

Name: JENKINS Douglas A

Date of Birth: 5 April 1951
Citizenship: Australian

Qualifications: **B.Sc.(Eng) Hons.** University of London, 1972
M.Eng.Sci. University of New South Wales, 1989

Affiliations: Member, Institution of Engineers, Australia.
CPEng(2012/13)
Member, Institution of Civil Engineers
Member, Concrete Institute of Australia,
National Vice-President 2011-2013



Present Position: Consultant Engineer, Interactive Design Services Pty Ltd

SPECIALIST EXPERIENCE AND KNOWLEDGE:

As an independent consultant, the majority of my work is in the analysis and design of buried arch structures, bridges, abutments and reinforced soil retaining walls, including the application of advanced analysis techniques to the design of these structures:

- Seismic and dynamic analysis
- Non-linear analysis
- Analysis of impact loads
- Analysis of creep and shrinkage effects

Experience relevant to these areas of work is highlighted below:

Buried Arch Structures

- During the time I was employed by Reinforced Earth Pty Ltd (1993 – 2000) as engineering manager I was head of the international committee responsible for development of the company's buried arch products. In this role I:
 - Managed the production of technical standards and guidelines.
 - Produced and presented training workshops and seminars in Australia, UK, France, Spain, USA, Canada, Malaysia, Thailand, Hong-Kong and Japan.
 - Produced design and analysis software to improve the efficiency of the design process.
 - Produced technical standards for review procedures, design for seismic loads, design for longitudinal loads, and design of raft foundations.
 - Investigated problem structures, including problems arising from longitudinal loads, poor foundations, inadequate fill compaction, and un-balanced fill loads.
- I was directly responsible for the design of many large and innovative arch projects in Australia, including the Homebush Bay Rail Link in Sydney, an entry portal structure for the Melbourne City Link Tunnel, and rail tunnels for the Kwinana freeway in Perth.
- I have carried out the detailed forensic analysis of a number of arch structures, including analysis of collapse during construction, and analysis of anticipated long term deflections.
- I have designed and reviewed buried arch structures to BS 5400 in the UK and the Middle East.
- I have been responsible for the design of mine conveyor tunnels with fill heights exceeding 40 metres and large span arches with fill heights up to 35 m.
- I have regularly presented papers on the analysis and design of buried arch structures at conferences in Australia and New Zealand.

Bridges and Abutments

- I have been involved with the design and construction of bridges and associated structures for the majority of my career, including many large and prestigious projects such as:
 - The London orbital motorway (M25).
 - The Jeddah-Makkah Expressway in Saudi Arabia (10 km elevated motorway of precast segmental construction)
 - The Parliament House Access Roads in Canberra
 - The Ankara-Gerede and Ankara Peripheral Motorways in Turkey
 - The Kwinnana Freeway in Perth
- I have designed structures for high seismic loads (including New Zealand and Turkey), collision loading, and detailed analysis of time-dependant effects and thermal effects.
- I have a detailed understanding of soil-structure interaction effects, including the behaviour of integral abutment bridges, the interaction of piles with embankments, and the design of reinforced soil foundations.
- I have completed a study of the use of modern computer applications in bridge deck analysis, presented at the 2004 Austroads Bridge Conference.
- I have detailed knowledge of the requirements of many bridge design codes, including AS 5100, The Austroads Bridge Design Code, BS 5400, and the AASHTO bridge design code.

Reinforced Soil Walls

- I have been directly responsible for the design of numerous reinforced soil walls in Australia, New Zealand, and Indonesia, including several very large projects, such as the South East Arterial project in Melbourne, and the Homebush Bay Rail Link.
- Design and analysis for the Freeport mine in Indonesia included design of a 35 metre high reinforced soil dump structure, which is as far as I know the highest vertical faced reinforced soil wall in the World.
- I have been closely involved with the introduction of new soil reinforcement and facing systems, including the assessment of pull-out capacity and durability of ladder reinforcing strips, and the development of limit state design methods for reinforced soil walls.
- Through my work with the Terre Armee International technical committee I have detailed knowledge of both new developments in reinforced soil systems, and of problems experienced by these systems around the World, including problems arising from aggressive backfill and poor quality fill.

Computer Applications

- I have extensive experience in the development of custom computer applications, designed to improve the efficiency of the design process for specific projects or products.
- I have standardised on the use of Strand7 for the analysis of both bridges and buried structures, and have developed several custom applications, including:
 - Generation of bridge deck models.
 - Modelling of staged construction.
 - Analysis of buried structures during construction and under live load.
 - Analysis of composite pre-stressed beams for creep and shrinkage effects.

Concrete Institute of Australia

I have been a committee member of the CIA NSW Branch since 2003, and was State Branch President from 2007 to 2009. I have been a member of the National Council since 2007, and I am currently National Vice-President. I am also a member of the AS 3600 and AS 5100 reference groups, responsible for overseeing the activities of the Concrete Institute's representative on these committees, and a member of the durability group.

Career: INTERACTIVE DESIGN SERVICES

2000 – Present: Principal

THE REINFORCED EARTH COMPANY

1993 - 2000: Engineering Manager

MAUNSELL PTY. LTD.

1991 - 93: Senior Engineer, Superintendent's Representative, Regional Quality Manager

1987 - 91: Deputy Structures Design Manager; Ankara – Gerede Motorway, Turkey

1985 - 87: Assistant Resident Engineer

DAR AL HANDASAH

1982 - 84: Acting Resident Engineer

1981 - 82: Bridge Engineer

GREATER LONDON COUNCIL, UK

1979 - 81: Assistant Resident Engineer

1978 - 79: Structures Design Engineer

DEPARTMENT OF TRANSPORT, UK, SOUTH EAST RCU

1975 - 78: Highways and Bridges Design Engineer

FREEMAN FOX & PARTNERS

1973 - 75: Site Engineer

1972- 73: Highways Design Engineer

EXPERIENCE:

2000 to Present:

Independent consultant, trading as Interactive Design Services Pty Ltd, specialising in:

- Design of buried arch structures, bridges, and retaining walls.
- Seismic and dynamic analysis and design.
- Soil-structure interaction analysis and design.
- Development of specialist computer applications.
- Training in soil-structure technology and computer applications.

Recent projects include:

- Tender and final design of arch structures, retaining walls and bridge abutments for Reinforced Earth Pty Ltd. Major projects include retaining walls and abutments, and rail tunnels for the Kwinana Freeway, an outfall culvert at Barcoo Outlet, and design of conveyor tunnels under more than 40 metres of fill at Morwell Power Station, requiring provision for long term settlements of over 2 metres.
- Tender design of a large span arch structure under high fill for SMEC.
- Design of arch structures for Freyssinet Middle East, including 20 metre span structures under embankments of up to 35 metres height.
- Verification and proof checking of arch and retaining wall designs for Reinforced Earth Australia, and associated companies in The United Kingdom and The Middle East.
- Forensic investigation of an arch structure with larger than expected deflections during backfill.
- Training in arch design procedures for companies in Australia and The UAE.

- Review of the dynamic analysis of a large mine crusher.
- Verification of bridge and culvert structures for GHD.
- Analysis and report on the condition of a large reinforced concrete load out tunnel for BHP Billiton.
- Analysis of anticipated long term deflections in a large span arch structure, and setting of trigger levels for increased monitoring and/or closure of the structure.
- Analysis of a large span arch structure over a railway in the UK that failed due to non-conforming backfill operations.
- Tender and final design of pre-cast arch structures for rail tunnels for Thies Contractors (Geraldton Southern Transport Corridor).
- Analysis of arch culverts for the RTA and Queensland Main Roads.
- Preparation of design procedures for buried arch structures for Freyssinet International, including seismic design, raft footings, and design for longitudinal loads.
- Design of bridges and buried structures for Maunsell.

1993 to 2000:

Engineering Manager for the Reinforced Earth Company. Responsible for:

- All technical aspects of the products and designs produced by the company, including development and implementation of quality and computer systems and development of new products.
- Head of the international committee responsible for development of the TechSpan precast arch system including research, development and documentation of design procedures, training, and technical assistance to licensees .
- Asia-Pacific representative on the international technical committee, responsible for liaison with head office in Paris and development and implementation of design standards and procedures.

During my time at Reinforced Earth the size and variety of retaining wall projects increased substantially, and the TechSpan precast arch system was developed to become a significant part of the company's turnover. I was directly responsible for the design of many large and innovative structures in both arch and retaining wall systems, such as the Homebush Bay Rail Link in Sydney, the Olympic Park Tunnel in Melbourne, and dump structures for the Freeport Mine in Indonesia.

1991 - 1993:

Project manager for structural design projects for Maunsell, including:

- 2km long jetty structure in Thailand.
- Proof check for Maribyrnong River Bridge.
- Structures for highway projects in Canberra.
- Resident Engineer on site for Eastern Parkway and Molonglo River Bridge; responsible for all quality control and contractual matters.
- Superintendent's Representative for Mirrabai Drive and Barton Site Servicing.
- Project Manager for Red Cross Building in Canberra.
- Regional Quality Manager, responsible for implementation of the company quality system and endorsement of the Canberra office by QAS.
- Computer manager responsible for development and implementation of computer systems for structural design and contract and financial control, and purchase and maintenance of hardware.

1988 to 1991:

Deputy Structures Design Manager for the Maunsell/Parsons-Brinkerhoff Joint Venture design services sub-contractor on the Ankara-Gerede and Ankara Peripheral Motorway Project. Fast track design of 250 km of motorway was taken from preliminary route location to completion of construction in four years. Features of this project were:

- Structures included 130 bridges and viaducts and associated retaining walls, river diversion channels, and culverts.
- All structures were designed for seismic forces ranging from moderate to very high.

- Major structures were up to 90 metres high and 140 metres span.
- The structures design team consisted of eight expatriate and about 20 local staff.
- An efficient design process combining CAD and spreadsheets was developed on the project, contributing to the reduction in size of the final design team to about half that originally envisaged.

1985 - 87:

Resident Engineer responsible for the supervision of construction of structures, roadworks, and landscaping for the Parliament House Access Roads in Canberra for Maunsell. Structures built in this award winning project included a concrete arch tunnel, a post tensioned box girder bridge, and extensive retaining walls. Responsible for all quality control and contractual matters and coordination with other contractors working on Approach Roads and Parliament House contracts.

1985:

Design of Erindale Bridge, Canberra, a box girder bridge of 50 metres span.

1983 - 84:

Acting resident engineer responsible for all technical and financial matters related to completion of the Jeddah-Makkah Expressway, Urban Section, including finalisation of all quantities and claims and hand-over to the client. The project is a prestressed concrete viaduct 10km long, constructed using pre-cast, glued segmental techniques and with great emphasis placed on achieving high quality surface finishes.

1981 - 83:

Bridge engineer, and from October 1992 acting resident engineer, for Al Siteen Viaduct, a cast insitu, prestressed concrete viaduct, about 4km long. Duties included quality control, completion of the project, liaison with the client, final measurement, settlement of claims and hand-over.

Both projects in Jeddah involved supervisions of a team of about 15 local engineers and support staff and liaison with the client, services authorities, and many local and international contractors.

1979 - 81:

Assistant Resident Engineer responsible for financial matters on a contract to raise the banks of the Thames. The contract combined bank raising and land reclamation and included dredging, hydraulic fill, and piling. A number of claims related to delays and latent conditions were resolved.

1978 - 79:

Design engineer for structures required for the raising and strengthening of river walls associated with the Thames Barrier. Detailed design of concrete retaining walls and sheet piling subject to marine conditions.

1975 - 78:

Design, checking, and detailing of concrete and steel motorway bridges, including supervision of junior engineers and drafters and preparation of feasibility reports and contract documents. Investigation of alternatives for motorway interchanges, and preparation of the public participation report. Preparation of contract documents for a motorway contract.

1972 - 75:

Site engineer on the Bristol Parkway (Stage II), a prestressed concrete viaduct of voided slab construction about 1 km long. Responsible for quality control and survey. Assistant engineer working on the conceptual and detailed design of major highways in the U.K. and overseas.

PUBLICATIONS AND PRESENTATIONS:

- 2011 Optimising Precast Bridge Girders for Sustainability with the use of High Performance Concrete; Austroads Bridge Conference, Sydney 2011
- Time to Dump the Rectangular Stress Block?;
Concrete Institute of Australia Conference, Perth 2011
- Optimising Building Design for Sustainability Using High Performance Concrete;
Concrete Institute of Australia Conference, Perth 2011
- Optimising Precast Bridge Girders for Sustainability with the use of High Performance Concrete; 9th Symposium on High Performance Concrete, Rotorua 2011
- 2010 High Performance Concrete in Bridges
Concrete Institute of Australia seminar, Sydney 2010
- 2009 Predicting the Deflection of Concrete Structures in Practice; Concrete Solutions 09, Sydney 2009
- Efficient Analysis with the Strand7 API presentation; Concrete Institute of Australia seminar, Sydney 2009
- Analysis and Design of Large Span Arch Structures under High Fills; Austroads Bridge Conference, Auckland 2009
- Design of Robust Structures, presentation; Concrete Institute of Australia seminar, Sydney 2009
- 2007 Soil Loads on Cut and Cover Tunnels Under High Fills
Concrete Institute of Australia seminar, Sydney 2007
- Settlement of Precast Culverts Under High Fills; The Influence of Construction Sequence and Structural Effects of Longitudinal Strains. Concrete Institute of Australia Conference, Adelaide 2007
- Finite element modelling of load shed and non-linear buckling solutions of confined steel tunnel liners. ANZ Geomechanics Conference, Brisbane 2007
- 2006 Prediction of Cracking and Deflections; International Code Provisions and Recent Research.
Concrete Institute of Australia seminar, Sydney 2006
- High Performance Concrete in Bridge Decks.
Austroads Bridge Conference, Perth 2006
- 2005 High Strength Concrete in AS5100
Concrete Institute of Australia seminar, Sydney 2005
- 2004 Seismic design of Buried Structures to AS5100
Australian Earthquake Engineering Society Conference, Mount Gambier 2004
- Design for Soil-Structure Interaction
Concrete Institute of Australia seminar, Sydney 2004
- Bridge Deck Behaviour Revisited
Austroads Bridge Conference, Hobart 2004
- 2003 Design of Precast Buried Structures for Internal Impact Loading
Concrete Institute of Australia Conference, Brisbane 2003

- Morwell Tunnels –Design of a Buried Arch Culvert Under Very High Fill
Concrete Institute of Australia Conference, Brisbane 2003
- 2001 Barcoo Outlet Culvert: The influence of soil structure interaction on the design of a buried arch culvert
Concrete Institute of Australia Conference, Perth 2001
- Kwinana Freeway bridge abutments: Value adding through innovation and partnering
Concrete Institute of Australia Conference, Perth 2001
- 2000 Seismic Analysis of Buried Arch Structures
World Conference on Earthquake Engineering, Auckland 2000
- 1999 Homebush Bay Rail Link
Concrete Institute of Australia Conference, Sydney 1999
- Arch Structures; Spanning Past Present And Future
Concrete Institute of Australia Conference, Sydney 1999
- 1998 Non-linear Analysis of Buried Arch Structures
Australasian Structural Engineering Conference, Auckland 1998
- 1997 Analysis of Buried Arch Structure: Performance versus Prediction
Concrete Institute of Australia Conference, Adelaide 1997