CRAIG OLDFIELD
TECHNICAL DIRECTOR
CURRICULUM VITAE



CRAIG OLDFIELD CV



PROFILE

Craig is a Chartered Professional Engineer and seismic specialist with more than 35 years of structural engineering, technical leadership and project delivery experience across New Zealand, the Middle East and Southern Africa. His work spans the design, assessment, peer review and construction monitoring of low, medium and high-rise buildings in the residential, commercial and hospitality, industrial, retail, education and sports, civic and healthcare sectors, including heritage buildings.

Craig has spent over a decade at the forefront of New Zealand seismic engineering. Arriving in Christchurch in the aftermath of the Canterbury earthquakes, he built and led AECOM's Christchurch structures team, secured and directed the Ministry of Education's post-earthquake assessment programme, and went on to assess and strengthen heritage and earthquake-prone buildings in Christchurch and Wellington. He holds a Postgraduate Certificate in Advanced Earthquake Engineering from the University of Canterbury and is experienced in non-linear pushover and time-history analysis, displacement-based design, and low-damage and focused-damage structural systems.

Craig is experienced with many international design standards, including New Zealand, British, South African and American codes, and is skilled in reinforced and post-tensioned concrete, structural steel, masonry, timber and aluminium structures. He builds his structures virtually in 3D before they are built on site, testing and refining the design so that the final solution is simple, robust and buildable.

Alongside his technical work, Craig has held senior management roles including National Technical Director, Director and General Manager of a 40-person consultancy, and Executive Vice President of Project Development for a US$2.4 billion property portfolio. An MBA (Finance) gives him a commercial perspective that clients value, from early feasibility and financial modelling through to procurement, delivery and close-out.

Craig enjoys mentoring engineers and has a track record of growing capable, culturally diverse teams. He believes in keeping ego out of engineering, respecting the forces of nature, and designing for the owners and generations who will live with a building long after it is completed.

QUALIFICATIONS

BSc Civil Engineering (1st Class Hons), University of Cape Town 1989

MBA (Finance), University of Cape Town 1994

Postgraduate Certificate in Advanced Earthquake Engineering, University of Canterbury 2015

Chartered Professional Engineer (CPEng) 2013, renewed through 2030

Chartered Member of Engineering New Zealand (CMEngNZ)

Member – Structural Engineering Society New Zealand (SESOC), New Zealand Society for Earthquake Engineering (NZSEE) and New Zealand Timber Design Society

CAREER HISTORY

2026 – Technical Director – Structus Consulting Ltd, New Zealand

2023 – 2026 Technical Director / Design Director (PMC) – Parsons, Saudi Arabia

2019 – 2023 Director – Simply Structures Limited, New Zealand

2019 – 2022 National Technical Director – Kirk Roberts Consulting, Christchurch

2016 – 2019 Technical Director – New Zealand Consulting Engineers, Christchurch and Wellington

2012 – 2016 Principal Engineer / Associate Director, Structures – AECOM, Christchurch

2011 – 2012 Head of Development – @Bahrain, Kingdom of Bahrain

2010 – 2011 Independent Consulting Engineer

2007 – 2009 Executive Vice President, Project Development – Gulf Holding Company, Bahrain

2002 – 2007 Head of Engineering, then Director and General Manager – COWI Almoayed Gulf, Bahrain

2000 – 2002 Project Director and Principal Structural Engineer – Ahmed Janahi Architects, Bahrain

1998 – 2000 Superintendent Civil and Structural Engineer – Saudi Iron and Steel Company (Hadeed), Jubail

1995 – 1998 Managing Partner – Calibre Consulting, Johannesburg

1990 – 1995 Graduate to Chief Structural Engineer – BKS Consulting Engineers, Johannesburg

MANAGEMENT SKILLS

- Track record of building and leading high-performing structural teams, including growing AECOM's Christchurch structures team from 3 to 20 seismic engineers in two years
- Experienced practice leader, with full commercial responsibility for a consultancy of 40 staff and US$8 million annual turnover
- Strong client manager and negotiator, from scoping and procurement of consultant services through to contract negotiation and close-out
- Commercially minded, using financial modelling and scenario analysis to test project feasibility and phasing
- Committed mentor who sets up technical standards, design handbooks and quality processes so that teams can deliver consistently

TECHNICAL SKILLS

- Specialist in seismic assessment and retrofit of existing buildings, including

heritage and unreinforced masonry structures

- Advanced analysis, including non-linear pushover and time-history analysis, damage and loss estimation, and displacement-based design
- Innovator in low-damage and focused-damage design, including replaceable active links, a post-tensioned rocking wall with replaceable buckling-restrained braces, yielding elements that can be repaired while a building stays occupied, and a structural braking system
- Design of reinforced and post-tensioned concrete, structural steel, masonry, timber and aluminium structures, including high-rise buildings
- Experienced peer reviewer, forensic engineer and expert witness
- Temporary works design, including basement excavations where the temporary support is built into the permanent structure
- Proficient in ETABS, SAP2000, Robot, Prokon, Advance Steel, IdeaStatica, SMath, SketchUp Pro and Revit

SELECTED PROJECT EXPERIENCE

RESIDENTIAL PROJECTS

Soudah Development, Aseer Region, Saudi Arabia, 2024, SAR 7b

Luxury mountain destination with an immersive cultural experience, comprising site-wide infrastructure, luxury hospitality, luxury residential and attraction assets. As Design Director for the project management consultant, Craig set up the organisation and processes to manage the lead design consultant. Within about six months, he and a team of six engineers scoped, negotiated and obtained approval for five task orders, together worth about SAR 7 billion, taking a project that had stalled at master planning into design.

Villamar@theHarbour, Bahrain, 2007-2009, US$800m

Mixed-use development of 257,769m² in the Bahrain Financial Harbour precinct, with about 550 residential units, a five-star hotel, luxury serviced apartments and promenade retail. Its three towers of 56, 54 and 42 storeys twist through 35 degrees and include apartments suspended between them, on a multi-level podium with basements below sea level. Craig was client lead and representative, responsible for delivery on time and on budget, and also prepared the financial modelling, carried out CM1 construction monitoring and acted as structural peer reviewer.

Pearl Towers (Abraj Al Lulu), Bahrain, 2004-2005, US$300m

Three 50-storey residential towers rising from a multi-storey retail and parking podium with rooftop amenities, about 200,000m² built area. The structure has reinforced concrete shear walls and columns, post-tensioned flat slabs and precast podium beams. Craig was the responsible structural engineer for the design and build contractor, providing structural design and CM1 construction supervision.

Al Areen, Bahrain, 2007-2009, US$1.2b

Mixed-use development of about 450,000m² in a suburban setting, including apartments, town homes and villas, retail, offices, a four-star hotel and serviced apartments, built in reinforced, precast and pretensioned concrete and structural steel. Craig was client lead and representative, responsible for delivery on time and on budget, and also prepared the financial modelling, carried out CM1

construction monitoring and acted as structural peer reviewer.

Villa Royale, Tangier, Morocco, 2008-2009, US$1b

Mixed-use resort development of about 400,000m², including a five-star resort hotel, a six-star boutique hotel, a range of residential types, a marina and beach club. As client lead, Craig developed the design and procured the initial contracting services.

The Vantage, Tauranga, and Steel-Framed Buildings, Hamilton, 2019-2022

Formal peer reviews of a four-storey steel-framed residential building in Tauranga and two steel-framed buildings in Hamilton.

Complex Seismic Assessments and Expert Witness, Christchurch, 2012-2016

Non-linear pushover and time-history analyses to verify %NBS after retrofit and to estimate damage and loss for insurance purposes. Craig peer reviewed damage assessments internally and externally, provided expert witness services, and oversaw rebuild quality assurance for a construction contractor. He also contributed to IAG's repair programme for over-cap residential properties damaged in the Canterbury earthquakes.

Further projects

- Two 30-35 storey towers, Muharraq, Bahrain (concept structural design)
- Mannai apartments, Juffair, Bahrain (US$12m, 12-storey apartment building)
- Ministry of Housing apartments, Bahrain (US$5m, 13-storey apartment building)

COMMERCIAL PROJECTS

Northern Quarter, Tauranga, 2021-2023, $70m

Mixed-use development of about 17,000m², comprising a five-storey office and conference centre and a nine-storey hotel on a shared podium. The structure is a largely precast podium with a structural steel superstructure and composite hollow section columns. Lateral stability is provided by shear walls, eccentrically braced frames with replaceable active links, and localised moment frames, on stone column ground improvement. Craig completed the preliminary design and was the design engineer for the lateral system and foundations, through several versions of the project between 2021 and 2023.

Mann Street Hotel, Queenstown, 2017-2018, $30m

Five-star hotel of five storeys over one and a half basement levels, about 5,000m², for Augusta Capital. The structure is a steel frame with concrete cores and uses focused-damage design: the two top core beams are designed to yield, so the building can be repaired after a major earthquake while the hotel stays open. For the deep basement excavation, Craig built the temporary lateral support into the permanent structure with a top-down (build-down and undermine) sequence, developed with the contractor, so no separate temporary works were needed. Craig was lead engineer with New Zealand Consulting Engineers and carried out the structural design and CM3 construction monitoring.

T30 Hotel, Queenstown, 2020

Focused-damage lateral system for a Queenstown hotel: a post-tensioned rocking wall with ten buckling-restrained braces at each end of the wall, five 60mm diameter

McAlloy bars and a reinforced shear key. Damage is focused on the braces, which can be replaced after an earthquake, leaving the primary shear walls undamaged. Carried out with Kirk Roberts Consulting; Craig was lead design engineer.

Hyatt Centric, Queenstown, 2022-2023, $30m

Six-storey modular hotel for Wellsmart Group. Craig completed the preliminary design and was technical adviser for the remaining structural design. He also developed two innovative solutions to technical challenges, one of which was adopted into the final design.

Queenstown Villa Views Hotel, Queenstown, 2019, $12m

Three-tiered, six-storey, six-star boutique hotel on Hallenstein Street for South Island Investments, about 1,500m², set into a large excavation on a steep site. The structure is a steel frame with timber infill floors and diaphragms. Craig developed and designed a novel seismic braking system that significantly reduced building accelerations and drift, so the building was expected to perform better in a 2,500-year earthquake than a conventional system would in a 500-year event. Any yielding can be repaired without entering the building, so the hotel can keep operating, and the system cost less than $50,000. As lead engineer with Simply Structures, Craig carried out the detailed design of the steel framing and timber diaphragms through to completion. He also prepared the structural drawings and part of the design for the retaining wall system that forms the building platforms, co-designed with Tonkin + Taylor. The documentation achieved building consent without a single RFI.

Sudima Hotel and Office Development, Christchurch, 2016-2018, $25m

Craig was lead engineer for the redesign of the structural steel for ABL Construction, and the engineer responsible for compliance of the imported structural steel used on the project.

Block 4, Wanaka, 2021-2023, $10m

Quality assurance and review of the structural design of a two-storey commercial development.

79 Hereford Street, Christchurch, 2016-2023, $10m

Seismic assessment, strengthening, extension and refurbishment of an eight-storey 1960s office building of about 3,800m², damaged in the Canterbury earthquakes, converting it into a hotel for Tailorspace. The concrete frame, reinforced concrete walls and reinforced masonry were strengthened to 80% NBS, using the existing reinforced concrete beams as controlled flexural yielding elements, with fibre reinforced polymer (FRP) shear strengthening. Craig carried the project through every stage as the assessing, design, drafting and supervising engineer: the assessment at AECOM (2016), the strengthening design at New Zealand Consulting Engineers (2019), and the strengthening redesign (2022) and CM3 construction monitoring (2023) with Simply Structures.

101 Cuba Street, Wellington, 2018-2019, $3-5m

Three heritage-listed buildings of mixed construction (the Working Mans Club), historically tied together and including unreinforced masonry, railway-iron reinforced concrete, cast iron, structural steel, precast concrete, blockwork and timber. As lead engineer for the body corporate, Craig used

ETABS to analyse the buildings and designed the scheme to tie them together and strengthen them to 70% NBS.

79 Boulcott Street, Wellington, 2018, $10m

Detailed seismic assessment and targeted retrofit solution for a high-rise building on Boulcott Street, Wellington, with a repair value of about NZ$10 million. Carried out with New Zealand Consulting Engineers; Craig was lead engineer.

Dunbar Sloane Building, Wellington, 2018-2019, $3-5m

Three to four-storey unreinforced masonry building on Waring Taylor Street with concrete and timber floors, a half basement and penthouse, originally built in 1920 and altered many times since. The structure combines unreinforced masonry, cast iron, structural steel and timber. Craig carried out the detailed assessment and the retrofit design to strengthen the building to 100% NBS.

125 Blenheim Road, Christchurch

Façade strengthening project. Craig's poster on the project took second place in the under-$1 million retrofit category at the 2016 NZSEE conference, where he also co-authored a conference paper.

Wellington Peer Reviews to ASCE 41-13, 2016-2019

Non-linear pushover peer reviews of the seismic assessments of 142 Wakefield Street ($20m), 130 Victoria Street (including response spectrum analysis), 100 Taranaki Street and 64 Ghuznee Street, using the American ASCE 41-13 standard alongside New Zealand codes.

Soudah Development, Aseer Region, Saudi Arabia, 2024, SAR 7b

Luxury mountain destination with an immersive cultural experience, comprising site-wide infrastructure, luxury hospitality, luxury residential and attraction assets. As Design Director for the project management consultant, Craig set up the organisation and processes to manage the lead design consultant. Within about six months, he and a team of six engineers scoped, negotiated and obtained approval for five task orders, together worth about SAR 7 billion, taking a project that had stalled at master planning into design.

@Bahrain Exhibition and Convention Centre, Bahrain, 2011-2012, US$350m

Phase 1 of a six-phase, one million square metre greenfield development worth about US$1.5 billion, comprising an exhibition and convention centre with lifestyle and hospitality offerings of about 110,000m² built-up area. Craig built the financial model to test any phase or combination of phases, and prepared Phase 1 for start-up.

Villamar@theHarbour, Bahrain, 2007-2009, US$800m

Mixed-use development of 257,769m² in the Bahrain Financial Harbour precinct, with about 550 residential units, a five-star hotel, luxury serviced apartments and promenade retail. Its three towers of 56, 54 and 42 storeys twist through 35 degrees and include apartments suspended between them, on a multi-level podium with basements below sea level. Craig was client lead and representative, responsible for delivery on time and on budget, and also prepared the financial modelling, carried out CM1 construction monitoring and acted as structural peer reviewer.

Villa Royale, Tangier, Morocco, 2008-2009, US$1b

Mixed-use resort development of about 400,000m², including a five-star resort hotel, a six-star boutique hotel, a range of residential types, a marina and beach club. As client lead, Craig developed the design and procured the initial contracting services.

Bahrain Financial Harbour Phase 1, Bahrain, 2004-2007, US$220m

Financial centre comprising two 53-storey towers, a seven-storey central mall and a 12-storey harbour house. On this design and build project, Craig audited the contractor's structural design and supervised the structural works on behalf of the owner.

BIIC Building, Bahrain Financial Harbour, 2004-2005, US$60m

21-storey design and build commercial building of about 16,000m² in the Bahrain Financial Harbour precinct, with reinforced and post-tensioned concrete flat slabs and a precast car park. Craig carried out the detailed structural design for the contractor and the CM1 supervision of construction.

Gulf International Bank Refurbishment, Manama, 2003-2006, US$10m

Complete refurbishment of the bank's nine-storey building while it remained in use.

South African Reserve Bank Head Office, Johannesburg, 1991-1995, ZAR 120m

Craig completed about 60% of the detailed design before the project was revised, and later managed the final stages of construction of Phase II, including resolving final contractor and consultant disputes.

Sandton Square, Johannesburg, 1993, ZAR 220m

High-profile development of about 55,000m² of basement parking and 35,000m² of offices. Craig completed the structural design and detailing of the post-tensioned parking decks.

Medcor Building, Port Louis, Mauritius, 1992, ZAR 140m

Structural design of the superstructure of a 19-storey office building to withstand cyclonic winds, with stability from an internal core modelled using finite element analysis. Craig also spent six months on site in Mauritius as site engineer.

Telecom Building, Port Louis, Mauritius, 1993, ZAR 100m

Structural design of a 19-storey high-rise office building using a finite element model.

Further projects

- Technical advice on several new high-rise buildings in Wellington and Auckland
- Commercial building, Bahrain (US$10m, design audit and structural remedial works for a change of use)
- IVTB office block, Phoenix, Mauritius (ZAR 25m, 12,000m²)
- Sanlam office park, Parktown, Johannesburg (ZAR 12m, 6,000m²)

INDUSTRIAL PROJECTS

Jazan City for Primary and Downstream Industries, Saudi Arabia, 2023-2024, SAR 40b

New industrial and commercial city. As Engineering Director, Craig led about 90 engineers in three departments delivering the capital works programme across

infrastructure, engineering and architectural disciplines. He challenged the masterplan through technical and commercial studies, briefed and managed design consultants, and ran quality checks and value engineering. On the downtown development, he challenged the team to rethink the earthworks, cutting volumes from about 14 million to 9 million cubic metres and saving about SAR 500 million.

Hadeed Steel Plant Cranes, Jubail, Saudi Arabia, 1999-2000, SAR 70m

Investigation and design management for the upgrade and replacement of two 250-tonne electric overhead cranes, including the structural adequacy of the crane runways and the design audit of the refurbishment.

Mauritius Power Station, 1998, ZAR 35m

Design, tender management, discipline coordination and financial control of the structural component of a new ZAR 400 million power station.

Further projects

- Multi-warehouse industrial development, Christchurch ($10m)
- Marine structures (two jetties, about 300m of 19m-long sheet pile walls, a mooring structure for 35,000-tonne vessels and an access pontoon)
- BAPCO, Bahrain (forensic and specialist evaluation of structures' load-carrying capacity)
- BMMI storage and distribution centre, Bahrain (US$5m, refurbishment while in operation)
- Hadeed, Jubail (traffic system upgrade, archive building, fire station and cafeteria, SAR 4.7m to 23m each)

RETAIL PROJECTS

Villamar@theHarbour, Bahrain, 2007-2009, US$800m

Mixed-use development of 257,769m² in the Bahrain Financial Harbour precinct, with about 550 residential units, a five-star hotel, luxury serviced apartments and promenade retail. Its three towers of 56, 54 and 42 storeys twist through 35 degrees and include apartments suspended between them, on a multi-level podium with basements below sea level. Craig was client lead and representative, responsible for delivery on time and on budget, and also prepared the financial modelling, carried out CM1 construction monitoring and acted as structural peer reviewer.

Al Areen, Bahrain, 2007-2009, US$1.2b

Mixed-use development of about 450,000m² in a suburban setting, including apartments, town homes and villas, retail, offices, a four-star hotel and serviced apartments, built in reinforced, precast and pretensioned concrete and structural steel. Craig was client lead and representative, responsible for delivery on time and on budget, and also prepared the financial modelling, carried out CM1 construction monitoring and acted as structural peer reviewer.

Bahrain Financial Harbour Phase 1, Bahrain, 2004-2007, US$220m

Financial centre comprising two 53-storey towers, a seven-storey central mall and a 12-storey harbour house. On this design and build project, Craig audited the contractor's structural design and supervised the structural works on behalf of the owner.

Further projects

- The Square Shopping Centre, Johannesburg (ZAR 10m, 6,000m² structural and civil design)

EDUCATION AND SPORTS PROJECTS

Ministry of Education Assessment Programme, Canterbury, 2012-2015, $5m

Following the Canterbury earthquake sequence, the Ministry of Education appointed six engineering firms to assess more than 3,000 school buildings. Craig led the team that secured AECOM's $5 million commission, directed its delivery and sat on the Ministry's earthquake assessment panel for Canterbury campuses. The Ministry commended AECOM as the first appointed firm to complete its programme, and for the consistency and quality of its reporting.

Jeddah Central Stadium, Saudi Arabia, 2024, SAR 6b

New 40,000-seat multi-use stadium in the Jeddah Central development. Craig set up the project management consultant's engineering team for post-contract administration and carried out a high-level seismic assessment of parts of the design before the project was paused.

SEVENs Entertainment Programme 4, Saudi Arabia, 2025-2026

Programme of entertainment venues in Jeddah, Makkah and Taif, part of a national programme to develop entertainment destinations across Saudi Arabia. Craig led the project management consultant's engineering and attractions teams through construction.

Canterbury Jockey Club Grandstand, Christchurch, 2015-2016, $3-5m

Heritage-listed four-storey racecourse grandstand built around 1920, combining reinforced concrete, composite concrete, cast iron and timber bleachers. Craig was the structural engineer for the detailed assessment, peer review and retrofit design.

Hippodrome, Mauritius, 1995, ZAR 100m

Horse racing track with a 200m-long grandstand, a 50m cantilevered roof and about 500,000m³ of earthworks. Craig carried out the detailed structural design, financial control, coordination with other disciplines and international fee negotiations.

CIVIC PROJECTS

Wellington Children's Hospital, Wellington, 2016-2019, $80m

New four-storey base-isolated children's hospital, funded through the Wellington Children's Hospital charity. Craig was Engineer of Record for the structural design while Technical Director at New Zealand Consulting Engineers.

Christchurch Library, Christchurch, 2016-2018, $90m

Peer reviewer on behalf of Christchurch City Council, using New Zealand Standards.

101 Cuba Street, Wellington, 2018-2019, $3-5m

Three heritage-listed buildings of mixed construction (the Working Mans Club), historically tied together and including unreinforced masonry, railway-iron reinforced concrete, cast iron, structural steel, precast concrete, blockwork and timber. As lead engineer for the body corporate, Craig used

ETABS to analyse the buildings and designed the scheme to tie them together and strengthen them to 70% NBS.

Government House, Gudaibiya, Bahrain, 2001-2002

Demolition and reconstruction of a new government palace at Gudaibiya as the seat of government, about 100,000m² built area. The reinforced concrete building has a mechanical plant basement under the full footprint, below the water table. Craig provided project, site and construction management and audited the structural design, including blast-resisting façade walls, basement flood protection and building security systems.

Bahrain International Airport Control Tower, Bahrain, 2000-2002, US$5m

Structural design of the proposed new air traffic control tower.

South African Reserve Bank Head Office, Johannesburg, 1991-1995, ZAR 120m

Craig completed about 60% of the detailed design before the project was revised, and later managed the final stages of construction of Phase II, including resolving final contractor and consultant disputes.

Further projects

- Bulls Town Hall, Manawatū (new Importance Level 3 building)
- Wellington Zoo (pro bono structural advice)
- Sitra Causeway replacement, Bahrain (Project Director)
- Ministry of Housing apartments, Bahrain (US$5m, 13-storey apartment building)

HEALTHCARE AND AGED CARE PROJECTS

Wellington Children's Hospital, Wellington, 2016-2019, $80m

New four-storey base-isolated children's hospital, funded through the Wellington Children's Hospital charity. Craig was Engineer of Record for the structural design while Technical Director at New Zealand Consulting Engineers.

DETAILED SEISMIC ASSESSMENTS AND STRENGTHENING

Ministry of Education Assessment Programme, Canterbury, 2012-2015, $5m

Following the Canterbury earthquake sequence, the Ministry of Education appointed six engineering firms to assess more than 3,000 school buildings. Craig led the team that secured AECOM's $5 million commission, directed its delivery and sat on the Ministry's earthquake assessment panel for Canterbury campuses. The Ministry commended AECOM as the first appointed firm to complete its programme, and for the consistency and quality of its reporting.

79 Boulcott Street, Wellington, 2018, $10m

Detailed seismic assessment and targeted retrofit solution for a high-rise building on Boulcott Street, Wellington, with a repair value of about NZ$10 million. Carried out with New Zealand Consulting Engineers; Craig was lead engineer.

79 Hereford Street, Christchurch, 2016-2023, $10m

Seismic assessment, strengthening, extension and refurbishment of an eight-storey 1960s office building of about 3,800m², damaged in the Canterbury earthquakes,

converting it into a hotel for Tailorspace. The concrete frame, reinforced concrete walls and reinforced masonry were strengthened to 80% NBS, using the existing reinforced concrete beams as controlled flexural yielding elements, with fibre reinforced polymer (FRP) shear strengthening. Craig carried the project through every stage as the assessing, design, drafting and supervising engineer: the assessment at AECOM (2016), the strengthening design at New Zealand Consulting Engineers (2019), and the strengthening redesign (2022) and CM3 construction monitoring (2023) with Simply Structures.

Seven-Storey 1970s Building Retrofit, Christchurch

Seismic retrofit of a 1970s seven-storey building. Craig used the existing capacity of the reinforced concrete beams as flexurally controlled active links, significantly reducing the cost of the retrofit. The scheme received building consent, and when the building was sold the new owners adopted it with minor changes. Craig then provided peer review advice to their engineer.

101 Cuba Street, Wellington, 2018-2019, $3-5m

Three heritage-listed buildings of mixed construction (the Working Mans Club), historically tied together and including unreinforced masonry, railway-iron reinforced concrete, cast iron, structural steel, precast concrete, blockwork and timber. As lead engineer for the body corporate, Craig used ETABS to analyse the buildings and designed the scheme to tie them together and strengthen them to 70% NBS.

Wellington Detailed Seismic Assessments, 2016-2019

Technical lead on up to 15 detailed seismic assessments of multi-storey buildings in Wellington and elsewhere, many of which went on to strengthening design. Craig also carried out rapid and detailed damage assessments in the Wellington CBD and Lower Hutt following the Kaikōura earthquake sequence, drawing on his experience of the Canterbury earthquake response.

Dunbar Sloane Building, Wellington, 2018-2019, $3-5m

Three to four-storey unreinforced masonry building on Waring Taylor Street with concrete and timber floors, a half basement and penthouse, originally built in 1920 and altered many times since. The structure combines unreinforced masonry, cast iron, structural steel and timber. Craig carried out the detailed assessment and the retrofit design to strengthen the building to 100% NBS.

Canterbury Jockey Club Grandstand, Christchurch, 2015-2016, $3-5m

Heritage-listed four-storey racecourse grandstand built around 1920, combining reinforced concrete, composite concrete, cast iron and timber bleachers. Craig was the structural engineer for the detailed assessment, peer review and retrofit design.

125 Blenheim Road, Christchurch

Façade strengthening project. Craig's poster on the project took second place in the under-$1 million retrofit category at the 2016 NZSEE conference, where he also co-authored a conference paper.

Wellington Peer Reviews to ASCE 41-13, 2016-2019

Non-linear pushover peer reviews of the seismic assessments of 142 Wakefield Street ($20m), 130 Victoria Street (including response spectrum analysis), 100 Taranaki Street and 64 Ghuznee Street, using the American ASCE 41-13 standard alongside New Zealand codes.

Complex Seismic Assessments and Expert Witness, Christchurch, 2012-2016

Non-linear pushover and time-history analyses to verify %NBS after retrofit and to estimate damage and loss for insurance purposes. Craig peer reviewed damage assessments internally and externally, provided expert witness services, and oversaw rebuild quality assurance for a construction contractor. He also contributed to IAG's repair programme for over-cap residential properties damaged in the Canterbury earthquakes.

PEER REVIEWS

Christchurch Library, Christchurch, 2016-2018, $90m

Peer reviewer on behalf of Christchurch City Council, using New Zealand Standards.

Wellington Peer Reviews to ASCE 41-13, 2016-2019

Non-linear pushover peer reviews of the seismic assessments of 142 Wakefield Street ($20m), 130 Victoria Street (including response spectrum analysis), 100 Taranaki Street and 64 Ghuznee Street, using the American ASCE 41-13 standard alongside New Zealand codes.

The Vantage, Tauranga, and Steel-Framed Buildings, Hamilton, 2019-2022

Formal peer reviews of a four-storey steel-framed residential building in Tauranga and two steel-framed buildings in Hamilton.

Block 4, Wanaka, 2021-2023, $10m

Quality assurance and review of the structural design of a two-storey commercial development.

National Technical Leadership, Kirk Roberts Consulting, 2019-2022

As National Technical Director, Craig reviewed design work across the South and North Island offices. He wrote the firm's structural design handbook and verified a suite of calculation tools so that engineers could design complex building sub-components efficiently and with confidence. He also reviewed three of the firm's historic buildings and documented the remedial works, and travelled to Auckland, Tauranga and Hamilton to lead technical solutions on medium and high-rise projects.

Complex Seismic Assessments and Expert Witness, Christchurch, 2012-2016

Non-linear pushover and time-history analyses to verify %NBS after retrofit and to estimate damage and loss for insurance purposes. Craig peer reviewed damage assessments internally and externally, provided expert witness services, and oversaw rebuild quality assurance for a construction contractor. He also contributed to IAG's repair programme for over-cap residential properties damaged in the Canterbury earthquakes.

Bahrain Financial Harbour Phase 1, Bahrain, 2004-2007, US$220m

Financial centre comprising two 53-storey towers, a seven-storey central mall and a 12-storey harbour house. On this design and build project, Craig audited the contractor's structural design and supervised the structural works on behalf of the owner.

Further projects

- BAPCO, Bahrain (forensic and specialist evaluation of structures' load-carrying capacity)
- Commercial building, Bahrain (US$10m, design audit and structural remedial works for a change of use)

LOW AND FOCUSED DAMAGE DESIGN AND STRUCTURAL INNOVATION

T30 Hotel, Queenstown, 2020

Focused-damage lateral system for a Queenstown hotel: a post-tensioned rocking wall with ten buckling-restrained braces at each end of the wall, five 60mm diameter McAlloy bars and a reinforced shear key. Damage is focused on the braces, which can be replaced after an earthquake, leaving the primary shear walls undamaged. Carried out with Kirk Roberts Consulting; Craig was lead design engineer.

Queenstown Villa Views Hotel, Queenstown, 2019, $12m

Three-tiered, six-storey, six-star boutique hotel on Hallenstein Street for South Island Investments, about 1,500m², set into a large excavation on a steep site. The structure is a steel frame with timber infill floors and diaphragms. Craig developed and designed a novel seismic braking system that significantly reduced building accelerations and drift, so the building was expected to perform better in a 2,500-year earthquake than a conventional system would in a 500-year event. Any yielding can be repaired without entering the building, so the hotel can keep operating, and the system cost less than $50,000. As lead engineer with Simply Structures, Craig carried out the detailed design of the steel framing and timber diaphragms through to completion. He also prepared the structural drawings and part of the design for the retaining wall system that forms the building platforms, co-designed with Tonkin + Taylor. The documentation achieved building consent without a single RFI.

Mann Street Hotel, Queenstown, 2017-2018, $30m

Five-star hotel of five storeys over one and a half basement levels, about 5,000m², for Augusta Capital. The structure is a steel frame with concrete cores and uses focused-damage design: the two top core beams are designed to yield, so the building can be repaired after a major earthquake while the hotel stays open. For the deep basement excavation, Craig built the temporary lateral support into the permanent structure with a top-down (build-down and undermine) sequence, developed with the contractor, so no separate temporary works were needed. Craig was lead engineer with New Zealand Consulting Engineers and carried out the structural design and CM3 construction monitoring.

Northern Quarter, Tauranga, 2021-2023, $70m

Mixed-use development of about 17,000m², comprising a five-storey office and conference centre and a nine-storey hotel on a shared podium. The structure is a largely precast podium with a structural steel superstructure and composite hollow section columns. Lateral stability is provided by shear walls,

eccentrically braced frames with replaceable active links, and localised moment frames, on stone column ground improvement. Craig completed the preliminary design and was the design engineer for the lateral system and foundations, through several versions of the project between 2021 and 2023.

79 Hereford Street, Christchurch, 2016-2023, $10m

Seismic assessment, strengthening, extension and refurbishment of an eight-storey 1960s office building of about 3,800m², damaged in the Canterbury earthquakes, converting it into a hotel for Tailorspace. The concrete frame, reinforced concrete walls and reinforced masonry were strengthened to 80% NBS, using the existing reinforced concrete beams as controlled flexural yielding elements, with fibre reinforced polymer (FRP) shear strengthening. Craig carried the project through every stage as the assessing, design, drafting and supervising engineer: the assessment at AECOM (2016), the strengthening design at New Zealand Consulting Engineers (2019), and the strengthening redesign (2022) and CM3 construction monitoring (2023) with Simply Structures.

Seven-Storey 1970s Building Retrofit, Christchurch

Seismic retrofit of a 1970s seven-storey building. Craig used the existing capacity of the reinforced concrete beams as flexurally controlled active links, significantly reducing the cost of the retrofit. The scheme received building consent, and when the building was sold the new owners adopted it with minor changes. Craig then provided peer review advice to their engineer.

Hyatt Centric, Queenstown, 2022-2023, $30m

Six-storey modular hotel for Wellsmart Group. Craig completed the preliminary design and was technical adviser for the remaining structural design. He also developed two innovative solutions to technical challenges, one of which was adopted into the final design.

Steel Erection Tolerance Device

Craig invented a device that takes up construction tolerances of up to 30mm between different elements. Where foundation bolts are set out of position, the device lets the steel structure connect cleanly without reaming holes.

Prototype Base Isolator for Light Structures, 2019

In about 2019, Craig developed and built a prototype base isolator for light structures with loads of up to 50kN. The prototype has not yet been load tested or shake-table tested.

