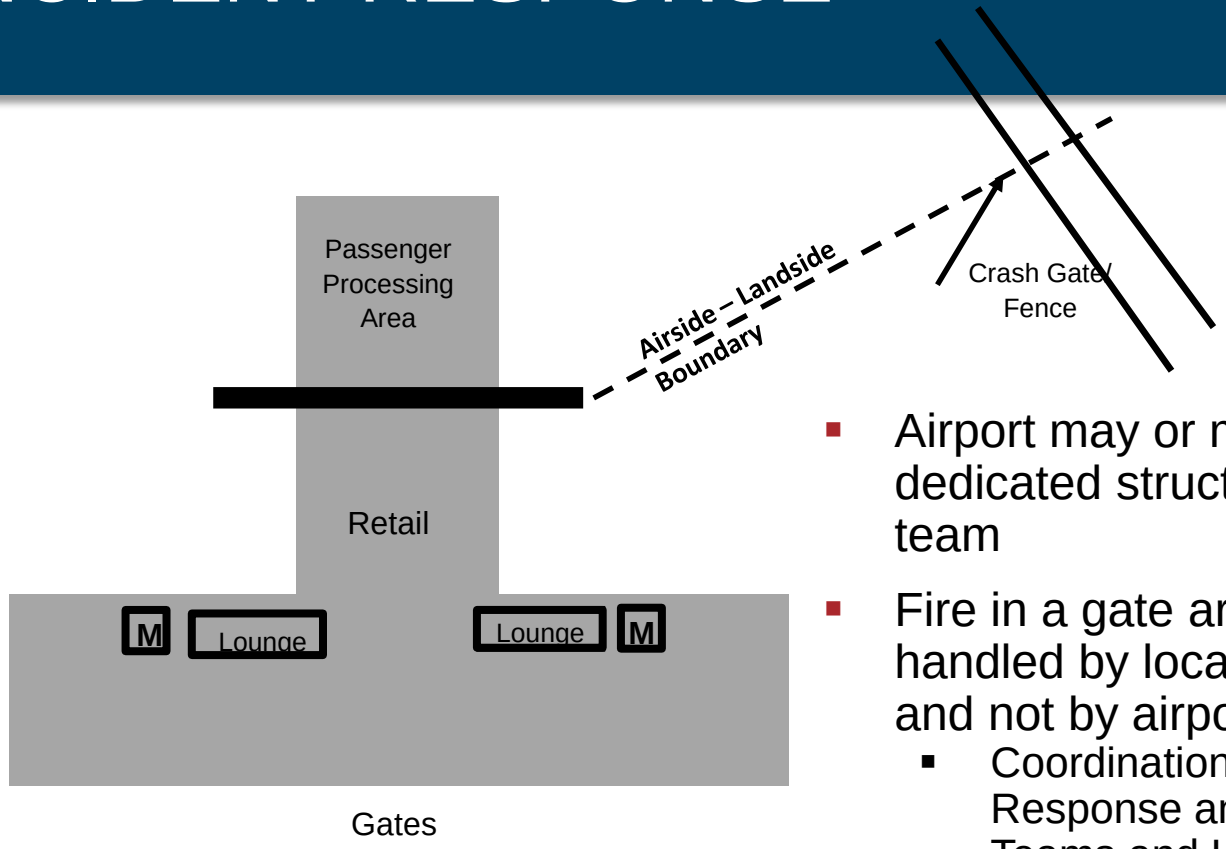
MAINTAINING AIRSIDE/ LANDSIDE BOUNDARY

- 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

MAINTAINING AIRSIDE/ LANDSIDE BOUNDARY

- Vertical circulation considerations:
  - Stairwells
  - Elevators
  - Escalators
- Security/emergency egress strategy coordination (limit/avoid going from lower security areas into higher security areas)

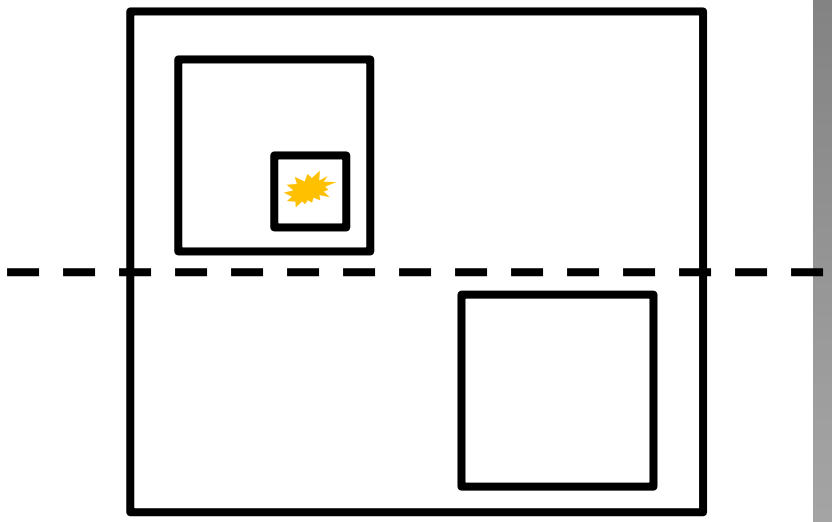
INCIDENT RESPONSE

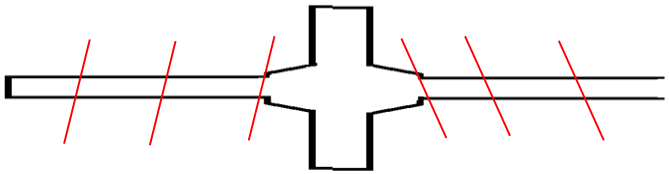


- Airport may or may not have dedicated structural response team
- Fire in a gate area may be handled by local Civil Defense and not by airport
  - Coordination between Airport Response and Security Teams and Local Civil Defense Authority
- Local Civil Defense arrival via “Crash Gate”
  - Must cross this airside-landside boundary to respond to incidents on airside

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 Terminal/Concourse
      - Fast response (i.e. first responder rooms strategically located by zones)

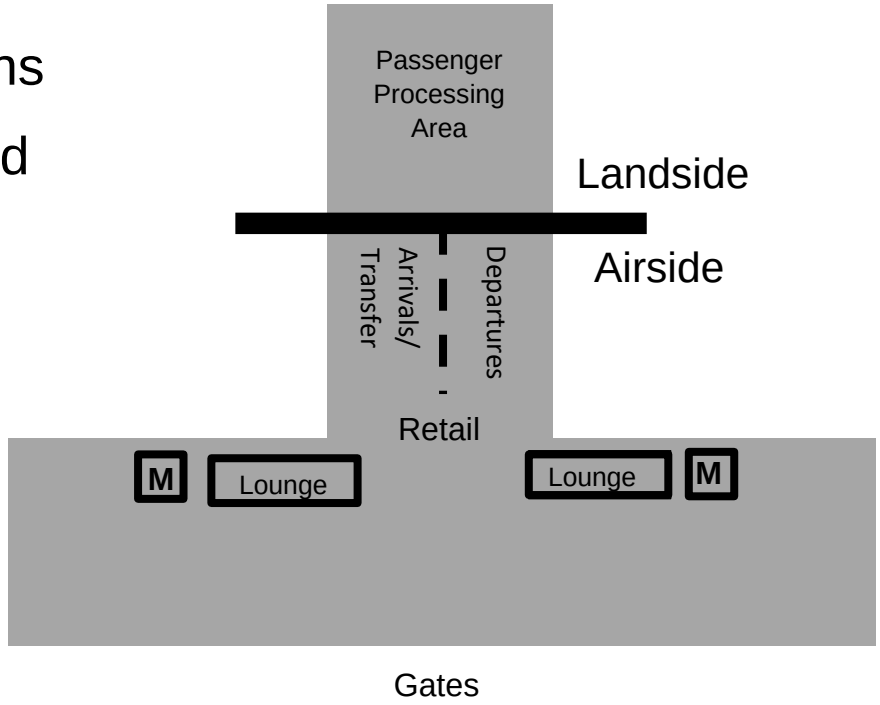




ZONING – COORDINATING ZONES

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/ gate lounge areas
  - Restrooms
  - Prayer rooms
  - Circulation areas
  - Passenger processing areas (ticketing)
  - Transferring areas
  - Baggage reclaim
  - Lounges
- Retail Areas
  - Traditional mercantile
  - Food and beverage areas
- 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)

- 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

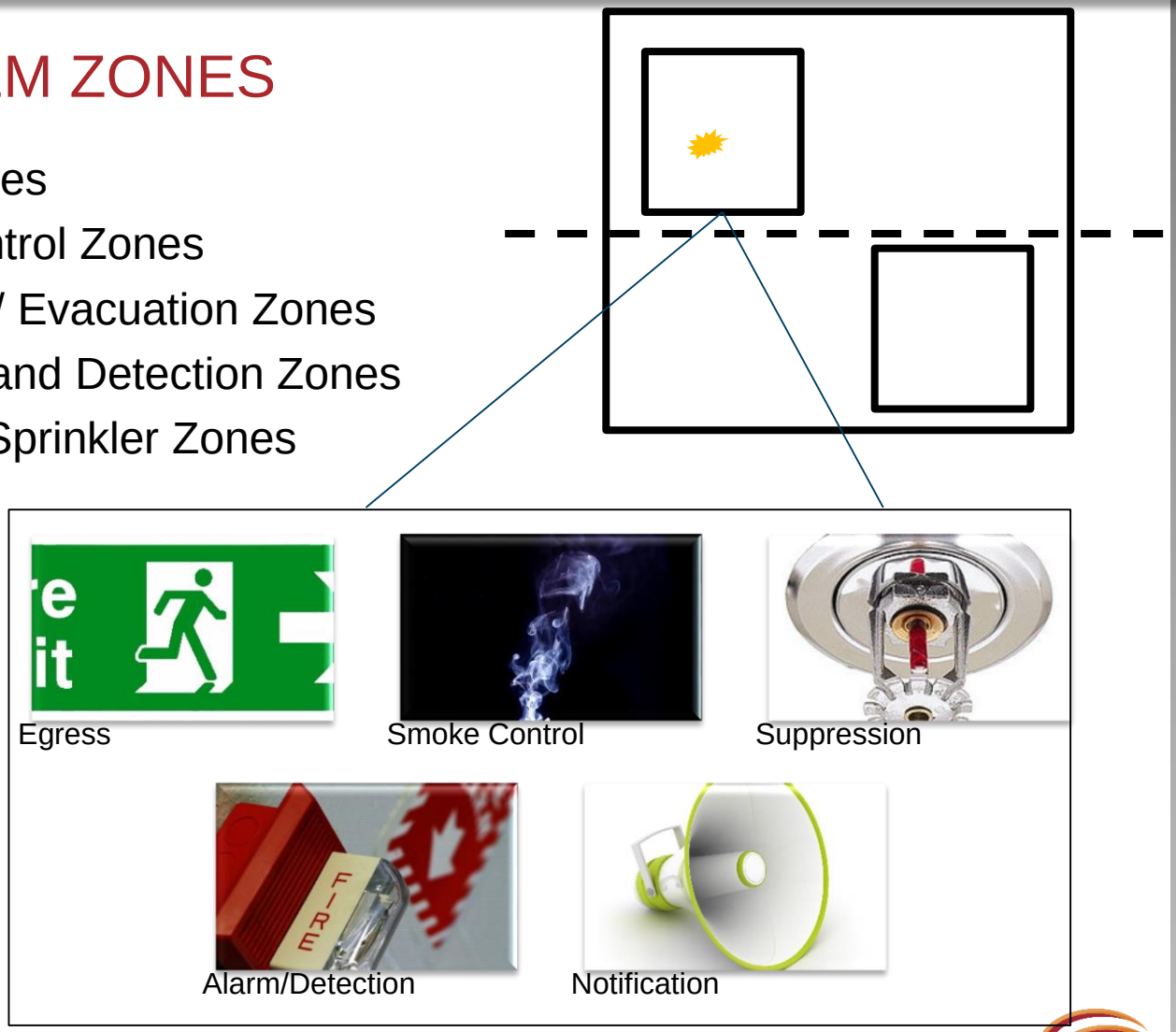
ZONES (Cont'd)

- Challenges
  - Retail may not be able to discharge into BOH areas 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

FLS SYSTEM ZONES

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

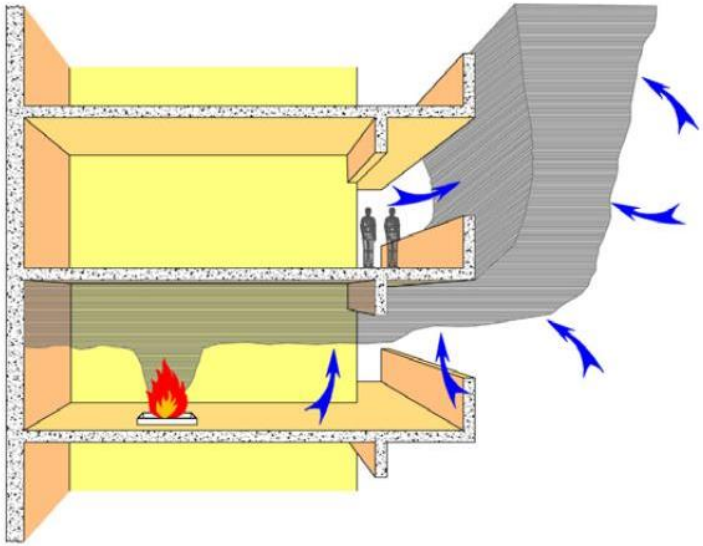


ZONING - EGRESS

- 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
  - Assembly at airport apron?
- Egress Zone = Evacuation Zone

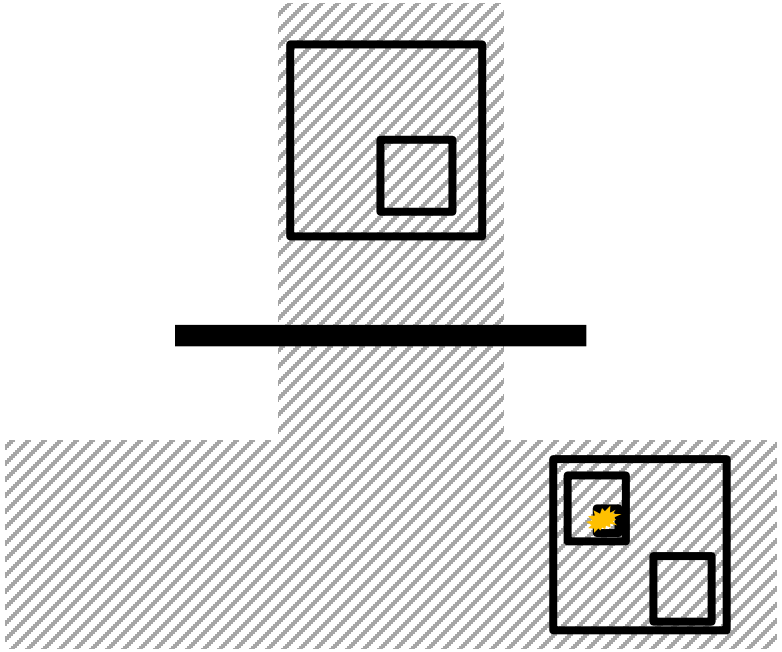
ZONING – SMOKE CONTROL

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

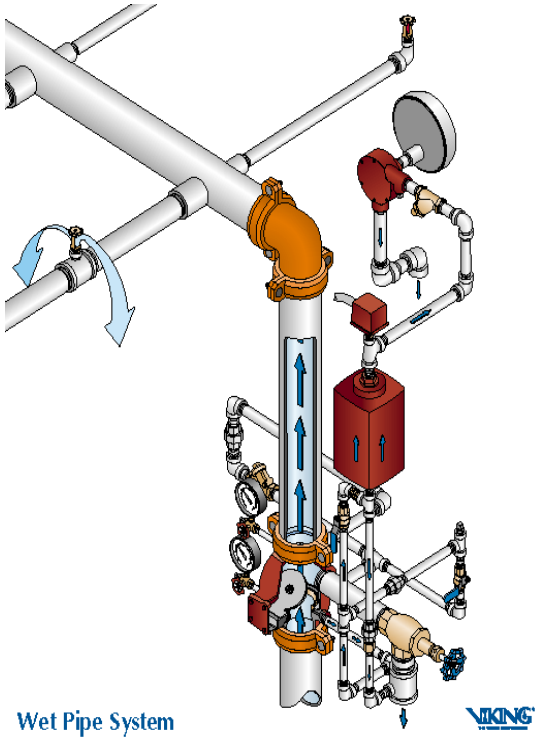


ZONING – EVACUATION (NOTIFICATION)

- Zone vs. 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
  - i.e. Avoid loss of multiple gates because of one incident

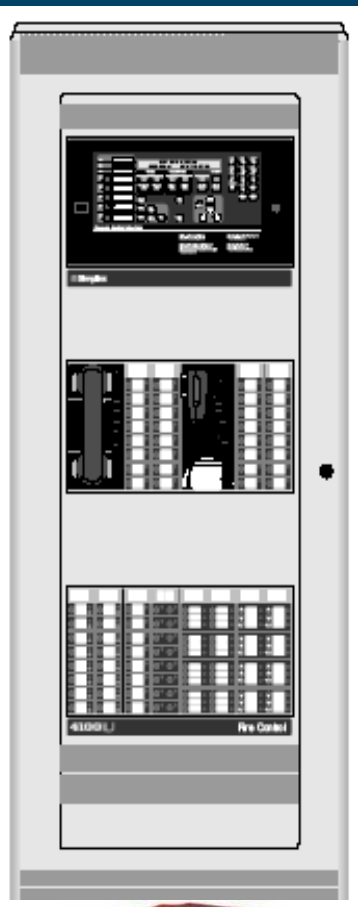


ZONING – SPRINKLER SYSTEMS

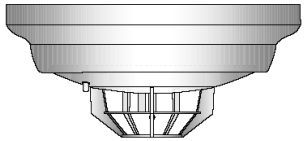


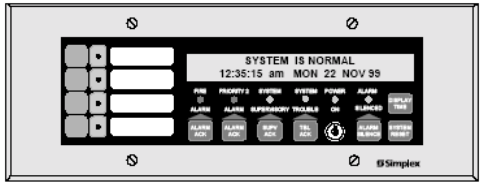
- Automatic sprinkler zoning
  - Hard to change later because it is based on water flow switches and zone control valves
  - Entire zone is activated under positive water flow switch condition
  - Each retail area in an airport facility typically is its own water flow zone, similar to a covered mall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

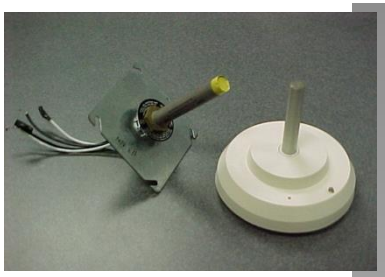
ZONING – FIRE ALARM AND DETECTION



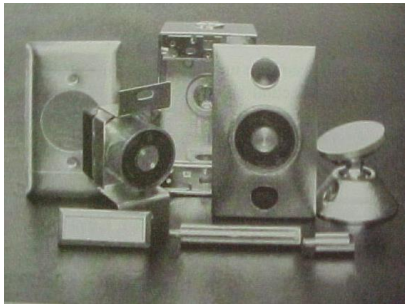
- Easiest to change with modern addressable fire alarm control panels
- Initiating Devices
  - Smoke Detectors
  - Heat Detectors
  - Aspirating Smoke Detection (e.g. VESDA)
  - Linear Heat Detection
    - Travellators
    - Long Corridors
    - Tunnels
  - Beam Detection
  - Open-area Smoke Imaging 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?

Contact

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