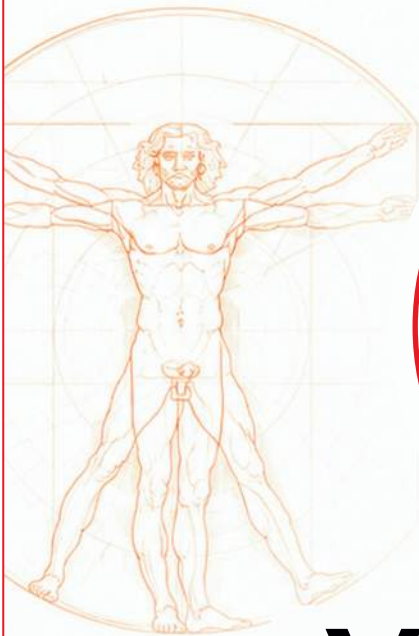




VITRUVIUS

FIRE SAFETY CONSULTING

Engineering Safer Environments Through
Fire, Life Safety and Risk Intelligence



**FIRE
ENGINEERING**



**LIFE SAFETY
SOLUTIONS**



**RISK &
RESILIENCE**



**CRITICAL
INFRASTRUCTURE**



**COMPLIANCE &
ADVISORY**

GUARDIANS OF SAFETY, ARCHITECTS OF PROTECTION

WHO WE ARE

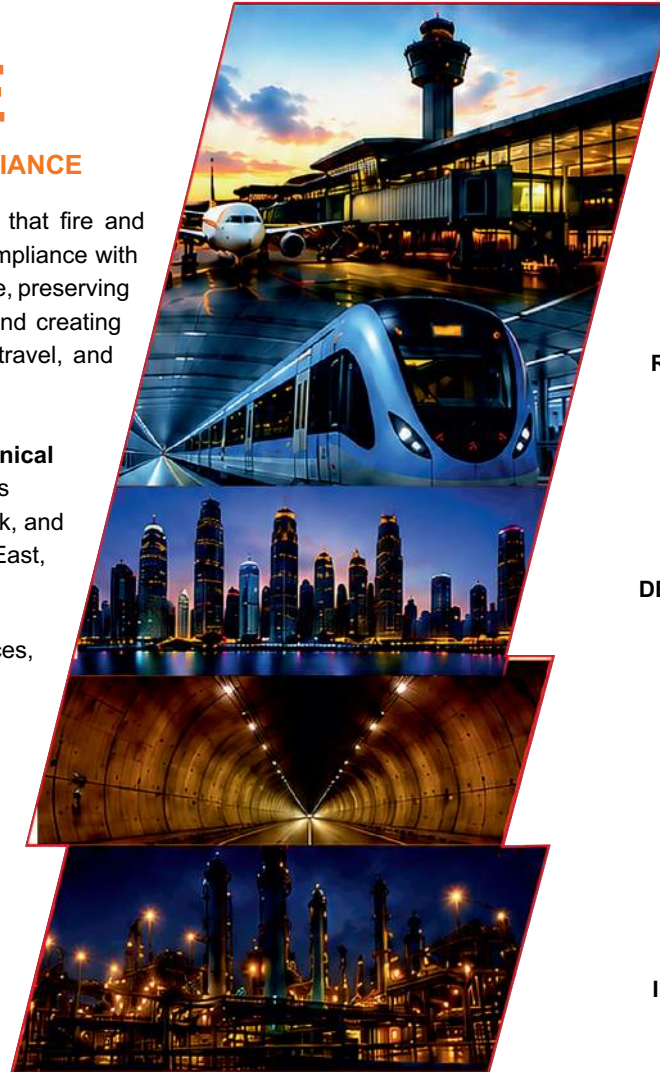
ENGINEERING SAFETY BEYOND COMPLIANCE

At Vitruvius Fire Safety Consulting, we believe that fire and life safety engineering is about far more than compliance with codes and regulations. It is about protecting people, preserving critical assets, enabling operational resilience, and creating environments where occupants can live, work, travel, and thrive with confidence.

Founded on the principles of innovation, technical excellence, and practical engineering, Vitruvius provides specialist fire engineering, life safety, risk, and resilience consulting services across the Middle East, Central Asia, and India.

Our approach combines international best practices, performance-based engineering methodologies, and deep understanding of regional regulatory frameworks to deliver solutions that are both technically robust and commercially practical.

From airports and transportation infrastructure to high-rise developments, industrial facilities, hospitality destinations, healthcare facilities, and mixed-use communities, we help clients navigate complex fire and life safety challenges throughout the project life cycle.



AIRPORTS



RAIL & METRO



HIGH-RISE DEVELOPMENTS



TUNNELS



INDUSTRIAL & ENERGY

OUR PHILOSOPHY

SAFETY BY DESIGN. PERFORMANCE BY ENGINEERING.

We believe that the most effective fire and life safety solutions are achieved when **safety considerations** are integrated into the design process from the earliest stages of a project.

By combining engineering analysis, risk assessment, computational modelling, and practical industry experience, we support our clients in developing solutions that enhance safety, improve functionality, and deliver long-term value.



OUR MISSION

To engineer safer environments through innovative fire, life safety, and risk solutions that protect people, assets, operations, and communities.



FIRE ENGINEERING

Performance-based fire strategies, code compliance, fire protection systems, CFD modelling, evacuation analysis, and authority approvals.



RISK & RESILIENCE

Fire risk assessments, explosion risk studies, quantitative risk assessments, emergency planning, and operational safety reviews.



CRITICAL INFRASTRUCTURE

Airports, metro systems, tunnels, transportation hubs, industrial facilities, logistics developments, and complex infrastructure projects.



INTERNATIONAL PRESENCE

Serving the Middle East, Central Asia and India.



MULTI-SECTOR EXPERTISE

Airports, rail, tunnels, high-rise developments, hospitality, industrial and critical infrastructure.



EXPERIENCED LEADERSHIP

Led by professionals with extensive international fire engineering and life safety experience.



PERFORMANCE FOCUSED

Engineering solutions beyond prescriptive compliance.



INDEPENDENT ADVISORY

Practical, objective and client-focused solutions.

GUARDIANS OF SAFETY, ARCHITECTS OF PROTECTION

WHY VITRUVIUS FIRE?

ENGINEERING CONFIDENCE. DELIVERING RESILIENCE.

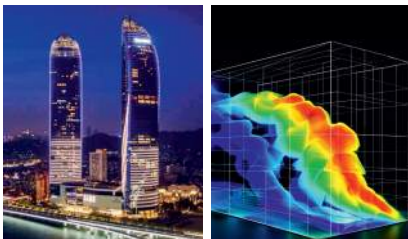
In today's complex built environment, fire and life safety challenges extend far beyond code compliance. Clients require solutions that balance safety, operational functionality, commercial objectives, sustainability, and regulatory requirements.

Vitruvius Fire combines international experience, engineering innovation, and practical industry knowledge to deliver solutions that protect people, assets, operations, and long-term project value.



FIRE ENGINEERING

**Performance Beyond
Prescriptive Compliance**



We develop fire and life safety strategies that address complex design challenges through engineering analysis and performance-based methodologies.

KEY SERVICES

- ♦ Fire Strategy Development
- ♦ Performance-Based Design
- ♦ CFD Smoke Modelling
- ♦ Evacuation Analysis
- ♦ Fire Protection Design
- ♦ Authority Compliance Support

VALUE TO CLIENTS

- ✓ Optimised designs
- ✓ Reduced project constraints
- ✓ Enhanced safety outcomes
- ✓ Regulatory compliance



RISK & RESILIENCE

**Understanding Risk.
Protecting Operations.**



We support clients in identifying, assessing, and mitigating fire, explosion, and operational risks across a wide range of developments and critical facilities.

KEY SERVICES

- ♦ Fire Risk Assessments
- ♦ Fire & Explosion Risk
- ♦ Assessment (FERA)
- ♦ Quantitative Risk Assessment (QRA)
- ♦ Emergency Response Planning
- ♦ Asset Condition Assessments
- ♦ Operational Safety Reviews

VALUE TO CLIENTS

- ✓ Reduced operational risk
- ✓ Improved resilience
- ✓ Better decision making
- ✓ Enhanced business continuity



CRITICAL INFRASTRUCTURE

**Safeguarding
Essential Assets**



Vitruvius Fire provides specialist advisory services for complex infrastructure projects where safety, reliability, and operational continuity are critical.

SECTORS

- ♦ Airports
- ♦ Metro Systems
- ♦ Rail Infrastructure
- ♦ Tunnels
- ♦ Industrial Facilities
- ♦ Logistics & Transportation Hubs

VALUE TO CLIENTS

- ✓ Specialist expertise
- ✓ Infrastructure-focused solutions
- ✓ Multi-disciplinary coordination
- ✓ Long-term asset protection

We do not simply interpret codes.

**We apply engineering judgment, risk intelligence, and practical experience
to create safer and more resilient environments.**

WHY CLIENTS CHOOSE VITRUVIUS FIRE



INDEPENDENT ADVICE

Unbiased, objective
and in your best
interest.



SENIOR-LEVEL INVOLVEMENT

Direct access to
experienced
professionals.



PERFORMANCE- BASED SOLUTIONS

Engineering solutions
tailored to project-specific
challenges.



CRITICAL INFRASTRUCTURE EXPERTISE

Proven capability in
complex and high-risk
environments.



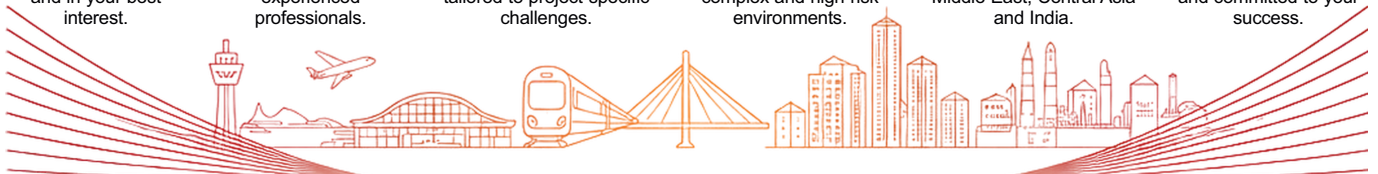
INTERNATIONAL EXPERIENCE

Experience across the
Middle East, Central Asia
and India.



CLIENT-FOCUSED DELIVERY

Responsive, reliable
and committed to your
success.



OUR SERVICES

Comprehensive Fire Engineering, Life Safety and Risk Advisory Services

Vitruvius Fire provides specialist consulting services across the full lifecycle of developments, infrastructure projects, industrial facilities, and operational assets.

Our multidisciplinary expertise enables us to support clients from concept planning through design, construction, commissioning, operation, and asset management.



1. FIRE ENGINEERING

Performance-Based Safety Solutions

We develop innovative fire engineering solutions that achieve compliance while supporting architectural intent, operational functionality, and commercial objectives.

- Fire Strategy Development
- Performance-Based Design
- Fire & Life Safety Compliance Reviews
- Alternative Solutions
- Authority Approvals Support
- Fire Engineering Peer Reviews



2. FIRE PROTECTION SYSTEMS

Active Fire Protection Design

Specialist design and review of fire protection systems to international and local standards.

- Sprinkler Systems
- Hydrant Systems
- Water Mist Systems
- Foam Suppression Systems
- Clean Agent Systems
- Fire Detection & Alarm Systems
- Smoke Control Systems
- Fire Water Storage & Pumping Systems



3. CFD & EGRESS MODELLING

Advanced Computational Analysis

Engineering simulation tools used to evaluate fire behaviour, smoke movement, and occupant evacuation performance.

- CFD Smoke Modelling
- Smoke Control Analysis
- Evacuation Modelling
- Pedestrian Movement Analysis
- Tenability Assessment
- Performance-Based Design Verification



SPECIALIST CAPABILITY AREAS



AIRPORTS &
AVIATION
FACILITIES



METRO & RAIL
INFRASTRUCTURE



TUNNELS &
UNDERGROUND
FACILITIES



DATA
CENTRES



ENERGY &
INDUSTRIAL
FACILITIES



HYDROGEN &
EMERGING
TECHNOLOGIES



MIXED-USE &
HIGH-RISE
DEVELOPMENT



4. RISK & RESILIENCE

Understanding Risk. Improving Resilience

Assessment and mitigation of fire, explosion, and operational risks affecting people, assets, and business continuity.

- ♦ Fire Risk Assessments
- ♦ Fire & Explosion Risk Assessment (FERA)
- ♦ Quantitative Risk Assessment (QRA)
- ♦ Hazard Identification Studies
- ♦ Emergency Response Planning
- ♦ Business Continuity Support



5. INSPECTIONS & AUDITS

Independent Technical Assurance

Assessment of existing facilities and systems to verify compliance, functionality, and operational readiness.

- ♦ Fire Safety Audits
- ♦ Asset Condition Assessments
- ♦ Existing Building Evaluations
- ♦ Due Diligence Reviews
- ♦ Regulatory Compliance Audits
- ♦ Fire System Inspections



6. TRAINING & ADVISORY

Building Knowledge and Capability

Supporting clients through technical training, workshops, and specialist advisory services

- ♦ Fire Safety Awareness Training
- ♦ Emergency Response Training
- ♦ Technical Workshops
- ♦ Authority Compliance Guidance
- ♦ Operational Preparedness Reviews
- ♦ Expert Witness & Specialist Advisory Services

SUPPORTING PROJECTS FROM CONCEPT TO OPERATIONS



CONCEPT



DESIGN



CONSTRUCTION



COMMISSIONING



OPERATION



ASSET
MANAGEMENT

SECTOR EXPERTISE

SPECIALIST FIRE ENGINEERING, LIFE SAFETY & RISK ADVISORY ACROSS DIVERSE SECTORS

Vitruvius Fire supports clients across a broad range of industries and asset types, delivering tailored solutions that address the unique operational, regulatory, and safety challenges associated with each sector.



1. AIRPORTS & AVIATION

Protecting Critical Transportation Infrastructure

Airports present some of the most complex fire and life safety challenges, requiring seamless integration of passenger safety, operational continuity, security requirements, and regulatory compliance.

TYPICAL SERVICES

- ♦ Airport Fire Strategies
- ♦ Terminal Building Fire Engineering
- ♦ Smoke Management
- ♦ CFD Modelling
- ♦ Evacuation Analysis
- ♦ Asset Condition Assessments

REPRESENTATIVE EXPERIENCE

- ♦ International Airport Developments
- ♦ Airport Asset Assessment Programs
- ♦ Terminal Expansions
- ♦ Airside Support Facilities



2. METRO & RAIL

Engineering Safety for High-Capacity Transit Systems

Specialist expertise supporting metro, rail, station, depot, and transportation infrastructure projects.

TYPICAL SERVICES

- ♦ Station Fire Strategies
- ♦ Tunnel Safety Reviews
- ♦ Smoke Control Systems

REPRESENTATIVE EXPERIENCE

- ♦ Evacuation Assessments
- ♦ Authority Compliance Support



3. TUNNELS & UNDERGROUND FACILITIES

Managing Risk in Confined Environments

Fire and smoke events within tunnels present unique challenges requiring specialist engineering analysis and emergency planning.

TYPICAL SERVICES

- ♦ Tunnel Fire Safety Strategies
- ♦ Smoke Modelling
- ♦ Emergency Response Planning

REPRESENTATIVE EXPERIENCE

- ♦ Ventilation Assessments
- ♦ Performance-Based Design



4. COMMERCIAL & MIXED-USE DEVELOPMENTS

Creating Safe, Functional and Efficient Environments

Supporting architects, developers, and design teams in delivering complex developments while maintaining safety and design intent

TYPICAL SERVICES

- ♦ Fire Engineering Strategies
- ♦ Life Safety Compliance
- ♦ Smoke Control Design

REPRESENTATIVE EXPERIENCE

- ♦ Performance-Based Solutions
- ♦ Design Review & Coordination

SECTORS WE SUPPORT



AIRPORTS



METRO & RAIL



TUNNELS



COMMERCIAL



HOSPITALITY



RESIDENTIAL



INDUSTRIAL



ENERGY



5. HOSPITALITY & LEISURE

Delivering Safe and Memorable Experiences

Hotels, resorts, entertainment venues, and destination developments requiring integrated life safety solutions and operational resilience.

TYPICAL SERVICES

- ♦ Fire Safety Strategies
- ♦ Life Safety Compliance
- ♦ Smoke Control Systems

FOCUS AREAS

- ♦ Emergency Planning
- ♦ Fire Protection Design
- ♦ Operational Risk Support



6. RESIDENTIAL & HIGH-RISE DEVELOPMENTS

Engineering Safety for Vertical Communities

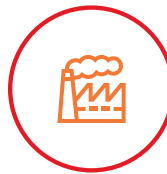
Fire engineering solutions for residential towers, mixed-use communities, and large-scale urban developments.

TYPICAL SERVICES

- ♦ Fire Strategies
- ♦ Smoke Control
- ♦ Means of Escape Assessments

FOCUS AREAS

- ♦ Refuge Strategy Development
- ♦ Fire Protection Design Reviews
- ♦ Authority Approvals Support



7. INDUSTRIAL & LOGISTICS

Protecting Assets. Ensuring Business Continuity.

Supporting manufacturing facilities, warehouses, logistics hubs, and industrial operations where asset protection and business continuity are critical.

TYPICAL SERVICES

- ♦ Fire Risk Assessments
- ♦ Fire Protection Design
- ♦ Hazard Analysis

FOCUS AREAS

- ♦ Emergency Planning
- ♦ Operational Safety Reviews
- ♦ Compliance & Due Diligence



8. ENERGY & EMERGING TECHNOLOGIES

Supporting a Safer Energy Future

Specialist support for high-hazard facilities and emerging technologies that are shaping the future of energy.

FOCUS AREAS

- ♦ Fuel Storage Facilities
- ♦ Hydrogen Applications
- ♦ Battery Energy Storage Systems (BESS)

FOCUS AREAS

- ♦ Renewable Energy Facilities
- ♦ Utility Infrastructure
- ♦ Process & Chemical Plants



EXPERIENCE ACROSS THE ENTIRE BUILT ENVIRONMENT

From international airports and transportation infrastructure to high-rise developments, industrial facilities, and emerging energy technologies, Vitrivius Fire delivers practical, performance-based solutions tailored to each sector's unique challenges.



AIRPORTS



METRO & RAIL



TUNNELS



COMMERCIAL



HOSPITALITY



RESIDENTIAL



INDUSTRIAL



ENERGY

FOUNDER PROFILE

VINAY DESHPANDE

Founder & Managing Director



“ Over 37 years of international experience in fire safety, fire protection systems, risk management, and critical infrastructure.



PROVEN LEADER

Designed and delivered fire safety solutions for some of the most complex and high-profile projects across the Middle East, South Asia and beyond.



TECHNICAL EXPERTISE

Fire protection system design, code compliance, project management and authority liaison across international standards including NFPA, BS, UAE Fire Code, SBC and NBC India.



EXTENSIVE PORTFOLIO

Airports, mixed-use towers, petrochemical facilities, theme parks, high-rise developments and critical infrastructure projects.



THOUGHT LEADER

Active speaker at major fire safety conferences and contributor to professional fire safety groups and industry forums.



MISSION

To simplify fire safety challenges and deliver cost-effective, practical, and buildable solutions that ensure compliance, safety and operational resilience.



Passionate about engineering excellence and life safety, I envision a future where fire protection is seamlessly integrated into innovation-creating resilient, sustainable and intelligent built environments.



KEY EXPERTISE



Fire Engineering & Life Safety Strategy



Performance based Design



CFD & Evacuation Modelling



Fire Risk Assessments (QRA, FERA)



Smoke Management



Authority Approvals & Compliance

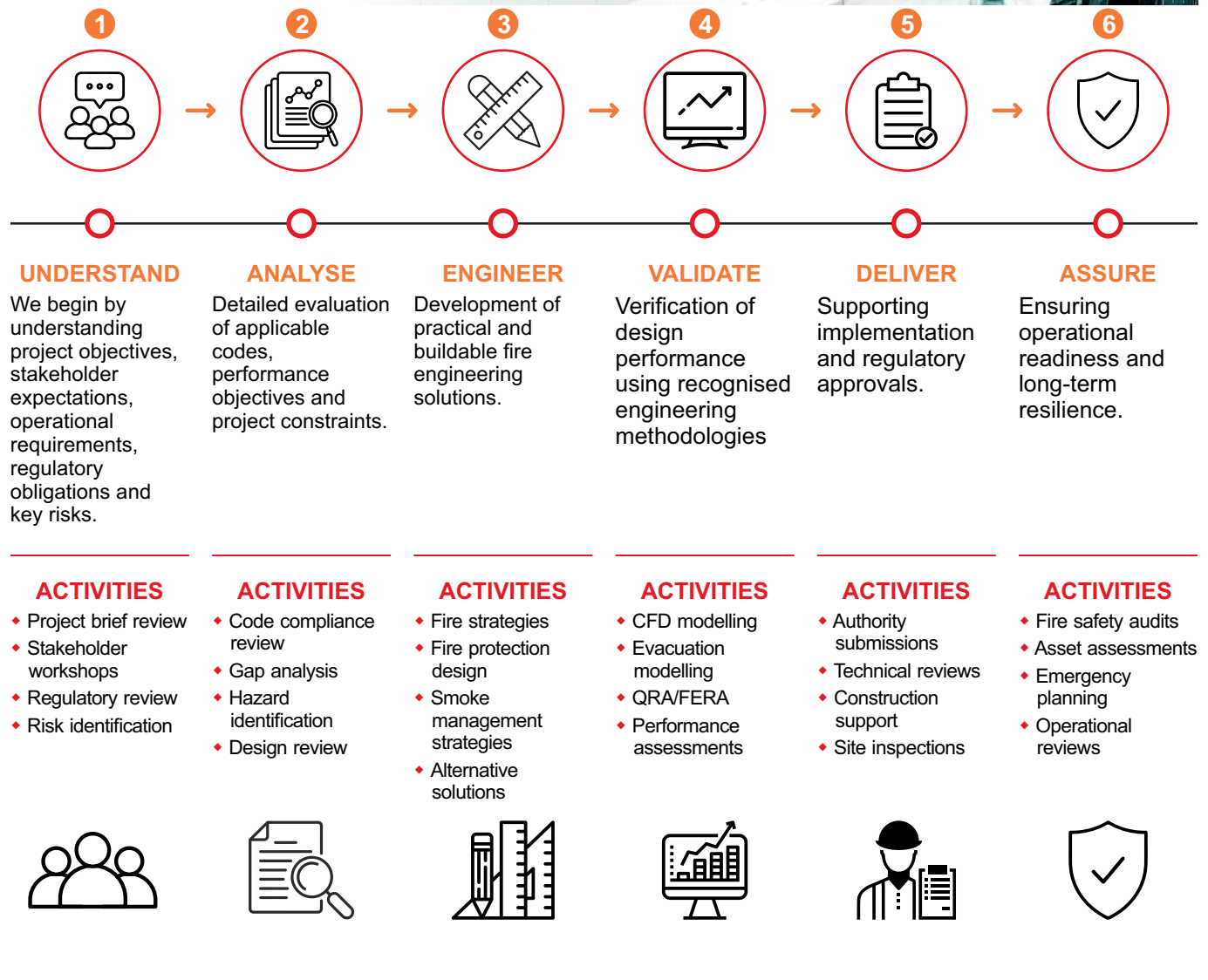


Critical Infrastructure & Mega Projects

OUR APPROACH

ENGINEERING CONFIDENCE THROUGH A STRUCTURED PROCESS

Our proven methodology ensures fire and life safety solutions are practical, performance-based and aligned with project goals from concept to operation.



From concept development to operational assurance, **Vitrivius Fire** delivers **practical, performance-based solutions** that balance **safety, compliance, functionality** and **commercial objectives**.



**SAFETY
FOCUSSED**



**RISK
INTELLIGENT**



**PRACTICAL
SOLUTIONS**



**VALUE
DRIVEN**





FOCUS AREA

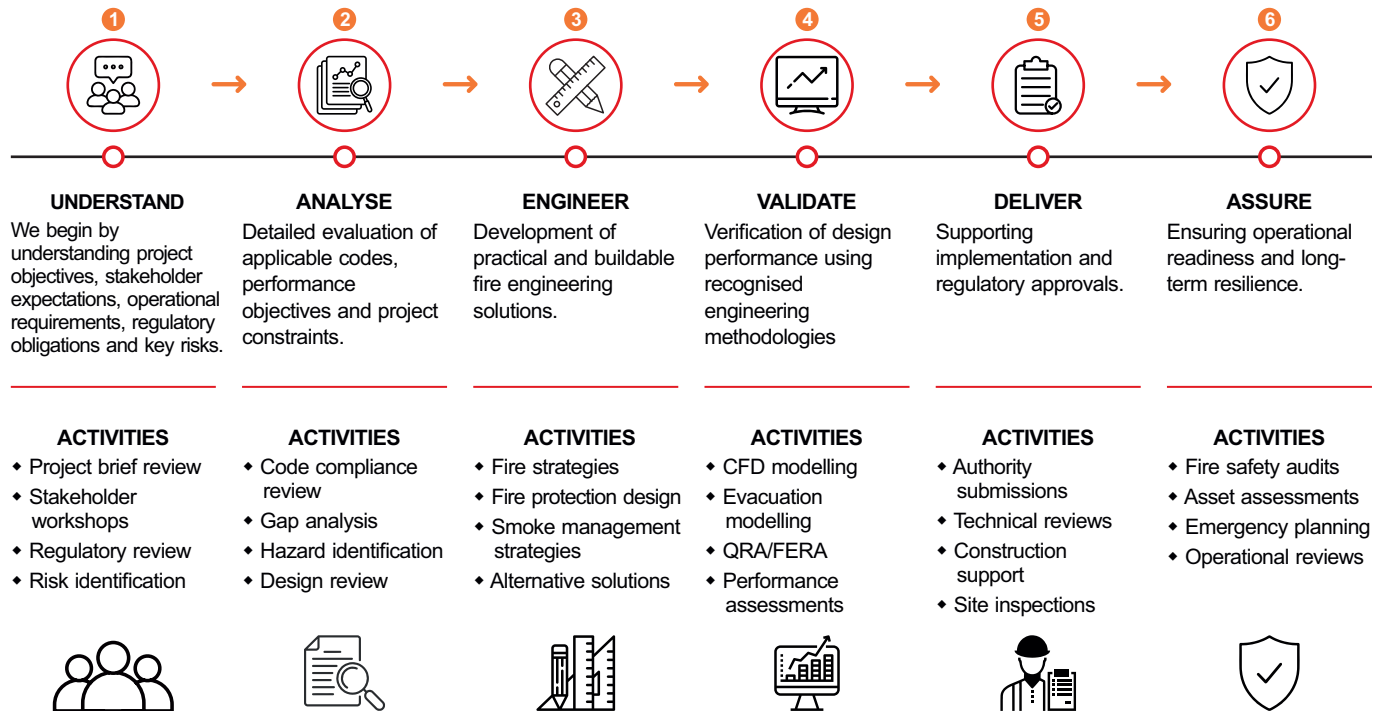
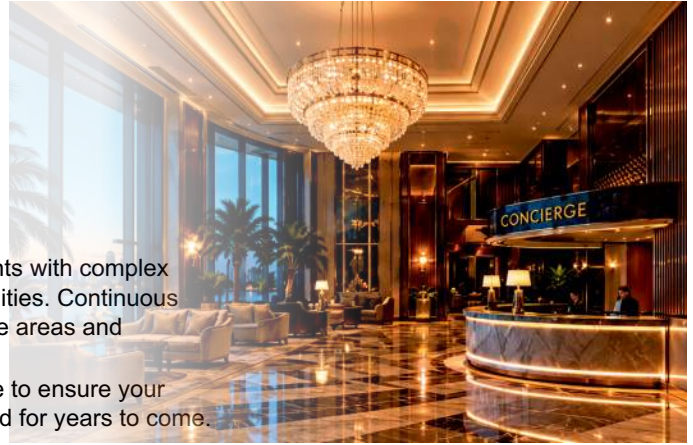
LUXURY HOTELS

FIRE AND LIFE SAFETY ASSURANCE

Protecting Guests. Empowering Operations. Preserving Excellence.

Luxury hotels are high-occupancy, high-expectation environments with complex layouts, premium guest experiences and extensive support facilities. Continuous operational changes, event loads, kitchens, spas, back-of-house areas and technical systems can introduce new fire and life safety risks.

Vitruius Fire provides independent fire engineering assurance to ensure your hotel remains safe, compliant and resilient - today, tomorrow and for years to come.



OUR FIRE ASSURANCE SERVICES

- FIRE LOAD & OCCUPANCY RISK REASSESSMENT**
 Evaluate current fire load, occupant load, event scenarios and operational activities against the approved design basis.
- HYDRAULIC ADEQUACY & FIRE-WATER SYSTEM REVIEW**
 Verify fire-water demand, storage, pumps, hydrants, sprinklers and pressure/flow at critical and remote locations.
- COMPREHENSIVE FIRE & LIFE SAFETY RISK ASSESSMENT**
 Holistic risk assessment covering means of escape, compartmentation, active systems, smoke control, detection, emergency power & other life safety provisions.
- FIRE SAFETY MANAGEMENT OF CHANGE (MOC)**
 Review and manage changes in layouts, tenant fit-outs, event setups, kitchens, LPG, EV charging, storage and fire protection systems.
- APPROVED DESIGN vs. ACTUAL GAP ASSESSMENT**
 Compare approved design and as-built/operational conditions to identify fire and life safety gaps.
- CFD, SMOKE MOVEMENT & EGRESS SIMULATION**
 Advanced modelling to evaluate smoke behaviour, tenability, visibility and evacuation performance in complex scenarios.
- EMERGENCY RESPONSE & FIRE SAFETY MANAGEMENT REVIEW**
 Assess emergency plans, response procedures, staff training, drills, coordination and interface with local fire services.
- PERFORMANCE-BASED DESIGN & REMEDIATION STRATEGIES**
 Develop engineered solutions and upgrade strategies tailored to hotel-specific risks and operational continuity.

OUR APPROACH

- 1 UNDERSTAND**
Understand your hotel operations, guest experience standards and safety objectives.
- 2 ASSESS**
Collect data, review documents, conduct site walks, testing and analysis.
- 3 ANALYZE**
Identify risks, gaps and performance deficiencies using advanced tools.
- 4 RECOMMEND**
Prioritize recommendations and practical, cost-effective solutions.
- 5 ASSURE**
Support implementation, verification and ongoing assurance.

VALUE TO HOTEL OWNERS & OPERATORS

- ✓ Ensures life safety of guests, staff and visitors
- ✓ Maintains brand reputation and guest confidence
- ✓ Ensures compliance with statutory & insurance requirements
- ✓ Reduces fire risks, downtime and potential business losses
- ✓ Supports operational continuity during events and peak seasons
- ✓ Strengthens investor, lender and stakeholder confidence



FOCUS AREA

HIGH-RISE COMMERCIAL BUILDINGS

FIRE AND LIFE SAFETY ASSURANCE

Engineering Resilience. Protecting People, Assets and Business Continuity.

High-rise commercial buildings are complex environments with high occupant density, vertical evacuation challenges, sophisticated building systems and critical business operations. Even small changes in use, layout or systems can significantly impact life safety and continuity.

Vitruvius Fire provides independent fire engineering assurance to ensure your high-rise remains safe, compliant and resilient-today, tomorrow and in the future.



KEY FIRE & LIFE SAFETY RISKS IN HIGH-RISE COMMERCIAL BUILDINGS



High occupant Density & vertical Evacuation Challenges



Fire load from Offices, storage, Pantries & technical Spaces



Elevators & Fire - fighter lifts Availability & Reliability



Smoke movement In atria, shafts & complex Compartments



Electrical load, Emergency power & critical system Integration



System reliability, Maintenance & Management Oversight

OUR FIRE ASSURANCE SERVICES



FIRE LOAD & OCCUPANCY RISK REASSESSMENT
Evaluate current fire load, occupant load, event scenarios and operational activities against the approved design basis.



HYDRAULIC ADEQUACY & FIRE-WATER SYSTEM REVIEW
Verify fire-water demand, storage, pumps, hydrants, sprinklers and pressure/flow at critical and remote locations.



COMPREHENSIVE FIRE & LIFE SAFETY RISK ASSESSMENT
Holistic risk assessment covering means of escape, compartmentation, active systems, smoke control, detection, emergency power & other life safety provisions.



FIRE SAFETY MANAGEMENT OF CHANGE (MOC)
Review and manage changes in layouts, tenant fit-outs, event setups, kitchens, LPG, EV charging, storage and fire protection systems.



APPROVED DESIGN vs. ACTUAL GAP ASSESSMENT
Compare approved design and as-built/operational conditions to identify fire and life safety gaps.



CFD, SMOKE MOVEMENT & EGRESS SIMULATION
Advanced modelling to evaluate smoke behaviour, tenability, visibility and evacuation performance in complex scenarios.



EMERGENCY RESPONSE & FIRE SAFETY MANAGEMENT REVIEW
Assess emergency plans, response procedures, staff training, drills, coordination and interface with local fire services.



PERFORMANCE-BASED DESIGN & REMEDIATION STRATEGIES
Develop engineered solutions and upgrade strategies tailored to high-rise specific risks and operational continuity.

OUR APPROACH

1

UNDERSTAND
Understand your building operations, tenancies, systems and safety objectives.

2

ASSESS
Collect data, review documents, conduct site walks, testing and analysis.

3

ANALYZE
Identify risks, gaps and performance deficiencies using advanced tools.

4

RECOMMEND
Prioritize recommendations and practical, cost-effective solutions.

5

ASSURE
Support implementation, verification and ongoing assurance.

VALUE TO BUILDING OWNERS & OPERATORS

- ✓ Ensures life safety of occupants, staff and visitors
- ✓ Maintains operational continuity and protects revenue
- ✓ Ensures compliance with statutory & insurance requirements
- ✓ Reduces fire & operational risks and potential business losses
- ✓ Supports asset value, tenant confidence and brand reputation
- ✓ Strengthens investor, lender and stakeholder confidence

WHY CLIENTS CHOOSE VITRUVIUS FIRE



INTERNATIONAL EXPERIENCE
Serving the Middle East, Central Asia and India.



MULTI-SECTOR EXPERTISE
Airports, rail, towers, hospitals, malls, industrial and more.



INDEPENDENT ADVICE
Unbiased, risk-focused and aligned with your best interests.



PERFORMANCE-BASED SOLUTIONS
Engineering solutions tailored to complex challenges.



EXPERIENCED LEADERSHIP
Led by professionals with extensive fire engineering expertise.



CLIENT-FOCUSED DELIVERY
Responsive, reliable and committed to your success.



FOCUS AREA

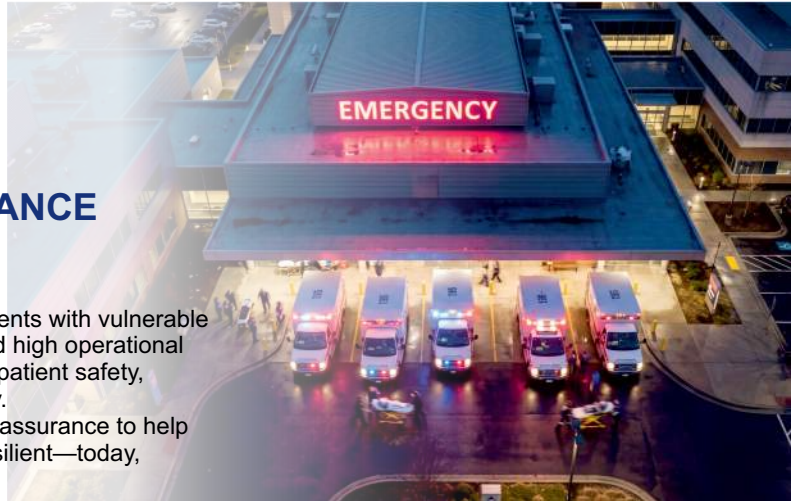
HOSPITALS

FIRE AND LIFE SAFETY ASSURANCE

Protecting Lives. Enabling Care. Ensuring Continuity.

Hospitals are complex, 24/7 mission-critical environments with vulnerable occupants, life-support systems, hazardous areas and high operational dependency. Any fire or smoke incident can threaten patient safety, interrupt essential services and impact the community.

Vitruvius Fire provides independent fire engineering assurance to help hospitals remain safe, compliant and operationally resilient—today, tomorrow and always.



KEY FIRE & LIFE SAFETY RISKS IN HOSPITALS



Vulnerable Occupants & Patient mobility



High fire load in Linen, storage, Pharmacy & Support areas



Life support & Critical medical Equipment Dependency



Complex evacuation for bed-ridden & assisted patients



Electrical systems, Generators & Emergency power Reliability



Infection control, Hazardous areas & Medical gas systems Integration

OUR FIRE ENGINEERING ASSURANCE SERVICES



FIRE LOAD & OCCUPANCY RISK REASSESSMENT
Evaluate current fire load, occupant load, tenant activities and operational changes against the approved design basis.



HYDRAULIC ADEQUACY & FIRE-WATER SYSTEM REVIEW
Verify fire-water demand, storage, pumps, hydrants, sprinklers and pressure/flow at critical and remote locations.



COMPREHENSIVE FIRE & LIFE SAFETY RISK ASSESSMENT
Holistic risk assessment covering means of escape, compartments, active systems, smoke control, detection, emergency power and other life safety provisions.



FIRE SAFETY MANAGEMENT OF CHANGE (MOC)
Review and manage changes in layouts, tenancies, systems, electrical load, EV charging, storage and fire protection systems.



APPROVED DESIGN vs. ACTUAL GAP ASSESSMENT
Compare approved design and as-built/operational conditions to identify deviations and compile a Fire Safety Gap Register.



CFD, SMOKE MOVEMENT & EGRESS SIMULATION
Advanced modelling to evaluate smoke behaviour, tenability, visibility and evacuation performance in complex scenarios.



EMERGENCY RESPONSE & FIRE SAFETY MANAGEMENT REVIEW
Assess emergency plans, response procedures, staff training, drills, coordination and interface with local fire services.



PERFORMANCE-BASED DESIGN & REMEDIATION STRATEGIES
Develop engineered solutions and upgrade strategies tailored to hospital-specific risks and operational continuity.

OUR APPROACH

1

UNDERSTAND
Understand your hospital operations, critical services and safety objectives.

2

ASSESS
Collect data, review documents, conduct site walks, testing and analysis.

3

ANALYZE
Identify risks, gaps and performance deficiencies using advanced tools.

4

RECOMMEND
Prioritize recommendations and practical, cost-effective solutions.

5

ASSURE
Support implementation, verification and ongoing assurance.

VALUE TO HOSPITAL OWNERS & OPERATORS

- ✓ Ensures life safety of patients, staff and visitors
- ✓ Maintains continuity of critical healthcare services
- ✓ Ensures compliance with statutory & insurance requirements
- ✓ Reduces fire risks and potential business interruption
- ✓ Supports asset value, tenant confidence and brand reputation
- ✓ Strengthens trust, reputation and community confidence

WHY CLIENTS CHOOSE VITRUVIUS FIRE



INTERNATIONAL EXPERIENCE
Serving the Middle East, Central Asia and India.



MULTI-SECTOR EXPERTISE
Airports, rail, towers, hospitals, malls, industrial and more.



INDEPENDENT ADVICE
Unbiased, risk-focused and aligned with your best interests.



PERFORMANCE-BASED SOLUTIONS
Engineering solutions tailored to complex challenges.



EXPERIENCED LEADERSHIP
Led by professionals with extensive fire engineering expertise.



CLIENT-FOCUSED DELIVERY
Responsive, reliable and committed to your success.



FOCUS AREA

MAJOR SHOPPING MALLS

FIRE AND LIFE SAFETY ASSURANCE

Engineering Safer Environments. Protecting People, Assets and Brand Reputation.

Shopping malls are complex, high-occupancy environments with dynamic tenant mix, high fire load, large atria and extensive public spaces. Continuous changes in occupancy, layouts, kitchens, electrical loads and retail activities can introduce new fire and life safety risks.

Vitruius Fire provides independent fire engineering assurance to ensure your mall remains safe, compliant and resilient—today, tomorrow and in the future.



KEY FIRE & LIFE SAFETY RISKS IN MALLS



High occupant load & complex Evacuation



High fire load From retail, Food courts & storage



Atriums & open spaces driving smoke spread risk



Frequent tenant changes & layout modifications



Electrical load, Kitchens & EV charging Integration



System reliability, Maintenance & Management Oversight

OUR FIRE ENGINEERING ASSURANCE SERVICES



FIRE LOAD & OCCUPANCY RISK REASSESSMENT
Evaluate current fire load, occupant load, tenant activities and operational changes against the approved design basis.



HYDRAULIC ADEQUACY & FIRE-WATER SYSTEM REVIEW
Verify fire-water demand, storage, pumps, hydrants, sprinklers and pressure/flow at critical and remote locations.



COMPREHENSIVE FIRE & LIFE SAFETY RISK ASSESSMENT
Holistic risk assessment covering means of escape, compartments, active systems, smoke control, detection, emergency power, and other life safety provisions.



FIRE SAFETY MANAGEMENT OF CHANGE (MOC)
Review and manage changes in occupancy, layouts, tenants, kitchens, LPG, EV charging, storage and fire protection systems.



APPROVED DESIGN vs. ACTUAL GAP ASSESSMENT
Compare approved design and as-built/operational conditions to identify deviations and compile a Fire Safety Gap Register.



CFD, SMOKE MOVEMENT & EGRESS SIMULATION
Advanced modelling to evaluate smoke behaviour, tenability, visibility and evacuation performance in complex scenarios.



EMERGENCY RESPONSE & FIRE SAFETY MANAGEMENT REVIEW
Assess emergency plans, response procedures, staff training, drills, coordination and interface with local fire services.



PERFORMANCE-BASED DESIGN & REMEDIATION STRATEGIES
Develop engineered solutions and upgrade strategies tailored to mall-specific risks and operational continuity.

OUR APPROACH

1

UNDERSTAND
Understand your mall operations, tenants and fire safety objectives.

2

ASSESS
Collect data, conduct site walks, testing and analysis.

3

ANALYZE
Identify risks, gaps and performance deficiencies using advanced tools.

4

RECOMMEND
Prioritize recommendations and practical, cost-effective solutions.

5

ASSURE
Support implementation, verification and ongoing assurance.

VALUE TO MALL OWNERS & OPERATORS

- ✓ Enhances life safety of occupants, staff and visitors
- ✓ Ensures compliance with statutory & insurance requirements
- ✓ Reduces fire & operational risks and potential business losses
- ✓ Supports business continuity and brand protection
- ✓ Strengthens investor, tenant and public confidence

WHY CLIENTS CHOOSE VITRUIUS FIRE



INTERNATIONAL EXPERIENCE
Serving the Middle East, Central Asia and India.



MULTI-SECTOR EXPERTISE
Airports, rail, towers, hospitals, malls, industrial and more.



INDEPENDENT ADVICE
Unbiased, risk-focused and aligned with your best interests.



PERFORMANCE-BASED SOLUTIONS
Engineering solutions tailored to complex challenges.



EXPERIENCED LEADERSHIP
Led by professionals with extensive fire engineering expertise.



CLIENT-FOCUSED DELIVERY
Responsive, reliable and committed to your success.



FOCUS AREA

MIXED-USE DEVELOPMENTS

FIRE AND LIFE SAFETY ASSURANCE

One Vision. Multiple Uses. Integrated Safety.

Mixed-use developments combine multiple occupancies retail, offices, residential, hospitality, entertainment and parking within shared structures and infrastructure.

The interaction between different use types, varied occupant profiles and complex interfaces can create unique fire and life safety risks that require specialist engineering insight.

Vitruvius Fire provides independent fire engineering assurance to ensure your mixed-use development is safe, compliant and resilient today, tomorrow and in the future.



KEY FIRE & LIFE SAFETY RISKS MIXED-USE DEVELOPMENTS



Complex occupancy interfaces & varied occupant behaviour



High fire load From retail, Food courts & storage



Vertical & horizontal Evacuation Coordination Challenges



Basement parking, EV charging & ramp fire scenarios



Smoke movement across atria, void spaces & transfers



Electrical load, emergency power & critical system integration



System reliability, Maintenance & Management Oversight

OUR FIRE ENGINEERING ASSURANCE SERVICES



FIRE LOAD & OCCUPANCY RISK REASSESSMENT
Evaluate fire load, occupant load, tenant mix, activities and operational changes against the approved design basis.



HYDRAULIC ADEQUACY & FIRE-WATER SYSTEM REVIEW
Verify fire-water demand, storage, pumps, hydrants, sprinklers and pressure/flow at critical and remote locations.



COMPREHENSIVE FIRE & LIFE SAFETY RISK ASSESSMENT
Holistic risk assessment covering means of escape, compartments, active systems, smoke control, detection, emergency power and other life safety provisions.



FIRE SAFETY MANAGEMENT OF CHANGE (MOC)
Review and manage changes in layouts, tenancies, systems, occupancy, EV charging, storage and fire protection systems.



APPROVED DESIGN vs. ACTUAL GAP ASSESSMENT
Compare approved design and as-built/operational conditions to identify deviations and compile a Fire Safety Gap Register.



CFD, SMOKE MOVEMENT & EGRESS SIMULATION
Advanced modelling to evaluate smoke behaviour, tenability, visibility and evacuation performance in complex scenarios.



EMERGENCY RESPONSE & FIRE SAFETY MANAGEMENT REVIEW
Assess emergency plans, response procedures, staff training, drills, and coordination with local fire services.



PERFORMANCE-BASED DESIGN & REMEDIATION STRATEGIES
Develop engineered solutions and upgrade strategies tailored to mixed-use specific risks and operational continuity.

OUR APPROACH

1

UNDERSTAND
Understand your development, tenants, operations, assets and safety objectives.

2

ASSESS
Collect data, review documents, conduct site walks, testing and analysis.

3

ANALYZE
Identify risks, gaps and performance deficiencies using advanced tools.

4

RECOMMEND
Prioritize recommendations and practical, cost-effective solutions.

5

ASSURE
Support implementation, verification and ongoing assurance.

VALUE TO DEVELOPERS & OPERATORS

- ✓ Ensures life safety of occupants, staff and visitors
- ✓ Maintains operational continuity across all use areas
- ✓ Ensures compliance with statutory & insurance requirements
- ✓ Reduces fire & operational risks and potential business losses
- ✓ Supports asset value, reputation and stakeholder confidence
- ✓ Strengthens investor, lender and client confidence

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VITRUVIUS FIRE

FIRE ENGINEERING | LIFE SAFETY | RISK ADVISORY

DESIGN & ENGINEERING OF FIRE & LIFE SAFETY FOR LARGE SPORTS COMPLEXES & STADIA

SAFE VENUES. SECURE CROWDS. SEAMLESS EXPERIENCES.

From iconic stadia to multi-sport arenas and athletic villages, we deliver integrated fire and life safety engineering that protects people, preserves operations and ensures compliance with international standards and authority requirements.



UNIQUE FIRE & LIFE SAFETY CHALLENGES



**Very high
Occupant
load & Dynamic
events**



**Complex
egress &
evacuation
Scenarios**



**Large open
Spaces &
Roof
Structures**



**Integration
With mep,
Structure & event
Operations**



**Operational
Continuity &
Business
impact**



**Compliance
with Local
& international
Regulations**

OUR FIRE ENGINEERING ASSURANCE SERVICES



PERFORMANCE-BASED FIRE SAFETY DESIGN

Risk-informed design solutions to achieve life safety objectives beyond prescriptive compliance.



EGRESS & EVACUATION ENGINEERING

Advanced modelling, crowd dynamics, evacuation time estimations and wayfinding strategies.



SMOKE MANAGEMENT & CONTROL

Natural, mechanical and hybrid smoke control solutions for stands, concourses, back-of-house and atria.



FIRE PROTECTION SYSTEMS DESIGN

Sprinkler, water mist, deluge, special hazard systems, hydrants, foam and detection & alarm systems.



MEP & ELECTRICAL SAFETY DESIGN

Emergency power, lighting, lightning protection, electrical load management and fire pump systems.



FIRE LIFE SAFETY STRATEGY & DOCUMENTATION

Fire strategy reports, safety cases, FEB/FER, FSMP, O&M manuals and compliance documentation.



AUTHORITY LIAISON & APPROVAL SUPPORT

Coordination with AHJs, code authorities and stakeholders to secure timely approvals.

OUR APPROACH

1

UNDERSTAND

Understand project vision, operations, occupancy and stakeholder objectives.

2

ASSESS

Assess risks, collect data and benchmark against best practices.

3

ANALYZE

Analyse performance through engineering tools and scenario modelling.

4

RECOMMEND

Develop integrated fire & life safety solutions aligned with architecture and operations.

5

DELIVER & ASSURE

Support implementation, commissioning, verification and ongoing assurance.

VALUE TO STADIUM OWNERS & OPERATORS

- ✓ Protects lives of spectators, staff and athletes
- ✓ Ensures safe and efficient evacuation in any scenario
- ✓ Meets regulatory and insurance requirements
- ✓ Enhances operational continuity and event readiness
- ✓ Strengthens reputation and public confidence

WHY CLIENTS CHOOSE VITRUVIUS FIRE



INTERNATIONAL EXPERIENCE

Serving the
Middle East, Central
Asia and India.



SPECIFIC EXPERTISE

Deep knowledge of
stadia, arenas and
large event venues.



INDEPENDENT ADVICE

Unbiased, risk-focused
and aligned with your
best interests.



PERFORMANCE-BASED SOLUTIONS

Engineering solutions
tailored to complex
challenges.



EXPERIENCED LEADERSHIP

Led by professionals
with extensive fire
engineering
expertise.



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VITRUVIUS FIRE

FIRE ENGINEERING | LIFE SAFETY | RISK ADVISORY

DESIGN & ENGINEERING OF FIRE & LIFE SAFETY FOR DATA CENTRES

Performance-based solutions for mission-critical facilities where reliability, resilience and uptime are non-negotiable.

Modern data centres are high-value, high-density, and high-risk environments.

Vitruvius Fire delivers specialist fire engineering solutions that protect critical infrastructure, safeguard lives and ensure business continuity-without compromise.



UNIQUE FIRE & LIFE SAFETY CHALLENGES



Fire risk Assessment

Comprehensive fire risk assessments tailored for data centres in line with NFPA, IFC and local codes.



Fire protection System design

Design of advanced suppression systems including FM-200, Novec 1230, Inergen, CO₂, Water Mist and Sprinkler systems.



Smoke management & pressurization

CFD-based smoke modelling, smoke exhaust design, pressurization of escape routes and stairwells.



Life safety Design

Egress strategy, occupant evacuation modelling, exit sizing and safe evacuation under fire conditions.



Fire detection & early warning

Aspirating smoke detection (VESDA), addressable systems, early warning detection for rapid incident response.



Compliance & Authority Approvals

Code compliance reviews, performance-based justifications and liaison for AHJ approvals.



DATA CENTRES ARE UNIQUE

- High fire load from electrical & IT equipment
- Mission-critical operations with zero tolerance for downtime
- Sensitive equipment requires non-damaging suppression
- Complex power, HVAC and cable infrastructure
- Continuous operations demand robust life safety systems

OUR ENGINEERING APPROACH

- Risk-based, performance-driven design
- Advanced engineering analysis (CFD, FDS, Evacuation Modelling)
- Integration with MEP and structural systems
- Reliability, maintainability and operational continuity
- End-to-end support from concept to commissioning

KEY SYSTEMS WE DESIGN



CLEAN
AGENT
SYSTEMS



SPRINKLER &
WATER MIST
SYSTEMS



ASPIRATING
SMOKE DETECTION
(VESDA)



SMOKE EXHAUST &
PRESSURIZATION
SYSTEMS



FIRE ALARM &
EARLY WARNING
SYSTEMS



EMERGENCY
LIGHTING & EXIT
SYSTEMS



FIRE SAFETY
MANAGEMENT &
DOCUMENTATION



INTERNATIONAL EXPERIENCE

Serving the Middle East, Central Asia and India.



SPECIFIC EXPERTISE

Deep knowledge of data centers and mission-critical environments.



INDEPENDENT ADVICE

Unbiased, risk-focused and aligned with your best interests.



PERFORMANCE-BASED SOLUTIONS

Engineering solutions tailored to complex challenges.



EXPERIENCED LEADERSHIP

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VITRUVIUS FIRE

FIRE ENGINEERING | LIFE SAFETY | RISK ADVISORY

DESIGN & ENGINEERING OF FIRE & LIFE SAFETY FOR SUPER TALL TOWERS

Engineering life safety into extraordinary heights. Performance-based fire engineering solutions for super tall buildings that redefine skylines.

Super tall towers present unique fire and life safety challenges due to height, complex mixed-use occupancies, large occupant loads, long evacuation times and advanced building systems. **Vitruvius Fire** delivers innovative, code-compliant, and performance-based solutions tailored for these iconic structures.



OUR FIRE & LIFE SAFETY ENGINEERING SERVICES



Fire risk Assessment

Comprehensive fire risk assessments including high-rise specific hazards, evacuation analysis and quantitative risk evaluation.



Fire protection System design

Design of advanced active and passive fire protection systems including sprinklers, stand pipes, fire pumps, facade protection and compartmentation.



Smoke control & pressurization

CFD-based smoke movement studies atrium smoke management, stair pressurization and refuge safety strategies.



Life safety Design

Evacuation modelling, travel distance analysis, refuge areas, occupant loading and phased evacuation plans.



Fire detection & early warning

Advanced detection systems, aspirating smoke detection, VESDA, addressable systems and integration with building automation.



Compliance & Authority Approvals

Code compliance reviews, performance-based justifications and liaison for AHJ approvals.

SUPER TALL TOWERS ARE UNIQUE

- Extreme heights with long evacuation times and long travel distances
- Wind effects influencing smoke movement and facade performance
- Mixed-use occupancies with varying risk profiles
- Complex vertical transportation and refuge strategies
- High reliability requirement for all systems



OUR ENGINEERING APPROACH

- Risk-based, performance-driven design
- Advanced engineering analysis (CFD, FDS, Evacuation Modelling)
- Integration with MEP and structural systems
- Reliability, maintainability and operational continuity
- End-to-end support from concept to commissioning

KEY SYSTEMS WE DESIGN



SPRINKLER & WATER MIST SYSTEMS



STAIR PRESSURIZATION SYSTEMS



SMOKE EXHAUST & VENTILATION SYSTEMS



FIRE PUMP & STANDPIPE SYSTEMS



FIRE DETECTION & ALARM SYSTEMS



FIRE HYDRANT & HOSE REEL SYSTEMS



FIRE DOORS & COMPARTMENTATION SYSTEMS



FIRE SAFETY MANAGEMENT & DOCUMENTATION



INTERNATIONAL EXPERIENCE

Serving the Middle East, Central Asia and India.



SPECIFIC EXPERTISE

Deep knowledge of tall towers / mission-critical environments.



INDEPENDENT ADVICE

Unbiased, risk-focused and aligned with your best interests.



PERFORMANCE-BASED SOLUTIONS

Engineering solutions tailored to complex challenges.



EXPERIENCED LEADERSHIP

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VITRUVIUS FIRE

FIRE ENGINEERING | LIFE SAFETY | RISK ADVISORY

AIRPORT FUEL FARM & HYDRANT SYSTEMS

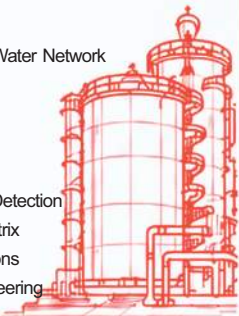
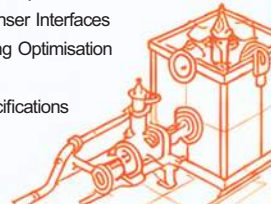
**FIRE PROTECTION ENGINEERING • PROCESS SAFETY
• RISK & RESILIENCE**

Engineering Safe Fuel Infrastructure for
Critical Aviation Operations



WHO WE SUPPORT

 International Airports	 Greenfield Airports	 Airports Expansions	 Fuel Farm Operators	 EPC Contractors	 Aviation Authorities
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 FIRE PROTECTION ENGINEERING • Fire Protection Philosophy • Design Basis Report • Fire Water Demand Assessment • Fire Water Storage • Fire Pump Stations • Underground Fire Water Network • Foam Systems • Hydrant Systems • Monitor Systems • Deluge Systems • Fire Alarm & Gas Detection • Cause & Effect Matrix • Hydraulic Calculations • IFC Detailed Engineering 	 AIRPORT FUEL HYDRANT ENGINEERING • Hydrant Pipeline Network Design • Hydraulic Network Analysis • Pressure Loss Assessment • Surge Analysis • Valve Station Design • Hydrant Pit Layouts • Isolation Philosophy • Fuel Hydrant Pump Station Interface • Hydrant Dispenser Interfaces • Pipeline Routing Optimisation • IFC Drawings • Technical Specifications 	 PROCESS SAFETY & ENGINEERING • HAZID • HAZOP • LOPA • SIL Assessment • Design Safety Review • QRA • Fire & Explosion Risk Assessment (FERA) • ALARP Demonstration • Consequence Modelling • Individual Risk Contours • Societal Risk (FN Curves) 
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SOFTWARE CAPABILITY

- DNV SAFETI
- DNV PHAST
- Hydraulic Calculation Software
- AutoCAD
- Bluebeam
- Consequence Modelling
- Individual Risk Assessment
- Fire & Explosion Analysis
- Thermal Radiation
- Explosion Over pressure
- ALARP Demonstration

WHY VITRUVIUS FIRE

 Airport Infrastructure Experience	 International Fire engineering Expertise	 Independent Consultancy	 Performance - Based Design	 Process Safety Integration	 Complete Engineering Concept to IFC
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CODE & STANDARDS

Designs undertaken in accordance with



Energy
Institute
(EI)



IATA



American
Petroleum
Institute

IEC
61508

IEC
61511

PROJECT LIFECYCLE



Concept



Feed



Detailed
Design



Construction



Commissioning



Operation

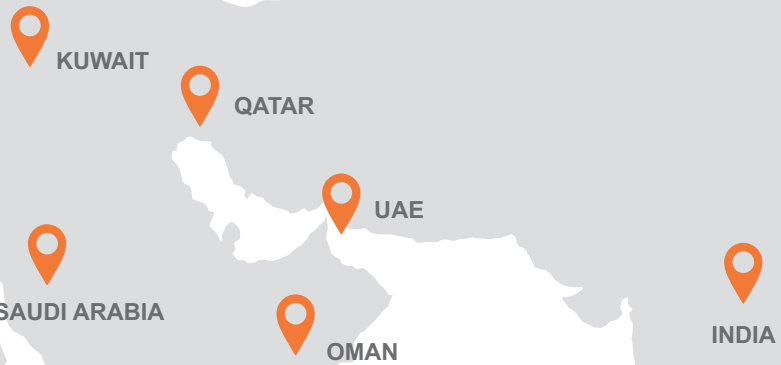
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GLOBAL REACH

DELIVERING FIRE ENGINEERING EXCELLENCE
ACROSS KEY MARKETS

Vitruvius Fire delivers performance-based
fire engineering and life safety solutions
across diverse geographies and sectors.



OUR GLOBAL FOOTPRINT



7+
COUNTRIES

Across Middle East,
Central Asia & India.



**LANDMARK
PROJECT
EXPERIENCE**

Airports, metros,
tunnels, high-rise and
hospitality developments*



37+
YEARS
FOUNDER EXPERIENCE

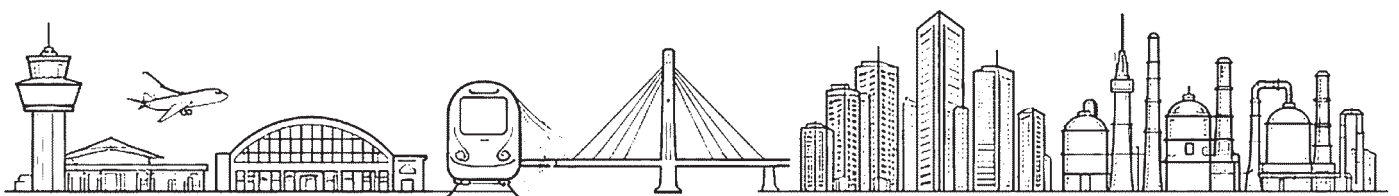
International fire
engineering leadership



100+
YEARS
COMBINED TEAM
EXPERIENCE

Collective expertise
across multiple sectors

* Representative project experience shown throughout this brochure reflects projects undertaken by Vitruvius Fire personnel during their professional careers, including while employed by leading international fire engineering and multidisciplinary consultancies.





VITRUVIUS

FIRE SAFETY CONSULTING

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AIRPORTS



RAIL & METRO



HIGH-RISE
DEVELOPMENTS



TUNNELS



INDUSTRIAL



ENERGY

Appoint Vitruvius Fire as your fire engineering consultants and you can be assured that you will comply with your fire safety obligations during building design, construction and occupation.

GUARDIANS OF SAFETY, ARCHITECTS OF PROTECTION



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