

Jim Benson

Qualifications

- BEng (Civil), University of Canterbury, New Zealand (1988)
- Chartered Engineer UK (1994)

Professional memberships and affiliations

- Fellow, the Institution of Civil Engineers (2006) - Member (1994), ICE Reviewer (2005 onwards)
- Fellow, Chartered Institution of Water and Environmental Management (2010) - Member (1997)
- Registered Professional Engineer, Hong Kong - Civil (2006)
- Registered Professional Engineer, Singapore (PE 4266) - Civil (2007)
- Member, Hong Kong Institution of Engineers (2003), Reviewer (2013 onwards)
- Member, the Association of Project Managers (2006)
- Member, Institute of Materials, Minerals and Mining (2008)
- Member, Institute of Quarrying, Hong Kong (2009)
- Tunnelling Society member - British, Singaporean, Hong Kong, and Australasian;
- Geological Society member - Hong Kong and Malaysian



Expertise

- Expert Witness and Arbitrations – Civil Infrastructure Construction
- Specialist advisor and Risk Manager – tunnelling and underground construction, planning and budgeting
- Asian Business Strategy, Planning, Management and Development

Summary of competencies

Tunnelling and Underground Planning, Design, Construction, Project Management, Owner's Engineer, Claims, Dispute Resolution, and Expert Witness, Specialist optioneering and co-ordination of multi-discipline engineering projects. Management, design and construction of tunnels, railways, stations, structures, sewage treatment, water treatment, reservoirs, pipelines, pumping, cement works, maritime works, drainage, bridges and highways.

Specific design and planning experience of TBMs, tunnels, stations, shafts, caverns, cut and cover, pipe-jacking, and related structures in soft and hard ground. Detailed design of structures including, steel, concrete, water retaining structures, foundations, piles, frames, and bridges. Familiar with associated engineering codes, software and capabilities.

In Hong Kong, Jim was the Design Director on **901-Admiralty Station** responsible for the tunnelling and cavern Engineer's Design for the new South Island Line and Shatin to Central Link. Jim was also the **Independent Checking Engineer** for the Hong Kong MTR **WIL 703, 705, XRL 810A&B, 803A&D, 823A&B, 826, 824, SIL 902, KTE 1002** and DSD **Lai Chi Kok** and **Stonecutters Island Tunnel - DC/2009/18**. Jim was the designated 'Designer' and led the successful Tender (based on an alternative tunnel design) and subsequent Detailed Designs for the Design and Construction of the **Kowloon Southern Link (KDB200 - West Kowloon to Tsim Sha Tsui East)** - Link200 JV and the **CLP - Castle Peak Cable**. Jim was also the Tunnel Design Manager for 3.5km of rock and soft ground tunnels and stations forming part of the **Shatin to Central Link (SDC100 – Tai Wai to Diamond Hill Section)**; and carried out the detailed design of the reinforced concrete tunnel lining for the **Route 8 (Previously Route 9) Nam Wan Tunnel at Tsing Yi** in granite. Jim has been involved in the design and construction of **14No. Metro tunnelling projects**, and **13No. Stations** in 4No. Countries.

EXPERT WITNESS, ARBITRATION & SPECIALIST EXPERIENCE

July 2014 to present – Managing Director – Benson Consultancy (HK) Limited

ARBITRATION | Lai Chi Kok viaducts – Contract HY/2003/01 – Route 8

The Government of the Hong Kong Special Administrative Region (“Claimant”) vs Maunsell-Hyder JV (“Respondent”)

Client: ADR Partnership Limited

Role: Claims Consultant - Negligence

Key achievements: Analysed pleadings, statements of claim, counter claims, witness statements, progress reports, cause and effect, variations, instructions, RFI's, flow of information/drawings/deliverables, claimed versus assessed amounts. Prepared detailed build up and Quantum analysis reports for King Wood & Malleson.

ARBITRATION | Lotte Engineering and Construction (Lotte) vs Mongolyn ALT Corporation (MAK)**Client:** Bae Kim and Lee LLC**Role:** Expert Witness – Foundations, Waterproofing and Dewatering – MAK Hyatt Regency Hotel aka MAK Tower**Key achievements:** Analysed statements of claim, statements of reply and counter claims, drawings, correspondence, flow of information and deliverables, and prepared detailed Expert Witness Report for Bae Kim and Lee. SIAC (Singapore International Arbitration Centre - 2013)**May 2012 to June 2014 – Group Manager Tunnelling – Jacobs/SKM****Role:** Responsible for developing and delivering SKM's Global tunnelling business, including Tunnelling Strategic Plan, Business Plan and Community of Practice for 120No. staff, before Jacobs acquired SKM.**PROJECT | Northern Line Extension – Nine Elms Station – UK – Banham Group vs Transport for London & Halcrow****Client:** Richard Max & Co. representing Banham Group**Role:** Expert witness – UK Civil Procedure Rules 1998**Key achievements:** Prepared a series of proofs for the planning, design and construction of Nine Elms Station. Critiqued the alignment limits of deviation, Consultants design documents and audit trail. Reference was made to London Underground Limited Design Standards, Codes of Practice, and Guidance documents. Various constraints and construction methods were investigated including top down, bottom up for the station; as well as Earth Pressure Balance TBMs and mining in London Clay for the platform tunnels. The advice highlighted feasible construction alternatives which enabled the client to 'win' and settle out of court, in order to achieve their financial and operational objectives. The opposition lawyers (Pinsent Masons) insisted my evidence "must not see the light of day."**PROJECT | Auckland City Rail Link – New Zealand****Client:** Auckland Transport and New Zealand Transport Agency**Role:** Tunnelling advisor**Key Achievements:** Specialist technical advice, cost comparison and presentation to Auckland Mayor, Councillors, NZTA, AT and other stakeholders for 1No. Cut and cover station at Aotea square, 2No. Station cavern platform stations at Karangahape Rd and Newton Rd, connected via twin bore 6.5m I.D. Earth Pressure Balance TBM tunnels. Geology included East Coast Bays formation, Parnell Grit, alluvium and volcanics. The Reference Class Forecasting (RCF) techniques compared project costs in Hong Kong, Singapore, UK, and Shanghai to reduce budgeting bias, quantify unknowns and reduce cost estimating uncertainties. Advised potential high level strategic, planning, design, procurement and construction risks as well as possible mitigation measures. NZD 2.86bn construction estimate - 2012.**PROJECT | New Zealand – Waitemata Harbour Tunnel****Client:** Auckland Transport and New Zealand Transport Agency**Role:** Tunnelling advisor**Key Achievements:** Prepared cost estimate and technical advice for the twin bore, 15.5m excavated diameter TBM tunnels. 2.7km twin bored tunnels plus 0.8km of cut and cover road and rail tunnels. Estimate used for budgeting purposes. Geology included alluvium, volcanics and East Coast Bays formation. NZD 1.5bn construction estimate - 2012.**Snowy Mountains Engineering Corporation (SMEC), Asia Limited, January 2008 - May 2012****Role:** Regional Manager - SMEC International - North Asia (Hong Kong, Macau, China, Mongolia, Taiwan, South & North Korea)**Key Achievements:** Built business from 5No. Staff in Hong Kong in 2008 and developed AUD 10m/yr. revenue business with 70 staff, in North Asia by 2011. Responsible for all operations, commercial and technical aspects including staff from 18No. different nationalities in Hong Kong, Mongolia and China. Staff included Technical Directors, Engineers, Country Managers, Office Managers, Accountants, translators, administrative and technical staff.**Role:** Managing Director – SMEC Asia Ltd**Key Achievements:** Developed HKD 30m/yr revenue business in Hong Kong. Responsible for all operations and commercial aspects; and growing business in tunnelling, geotechnical, structural, environmental, E&M and transport planning sectors.

- Managing Director, SMEC Asia Ltd (Hong Kong and Macau)
- Executive Director – SMEC Mongolia LLC (Founding Director)
- Director – SMEC Beijing Ltd
- Director – SMEC Consulting Pte Ltd (Singapore)
- Chairman – Engineering Consultants Contracting Ltd
- Project Director – SMEC International

PROJECT | 1500km Railway – Mongolia – Technical Advisor (USD6BN) (2011 to 2012)**Client:** MTZ (Government of Mongolia)**Role:** Engineer's Design

Successful Bid Manager and Project Director responsible for bidding and winning the 1500km FEED (Front End Engineering Design – Technical Advisor) to the Mongolian Government – MTZ. The railway passes through the extreme climate of the south Gobi desert between Dalanzadgad and Choibalsan including a major interface at Sainshand with the Trans-Siberian railway. Developed strategy for developing a further 3000km of railways.

PROJECT | Ukhaa Khudag – Gashuun Sukhait Rail Project – Mongolia (2009 to 2012)**Client:** Leighton Mongolia LLC**Role:** Bid Manager/Project Director/Project Manager (Design and Build)

Responsible for the design management and delivery of 225km of continuously welded rail with temperature range of -40°C to 45°C. Responsible for all project management, specifications (procure and construct), and 600No. drawings translated into Mongolian. 28.2mtpa coal Operational requirements and Train simulations generated the final design.

Mott Connell Ltd. (Hong Kong & Singapore) 2003 to 2008 - Associate / Principal Engineer**PROJECT | KCRC Kowloon Southern Link, KDB200 - Austin Station and Tunnels, Hong Kong (2004 to 2008)****Client:** Link200-JV (Leighton, Balfour Beatty (Gammon), Kumagai Gumi, John Holland)**Role:** Designated 'Designer' for Detailed Design – Design and Build (Lump-sum)

Key Achievements: Project Manager / Design Manager / Tunnel Designer and designated MMJV 'Designer' for the successful KDB200 Tender design, detailed design, and construction supervision for the Link200 joint venture on the KCRC Kowloon Southern Link. A 3.8km underground, double tracked electrified domestic passenger railway connecting east Tsim Sha Tsui and Nam Cheong Stations. The tunnels run level at the new Austin Station and existing ETST island platform Stations, and are stacked along Canton Road. Responsible for the tunnel design and co-ordination of the alignment (min. radius 225m), permanent way, settlement analysis and impact assessment (Boscardin & Cording), segmental tunnel lining design, space proofing options, cross passages, sumps and trackside safety issues as the tunnels pass through marine fill, completely decomposed granite and grade G3 granite, with as little as 3m clearance between tunnels, buildings, foundations and the existing MTRCL Tsuen Wan Line tunnels below Salisbury Road. During Construction reassessed the effects to buildings and utilities due to increased volume loss. 8m OD Herrenknecht slurry TBM. Prepared the significant design prolongation claim. Also prepared station/ tunnel/shaft construction claims and justifications for additional time and money for the Contractor. Supported the specialist claims advisors, by classifying and defining the 'cause and effect' arguments to achieve a successful settlement. The MTRCL then took over KCRC towards the end of the project. Construction value HKD ~2BN.

PROJECT | Gambas to Novena/May School Cable Tunnel - Singapore (2007)**Client:** Singapore Power**Role:** Feasibility Study and Scheme Design

Key Achievements: Project Manager for the study of an 18km cable tunnel supplying 10No. 400kV circuits. This required a ~6.2m ID tunnel. The ground conditions included Bukit Timah granite, Jurong Formation and Old Alluvium. Managed the option study, optimisation and preliminary design of E&M, Ventilation, Civil and Structural elements. Developed TBM and construction logistics, contract strategies, programmes and costs estimates. Presented procurement options to Singapore Power Board recommending Engineer's Design for greater control of the management, operations, maintenance and design requirements. SGD 690m.

PROJECT | CLP Castle Peak Cable Tunnel, Hong Kong (Design & Build) (2005 to 2006)**Client:** Dragages (Hong Kong) Ltd**Role:** Design and Build – Detailed Design

Key Achievements: Project Manager / Tunnelling Design Manager / Bid Manager for the successful Dragages tender design (based on an alternative). A 4.5m ID tunnel, 4.5km in length, connecting the existing Castle Peak Power Station with Tuen Mun, housing 8No. 132KV circuits. Responsible for the detailed design and co-ordination with Dragages included managing the tunnelling, geotechnical, mechanical and electrical design during construction. Specific input to alignment design, 'drained' and 'undrained' segmental tunnel lining details, durability report and co-ordination of the spaceproofing requirements. Maximum overburden of 260m (cover). The ground conditions are predominantly grade G3 Granite and Tuff along with overlying decomposed strata. 5.25m OD Double shield hard rock Herrenknecht TBM. Construction value HKD 0.38 BN.

PROJECT | Hobson's Bay Main Sewer Relocation, Melbourne, Australia (2004)**Client:** Melbourne Water**Role:** Project Manager and Scheme Design (Alliance)

Key Achievements: Seconded to Melbourne Water as Project Manager to work with John Holland (Contractor) and GHD (Designer). A 3m diameter siphon with ground conditions of soft sandstone, gravels, sands, silts and clay ~35m below the river Yarra. Prepared the Cost reimbursable tender documents based on AS2124, chaired Risk Management workshops, managed the fast track D&C program. TBM tunnel and Diaphragm walls for shafts. Project shelved by Port of Melbourne Corporation. Construction AUD ~80M.

Charles Haswell and Partners Limited - 1992 to 2003, Haswell (Singapore)**2002 to 2003 - Specialist Tunnelling Advisor –Project and Office Manager**

Responsible for all of Haswell's Singapore operations and project management in Singapore.

PROJECT | Link Sewers to the Deep Tunnel Sewerage Scheme, Singapore (2000 – 2003)**Client:** Singaporean Consultants - KTP, CKM, CHP, PWD, CDM, Fong Consult**Role:** Specialist Tunnelling Advisor

Key Achievements: Specialist sub-consultant advice included site investigation, pipejacking, vortex drop shaft and hydraulic design, specifications, settlement, instrumentation and monitoring, construction methods, machine selection, risk assessments, tender evaluation to a number of local Consultants engaged by the Public Utilities Board. Specifically Tuas-5, Link-U-Upper Thomson, Link-H-Lentor, Link-S&T-Novena, Link-R, Link-D2. The maximum length of pipejack was ~1km. The combined length of sewers is 50 km with internal diameters ranging from 0.25m to 3 m, shafts up to 35m deep, and ground conditions including Gombak Norite, Bukit Timah Granite, Jurong Formation (Mudstone and Sandstone), Old Alluvium (Lightly cemented Sandstone), and Kallang Formation (very soft Marine Clay). The Upper Thomson – Link 'U' Sewer used a Herrenknecht Dual-Mode (alternating Slurry & EPM) TBM for the 3km at I.D.2.4m and 4 bar pressure (max.). Prepared alternative designs and extensive optioneering. Construction cost ~ SGD 200m.

Haswell (Scotland), 1998 to 1999 - Resident Engineer**PROJECT | Clinker Cooler Works, Dunbar, Scotland, UK****Client:** Blue Circle Cement**Role:** Engineer's Representative – Civil works (Design and Build)

Key Achievements: Planned and co-ordinated all subcontractors works during the shutdown period using Powerproject software to ensure all works were undertaken safely and expediently. Supervised the civil subcontractor Tilbury Douglas Construction. Resolved unforeseen physical difficulties, design proposals and construction methodology in order to progress the works as quickly as possible. Assessed and evaluated all Civil/Structural/Geotechnical variations, claims and extensions of time to achieve a successful settlement. Model Form 'A' Conditions of Contract.

Haswell (Trinidad), 1997 to 1998 - Design Co-ordinate & Sub-Consultant Manager – Water Treatment**PROJECT | South Water Supply Project, Trinidad, West Indies (Design & Build)****Client:** Trinidad and Tobago Water Services (TTWS)**Role:** Design Co-ordinator

Key Achievements: Co-ordinated the South Water Supply Project team operating within Trinidad and Tobago Water Services Ltd (TTWS) and the Water and Sewerage Authority (WASA). Value \$TT 643M (approx. £63m). The project required upgrading an existing 270 Mld Water Treatment Plant to provide a new 70 Mld stream. Other works involved providing an additional 11 Mld to be treated by modifying eight existing Water Treatment Plants served by borehole water wells. The plants required refurbishment, upgrading and/or replacement. Sixteen new borehole water wells were drilled or refurbished. An existing 20km transmission main was provided with a new 900mm diameter dual steel pipeline. Further works included 70 km of new transmission and distribution pipelines with diameters varying (100 - 300mm). Design Co-ordination involved extensive information gathering and liaison with the Client (WASA) and other bodies to finalise the design requirements. Field investigations were undertaken to finalise the scope of works. Local Consultants were engaged and managed to produce tender documents. Planning Permission required liaison with a wide range of engineering disciplines in order to ensure the objectives were co-ordinated. Haswell and the local consultants jointly produced the D&C tender documents. The Conditions of Contract were based on modifying the IChemE Red Book and FIDIC.

Haswell (London- UK), 1995 to 1996 - Project Manager & Senior Engineer – Tunnelling and Structures

PROJECT | CrossRail redevelopment at Liverpool Street Station, London, UK

Client: Transport for London (London Underground Ltd and British Rail)

Role: Tunnel and Cavern Designer

Key Achievements: Sub-consultant to W.A. Fairhurst. Detailed structural and geometrical NATM design of underground caverns, ventilation shafts, escalator shafts, station tunnels, running tunnels. Checked design from first principles for caverns (dome shaped circulation concourses). Resolved the cut and cover design where the tunnels interfaced with the Station box. Designed the escalator shafts in S.G.I. where NATM was not feasible in the Woolwich and Reading gravel beds. Rescheduled the overall programme using Power Project to achieve the optimum construction sequence in London Clay, Lambeth Group, Thanet Sands and Chalk.

PROJECT | Northern Line tunnels, London Bridge, UK

Client: City of London

Role: Specialist Tunnelling Advisor

Key Achievements: Advised the City of London during reconstruction of the Northern Line tunnels beneath London Bridge for the Jubilee Line Extension. Particular attention was given to the close proximity of the River Thames and London Bridge when reviewing tunnelling construction methodology on site. Arranged to issue an injunction order as the Contractor refused to comply with man lock specification requirements.

PROJECT | Storm Relief Tunnel, Hastings, Sussex, UK

Client: Southern Water Ltd

Role: Tunnelling Advisor

Key Achievements: Developed cost and programme estimates based on construction options for a 6.5m ID storm relief tunnel. Construction value ~£20M.

PROJECT | Heathrow Express Tunnels, London, UK

Client: London Underground Limited

Role: Specialist Tunnelling Advisor

Key Achievements: Advised London Underground Limited on site with respect to the stability of their Piccadilly Line running tunnels and station during the construction of the Heathrow Express tunnels after the well documented NATM collapse. NEC form of contract.

PROJECT | East London Line, London, UK

Client: London Underground Ltd; **Role:** Feasibility Study

Key Achievements: Feasibility design of escape tunnels and flood gates at Rotherhithe and Wapping Stations on the East London Line for London Underground Limited.

Grafham Carbons Limited, West Midlands – UK (1993 to 1995)

Client: Grafham Carbons Ltd (Severn Trent Water and Anglian Water – JV)

Role: Engineer's Representative (Seconded from Haswell)

PROJECT | Tipton - Granular Activated Carbon Regeneration Plant – West Midlands, UK (Design & Build)

Key Achievements: Engineer's Representative responsible for the civil, mechanical and electrical construction, commissioning, performance tests and final account. The scheme included a kiln, acid bath, water retaining structures, extensive pumping, pipework, gas and chemical treatment, and full operational control by SCADA. Vibro-compaction piles and pad footings provided support to the 20m high main building. Additional delegated powers include supervising and approving design checks. The programme, delays and extensions of time were analysed using the "Time Slice" approach on the Powerproject software package. Responsible for Civil, Mechanical and Electrical Inspectors as well as the Plant Manager during construction, commissioning and the performance tests. IChemE (lump sum) Contract. Tender value £8.25 million. Further advice during the maintenance period, included a lining investigation report. Attended Board meetings and advised on progress, commercial, safety and technical aspects. Critically evaluated all the Geotechnical, Civil, and Structural variations, extensions of time and claims to achieve a final project cost of £8.55M.

Charles Haswell and Partners Ltd, London – UK, 1992 to 1993 - Graduate Engineer – Tunnelling and Structures

Responsible for training all London Operations Staff in the effective use of their Quality Assurance procedures before successful certification.

PROJECT | Northern Line Tunnels, London, UK

Client: London Underground Ltd

Role: Tunnel Designer

Key Achievements: Design Engineer responsible for the detailed design of permanent and temporary works including tunnels, shafts, openings and track support system integral within specialist Tunnel Shield for the Northern Line tunnel lining replacement project. Two existing 150m lengths of SGI running tunnel linings were replaced with a larger stainless steel lining (with a 400 year design life) due to naturally occurring sulphuric acid in London Clay. The running tunnels were relined during night-time possessions to maintain normal tube-train commuting during operational hours. Construction options (GRP, SGI, RFC, SS) were interrogated during the design process. Settlement was estimated based on O'Reilly and New. Responsible for preparing detailed designs, Specifications, Bills of Quantities, cost estimates and Construction programme options. Construction value £7M.

PROJECT | Jubilee Line, London, UK

Client: London Underground Ltd

Role: Tunnel Designer

Key Achievements: Responsible to London Underground Limited for structural advice requested during the Waterloo International escalator tunnel construction that interfaced with the Jubilee Line. Advice related to the resolution of over stressed temporary supports under load from compensation grouting. Construction value £5M.

Robert West and Partners, London – UK, 1989 to 1992 - Graduate Engineer – Structures, Bridges, Highways and Maritime**PROJECT | Trident Submarine Channel and Beacon Structures, Barrow-in Furness, UK**

Client: Ministry Of Defence

Role: Maritime and Structural Designer

Key Achievements: Design of leading light and beacon structures, piled foundations and navigation channel for Trident submarines.

PROJECT | Bridges, Highways, Drainage and Retaining Walls, UK

Client: Leeds City Council

Role: Road and Drainage Designer

Key Achievements: Design of highways, retaining wall, and drainage design for 2km of dual carriageway at Pudsey, Leeds. The highway alignments, slope stability and drainage networks were all verified using the MROAD-3, SLOPE and CADS-DRAINAGE software packages. Value £5M.

- Highway alignment, roundabout and priority junction design using the MROAD-3, ARCADY and PICADY software packages.
- Analysed various masonry arch bridges in North Yorkshire as part of the Department of Transport's 40 tonne load assessment.
- Prepared all Contract Documents, for a bridge replacement project in Bridport, Dorset. Value £200K.
- Designed reinforced concrete elements for a pumping station in Darenth, Kent. Construction value £70K.

Robert West and Partners, London – UK, 1990-1992 - Resident Engineer**PROJECT | King George V dock Bascule Bridge and Lock gates – London Docklands**

Client: London Dockland Development Corporation Ltd

Role: Resident Engineer

Key Achievements: Supervised the final civil works, Mechanical and Electrical commissioning of the Bascule Bridge and Lock gates. Taylor Woodrow was Contractor. Construction value £2M. In addition, prepared the Specification and supervised all aspects of the final civil works during the three months construction period. The London Docklands Development Corporation was the client, and the Geoffrey Osborne Builders were the Civil Contractor. Construction value £150K.

Languages

English – reading, writing and speaking – Excellent
Cantonese, Mandarin, Japanese, Spanish – Minimal

Papers Presented

Benson J.F. (2003) ‘*Design Considerations for Small Diameter Tunnels in Singapore*’ – Proceedings of Underground Singapore, “Updating the Engineering Geology of Singapore” 27th -29th November 2003, NTU, Singapore.

Wightman, N.R. & Benson J.F. (2014). “*Impact of changing geological conditions for foundation design and construction in Tung Chung New Town Area*”. Proceedings of HKIE 34th Geotechnical Division Annual Seminar, 30 May 2014, pp135-141.

Benson, J.F., Wightman, N.R. and Mackay, A.D. (2014). “*Cost comparisons for metro tunnelling projects in 4No. major world cities*”. Proceedings of World Tunnel Congress - WTC2014 & 40th ITA-AITES General Assembly, at Iguassu Falls, Brazil, 9-15 May 2014.

Referees

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