

# SECURE STATION

DESIGN GUIDELINES FOR  
RAILWAY STATION SECURITY



SecureStation is funded under the EU 7th Framework Programme, project reference 266202.

# Participants in the Project

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Coordinated by Spanish defence company Isdefe, ten organisations from across Europe form the consortium set up for SecureStation:

1. **Ingeniería de Sistemas para la defensa de España (ISDEFE)**  
Securities and defence consultant - Spain, Project coordinator
2. **MTRS3 Solutions And Services Ltd**  
Risk management and security - Israel
3. **University of Sheffield**  
Mechanical Engineering Railway Research Group - United Kingdom
4. **Integral Consulting R&D**  
Consultancy, research, and innovation - Romania
5. **D'appolonia S.p.A.**  
Engineering consultant - Italy
6. **Consortio Regional De Transportes De Madrid**  
Madrid transport authority - Spain
7. **John McAslan + Partners**  
Architect and Masterplanner - United Kingdom
8. **Heuristics GmbH**  
Problem solving in engineering - Switzerland
9. **Fundacion Tecnalía Research & Innovation**  
Technology / materials innovation - Spain
10. **Azienda Trasporti Milanesi**  
Milan transport operator - Italy



JOHN MCASLAN + PARTNERS



D'APPOLONIA



# Background

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Railway stations and public transport systems have been the target of past terrorist attacks and as a public and open, but crowded environment, the threat to stations and transport systems means that security should be considered at the earliest stages of a new design or refurbishment project.

The threat to the transport system is demonstrated with the attacks on London's public transport network in 2005, the Madrid bombings of 2004 and more specific attacks targeting station environments in Mumbai Chhatrapati Shivaji Terminus, 2008; Moscow Metro Stations, Lubyanka and Park Kultury, 2010; Volgograd, 2013; and Kunming, 2014.



Madrid bombings of 2004

# Scope of SecureStation Project and Design Guidelines

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SecureStation is an EU 7th Framework Programme funded project with the objectives to:

- Develop a quantitative risk assessment methodology
- From modelling and simulations provide guidance for resilient design
- Develop the **Design guidelines for railway station security** comprising best practice design methodologies and considerations for secure station design, as well as the guidance developed throughout the project.

Over a period of three years, from 2011 to 2014, the SecureStation team analysed past terrorist incidents, assessed end-user requirements and conducted computational and physical simulations of the most probable attacks in stations to understand their impact. The results of these studies generated a quantitative risk assessment methodology and guidance to protect against terrorist threats.

The SecureStation key outputs are:

- **The SEST-RAM quantitative risk assessment methodology**
- **The Design guidelines for railway station security**

# Introduction to the SecureStation Design Guidelines for Railway Station Security

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The **Design Guidelines for Railway Station Security** provide guidance for anyone involved in the design or operation of stations, including infrastructure managers, transport operators, planners and architects. They lead the reader through the design process and identify the security features and best practice which should be considered at each stage, as well as the relevant stakeholders who should be involved in the security specifications.

The **Design Guidelines for Railway Station Security** are broken down into three main chapters::

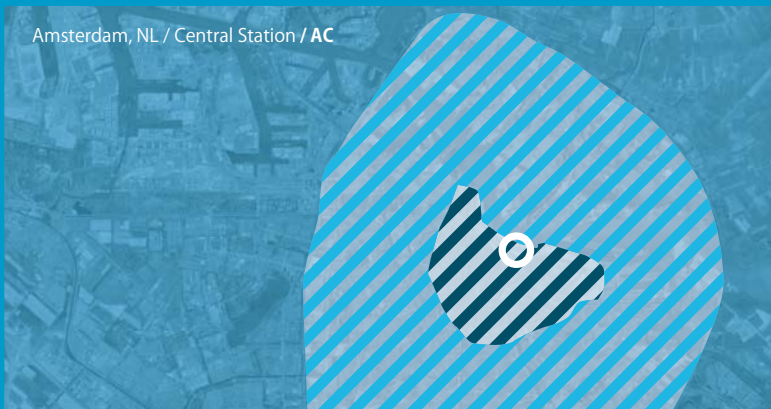
- **General Station Design Principles**
- **Risk Identification and Mitigation**
- **Design Guidelines for Station Security**



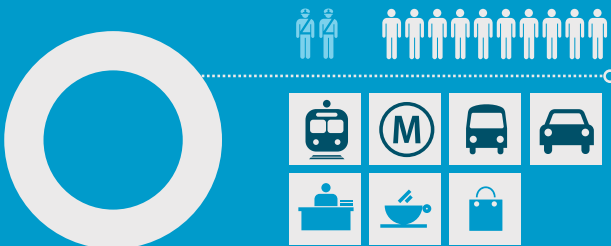
King's Cross station, London – the station concourse is a large open area which allows people to move freely or wait without causing congestion points. It is well lit and the signage is clearly legible.

# General Station Design Principles

The **General Station Design Principles** chapter describes the general principles of station planning that need to be considered from the beginning of the design process. It identifies the key stakeholders and decision makers in the design of the station, categorises station types and users and offers an overview of the functional relationships within the station's layout.



○ Station      ■ Historic Centre      ■ Central Area



Amsterdam Central is an international transport hub with 91 million passengers/annum, interchange between 7 transport modes, high symbolic value.

# Risk Identification and Mitigation

The **Risk Identification and Mitigation** chapter informs the reader of the most probable categories of terrorist attacks on a station and explains the impact of their consequences. A series of potential attack scenarios are presented as examples to identify the relationship between the attack type, severity of its effects, station vulnerability and possible means of mitigation.

## Explosives and weapons



IED



PBIED



VBIED



Weapons

## Fire



Arson



Timed IED



Home made petrol bomb

## Dispersion of toxic materials



Toxic industrial chemicals



Acid attack



Nerve agents

## Sabotage



Signalling systems



Infrastructure



Structures

## Cyber attacks



Physical access to MCS



Hacking into IT systems



Diffusion of malware

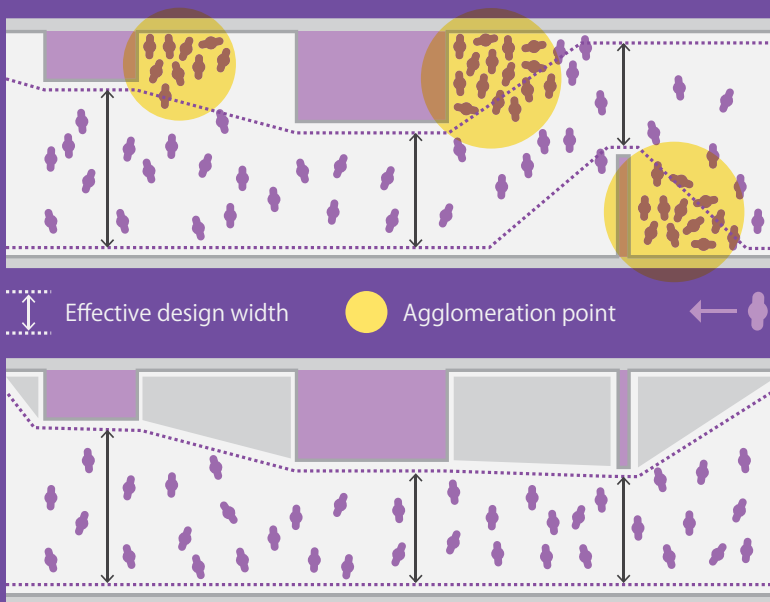


Interception of information



# Design Guidelines for Station Security

In the **Design Guidelines for Station Security** chapter, the strategies and recommendations for the design of new stations and retrofit of existing ones are outlined. Guidance is given with respect to the types of attacks described in the Risk Identification and Mitigation chapter. The recommendations identify best practice which may be incorporated into each design stage after a cost-benefit analysis has been carried out. They are based on a wide range of existing guidelines and station standards. Additional security measures and design recommendations have also been made based on the modelling and simulation work carried out within the SecureStation project.



The design of the evacuation routes can help improve passenger flow while keeping the same effective width

# Structure of Design Guidelines

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## Layout design

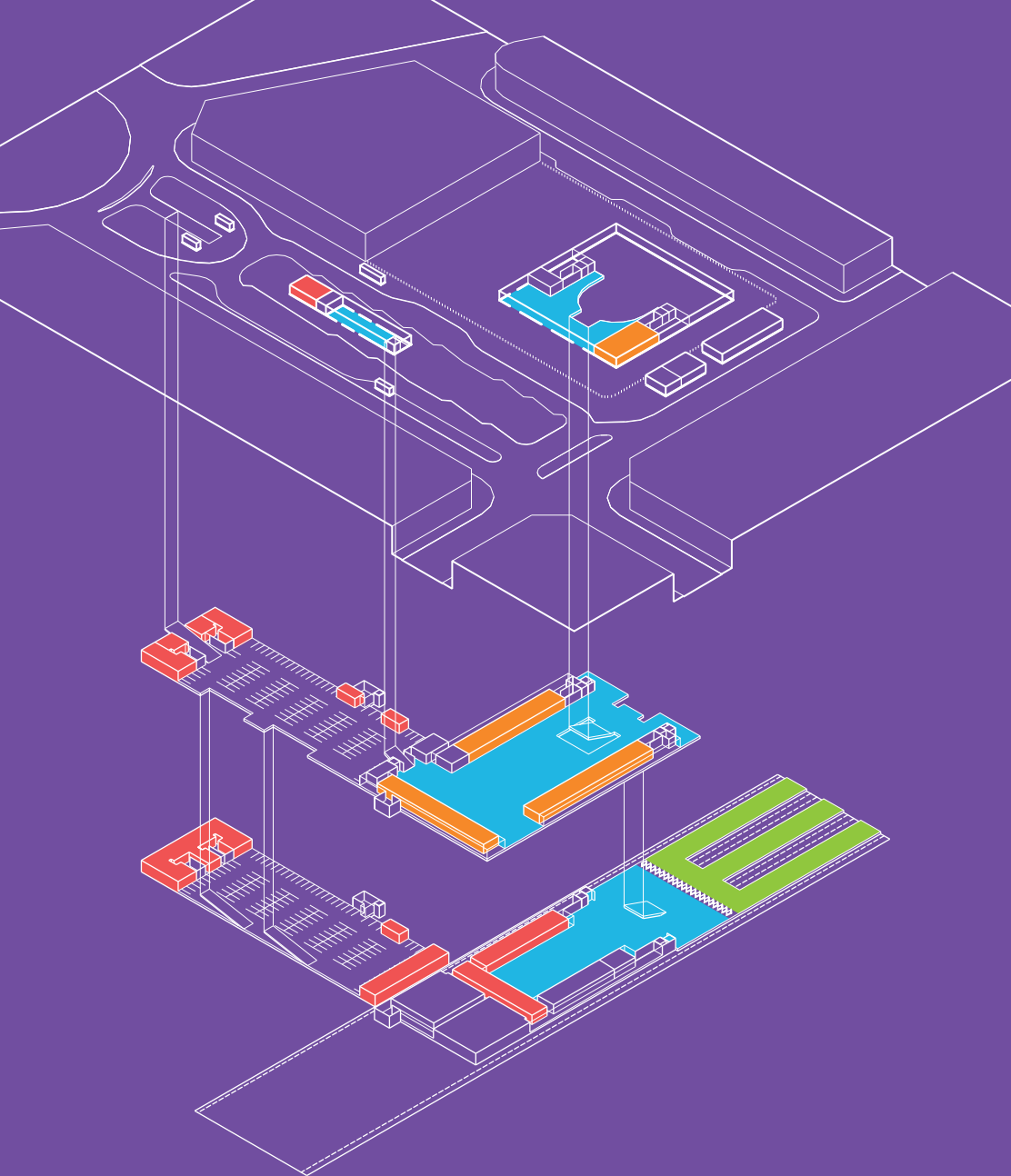
- Site design
- Station design

## Design and engineering

- Secured evacuation requirements
- Fire protection and smoke management as key factors for evacuation
- Physical reinforcement against blast
- Protection against CBR
- Design strategies to protect critical systems



Crossrail Bond Street, London – The site design enforces speed reduction for vehicles approaching the station and bollards are placed to create the stand-off distance.



Concourse



Retail & Cafe



Platform



Staff Area

Station zones in a generic station model

# Contact

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