



Arnold Dix

Sovereign & Corporate Technical Risk management
for Underground, Transportation & Complex
Structures:
Operational Safety & Disasters

Direct Dial: +974 55352652

www.arnolddix.com

Summary profile

Professor Arnold Dix provides specialist advice on managing Sovereign and Commercial risks associated with life, property and the environment within the underground. His focus is upon Sovereign and Corporate risk management through excellence in Law, Science and Engineering with a focus on functional performance – not merely process and procedure. He provides risk mitigation and disaster response advice for tunnels in complex technical, scientific and engineering contexts. He is recognized as a world authority in this area.

Arnold is qualified as both a scientist and lawyer. He is an Associate Professor (Science, Mental Health and Adversity – Disasters & Emergencies 2008+) with the Medical School, University of Western Sydney and was a past Adjunct Professor of Engineering at Queensland University of Technology between 2005 and 2009.

Professor Dix is an accomplished advocate with over 15 years' experience as a Barrister. He is a member of the Dispute Resolution Board Foundation.

At the operational level he regularly provides advice and "*in field*" services on fitness for purpose, including commissioning, procedures and operational readiness. His special expertise is focused on operational safety and security.

Professor Dix's special interests are in the underground and transportation infrastructure - from construction risk (including contractual, fire safety and insurance issues) to more technical issues associated with the actual safety performance from an operational safety perspective.

He has played a key role in managing the risks in structures around the world including railways, roadways, buildings and tunnels from a design, commissioning, operations, security, and functional safety perspectives.

Special Expertise

Professor Dix is highly regarded by his peers as one of the leading independent expert on underground infrastructure, buildings and transportation risk.

Arnold is the Animateur of the International Tunnelling and Underground Space Association's (ITA – is a United Nations affiliate organization) contractual practices group.

He has held this position since 2004. The group have been very productive during this time and have produced numerous reviews and studies.

He is an invited member of the International Tunnel Insurance Group (the association of the world's tunnel re-insurers based in London) and contributed to the international version of the insurers 'Tunnel Code of Construction Practice'.

The focus of Arnold's ITA and ITIG work is upon management of underground construction and future operational risks. He advises on the peculiar risks associated with underground construction from geotechnical investigations, selection of the best techniques and equipment, to selecting the most appropriate contractual arrangements and dispute resolution mechanisms.

Professor Dix holds appointments as a member of 3 person dispute avoidance boards for a range of projects around the world.

Professor Dix also sits on the Tunnel Safety Committee of PIARC (World Road Association), and was the appointed task leader (2008+) for the review of underground fixed fire fighting systems. He also chaired the working group on air quality in the underground from 2003 to 2008.

At the operational level Arnold was invited by the United States to serve on the prestigious United States National Fire Protections Underground Road and Rail Committees (130 & 502) which underlie the safety standards for a large proportion of the world's underground road and rail systems.

In 2008 the British Tunnelling Society invited him to present the prestigious bi-annual Harding Lecture on contemporary world tunnelling issues. In that year he was also invited by the European Parliaments' STOA (tunnel safety committee) to give evidence on tunnel safety matters (Brussels) at the EU Parliament as a subject matter expert.

In 2008 and 2009 he chaired the World Tunnelling Summit in Switzerland, and in November 2009 he was invited to France to lead the European Union's tunnel operators' safety forum.

In March 2011 Arnold was awarded the Alan Neyland Australasian Tunnelling Society bi-annual award for excellence in tunnelling (tunnel fire safety) and his contribution to fire safety in the world.

Professor Dix was recently (2012/2013) a key advisor in the coronial investigation of the Lakanal House (London) multi-fatality high rise apartment deaths case in the United Kingdom. He was also the independent coronial special expert and investigator in the Burnley Tunnel Fires deaths investigation in Australia.

In April 2013 he was appointed to assume personal responsibility for operational readiness, procedures, training and performance of more than 500 personnel at NDIA Qatar. By July 2013 Qatar Civil Defense requirements were met under his leadership.

He has played a key role mitigating the risks of disasters and responding to actual disasters. He investigated the 9/11 disaster in New York (Underground aspects), London Bombings, Madrid Bombings, along with fire related disasters such as the Daegu Metro Fires, and Hong Kong Metro fires.

Qualifications

- Honours Degree of Bachelor of Science (Monash University 1986)
- Bachelor of Laws (Monash University 1988)
- Admission to Practice Supreme Court of Victoria 1989
- High Court of Australia entry on Register of Practitioners 1989
- Admission to Victorian Bar 1990 - 1999 (readmitted 2003+)
- Accredited Mediator – Bond University 1995

Memberships

- Member of Legal Counsel (Australia) from 1989 – 1998, 2003- ongoing
- International Tunnel Insurers Group [ITIG] (Association of Global re-insurers, London) 2003 ongoing
- Honorary member of the Fire Protection Association of Australasia
- Dispute Resolution Board of Australasia

Appointments

- Adjunct Associate Professor of Engineering QUT 2005 - 2009
- Associate Professor of Disasters, school of Medicine (Science, Mental Health and Adversity) UWS 2008+
- World Road Association PIARC (Full Committee Member) 2000+
 - Special Task Group Leader – Fire Suppression Systems
 - Special Task Group Member – Fire Life Safety
 - Special Task Group Leader - Environment
- International Tunnelling Association (United Nations Affiliate) 2003+
 - Chairman - Contractual Practices Group
 - Secretary - Security Group
- United States National Fire Protection Association (Committee Member at invitation of the United States)
 - Underground Fixed Guideway Transit Systems Committee NFPA 130 – 2004+
 - Road Tunnels Committee NFPA 502 - 2005 +
- Society for Social Management Systems, Japan (Full member at invitation of the Centre of excellence disaster engineering program for Kochi University, Japan) 2006 +
- International Tunnel Insurers Group [ITIG] (Association of Global re-insurers, London) 2003 ongoing
- Honorary member of the Fire Protection Association of Australasia

Project examples (“+” means current)

- 2014 + Airport Line (including tunnels) upgrade independent verifier, Sydney Australia
- 2014+ Independent adviser East West Link tunnels, Linking Melbourne Authority, Australia
- 2013/2014+ Independent adviser F3-M2 tunnels, Sydney Australia
- 2013/2014 Independent adviser Midfield Tunnel, NDIA, Qatar, preparing Safe Operating Procedures and training of staff - Qatar
- 2013 (August/Sept) LNG Bus explosion risk operational safety review (confidential Government client)
- 2013 (April 1 - July 26) New Doha Airport Accelerated Operational Safety Opening Project – Fire Safety Readiness
- 2012 - Lakanal House High Rise Apartment Block fire Deaths – London Coroners Court
- 2012 - Peer review of Fire and Life Safety Review for the Batman Hill Project
- 2011- Independent adviser on the proposed new underground busway in Perth – Perth Transport Authority
- 2011 - Safety Review of Train Operations for a combined Rail/Road Corridor – Perth Transport Authority 2011, Independent adviser, value engineering and fire life safety advice on the sinking of Perth Station and its affect on the current underground - Public Transport Authority (Perth Railway)
- 2011- Independent adviser on the New Doha International Airport tunnels, fitness for operation, commissioning, preparing operating manuals and training of staff - Qatar
- 2011 - Independent Review of the operational safety of running a heavy rail corridor in the middle of freeways – Mandurah and Joondaloo Lines, Perth, WA
- 2010 - Independent adviser, value engineering and fire life safety, West Main Road Tunnel Project, Seoul, Korea
- 2010- independent reviewer Trans Bosphorus Tunnel, fire and life safety, Istanbul Turkey
- 2010 - Independent lead adviser and peer reviewer to BCC on fire and life safety performance of bidders for Northern Link Tunnel Project.
- 2009/10 – advisor to Perth Metro (PTA) advisor to board and CEO on fire and life safety operational issues including design and commissioning – the proposed sinking of sections of the current Perth Railway Station
- 2010 – Appointed as Independent Tunnel Expert to the New Zealand Transport Authority for all underground projects
- 2010 – Clem 7, commissioning and operations fire safety workshop for tunnel operators
- 2008 - Airport Link, fire and life safety independent advisor - City North Infrastructure & Coordinator General.

- 2008 - Albanian Motorway Project (Kosovo– Albania) Independent Tunnel Safety advisor - construction/operations - (for Government and Consortium).
- 2008 – Tugan Desalination Plant – insurance review
- 2008 – North West Sydney Metro – Fire life safety and operations advisor to Transport Infrastructure Development Corporation
- 2008 – Brisbane Underground Rail Extension Project – Fire and Life Safety Advisor to Coordinator General of Transport
- 2008 - Robina rail tunnel – design, construction and fire life safety operations – advisor to Trackstar Alliance
- 2007 - Perth Metro Western Australia independent adviser on operational safety issues including design and commissioning (ongoing) on underground rail extensions including CBD and suburban extensions.
- 2007/2012- Principal Investigator for the Coroner Burnley Tunnel Fatal road crash
- 2007 - Insurance rail tunnel sufficiency review - Perth Metro
- 2007 – A Review – Systems, Procedures and Documentation for Safe Operation – Perth Metro
- 2007 – Operational risk and Design Review of a Proposed tunnel design for the Robina to Varsity Lakes Rail Extension
- 2007 - Insurance tunnel review (confidential underground major project) for Co-coordinator Generals Department of an Australian State.
- 2006 - Reassessment of post incident passenger access to a place of safety in the Sydney
- 2006 - Clem 7 advising Brisbane City Council on construction & fire life safety risk matters
- 2006 – Phase 2 – Major Incident/Threat: Optimisation of response for the Sydney Underground Rail – Emergency Preparedness
- 2001 – 2006 - RailCorp Australia, Principal independent adviser, tunnel safety (Metro components), rollingstock performance (Metro), air rights development (over Metro stations), fire and life safety and security. (Multiple investigations – details available if required)

A Selection of Recent Papers/Publications

'CNG, LNG , LPG new energy source vehicles and their special fire safety risks – the Australian experience,' ISTSS Conference, March 2014, Marseille, France

'The future of tunnel operations – a word of caution', Keynote Address, British Tunnelling Society, London UK, October 2013

'Operational safety decision making - lessons for Engineers from legal investigations' Keynote Address and paper; - BHR Barcelona, September 2013

'The New Ausroads Guide for tunnel safety' - ATS, Melbourne Chapter, 28 August 2013

'Lessons from the Burley Tunnel multi fatality disaster' - Brisbane Tunnelling Conference, 4 June 2013

'Modern Trends in Emergency Systems for Road Tunnels' - MEED Conference, Qatar, 28 May 2013

'Operational Decision making in a world of blame - UK Tunnel Operators Forum', London UK, 18 April 2013

'Burnley Tunnel Fires of 2007 - a Courts Perspective' - Tunnelling Journal; March 2013

'Dix Report - Burnley Tunnel Incident 2007 - Coronial Inquest' - Published February 2013

'Human behaviour during an evacuation scenario in the Sydney Harbour Tunnel' - Australian Government, Attorney-General's Department,; Australian Emergency Management Institute - Australian Journal of Emergency Management Volume 28, No. 1, January 2013

'Emergency Cable Certification Withdrawal - the problems gone global - could equivalency be part of the solution?' - North American Tunnelling Journal, Dec/Jan Ed., January 2013

'Incorporating the latest scientific information on Metro tunnel fires into daily decision making - the challenges of real operations' - SP Metro Fire Project Conference, Stockholm Sweden, 11 December 2012

'US Emergency Systems Cables Certification Withdrawn: Crisis or Crossroad?' - North American Tunnelling Journal, Oct/Nov Ed., 2012

'Best Projects Deserve the Tailored Contractors - the latest learnings from the ITA's review of subsurface construction contracts from projects around the World', MEED Middle East Tunnelling Conference, Doha, Qatar, 19 November 2012

'Managing fire and life safety issues in sub-surface infrastructure', MEED Middle East Tunnelling Conference, Doha, Qatar, 20 November 2012

'Risk Based Decision Making for Engineers - Imperfect data is just the beginning' - ATS Short Course, Melbourne, 24 September 2012

'The implications of the EU directive on transnational tunnel safety for Taiwan', - Taiwan 25 July 2012

'Discussion State of the Art of Tunnel Safety and Future Perspectives', Graz Aerodynamics and Tunnel Ventilation Conference, 23 April 2012

'Practices and Trends for Financing and Contracting Tunnels and Underground Works', Greek Tunnelling Association, Athens Greece, 23 March 2012

'Latest learnings on the operational implications of fixed fire fighting systems for tunnels' - ISTSS - New York USA, 15 March 2012

'Design Fires for Road Tunnels – State of the Art by PIARC', - ITA –COSUF Workshop and General Assembly, Finlandia Hall, Helsinki, Finland, 24 May 2011

'Risk Analysis – from the Garden of Eden to its seven most Deadly Sins' – Joint paper with L Ferkl of the Czech Republic - 14th International Symposium on Aerodynamics and Ventilation of Tunnels. Dundee, Scotland, May 2011

'Water spray experiment in road tunnel in Australia' – International Seminar on Construction, Operations and Management Technology of Road Tunnel in China, Xiamen Workshop 23-26 March 2011

Keynote Presentation – *'Fire Suppression Systems – Protection for People, Concrete or Profits'*, Australasian Tunnelling Conference, Auckland, New Zealand, March 2011

'Fire and Life Safety in Road Tunnels' – The Qld Chapter of the Risk Engineering Society, Brisbane, Australia June 2010

Keynote Speaker - *'The impact of fixed fire fighting systems on tunnel safety – the Burnley incident in a current theoretical perspective'*, Graz, May 2010

Open Session Keynote Presenter - *'Bringing certainty to the unknown: The role of law in the apportionment of underground construction risk'*, International Tunnelling Association, Vancouver, Canada May 2010

Keynote Speaker - *'Tunnel fire safety in Australasia'*, Fourth International Symposium on Tunnel Safety and Security, Frankfurt am Main, Germany, March 17-19, 2010

'The challenges of sound engineering for underground construction in the 21st Century', bi-annual Harding Lecture, Institute of Civil Engineers London UK 17 April 2008

'New approaches to managing construction and operational risks in tunnels', Shanghai Conference 20 March 2008

'Disaster prevention for better effectiveness and efficiency – the importance of culture in developing standards', Kochi University, Japan, March 2007

'A global perspective on fire suppression systems and the implications for designers and decision makers', Hong Kong Conference April 2006

Handbook of Tunnel Fire Safety, Joint Author, Thomas Telford Press, London 1st edn 2005, 2nd edn 2011