



Car Park Ventilation by ***Jet Thrust System***

- Example smoke control project-
- London, UK-

- What is CFD?
- Why use CFD?
- Design criteria for car park
- Special instructions
- How the model was constructed
- Geometry & Results
- Summary & Conclusions

What is CFD?

- Stands for Computational Fluid Dynamics
- Consists of a mathematical method called Finite Volume Analysis where the following equations are used:
 - Conservation of mass (continuity equation)
 - Conservation of linear momentum (Newton's second law)
 - Conservation of energy (First law of thermodynamics)

Why use CFD?

- CFD is an effective means to ensure that there is a good distribution of the airflow throughout the car park.
- Rather than simply complying with regulations CFD offers the opportunity to provide an engineered solution to car park ventilation.
- CFD is an integral part of the systems that we offer.

Design Criteria for car park

General Ventilation

The ventilation system is to provide 6 air changes per hour as defined in Approved documents F1 section 2.8, 2.9.

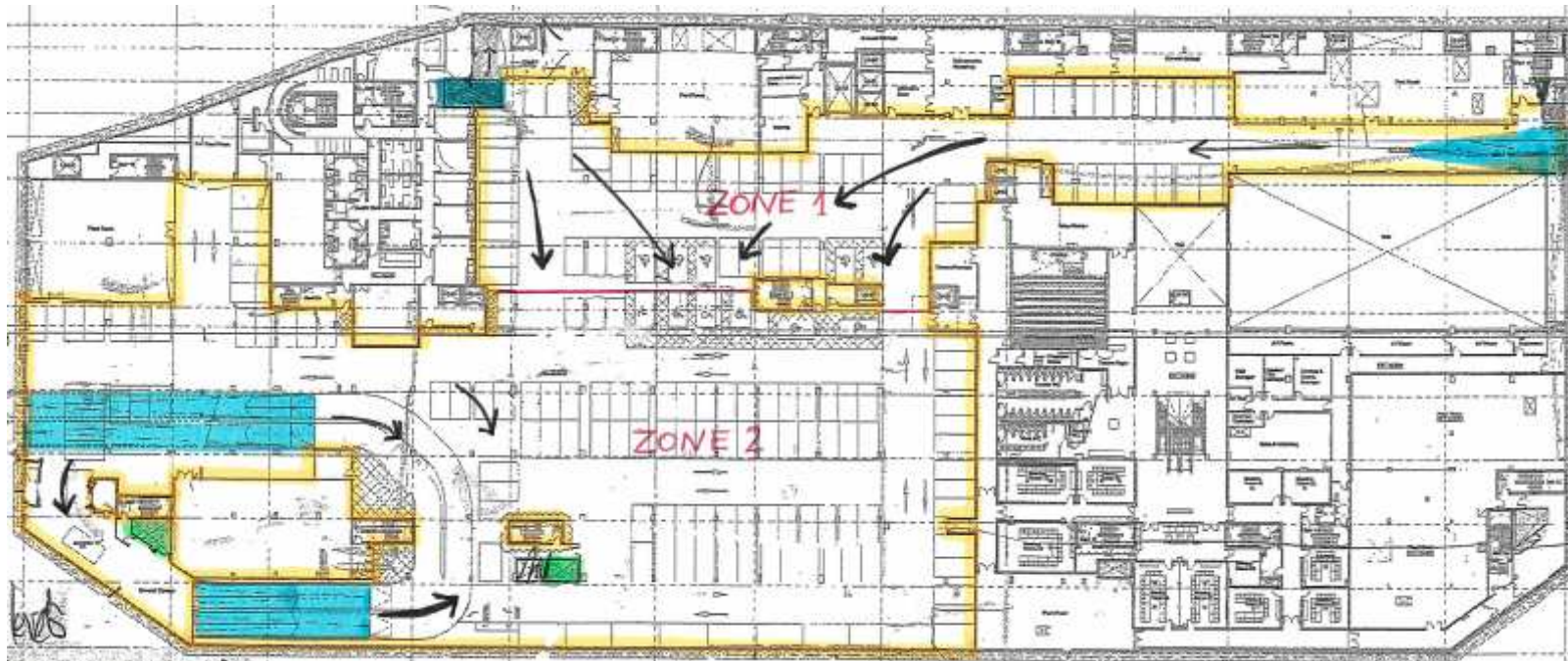
Emergency Ventilation

The ventilation system is to provide 10 air changes per hour as defined in Approved documents B3 section 12 or be designed in accordance with the BS7346 part 7 to cope with a fire load in an unsprinkled car park.

The fans must be suitable for 300 degrees Celsius for 1 hour, with the extract flowrate divided between at least 2 fans.

Special instructions

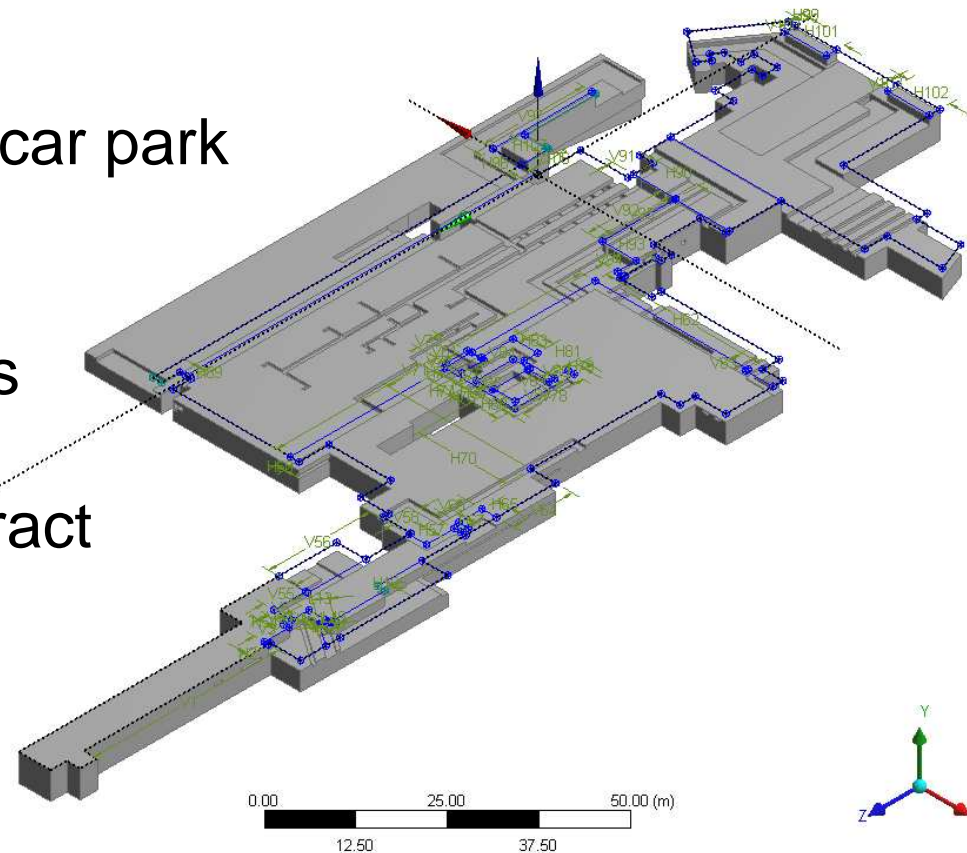
- The ventilation system is to achieve smoke control in emergency ventilation in order to aid fire fighter access to the seat of the fire.



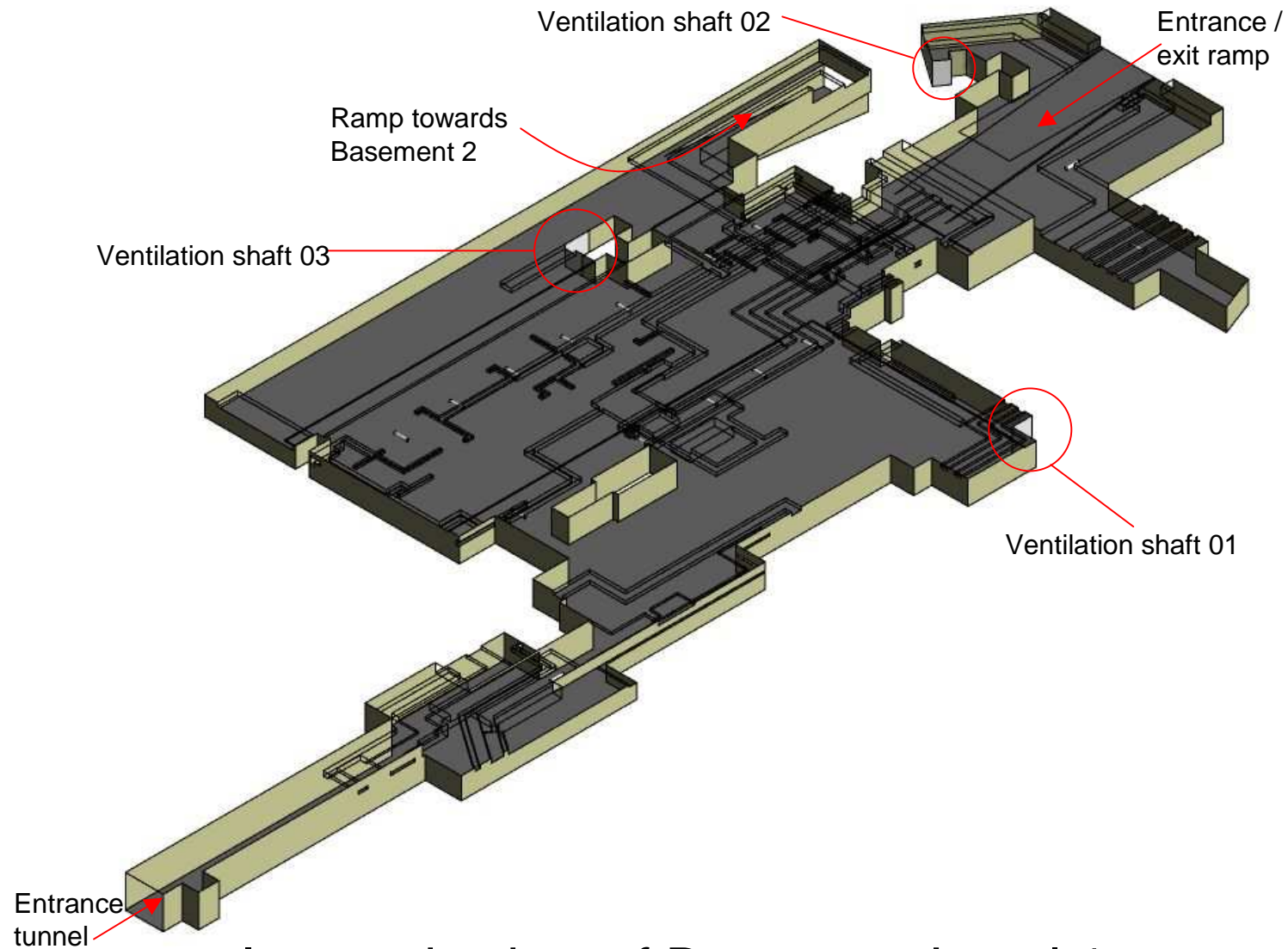
How is the CFD model constructed?

How is the CFD model constructed?

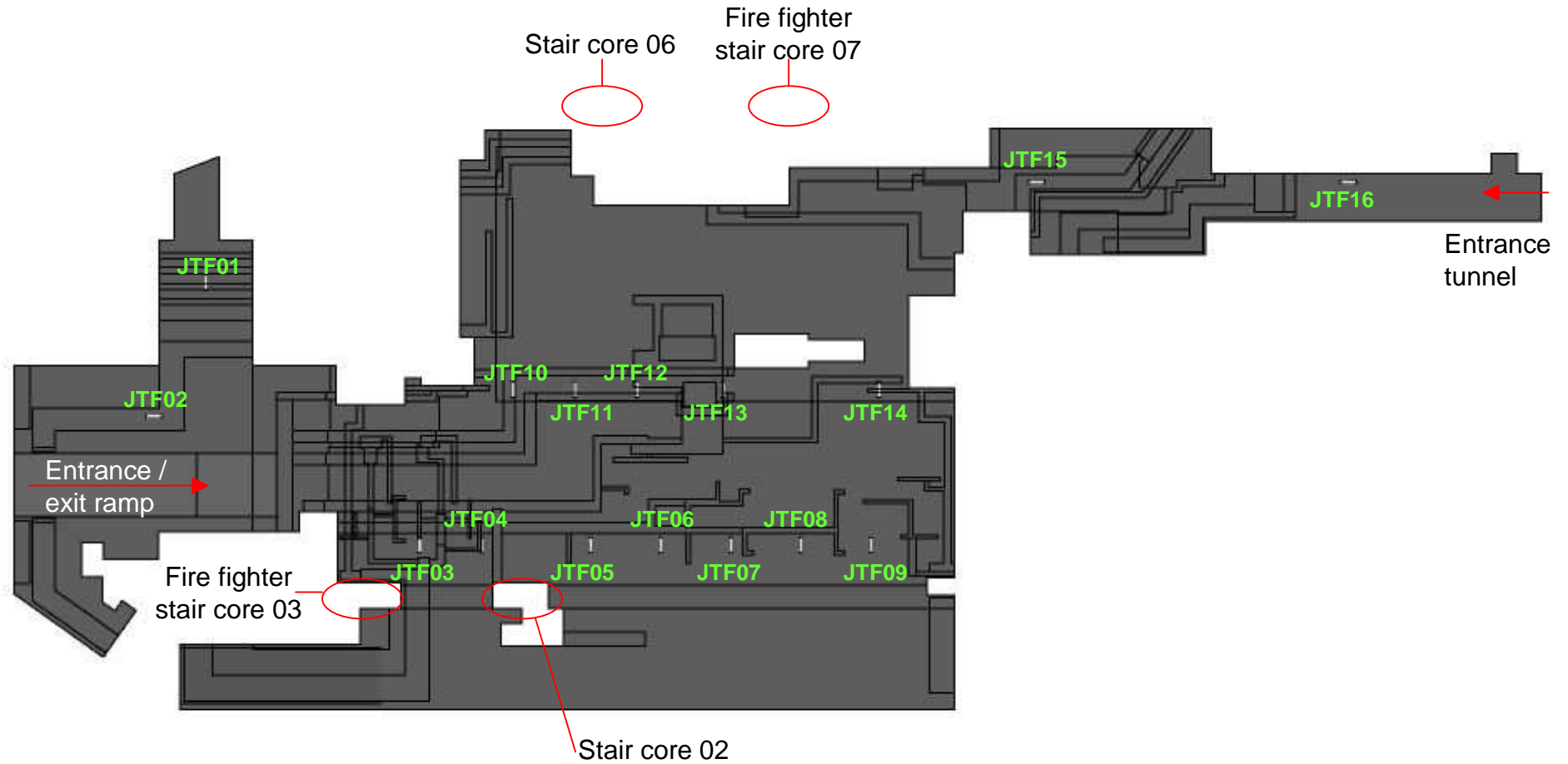
- An enclosure is constructed that defines the outline of the car park.
- Into this enclosure the car park geometry is added.
- Ventilation components are added such as Jet Thrust Fans and extract / supply fans.



Geometry & Results

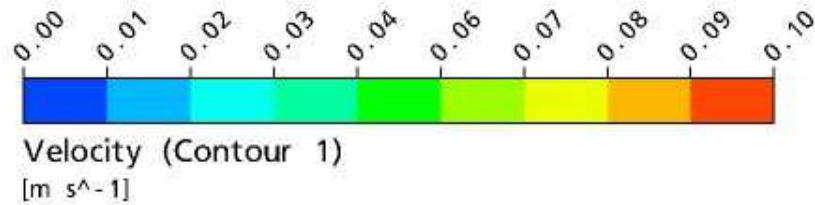


Isometric view of Basement Level 1

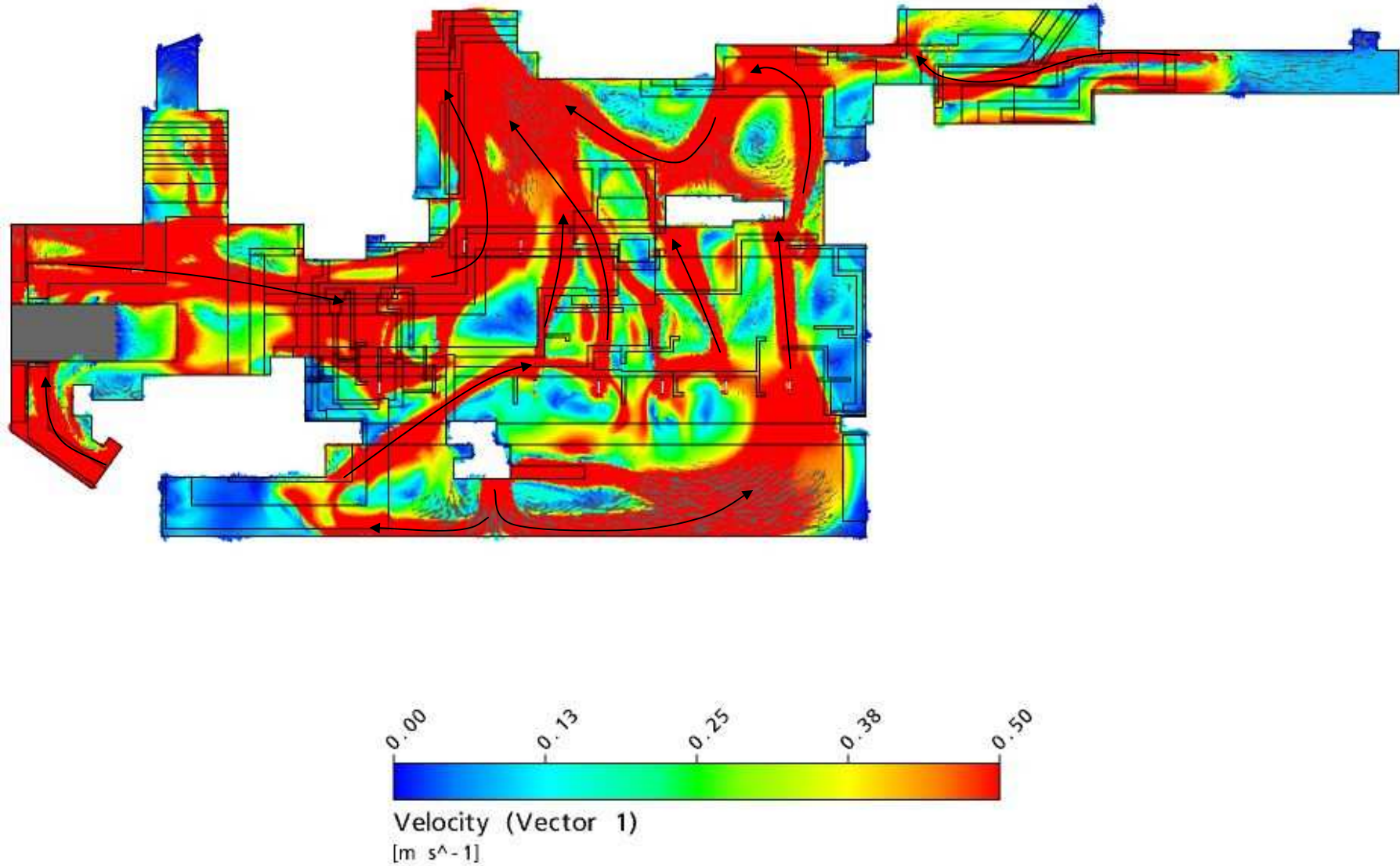


Plan view of Basement Level 1

General Ventilation

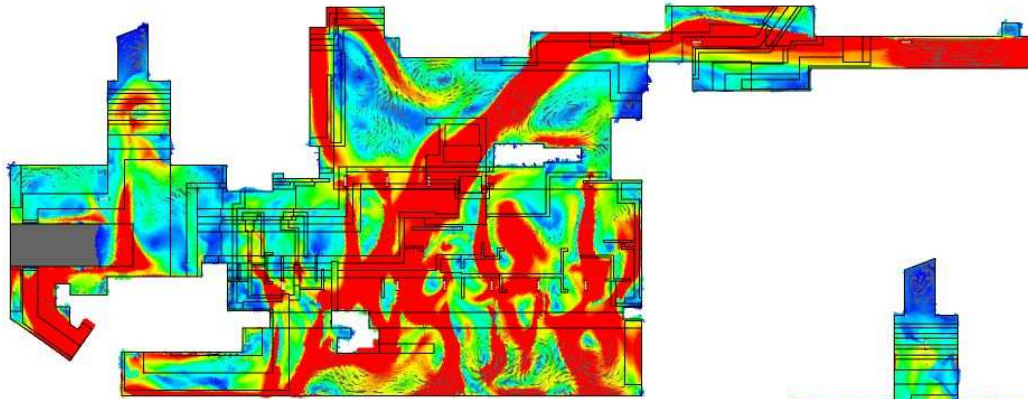


General Ventilation - Speed plot at mid level

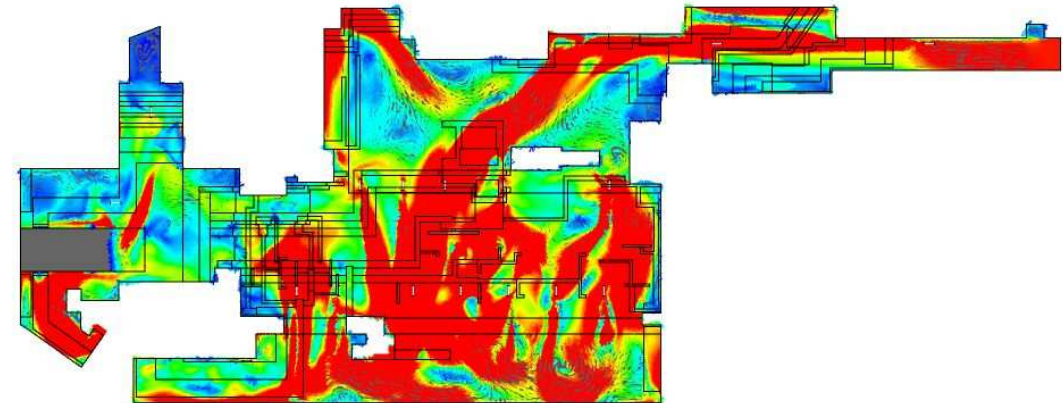


General Ventilation - Velocity plot at mid level

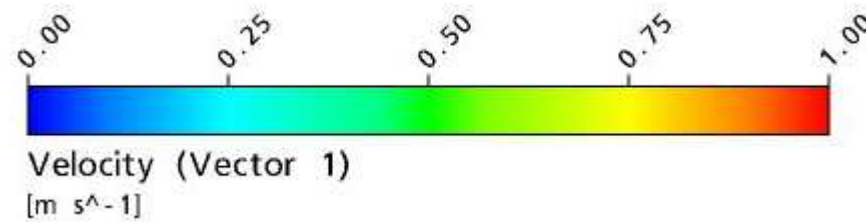
Emergency Ventilation



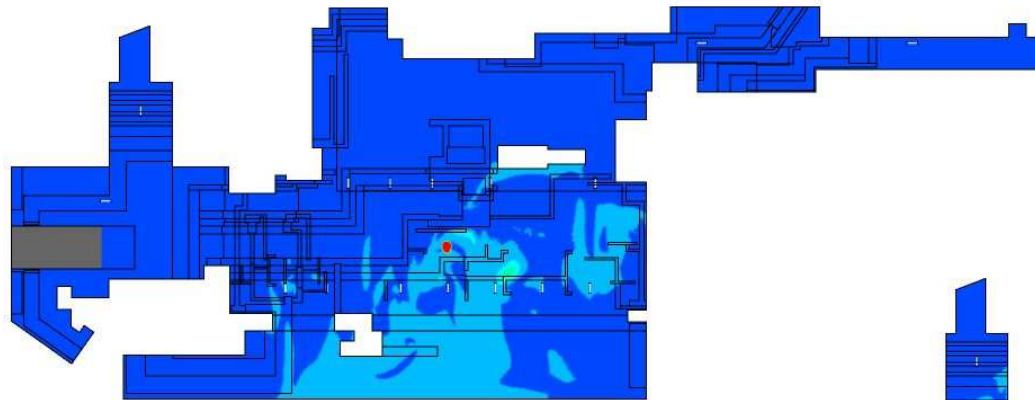
180 seconds



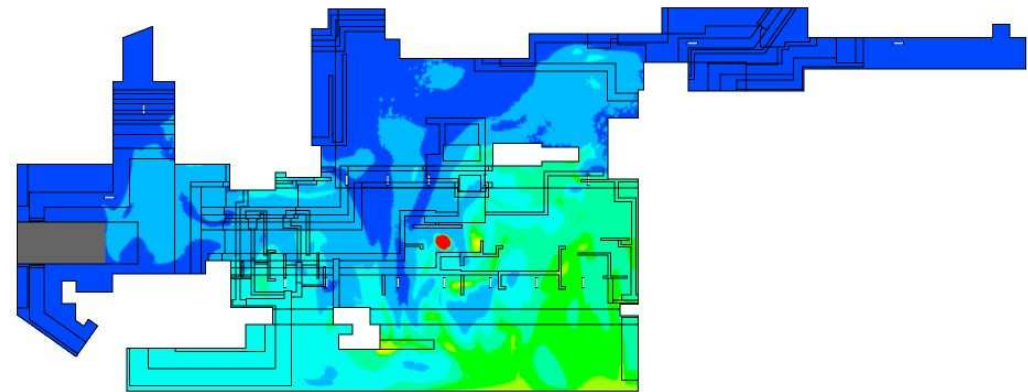
360 seconds



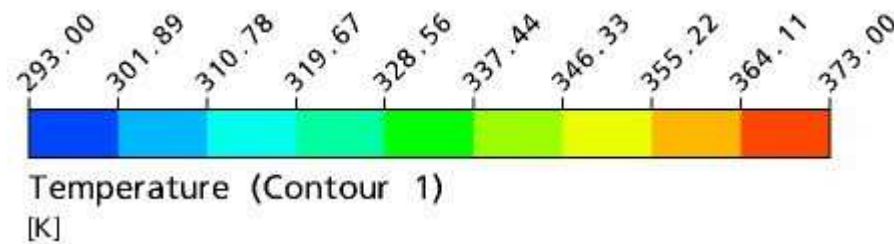
Emergency Ventilation – Velocity plots



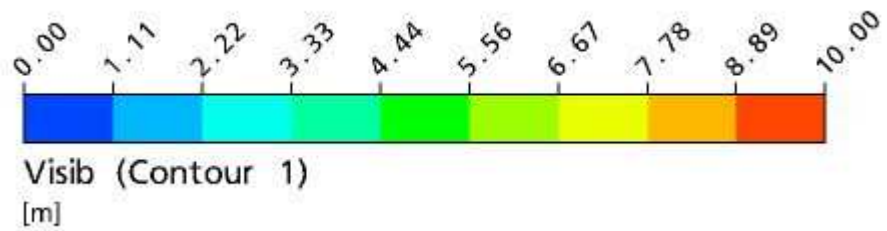
180 seconds



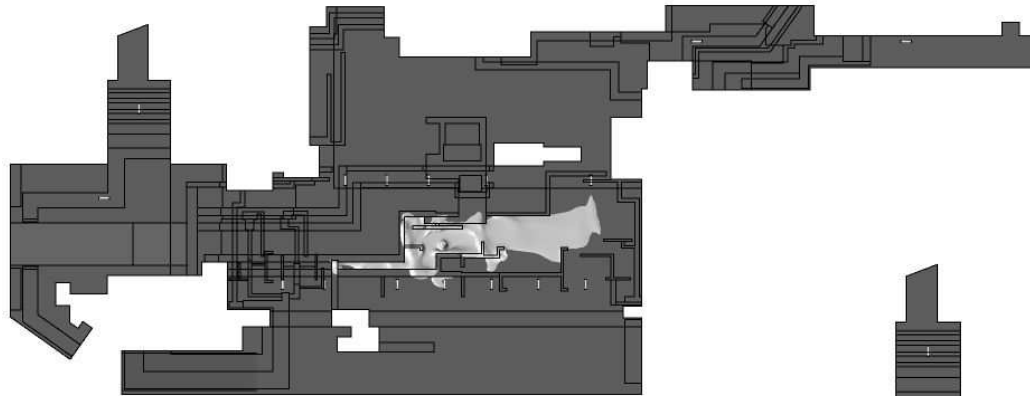
360 seconds



Emergency Ventilation – Temperature plots



Emergency Ventilation – Visibility plots

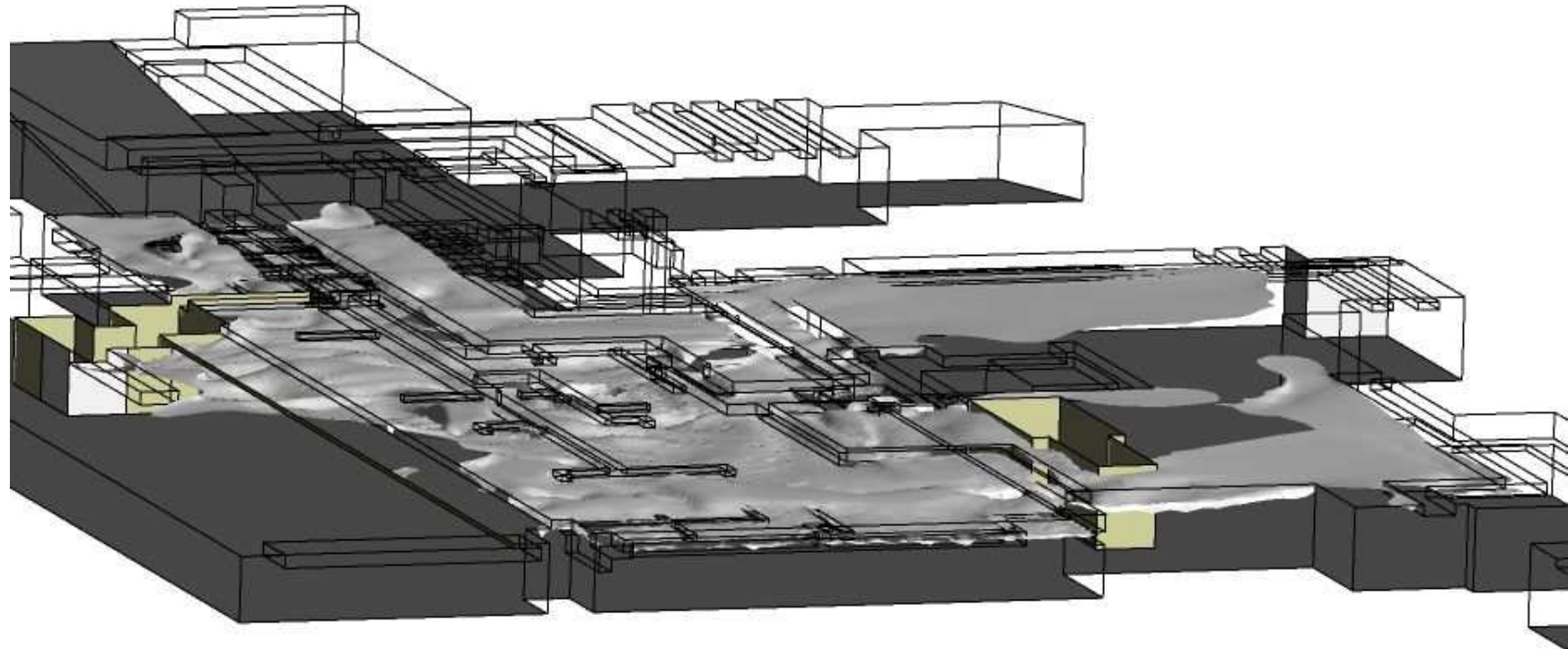


180 seconds



360 seconds

Emergency Ventilation – Smoke spread plots



360 seconds

Emergency Ventilation – Smoke spread plots



Emergency Ventilation – Smoke Test



Emergency Ventilation – Smoke Test

Summary & Conclusions

- The results of the CFD analysis demonstrate that the scheme provides a good distribution of air throughout the car park prior to extraction, for both general and emergency ventilation scenarios.

- The ventilation system provides good smoke control in the case of a fire taking place Basement Level 1.

Any Questions???



This presentation and any accompanying notes are copyright of Fläkt Woods Limited and should not be copied or reproduced without written permission. Please note that figures in this presentation should NOT be applied to any project designs without the express written permission of Fläkt Woods Limited