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Redevelopment of Ascot Racecourse

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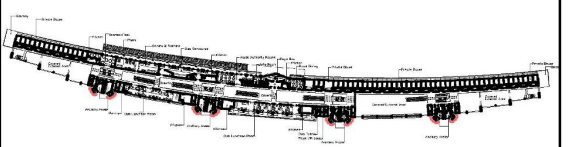
Project Background

Client: Ascot Racecourse Ltd
Architects: HOK Sports and Venues (now Populous)
UK prime horse racing facility
Design period: 2000 until 2005 - In very successful operation since 6 years
Up to 10,000 people on Ladies Day during the week of Royal Ascot

Building Description



Level 02 Plan

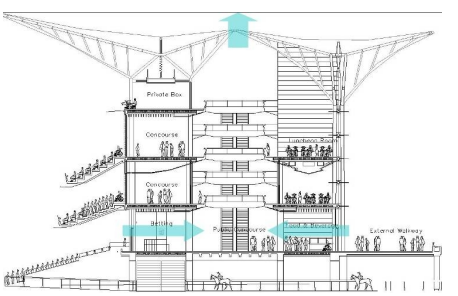
Challenges

- Open and transparent feel to grandstand
- Escape of entire grandstand within 8 minutes
- Stairs at back of grandstand so people need to evacuate across the atrium
- Reasonable structural fire protection

Design Approach

- Fire engineering approach to demonstrate primarily life safety and property protection on race days. Non race days are not critical in general.
- Performance based design code BS7974, PD1-7 used
- Recommendations from Green Guide, Approved Document B, BS 5588 series are considered.

Spread of Smoke - Principle for Smoke Management System

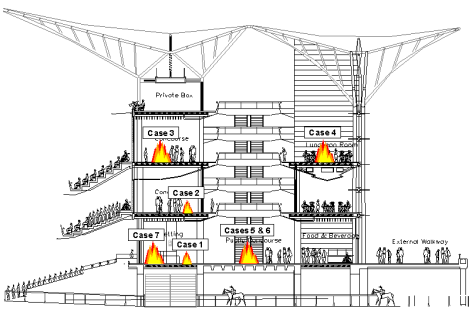


Design Fire Scenarios

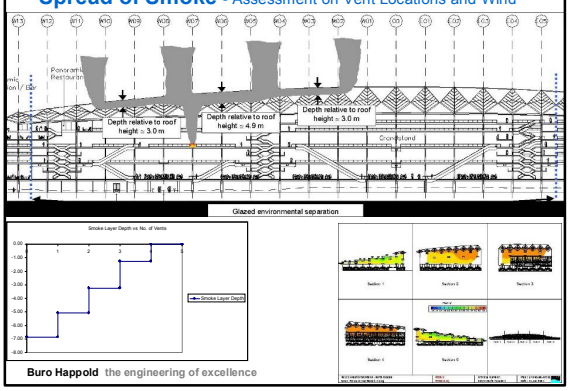
- Boxes and back of house areas are sprinklered
- Atrium is unsprinklered
- Eventually 2.5 MW (similar to retail) has been considered throughout the whole building.

Benefits include:
- Increase margin of safety
- Additional comfort for future management
- Additional comfort for controlling authorities

Spread of Smoke - Fire Cases



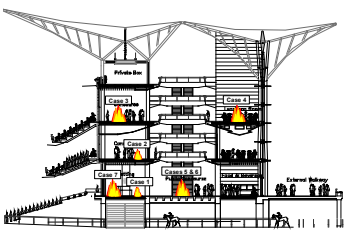
Spread of Smoke - Assessment on Vent Locations and Wind



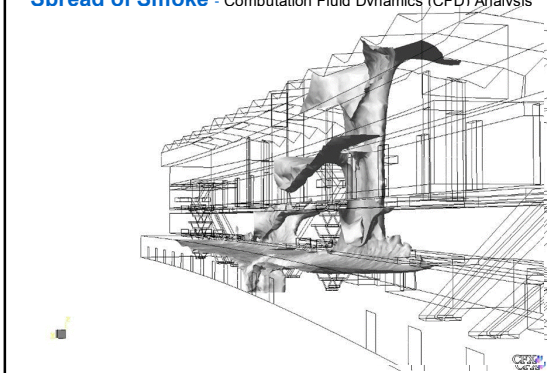
Spread of Smoke - Computation Fluid Dynamics (CFD) Analysis

Occupancy modeled to take benefit from the microclimate within the building.
Different wind scenarios and seasons modeled.

Fire Case 1: Level 00 fire, 1.2 MW (similar to office)
Fire Case 3: Level 04 fire, 2.5 MW (similar to retail)
Fire Case 7: Level 00 fire, 2.5MW (similar to retail)

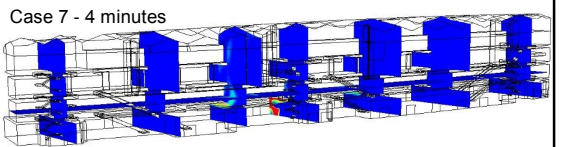


Spread of Smoke - Computation Fluid Dynamics (CFD) Analysis

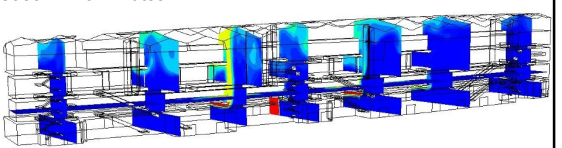


Spread of Smoke - Computation Fluid Dynamics (CFD) Analysis

Case 7 - 4 minutes



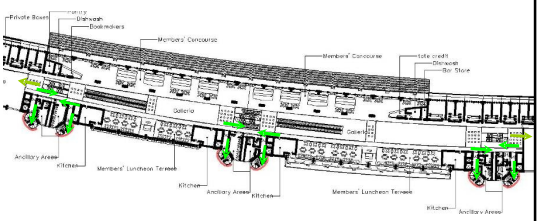
Case 7 - 19 minutes



Spread of Smoke and Escape

- Microclimate and heat from people is very important to keep the smoke at high-level.
- CFD demonstrated that the smoke is so diluted that a save escape across the bridges is acceptable.
- Not more than one stair is affected by the smoke.
- Total travel time to leave the building should not be more than 8 minutes to prevent panic.

Means of Escape



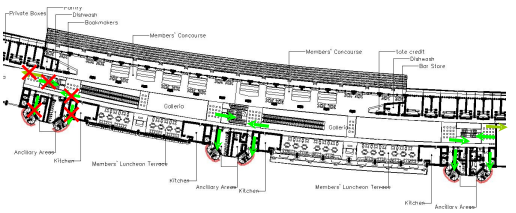
Horizontal Escape at 1.35m Vertical Stair Escape at 1.60m

Scenario 1 - All escape routes available

Last person to enter stair (end of queuing at floor level)= 2.8 minutes

Last person to exit stair = 5.2 minutes

Means of Escape



Horizontal Escape at 1.35m Vertical Stair Escape at 1.60m

Fire Case 7 - 2.5 MW Fire on Level 00 (discount stairs at all levels)

Last person to enter stair (end of queuing at floor level)= 5.1 minutes

Last person to exit stair = 7.6 minutes

Structural fire resistance – Risk Based Approach

Sample Steelwork Location	*Probability / Consequence*	Typical level of Applied Fire Protection
EAST AND WEST END ROOFS		
DIAGRID ROOFS	LOW / LOW	0 MINUTES / NOT REQUIRED
GABLE TRUSSES	MED / LOW	0 MINUTES / NOT REQUIRED
NORTH AND SOUTH BALCONIES (Outside Private Boxes)		
BALCONY BRACKETS	MED / LOW	0 MINUTES / NOT REQUIRED
BEAM CAST IN PLATES	MED / LOW	0 MINUTES / NOT REQUIRED
EAST AND WEST BALCONIES		
EXTERNAL BALCONY BEAMS	MED / LOW	0 MINUTES / NOT REQUIRED
INTERNAL BEAMS AND COLS	MED / HIGH	90 MINUTES - INTUMESCENT PAINT
VERTICAL BRACING	MED / HIGH	90 MINUTES - INTUMESCENT PAINT
TERRACES		
TERRACE SUPPORTS	LOW / MED	30 MINUTES - INTUMESCENT PAINT
BACKSPAN STRUTS	MED / HIGH	90 MINUTES - INTUMESCENT PAINT
GALLERIA		
GALLERIA BRIDGES	MED / HIGH	90 MINUTES - INTUMESCENT PAINT
GALLERIA STAIRS	HIGH / LOW	30 MINUTES - INTUMESCENT PAINT

Conclusion

Performance based fire engineering enabled the vision of client and the architects

Highly successful building

The Queen is happy !