



INTEGRATING SAFETY & SECURITY SYSTEMS IN ASSEMBLY OCCUPANCIES

Access/Egress in Stadiums



LEARNING OBJECTIVES

1. Case Studies 5 tragic events in stadiums.
2. Contingency Plan - the related Security & Safety Risks, and solutions.
3. Access Control - How can System Integration help Safety & Security issues?

Assembly Occupancy

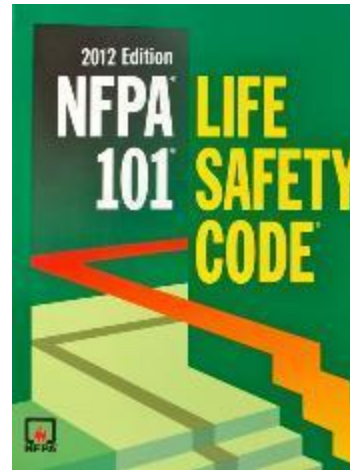
6.1.2 Assembly.

For requirements, see Chapters 12 and 13.

6.1.2.1* Definition — Assembly Occupancy. An occupancy (1) used for a gathering of 50 or more persons for deliberation, worship, entertainment, eating, drinking, amusement, awaiting transportation, or similar uses; or (2) used as a special amusement building, regardless of occupant load.

A.6.1.2.1 Assembly Occupancy. Assembly occupancies might include the following:

- (1) Armories
- (2) Assembly halls
- (3) Auditoriums
- (4) Bowling lanes
- (5) Club rooms
- (6) College and university classrooms, 50 persons and over
- (7) Conference rooms
- (8) Courtrooms
- (9) Dance halls
- (10) Drinking establishments
- (11) Exhibition halls
- (12) Gymnasiums
- (13) Libraries
- (14) Mortuary chapels
- (15) Motion picture theaters
- (16) Museums
- (17) Passenger stations and terminals of air, surface, underground, and marine public transportation facilities
- (18) Places of religious worship
- (19) Pool rooms



- (20) Recreation piers
- (21) Restaurants
- (22) Skating rinks
- (23) Special amusement buildings, regardless of occupant load
- (24) Theaters

Hillsborough Disaster (Sheffield)

(15 April, 1989 - [Liverpool](#) Vs [Nottingham Forest](#) . At least **96 killed** & **766 Injured**)

- Structure : **Standing Terraces**
- **Overcrowding** outside the ground before kick-off.
- **Entry** was possible only via **one of seven turnstiles**
- **Barriers** installed **did not meet** official safety **standards**.
- Firefighters with cutting gear had difficulty getting into the ground
- Cause of death was mostly from compressive **asphyxia**.

Video



National Stadium Disaster – Peru

(24 May, 1964 - Peru vs Argentina. At least **328 killed** & above **500 Injured**)

- Pitch Invasion
- Panic and an attempt at a **mass exit** to avoid the gas.
- Cause of death was mostly from internal **haemorrhage** or **asphyxia**.
- **No standard gates** available. (The stadium had solid **corrugated steel shutters**)
- In the street, the crowd caused destruction on private property around the stadium.



The Kathmandu Disaster - National Stadium, Nepal

(12 March, 1988 - Janakpur Cigarette Factory Ltd Vs Liberation Army of Bangladesh.

At least **93 killed** & more than **100 Injured**)

- Structure : **No proper Roofing**
- Fans attempted to flee from a hailstorm inside the stadium.
- **Exit doors were closed.**
- Spectators rushed to the stadium's **eight exits** but found **only one open.**



Ohene Djan Stadium, Accra, Ghana

(9 May, 2001 - [Accra Hearts of Oak Sporting Club](#) Vs [Asante Kotoko](#))

At least **127 killed** & **Hundreds Injured**)

- **Disappointed** fans throwing plastic seats and bottles onto the pitch
- **Panic** and a resulting stampede.
- Cause of death was mostly from compressive **asphyxia**.
- Some **gates were locked**, preventing escape.



Air Defense Stadium – Egypt

(8 Feb, 2015 - Zamalek Vs Enppi, **22 killed** & **Dozens Injured**)

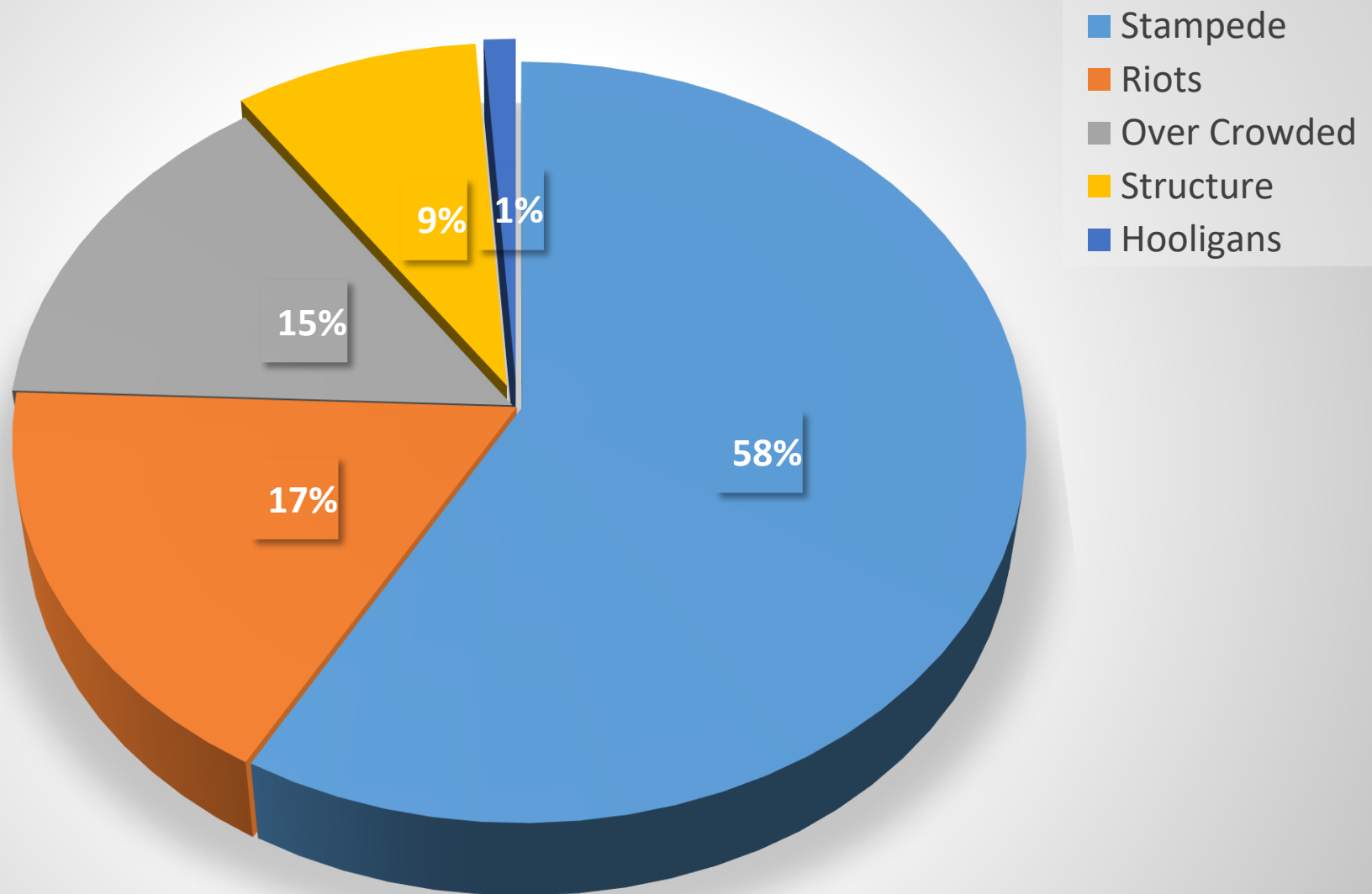
- No proper check on the no. of tickets issued and no. of fans gathered
- No proper Access Control System – fenced-in passageway
- **Instead of a Turnstiles a customized Iron cage was put for Access Control**
- No Crowd Management
- No proper Fencing - Forced Entry
- People were crushed in a stampede.





Cause of the Incidents - Analysis based on the 100 years of History

Precious Lives Lost



The main Risks for an Event:

A. Before the Event

1. Ticketing
2. Ingress
3. Fan Separation
4. Structure Design (The View from the Crowd)
5. Extremism

B. During the Event

1. Excited Moments (a Goal, a Foul, a Penalty, a Wrong decision etc)
2. Weather / Natural Calamity (Hailstorm, HVAC, Rain, Earthquake etc)
3. Riots
4. Egress due to Emergencies

C. End of the Event

1. Egress (Access Control and Escape Route Systems needs to be balanced)
2. Alternative means of Egress.
3. Crowd Management – Based on Behavior of the winning team fans and losing team fans





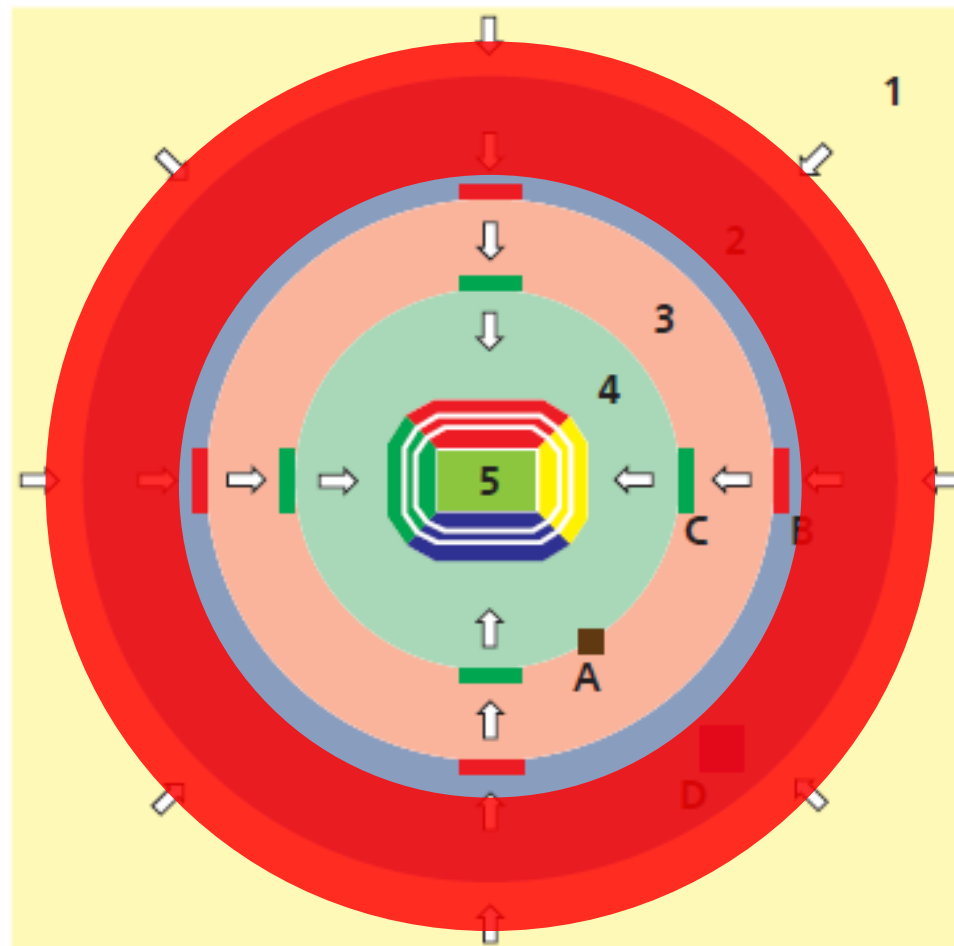
Contingency Plan





Stadium Areas & Zones

Stadiums used during FIFA events are divided into five distinct perimeters, as follows:



- 1. The public zone
- 2. The exclusive zone
- 3. Outer perimeter
(visual ticket check)
- 4. Inner perimeter
(electronic access control)
- 5. The stands
- A. TCP
- B. Mags & bags
- C. Turnstiles
- D. STC

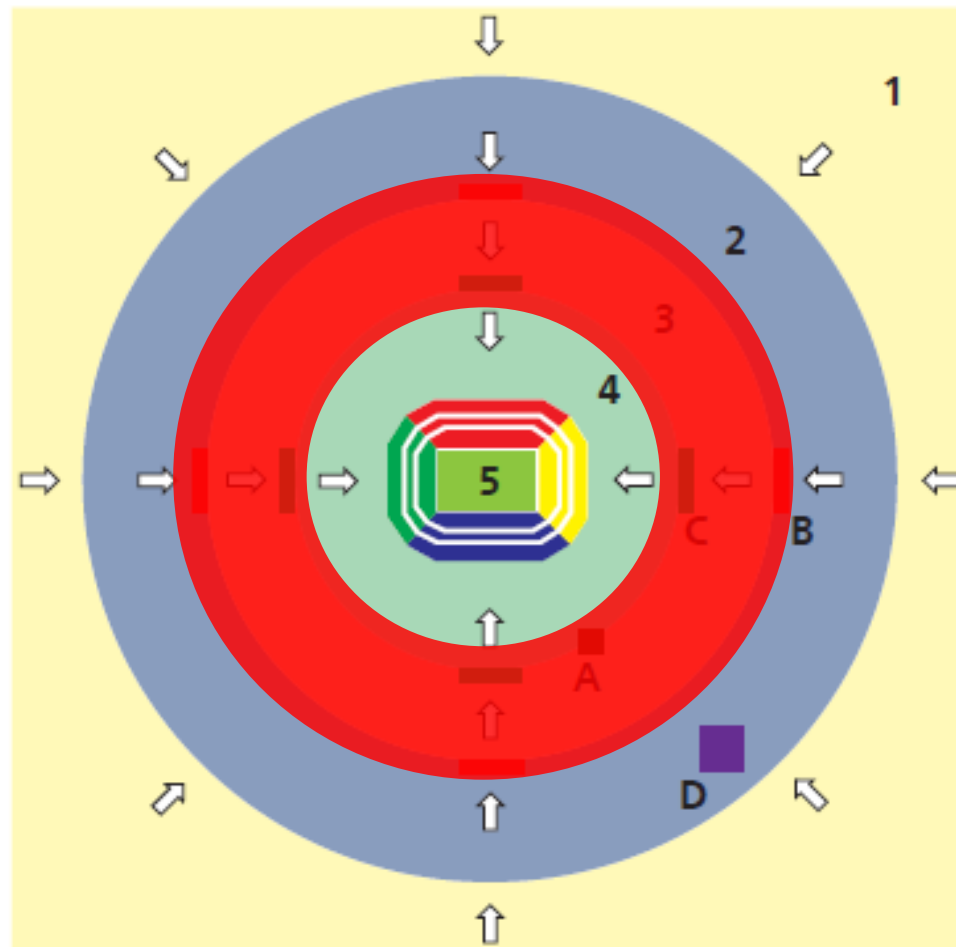
Notes:

TCP: Ticketing clearing point
 STC: Stadium ticketing centre



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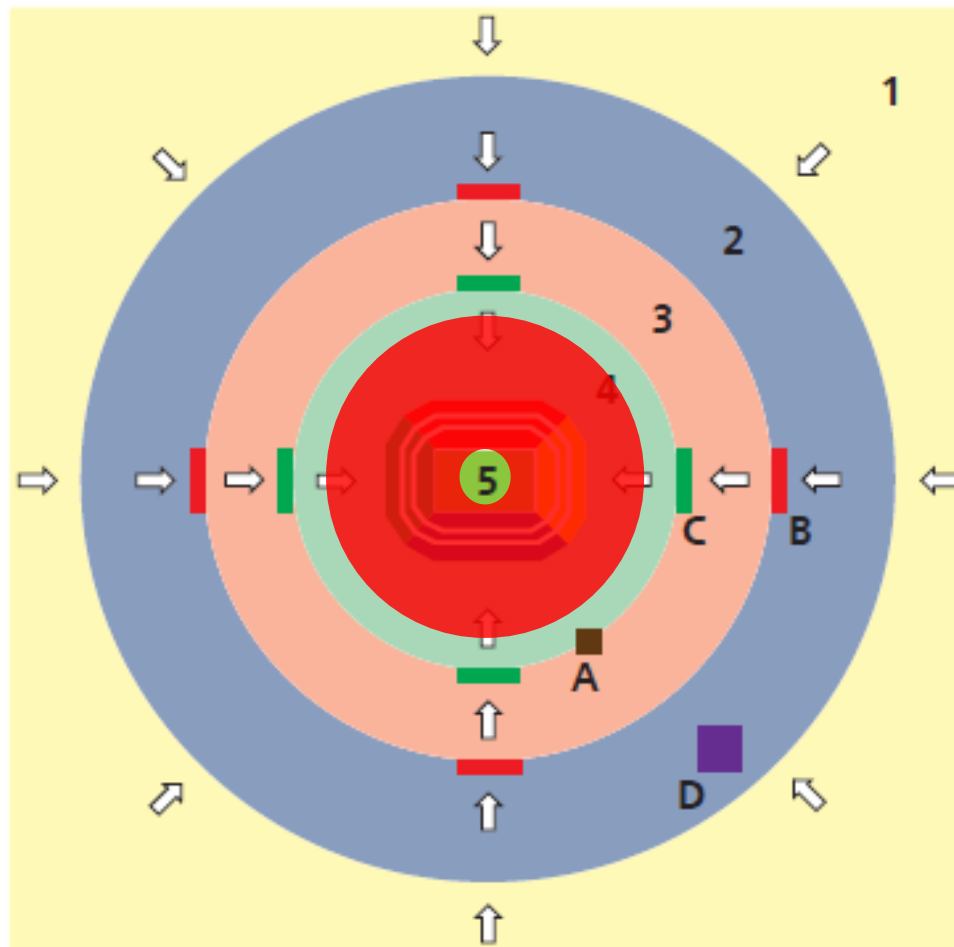
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Stadium Areas & Zones

Public Zone

- Check points- away from the Stadium
- Checking of Cars, No. plate recognition
- Checking people and bags etc



Stadium Areas & Zones

Outer Perimeter

- Checking of tickets, Manually & Mobile or Handheld devices
- Check points – Few meters away from the Stadium
- CCTV with Video Analytics
- Body & Bag Scanners
- Tickets issued and no. of fans gathered



Stadium Areas & Zones

Inner Perimeter

1. Main Entrances

- Turnstiles, barriers and revolving doors.
- An Intelligent Ticketing System



2. Internal Doors, Stands & Virtual Fences

- Hardware for the protection of the Doors and walls against heavy impact
- Delayed action as standard for ease of access
- Electro-mechanical hold-open function for single-leaf fire / smoke control doors



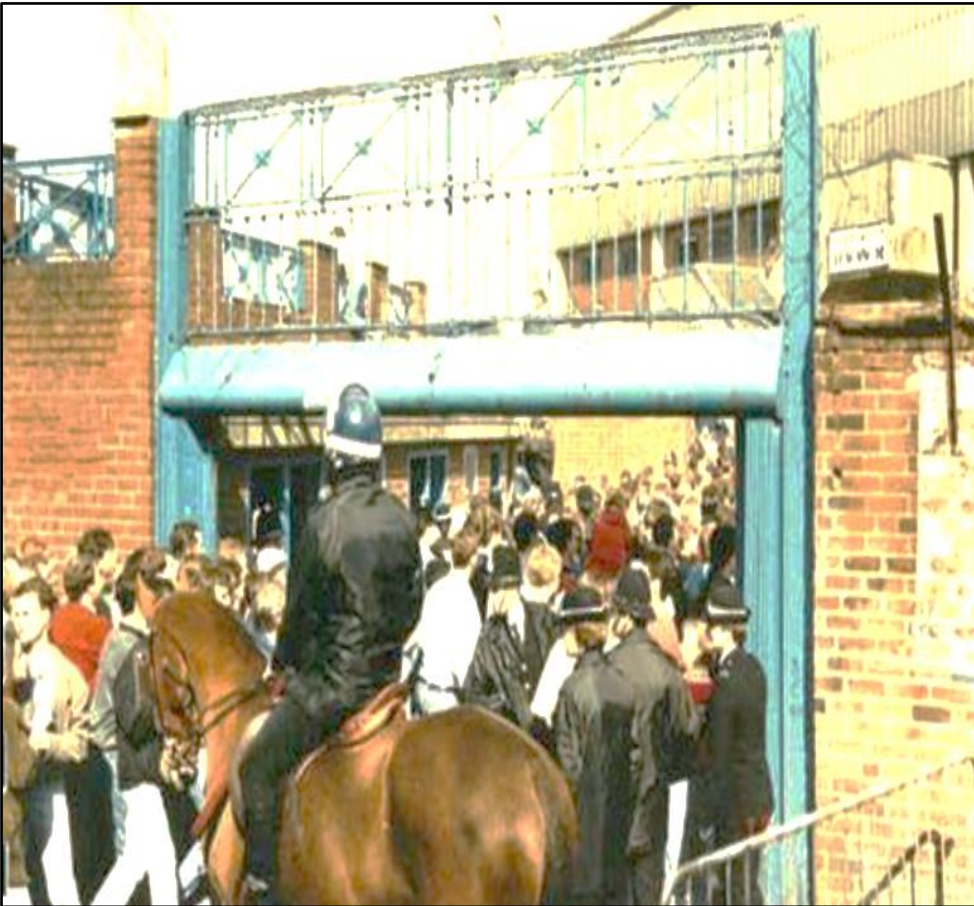
3. Exit or External Doors

- Door locking system and door terminal for electronic escape route control system



Access Control System

1. Main Entrances – Turn Stiles



Access Control System

Full Height Turnstiles

- For High Security
- Control and regulate throughput





Access Control System

Main Entrances –

- Half Height & Full Height Turnstiles for people with Special Needs
- Way to Carry Trolleys



Access Control System

Main Entrances – Carpark Control

- Physical protection of cars/lorries,



Access Control System

Main Entrances – VIP

- Elegant design as per the entrance areas
- Adaptable design
- Matches the Aesthetics of architectural design
- Silent



Access Control System

No. of Turnstiles depending on the capacity of the Stadium.

Approximate Stadium Capacity: 40,000 persons
Considering the Turnstile throughput: 10 persons per min.

Assumed time to fill the stadium: 60mins

No. of turnstiles required = = **66.66 or 67 turnstiles**
(40,000 persons/ 10 persons per minute/ 60 minutes)

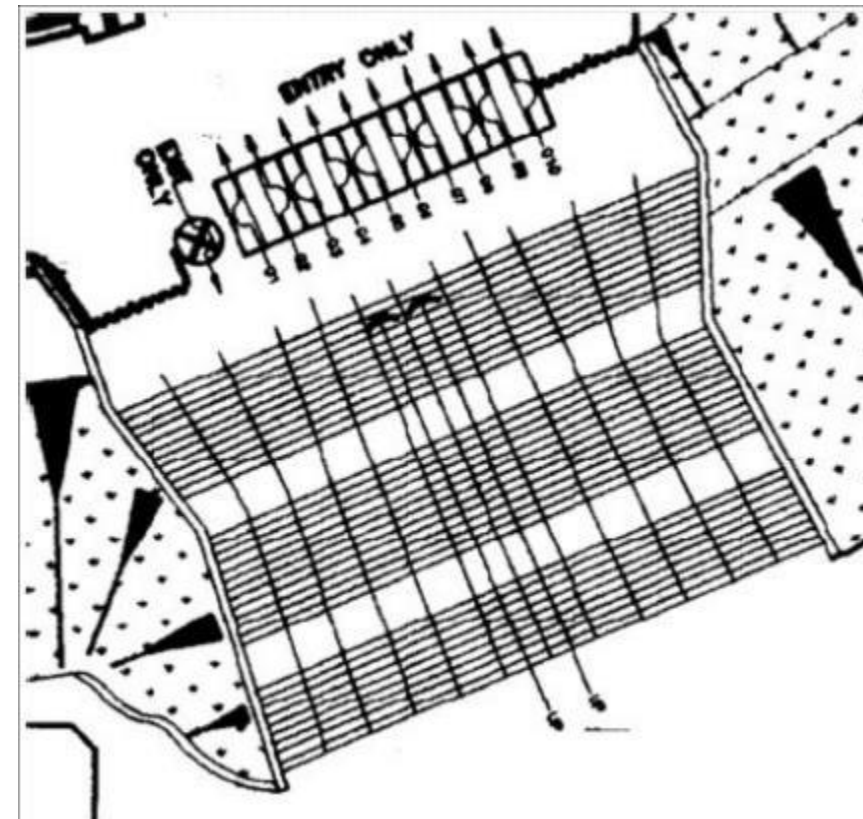
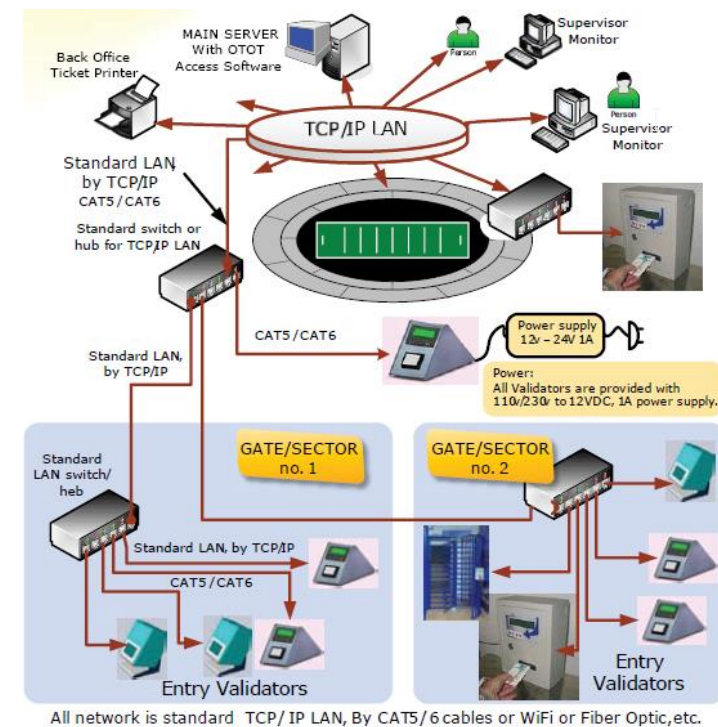


Figure 42 - Plan of gate G and turnstiles (Left = 1, Right = 10)

Access Control System

Integration of ACS with the Ticketing System

- System has to **count the people** per block .
- Ticketing System should give **an alarm**, if the maximum number is reached.
- Fan **Separation**.



Access Control System

Main Entrances – Access Points or Readers

1. Vandal Proof & Bullet Proof readers



Bullet & Vandal Proof
Access Card Readers



Access Control System

Main Entrances – Other Areas

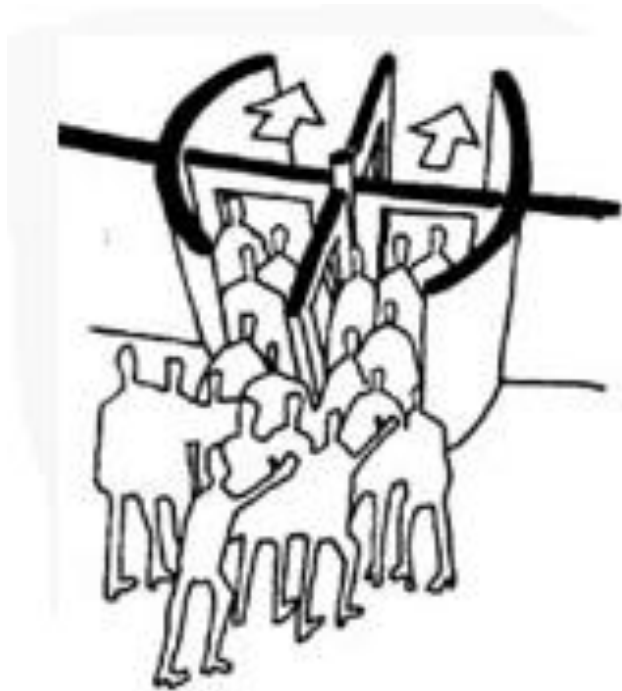
- Fan shop
- Press Center
- Office Areas



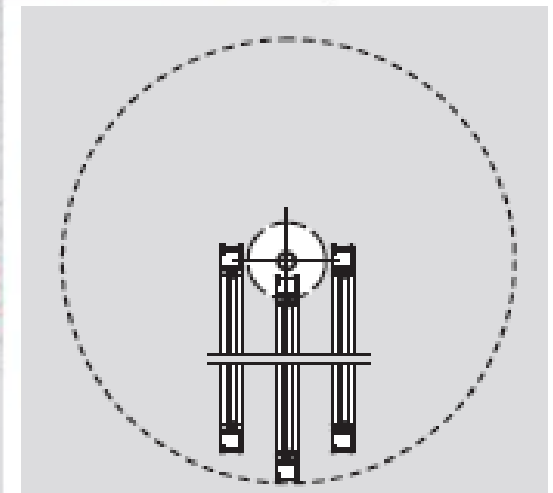
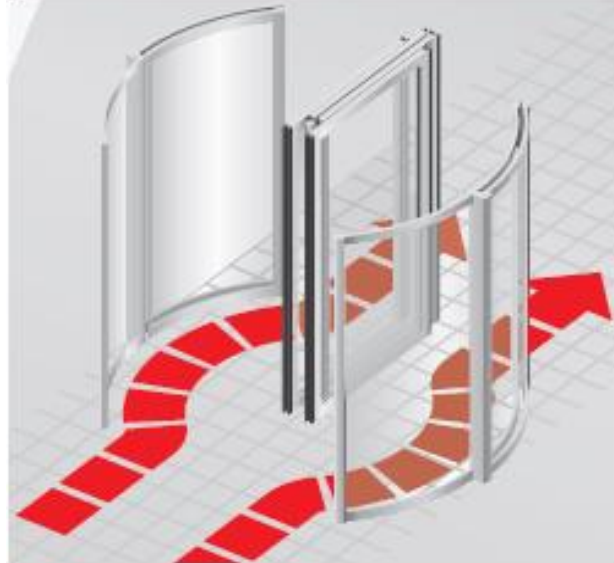


Access Control System

Automatic Revolving door with Breakout Function

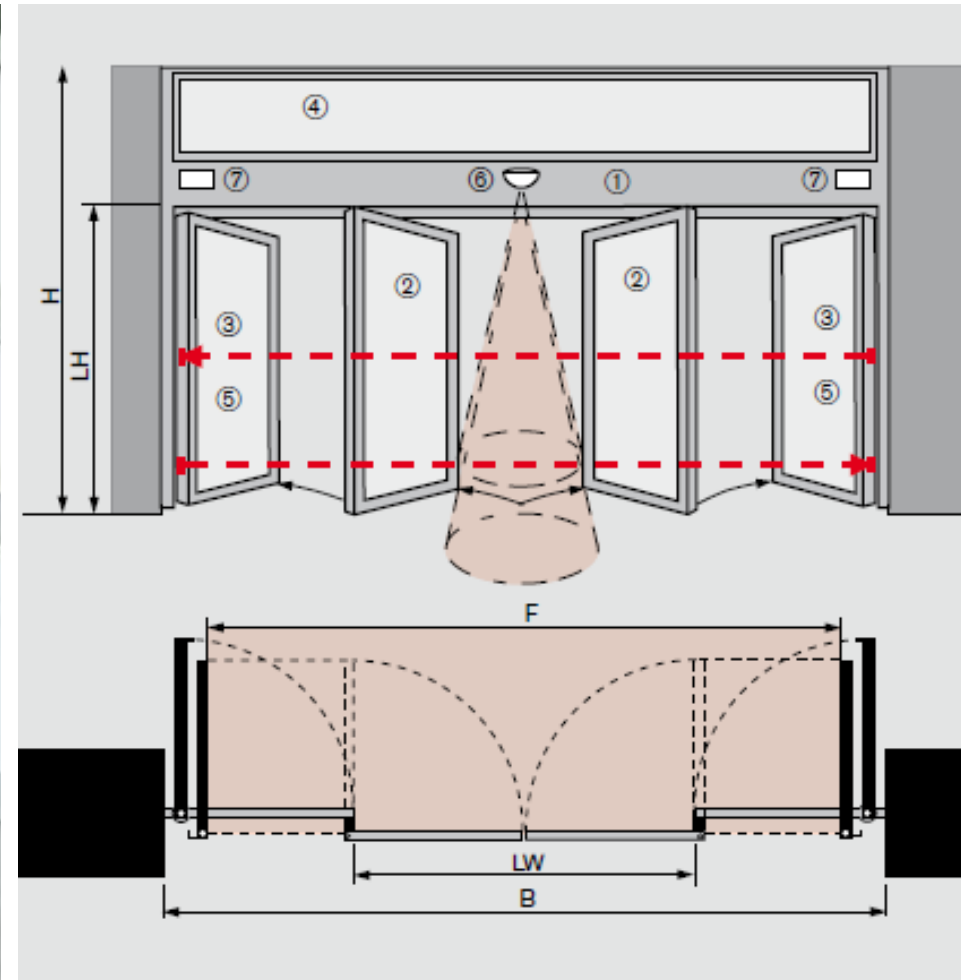


Escape route



Access Control System

Automatic Sliding Door with Breakout Function



Access Control System

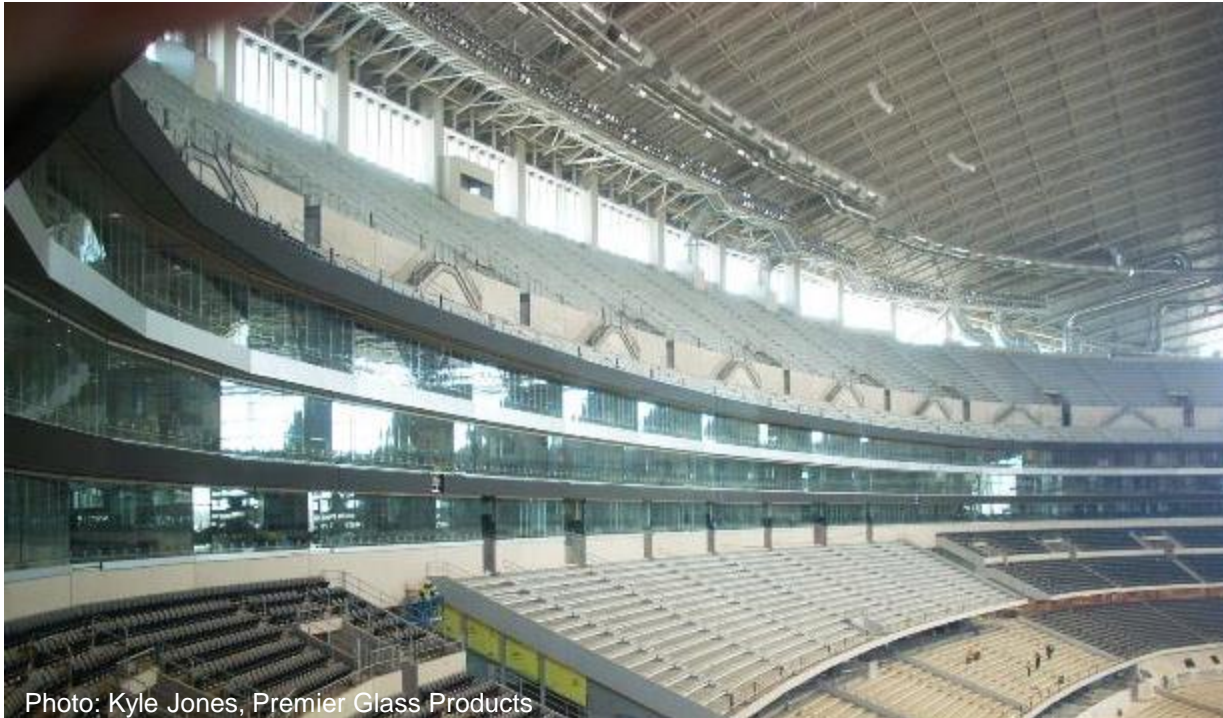
Internal Doors, Stands & Fences

- No solid fence between fan block and playing field
- Fan Separation, through security people & ACS.
- One seat per fan, no standing fangroups.
- Restriction of numbers of fans per entrance block
- Entrance via card for a certain block.



Access Control System

Transparency and flexibility for VIP boxes



Access Control System

2. Internal Doors

- Equipped with adjustable **back-check** as standard
- Protects the wall and door against heavy impact
- Optionally with delayed action for ease of access – also for fire and smoke control doors
- Electro-mechanical hold-open function for single-leaf fire / smoke control doors





Access Control System

3. Exit or External Doors



Access Control System

3. External Doors – Emergency Exit Doors

- Panic Bars with Motorized Latch Retraction (MLR) function for immediate Egress
- Should be Remotely operable for Magnetic Dogging
- Delayed Egress Panic bars (also EMDE) for delayed Egress

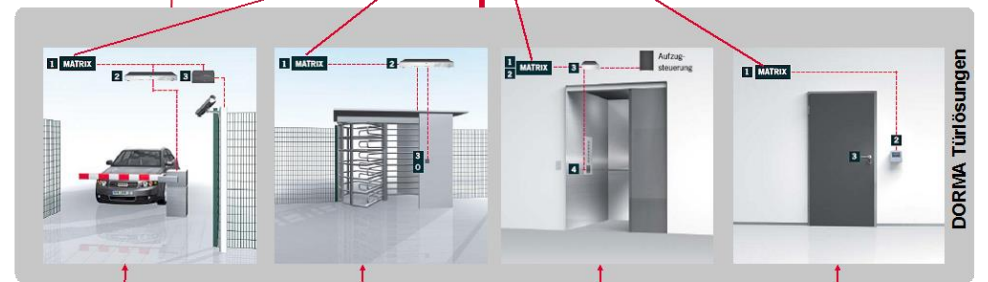
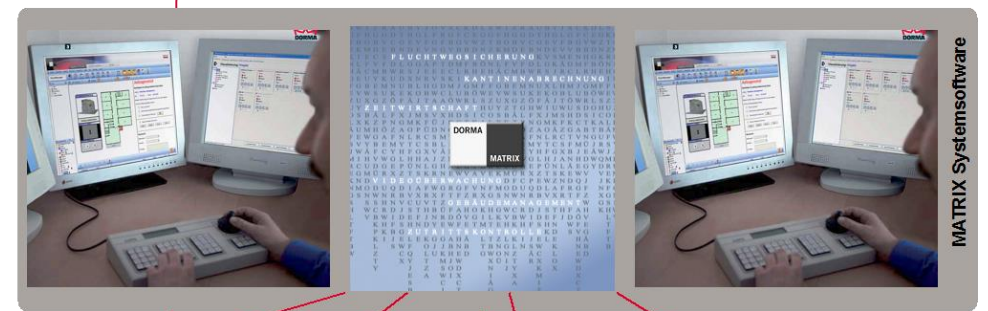
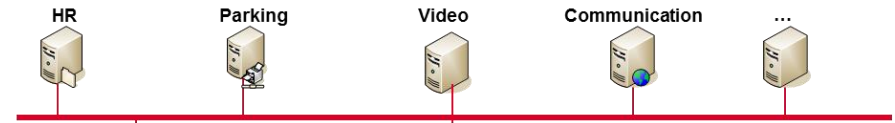




Access Control System

3. External Doors – Emergency Exit Doors

- Door Management System for electronic escape route control.
- Door locking system
- Door terminal for electronic escape route control system



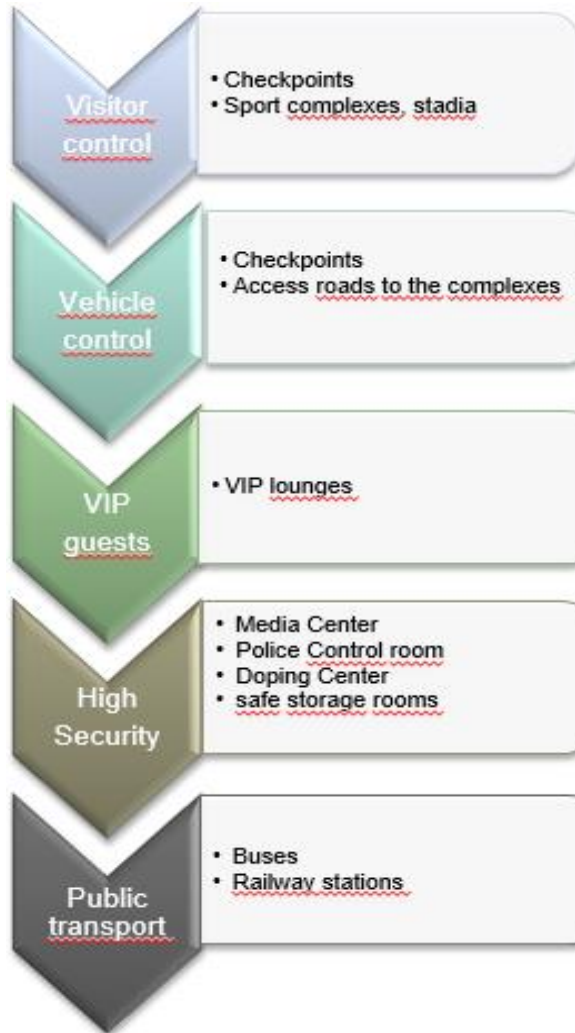
Magnet, Mifare, Legic, Legic Advant, Mifare DESFire, Trovan, Indala, EM



Access Control System

One card can give access to:

1. Parking
2. Hospitality
3. Fan Shop
4. Viewing the game





Access Control System

ACS should be Integrated to:

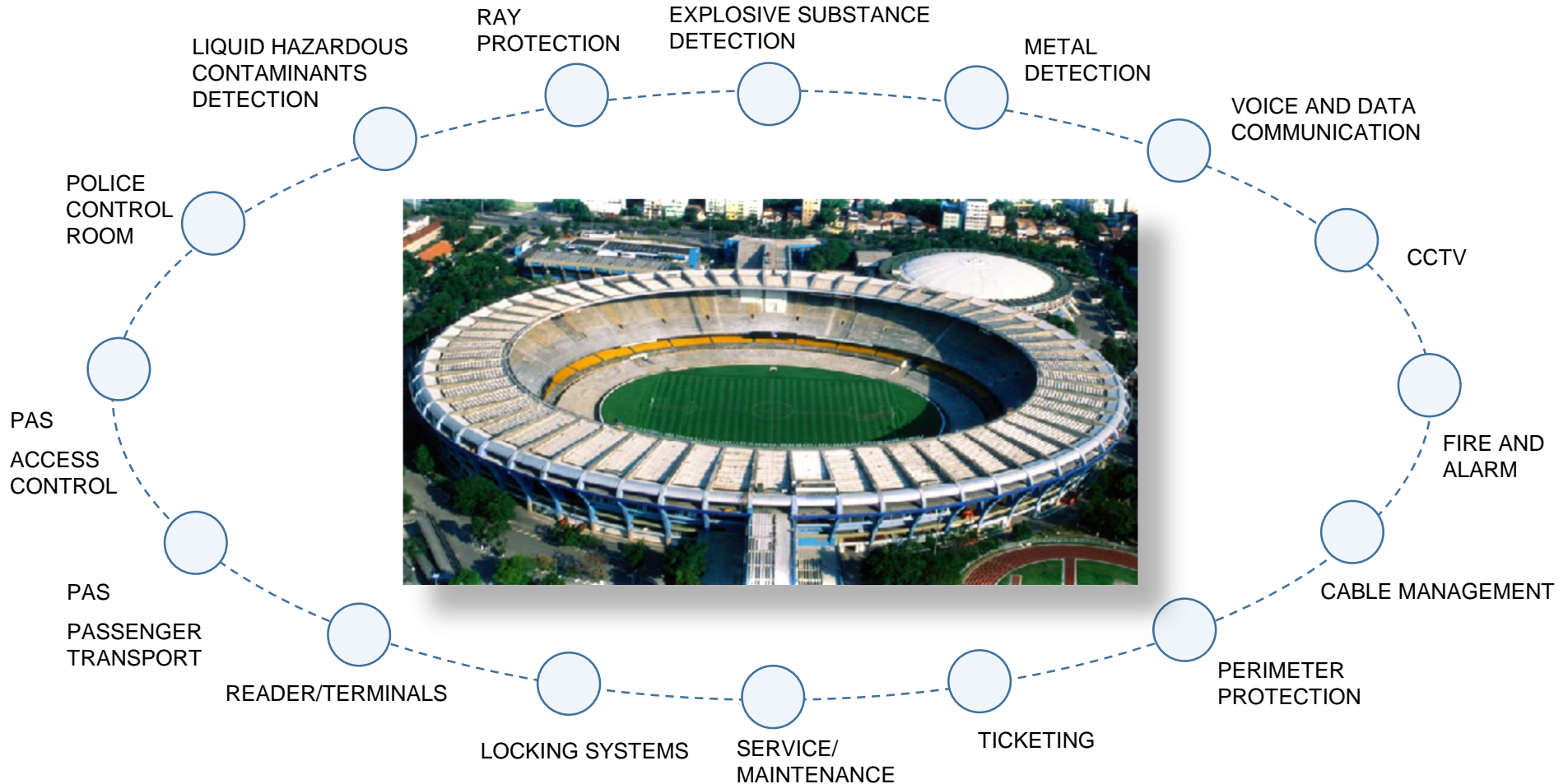
- Fire Alarm System
- Escape Route System
- Building Management System
- CCTV
- Intrusion / Burglar Alarm System
- Ticketing System
- Payment Solutions
- INTERCOM System
- Public Address System





Total Solution:

Safety & Security Systems as one Integrated System

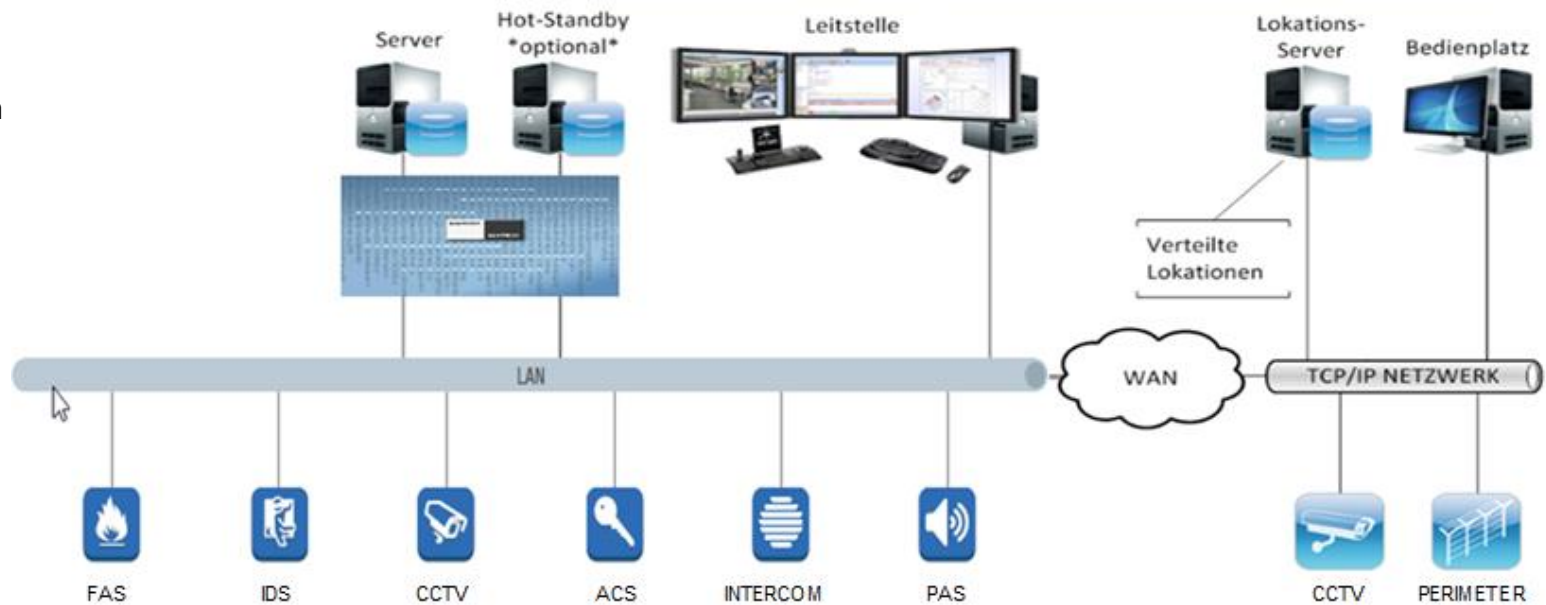




Common Control/ Command Center

One system can give you control over:

1. Access (Parking, Perimeter, Stadium)
2. Fire Alarm System
3. Escape Route System
4. Building Management System
5. CCTV
6. Intrusion / Burglar Alarm System
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Video





Thank you

dormakaba 

