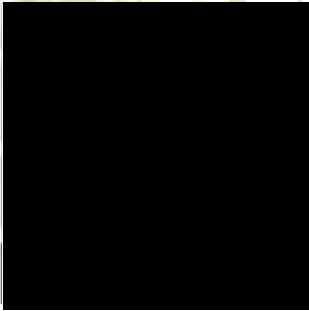


Michele Mangione



Profession

Tunnel Engineer

Current Position

Associate Director

Joined Arup

2001

Years of Experience

18

Nationality

Italian

Qualifications

MEng, Civil Engineering
MSc, Structural Engineering
Ing, Chartered Engineer in Italy
CEng, Chartered Engineer in UK
Professional Engineer in California
C80171

Professional Associations

Member of the Italian Institute of Civil Engineering
Member of the British Institution of Civil Engineers (MICE)
Member of the British Tunnelling Society

Awards

Winner of the British Tunnelling Society Harding Prize, 2009
HK Institution of Engineer Award for Best Geotechnical Paper, 2016

Publications

“PAS 8810: Design of Segmental Tunnel Linings – Code of Practice”
Jung, Mangione, Almog and Harding, 2016 – BSI, London

Observed loading behavior during cross passage construction at the Brisbane Airport link project (WTC 2016)

Developments in Joint Design for Steel Fibre Reinforced Concrete Segmental Tunnel Linings (WTC 2012)

Segmental Opening Sets at King’s Cross St. Pancras (Tunnels and Tunnelling 2009)

Tunnels Ground Movement Back Analysis - King’s Cross St Pancras Underground Station Redevelopment (NCE New Civil Engineer)

Michele is a civil engineer with a keen interest in complex structural systems. He has an extensive knowledge of design of concrete, steel and composite structures.

Michele has 15+ years of experience in multidisciplinary design and construction supervision of underground structures, bored and mined tunnels around the world.

Michele is the technical lead of the Tunnel team in London, responsible for the delivery of underground projects and peer reviews on Arup global projects.

Michele has multidisciplinary design experience in the Highway, Rail and Water Industry in Europe, Australia, East Asia and USA.

He has a comprehensive knowledge of the design and assessment of tunnels in cast iron, SGI (spheroidal graphite iron), steel and concrete (plain, reinforced and fibre-reinforced) and associated details. One of his areas of expertise is the design of openings in newly built and existing tunnels with associated temporary works. His work at LUL King’s Cross Underground Station granted him the 2009 Harding Prize.

His design experience is complemented with several years on site where he has been responsible for structural and condition surveys, for buildings and tunnels, and for providing technical assistance during the construction phase, supporting the contractor on site, reviewing temporary works, Risk Registers and Method Statements.

Michele’s background in structural and bridge engineering places him in an ideal position to conduct full assessments of effects of tunnelling on over ground (buildings, bridges and stations) and underground (existing tunnels and utilities) structures with associated monitoring systems and mitigation measures to minimize the effects of the tunnelling works.

These combined capabilities and a full commitment to follow CDM regulations provide Michele the technical basis to carry out tunnel and station design from concept to execution with full clarity of the requirements for operation, construction, durability and safety during construction and operation.

Furthermore, Michele is heavily involved in internal researches and collaborations with Universities (he is a guest lecturer at Turin and Milan Masters of Tunnelling), with a particular interest in new materials for the tunnelling industry such as composite materials and sustainable concrete types.

Key Projects:

HS2 – MWCC Lot 1 and 2, UK (2017-2019)

Michele is the design lead for the mined tunnels for Lot 1 and 2. These sections of the project include the Euston tunnels leading to the Euston Terminal, approximately 18 km constructed with SCL and mechanized technologies. The sections comprise large SCL caverns (up to 18m in span) and shafts in challenging geology and third parties interfaces along the alignment.

Elephant and Castle, UK (2017-2019)

Michele was the tunnel discipline lead for this station redevelopment, which includes a new independent station constructed with a cut and cover box and new SCL tunnels connecting the stations to existing tunnels and facilities. He played a key role in determining a new scheme for this station by selecting a different location for the tunnels to minimize construction risks and impact to existing Third Party Assets while providing a functional solution for passengers' circulation into the station tunnel.

IDRIS MTS02 – Doha, Qatar (2015-2016)

Michele was responsible for the delivery of the design of a 14.7 km-long trunk sewer tunnel. The tunnel is constructed by TBM at ground depths varying between 30m and 50m. The sewer is formed by a 5.0 m internal diameter segmental lining with an inner protection concrete lining. The scope also include four connection shafts and adits built with traditional methods.

Northern Line Extension (2015)

Michele was the Tunnel Technical Lead for the Category 3 check for the Northern Line Extension project. The project consists of 2 new stations at Battersea and Nine Elms and twin tunnel connecting the new stations to the existing Kennington Station.

BSI – PAS – Tunnel Lining Design Guide (2015)

Michele is one of the Technical Author (TA) of the Tunnel Lining Design Guide for the British Standard Institute, sponsored by HS2 and the BTS.

Michele's contribution focused on numerical analysis methods and structural design methodologies for the design of segmental tunnel lining.

Metro-Cekmekoy-Sancaktepe-Sultanbeyli (2014-2015)

Michele has led the tunnel design for the metro lines from Cekmekoy Station to Sultanbeyli Station.

He was responsible of the tunnel design scope for the first phase of the project, which consisted in the development of feasibility studies and the basis He followed this role with the design for inclusion in the technical documentation for the ITT. The scope includes approximately 20km of twin bored tunnels and 21 underground stations in mixed ground conditions, some cut and cover and some deep stations with mined connections to the platform tunnels.

Hong Kong TMCLKL (2014 -2015)

Michele was responsible for the structural design of the segmental lining for the 4.5km sub-sea tunnel connecting the Hong Kong airport in Tuen Mun and the future Tuen Mun Western Bypass in Chek Lap Kok.

The segmental lining will be constructed by a 14m and a 17.8m (current world record) diameter tunnel boring machines in a reclamation area and in mixed ground conditions within the seabed.

Hong Kong Shatin to Central Link, Contract 1103 (2013-2014)

The Shatin to Central Link (SCL) will provide a new metro line linking the North-East New Territories and the urban areas of Hong Kong.

Michele managed the delivery of the TBM section of the contract to provide temporary and permanent design of the traditionally reinforced segmental lining over the alignment, special segments at openings in conjunction with cross passages.

Los Angeles Crenshaw LAX Transit Corridor (2013-2014)

The Crenshaw Transit project will provide a new light rail link between LAX Airport to the Metro Expo Line in Los Angeles.

Michele was responsible of the design of the traditionally reinforced segmental lining over the alignment. The tunnel is approximately 6m in diameter and designed in Zone 4 Seismic Area.

Toronto Billy Bishop Airport, Canada (2012-2013)

The 610 ft. (186m) long 35 ft. (10.6m) span tunnel under the Lake Ontario will provide pedestrian access to the city airport of the city of Toronto. The tunnel will be mined in shale material with significant time dependent deformation.

Michele was responsible of the design of the permanent lining for the tunnel. Several modelling was carried out in finite difference and finite element software to capture the time dependent behaviour for the design.

Singapore Thomson Line Package D (2011 – 2012)

The Thomson Line will run for up to 30km underground from the Marina Bay area northwards through the Central Business District and up through Ang Mo Kio to Woodlands.

Thomson Line Package D comprises approximately 6 km of running tunnel and 6 stations.

Michele was responsible of the SEM mined sections of the alignment, technical support for the TBM section and safeguarding of the existing underground assets affected by the works.

San Francisco Central Subway Project, USA (2011 – 2012)

The Central Subway Project consists of approximately two miles twin TBM tunnels forming an extension to the Third Street Light Rail. The Project includes 3 underground stations at Chinatown, Market Street and the Moscone centre under a separate contract.

Michele was responsible for pre-bid support for the tunnelling and station contracts and provided design support to the Barnard

Impregilo SA Healy JV responsible for the tunnel contract.

His contribution includes segmental lining design, building damage assessment and review of compensation grouting schemes.

Hong Kong Express Rail Link, Contract 820 and 821 (2010)

The Guangzhou-Shenzhen-Hong Kong Express Rail Link provides high speed rail services between HK and Guangzhou.

Contract 820 and 821 comprises two sections of bored tunnels in mixed ground conditions with an internal diameter of 8.15m.

Michele is responsible for the structural design of the traditionally reinforced segmental lining over the alignment and at openings in conjunction with cross passages.

Lake Mead Intake 3, Nevada USA (2010)

The project comprises a 200 m deep shaft, a 4.7 km long and 7 m diameter bored tunnel located beneath Lake Mead, and Intake located 175 m below the water level.

Michele has been involved in design review and development of the reinforced concrete segmental lining, designed to cater for the extreme hydrostatic loads.

London CrossRail Contract C122 – Bored Tunnels, England (2010)

The London CrossRail bored section will be built with a fibre reinforced segmental lining with an internal diameter of 6.2m. Openings at cross passages and shafts will be formed by SGI segments.

Michele has carried out technical reviews of the design of the opening sets along the alignment of the bored tunnels.

Brisbane Airport Link Project, Australia (2008 – 2010)

The Airport Link project provides a network of road tunnels aimed to improve the transportation system in the fast growing city of Brisbane. The design is carried out by PBAJV, a joint venture formed by Parsons Brinckerhoff and Arup.

Michele has been involved in the design of the mined section of the project. He is responsible for the design of the pumping stations, including temporary and permanent support, sequencing and excavation induced settlements.

Michele has also been extensively involved in the bored section of the project. The twin bored tunnels are about 12 m in diameter and constructed with an earth pressure balanced TBM. The geology varies significantly from weak sandstone sediments to very stiff Brisbane Tuff.

Michele has been design lot leader for the steel opening sets required at the cross passages within the TBM mainline tunnels. He was responsible for the delivery of the design and the related documentation, the technical input and the management of the team.

Michele has previously been responsible for the design of the steel-fibre reinforced segmental lining. His responsibilities included structural design of the segments and associated details, design at

interface with openings and design of monitoring instrumentation.

King's Cross Underground Station Redevelopment (Phase 2), London, England (2004 – 2008)

The scope of this project is the refurbishment of the existing assets and the provision of a new ticket hall and new public routes to the deep tunnels (Northern, Piccadilly and Victoria Lines) at King's Cross Underground Station to relieve congestion.

Michele was responsible for the supervision of the permanent design of the new tunnels and managed the multidisciplinary design for the system of tunnels providing access from the newly built underground station box to the deep tunnels. The tunnels were constructed with the sequential excavation method within London Clay and lined with SGI rings.

He followed that role with site supervision during the critical construction activities. As Michele was also responsible for the assessment of ground movements and impact on above and below ground structures, he was a key member of the RESS meeting to review daily progress, actions and mitigations, with special considerations of construction under live Network Rail tracks at King's Cross Station. This role included regular interface with Stakeholders of affected properties including Network Rail, London Underground and Union Railways. Michele carried out an extensive plan of structural and condition surveys on the cast iron tunnels within the London Underground network, NR masonry rail tunnels and buildings affected by the works including St Pancras and King's Cross rail stations.

During close out of the project, he compiled for LUL a back analysis document of all critical tunnel activities for use on their future projects.

HS1 - CTRL (Channel Tunnel Rail Link) Project Section 2, London, England (2001 – 2004)

Michele played a key role in the detailed design of the ventilation shafts along the route of the bored tunnels connecting Central London to Section 1 of the CTRL. The CTRL tunnels are 7.85 m in diameters and were constructed with EPB Tunnel Boring Machines.

He designed and reviewed diaphragm walls, waling systems and internal structure for the five ventilation shafts that are up to 55m deep. He followed this with a role in the Settlement Analysis Team where he assessed several structures, including highway bridges, along the CTRL route. Where necessary, he has designed mitigation works for these structures and integral utilities.

Michele then managed the design and coordination with the contractors on site for tunnels, cross passages and portals.

Design of a Cement Plant (Italcementi Group) in Bergamo, Italy (2000 – 2001)

Employed by Finzi Associati (Civil Engineering Consultants) as a structural designer, Michele was involved in the design of an industrial complex composed by a composite steel-concrete 107m high tower and other 22 associated structures.