

**ACENZ**  
AWARDS of  
**EXCELLENCE**  
2019

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**of excellence in roads**  
**bridges precast marine**  
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# About ACENZ

**The Association of Consulting Engineers New Zealand provides leadership, support and advocacy for the consulting and engineering sectors in Aotearoa.**

Founded in 1959, we have some 200 member firms who employ more than 13,000 staff. Our members play a critical role in the planning, design and delivery of our nation's construction and infrastructure sectors.

Our vision is to positively shape the future of Aotearoa by supporting our members to create sustainable value for themselves, their clients and their communities.

At the heart of it our purpose is to:

- Enable our members to compete, excel and thrive
- Lead, connect and shape the future of our sector
- Assert and preserve the importance and credibility of our sector

## **A new era is coming:**

Our world and our industry are changing at an ever-increasing rate, thanks to the influence of technology, big data, globalisation, environmental pressures, and human behaviour. We are, without doubt, operating in far more volatile, uncertain, complex and ambiguous conditions than ever before.

As we enter this new era of design and delivery in the built and natural environment, ACENZ has a crucial role in supporting our members and our nation to adapt and thrive.

This is an incredibly exciting time; there will be countless opportunities and just as many challenges, we need to make sure we are ready for what is to come. We need to make sure we are future-fit.

To enable this, ACENZ's priority areas are:

**Influence:** Be the pre-eminent advocate for engineering and consulting firms in

Aotearoa by building our profile, providing an influential media voice, playing a central role in public policy, and having a positive impact on the commercial environment in which our members operate.

**Connections:** Provide high-quality, agile, and member-centric services driven by a powerful brand, clear engagement pathways for members, and facilitate meaningful relationships between members, clients, and their communities in a way that creates value for both themselves and society.

**Future-fit:** Ensuring that our members are ready for this new era and can adapt to new ways of working. Our role is to deliver credible and well-researched thought leadership, provide our members with the tools, knowledge, resources and training to ensure they can adapt and thrive; and facilitate opportunities for our members to develop their leaders, their ideas and their practices.



## CEO's Message

### Paul Evans

Kia ora koutou everyone. It is my great honour to have recently joined ACENZ as the association's new chief executive.

This is an incredibly exciting time for ACENZ and our members, as I fundamentally believe that we are at the heart of a thriving Aotearoa. Without a strong and successful engineering and consulting sector, it is hard to see our nation achieving its significant aspirations.

There are many momentous challenges ahead of us. From unlocking affordable, high-quality housing supply to providing safe and integrated transport choices. From tackling the existential issue of climate change to something as foundational as ensuring all Kiwis have access to safe drinking water. ACENZ and our members must be at the heart of these discussions.

We must be shaping policy, sharing and embedding good practice, fostering favourable commercial conditions and influencing the public narrative.

Something else which is critical is our spirit of innovation – finding new ways of doing things

in an increasingly volatile, uncertain, complex and ambiguous world. This is where our awards programme is so important. Through the awards, we recognise the very best in strategic thinking, project innovation, high-quality delivery, and consulting excellence.

I felt very privileged to observe the judging process this year, and I was impressed with the level of rigour that sits behind the awards. With great confidence I can say if you win one of these awards, then you are absolutely at the forefront of engineering and consulting practice. This level of rigour requires a massive commitment from David Bridges (Convenor) and all our judges. Their willingness to give back to the sector is phenomenal. So, to all of you, please accept my heartfelt thanks.

As we move ACENZ into the future, there will be a significant amount of change to ensure that our membership offering is fit-for-purpose and that our services are high-quality, agile and member-centric. But I can unequivocally say that our awards will continue to be central to what we do.



# The ACENZ Awards

The ACENZ Awards are informally known as our people awards, recognising incredible personal achievement within and for the consulting and engineering industry. The people awards are designed to recognise significant contributors to the industry or rising young leaders who may influence the future of our profession. The awards include:

AECOM ACENZ Best Practical Work Report Award (for students)

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Tonkin + Taylor ACENZ Future Leader Award (for young professionals)

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President's Award

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## President's Message

### Ida Dowling, Commute Transportation Consultants

Our world and our sector are changing at an ever-increasing rate, thanks to the influence of new technology, big data, globalisation, environmental pressures, and human behaviour. We are entering a new era of design and delivery in the built and natural environment. Are we fit for this future? As an industry, we need to create a climate where innovation can thrive and where we are fully supportive of new knowledge and new technology.

The INNOVATE Awards give us an opportunity to celebrate excellent consulting services, solutions and innovations that have gone above and beyond the norm and help to shape the direction of our industry and our nation into the future. The calibre of entries for these awards makes me feel privileged to be part of such a dynamic and future looking industry, I encourage you all to continue to seek out

opportunities to go above and beyond in your teams and businesses.

Finally, we all owe a debt of gratitude to the award judges, who are all well-respected, senior practitioners in their specialist areas. They thoroughly investigate every project, conduct physical site inspections and detailed client interviews to pick out the exceptional submissions from the many excellent ones. It is this thorough and robust process that contributes to the INNOVATE Awards' premiere reputation in the industry.

As an association, ACENZ works hard to deliver effective, valuable and relevant services and advocacy to support our members and to showcase, celebrate and promote their excellence, quality and innovation. I am very proud of the role ACENZ plays to bring these awards together.



## President's Award

### Alison Murray, Ministry of Education

Alison has worked in procurement for over 20 years in leadership, operational and consulting roles in the UK and New Zealand. Alison joined the Ministry of Education in 2014 and has been integral in transforming infrastructure procurement, and directing the procurement of major construction projects, transport, school internet provision and schools payroll.

In recent years, infrastructure expenditure has doubled and is 30 percent of all published government procurement opportunities. Alison has delivered a step change in procurement capability to support thousands of distributed buyers in schools and the wider public sector, driving best procurement practice, and striving to make the Ministry easier to do business with.

Alison is a passionate leader and natural collaborator. She has a humble yet strong, commercial-style which she has used to bring about genuine change. This has included standardising the Conditions of Contracts for Consultancy Services, to create efficiencies and a better experience for consultants working with government agencies. Alison also drove the implementation of a standardised process for financial due diligence, the key risk assessment criteria when selecting a main contractor. This is why we recognise her – collaboration and commitment to the industry and encouraging both consultant and client to work together for the good of Aotearoa.

# Life Membership

## About Life Membership

From time to time, ACENZ recognises long-term commitment and volunteer service by individuals to the association through bestowing honorary life membership. Life members to date:

<b>Year</b>	<b>Name</b>	<b>Location</b>
1972	<b>E R Garden</b>	Deceased (1999)
1990	<b>R M McLeay</b>	Retired, Christchurch
1990	<b>G S Beca</b>	Deceased (2001)
1992	<b>Steve Gentry</b>	Retired, Wellington
2001	<b>Alec McCulloch</b>	Retried, Auckland
2012	<b>Ken Shores</b>	Retired, Auckland
2012	<b>George Butcher</b>	Retired, Masterton
2012	<b>Ian Fraser</b>	Retired, Wellington
2012	<b>Murray Spicer</b>	MacDonald Barnett, Auckland
2012	<b>Adam Thornton</b>	Dunning Thornton, Wellington
2012	<b>Arthur Park</b>	Clendon, Burns & Park, Wellington
2012	<b>Don Houchen</b>	Deceased (2013)
2012	<b>Enrico Vink</b>	FIDIC, Switzerland
2016	<b>Allan Leahy</b>	Stantec, Auckland
2016	<b>Andrew Charleson</b>	Victoria University (Retired), Wellington
2016	<b>David Bridges</b>	Good Earth Matters, Palmerston North
2016	<b>Peter Riley</b>	Riley Consultants (Retired), Auckland
2016	<b>Bob Nelligan</b>	RJ Nelligan, Auckland
2016	<b>Ernst Sansom</b>	Melrose Property Consultancy, Auckland
2016	<b>Gavin Still</b>	GA Still (Retired), Auckland
2016	<b>Ray O'Callaghan</b>	O'Callaghan Design, Wellington
2016	<b>Stephen Jenkins</b>	Aurecon, Wellington
2016	<b>Andrew Read</b>	Pedersen Read, Christchurch
2016	<b>Brent Meekan</b>	Beca, Auckland
2016	<b>Graham Chapman</b>	AECOM, Auckland
2016	<b>Lyall Green</b>	Design Management Consultants, Hamilton
2017	<b>Keryn Kliskey</b>	WSP Opus, Auckland



## 2019 | Life Member

**Alistair Cattanach, Dunning Thornton Consultants**

Alistair is a director at Dunning Thornton Consultants, and has over 20 years of structural engineering experience in New Zealand and the United Kingdom. He has an unrivalled reputation for structural flair with particular skills in innovation, strategic planning, complex analysis, low-damage design, timber structures and heritage engineering. He has provided notable industry input into areas as diverse as base-isolation, timber design, seismic assessment, heritage refurbishment, modular structures and environmentally sustainable design.

Alistair has a long history of ACENZ involvement, most notably over the past 15 years as an INNOVATE judge. It is for this commitment to the industry and the recognition of his peers through the awards process that ACENZ awarded life membership.



## 2019 | Life Member

**Brett Harries, Stantec**

Brett graduated from Auckland University in 1982 with a BE in Civil Engineering and joined the Traffic Design Group initially as a staff engineer, becoming joint managing director in 2001. Following the acquisition of TDG by Stantec in 2018, he is currently Australasian transport sector leader – private development. He is passionate about the contribution transportation makes to community wellbeing and this is reflected in his specialities of transportation planning and engineering.

His contribution to ACENZ and the wider profession is outstanding. Brett has been a judge for the ACENZ Awards of Excellence for the last 15 years. This role has occurred along with involvement with the ACENZ Transportation Group, and the ACENZ Large Firms Forum. Brett is an Engineering New Zealand practise assessor and Transportation Group Auckland co-chairman, and is currently working with Auckland University's Engineering School in helping to evaluate and shape the Civil Masters programmes, and contributes guest lectures for the MEngSt (Transport) course. He is highly respected by his peers and his contributions are always quietly delivered in a reasoned, considered manner with humility and humour. People listen when Brett speaks which is the ultimate accolade. His contribution is outstanding.

# Future Leader Award

## About the award

Introduced in 1998, the award was established to recognise and acknowledge the future leaders of our industry. ACENZ aims to empower young leaders and equip them with the management tools and training through the experiences of this award. The winner and finalists for this award have been identified as possessing a high standard of leadership abilities and great potential to be game changers within our industry. This award has been jointly sponsored by ACENZ and Tonkin + Taylor since 2015. We also want to thank our judging panel including Samir Govind (Beca - past award recipient), Rachel Wright (RS Eng), Jenson Varghese (MRCagney - past award recipient), and Doug Johnson (Tonkin + Taylor).

## About Tonkin + Taylor

Tonkin + Taylor is an employee owned, New Zealand environmental and engineering consultancy that provides innovative, cost effective and sustainable solutions for a diverse range of clients. T+T has a strong reputation for technical excellence in the following discipline areas, civil, environmental, geotechnical and water resources. T+T are the proud sponsors of the award for young professionals in the built and natural environment.

## Winner + finalists

Chris Maguire, Stantec

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Rebecca McMahon, Beca

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Steve Roskruge, Beca

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## Winner | Future Leader Award

**Chris Maguire, Stantec**

Chris intuitively understands how to best harness resources to deliver client needs. As the South Island group manager for water and industry, he leads nearly 100 engineers and associated professional services across six offices. His multidisciplinary team (comprising civil, 3 waters, structural, geotechnical, asset management, GIS, electrical and mechanical) services over 100 clients from private industry to local, regional and national government.

A trained project manager and civil engineer, Chris brings in-depth understanding of local government processes and first-hand experience of earthquake disaster recovery and resilience. Chris is experienced in change management and believes in the power of

addressing difficult conversations to enable change. His passion is developing people and sees his success in enabling others to achieve their goals.

Also experienced in business development and commercial management, Chris's focus is on building relationships and providing true customer service while sustaining and growing the bottom line. He is a past chair of Engineering New Zealand, Canterbury branch. Chris was the winner of the 2015 IPWEANZ Hynds Paper of the Year and a finalist in the NZEE Young Engineer of the Year 2013.



## Finalist | Future Leader Award

**Rebecca McMahon, Beca**

Rebecca is a geotechnical engineer for Beca, based in Nelson. After graduating from the University of Canterbury in 2012, Rebecca spent some time working in Fiji, as well as on a range of projects around New Zealand. From 2016 to 2017 Rebecca completed a Master's degree in Civil Engineering as a part-time student at the University of Auckland. This study was an earthquake engineering research project titled 'Nelson-Tasman Site Characterisation Study', which explored the dynamic site response of local geological formations. Currently, Rebecca is working on the NZTA Takaka Hill 5 Major Sites Remediation project. As the deputy team lead, this project requires her to help coordinate and lead people from a range of disciplines and from offices located around New Zealand. Rebecca is the treasurer for the Engineering New Zealand Nelson-Marlborough branch and has a keen interest in outreach activities, engaging with schools and community groups. In particular, she is passionate about broadening students perception of engineering career-paths and organising events that help to connect industry with the next generation of engineers.



## Finalist | Future Leader Award

**Steve Roskrug, Beca**

Steve is a senior associate at Beca and is manager of the 110-strong Auckland building services division. His recent projects include leading the building services for ANZ's retail portfolio, leading all engineering services for AUT University's Mayoral Drive project currently in design and the recently completed Mana Hauora building at the South Campus. Steve is also the client relationship manager for AUT University and is responsible for bringing together a team from the best of Beca to respond to AUT's built environment needs. Steve has managed the Auckland building services team for 18 months, a team with diverse technical expertise (mechanical, electrical, specialist lighting, ICT, fire engineering, plumbing and drainage, fire protection) who service an even more diverse client base, and is responsible for the daily operations including development of staff, resourcing for projects, recruitment and financial performance of the division. Steve obtained his BE in 2008 from the University of Auckland and graduated in the 2016/17 cohort of the Committee for Auckland Future Leaders Programme.



# Student Award

## The AECOM ACENZ Best Practical Work Report Award

### About the award

The student award was introduced by ACENZ in 1996 and highlights the importance of written communication, which is essential in the business of consulting and engineering. AECOM is pleased to sponsor this award jointly with ACENZ since 2015. Fourth year engineering students are invited to submit their practical work report as part of the Bachelor of Engineering Degree prescriptions, which are then judged on report writing and the student's ability to describe the work they carried out and their experience gained. We want to thank our judging panel Mike O'Halloran (Mott MacDonald), Craig Davidson (AECOM), Rob Holland (RJ Nelligan & Associates), and Theodore Carlos (AECOM - past award recipient) for their contribution to the award process.

### About AECOM

AECOM is built to deliver a better world. They design, build, finance and operate infrastructure assets for governments, businesses and organisations in more than 150 countries. As a fully integrated firm, AECOM connect knowledge and experience across a global network of experts to help clients solve their most complex challenges. From high-performance buildings and infrastructure to resilient communities and environments, to stable and secure nations, their work is transformative, differentiated and vital. It is the fusion of AECOM's global reach with local knowledge that enables their New Zealand team to deliver innovative solutions, technical excellence and support the nation's growth.

### Winners

Will Meng, University of Auckland

Kurt Haywood, University of Auckland

Helena Li, University of Auckland

WITHOUT  
LIMITS

AECOM

# SENTIMENT

## INFRASTRUCTURE AND BUILDINGS CONSTRUCTION SURVEY NEW ZEALAND 2019

As a nation, New Zealand is looking towards a new era of growth. The way we plan and build our cities and regions is a key part of this. For the past 10 years, AECOM has surveyed the market to provide the industry with in-depth insights to meet the challenges ahead. Our 2019 Sentiment Report is out now.



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# 10

10<sup>th</sup> Anniversary Edition



# About the INNOVATE Awards

The INNOVATE Awards of Excellence showcase and celebrate outstanding consulting service or innovative practice which raises the profile of the industry in the built and natural environment. All the winning projects have demonstrated excellence in either innovation or superior consulting service.

The INNOVATE Awards differ from others as the projects are evaluated individually on the merit of each project alone, so there may be more than one award in any of the given categories or none at all.

A project is not awarded a prize (being gold, silver or merit) for simply being a good project. The work, technology,

service, and innovation must go above and beyond what is considered standard operating procedure for the industry. Often winning projects help to instate a new industry norm, which constantly challenges professionals to become better at consulting for clients and the public good.

This in turn helps the profession to grow, continually pushing the boundaries of what is accepted as standard practice or what is determined to be outstanding work in the consulting or engineering field.

The awards are about more than just business as usual or doing a good job. Consultants should be delivering a good job as a part of the standard. Winning is about producing an above and beyond result and setting a new standard of practice for the industry.



## Convenor's Message

**David Bridges, Good Earth Matters Consulting**

The awards bring together the very best projects that our members are undertaking and provides the opportunity to showcase the contribution of our profession to the natural and built environment. The depth and breadth of the projects this year is breath-taking and ranges from landscaping, tunnelling, cycleways, road safety, heritage bridges and roading through to iconic buildings.

It is a privilege to share these outstanding projects with you and note that each possesses common elements which make it outstanding. Firstly, there is an outstanding client who has given the consulting team space to excel, secondly a consulting team who have seized the opportunity to go "above and beyond" to deliver the project, and thirdly a commitment to "making a difference". This is achieved through

a strong collaborative framework involving the client, contractors, stakeholders and consultants.

The INNOVATE Awards are an opportunity for the profession to showcase its work to a wider audience. I ask that you stand tall, speak with pride and share this celebration of excellence with your colleagues, friends and neighbours.

I wish to acknowledge the contribution and dedication of my fellow judges and their willingness to take time out of busy schedules. It is a privilege to welcome new judges to the panel and I applaud the professionalism and contribution they have brought to the table. Lastly, I wish to thank all the entrants for sharing their projects with us and congratulate the winners.



# The Process

What many don't fully realise is just what an intensive judging process the INNOVATE Award entries go through. It is by far one of the most thorough and rigorous award processes in New Zealand.

Written submissions are entered annually around March, each addressing a standard set of criteria and highlighting what the entrants feel is the most special or meritorious aspect of their projects.

From there, the convenor reads each submission to assess which skill set will be most needed to evaluate the project to the highest of standards in a particular discipline. The entire judging panel is composed of 25-35 judges in an array of specialist and general engineering

experience. Our panel combined holds close to 1000 years of experience and expertise to contribute to the evaluation of projects.

Each project is then assigned a specific judges team of 4-6 people including one lead judge, one judge, and up to four readers for each project.

The teams then investigate the written material of each project, often conducting client interviews, and where appropriate interviews with the lead contractor and sometimes principal. The lead judge and judge often conduct a physical site visit of the project to further investigate the meritorious aspects of the submission. This preliminary evaluation period can last several months and culminates at a final

judges meeting where the full panel of 25-35 judges come together in one room over two days to debate and test the meritorious aspects of each project. The judges consider what the current industry standard or "norm" of delivery is and considers if these projects elevate the industry standard or have provided exceptional and superior consulting work. It's not good enough to just be good, but winners provide exceptional consulting work for their clients.

This robust process is what keeps the INNOVATE Awards as the pinnacle awards programme in the consulting and engineering industry.



# The Panel

## 2019 INNOVATE Judges

Steve Abley, David Bridges (Convenor), Tim Brook, Andrew Brown, Alistair Cattanach, Andrew Charleson, Win Clark, Simon Drew, Andrew Field, Brett Harries, Ben Holland, George Homan, Rebecca Jackson, Allan Leahy, Stanley Lee, Jodi Leeves, Angus Macdonald, Trevor Matuschka, Brent Meekan, Richard Neate, Bob Nelligan, Sandra O'Brien-Kelly, Ray Patton, Andrew Read, Murray Spicer, Matt Spooner, Nathanael Sterling, Nigel Stevenson, Adam Thornton, Jeremy Trevathan, Scott Vaughan, David Voss, Tania Williams, Ashley Wilson, Cam Wylie.

# The Community Award

## About the Community Award

The Community Award was introduced in 2003 for those projects entered into the INNOVATE Awards which show an outstanding community input. Often the meritorious aspects are the community or group's involvement (sometimes even a physical contribution) towards the project outcome. The award is not necessarily an annual award and only made when truly excellent community effort and achievement is prevalent. Since the award's inception, only six Community Awards have been made.

Past Community Award Winners:

- 2017 Taumanu Reserve (Onehunga Foreshore)
- 2016 Sumner Surf Life Saving Club Clubhouse Rebuild
- 2010 Waka & Wave Sculpture at Hihiaua Point
- 2007 Weavers Pit Rehabilitation
- 2004 Cambridge CBD Redevelopment
- 2003 Gore Multisports Centre





## Tūranga - Christchurch City Library

Presented to the people of Christchurch, Christchurch City Libraries Leadership Team, and Christchurch City Council and Matapopore Trust

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At the opening of Tūranga in October 2017, the Mayor of Christchurch, Lianne Dalziel stated:

"What I love about Tūranga is that the people of Christchurch helped co-design it. The community contributed nearly 2500 ideas that helped shape the vision for Tūranga during the highly successful "Your Library, Your Voice" campaign in 2014. Many of those good ideas have now literally taken shape inside the finished building – and what an incredible building it is."

It is a testament to the involvement of the people of Christchurch, the commitment of council officers, particularly the CCC library leadership team and the willingness of the consulting team to embrace community ideas that such an outstanding library has been delivered.

Tūranga is the new five storey, central library in the heart of Christchurch and is now the

largest public library in the South Island. It is one of nine anchor projects that are crucial to the redevelopment of the city and is the only anchor project that actively sought stakeholder and community input. AECOM, as project manager, recognised the importance of community input and worked diligently to incorporate feedback into the project.

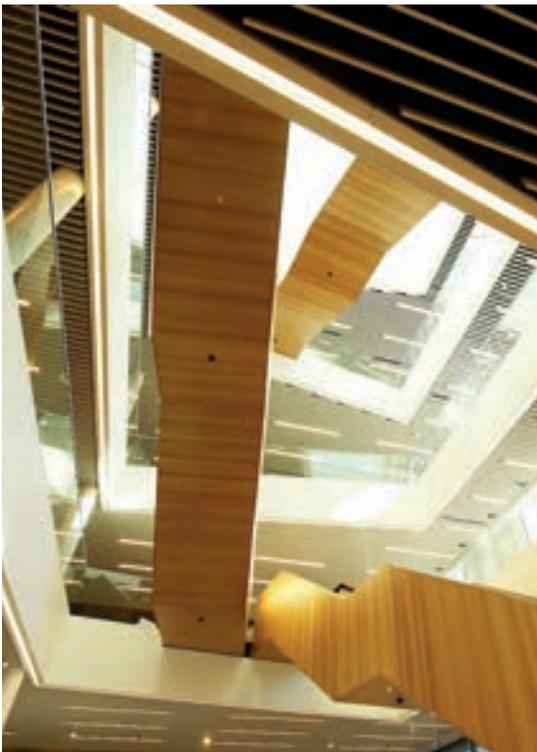
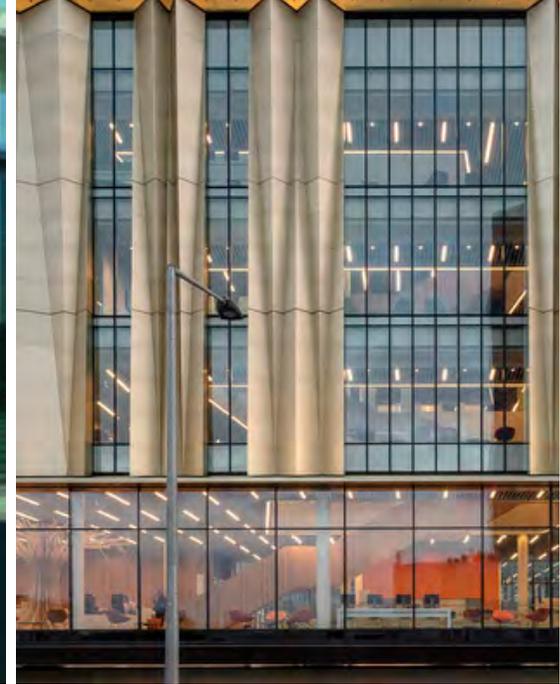
It's a visually stunning symbol of hope, unity and rebirth that shapes the way residents and visitors experience Christchurch's City Centre. Tūranga celebrates diversity and culture, creating a social hub for information, innovation and entertainment.

The design process involved consultation with librarians, local iwi, community members, surrounding businesses, the Ministry of Education, social services, residents'

associations and the national library.

The "Your Library, Your Voice" campaign shaped the guiding design principles for the project alongside the contribution from key stakeholders who called for a cultural hub in the heart of Christchurch. The project also needed to support a strong sense of place, encourage the regeneration of Christchurch and add value to the surrounding area. The collaboration of the consultants AECOM and Lewis Bradford Consulting Engineers, contractor, Southbase Construction and architect, Architectus, working together in response to the feedback has helped bring the community's vision to life.

The truly outstanding outcome and the community driven process that has shaped the facility make Tūranga a worthy recipient of a 2019 ACENZ Community Award.



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# The Gold Awards

The premier award is the Gold Award of Excellence. This award acknowledges a superior project for innovative achievement or setting a new industry precedent. It also is awarded for outstanding consultancy service to the client which goes above and beyond good service delivery.

20 Customhouse Quay

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Waterview Connection

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Watercare Mangere Wastewater  
Treatment Plant BNR Upgrade

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Waitangi Wharf Upgrade Project

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## 20 Customhouse Quay

Dunning Thornton Consultants for 20 Customhouse Quay LP | WELLINGTON

The 2013 Cook Strait earthquakes badly damaged BP House in Wellington, and Dunning Thornton Consultants were approached to design a new office tower for the site. The client requested a 16-level tower with very efficient floor plates and an “iconic” architectural form. The objectives were to design a building that is seismically resilient with the retention of the original basement. The design process required a thorough research phase to establish a methodology for this unique design within a New Zealand compliance pathway.

A base-isolated building of this height had not been constructed in New Zealand previously and while the use of tubular diagrid frame is not unique in this country, combining both in one building was a first for New Zealand. The development and implementation of this system sets the engineering design apart as a unique innovative solution.

Challenging factors included basement considerations regarding seawater and the flooding risk, and there were many joint points in this tall, steel structure each requiring detailed design and coordination.

20 Customhouse Quay was designed to 180 percent of the current building standard, incorporating simplistic elegance while undertaking strong leadership to ensure the project was completed successfully. Dunning Thornton Consultants applied significant technical skill and innovation to deliver this new benchmark for New Zealand high-rise office design. This is a very high-quality building, and their contribution received glowing praise from the client, contractor, peer reviewer and architect.





## Waterview Connection

**Well-Connected Alliance (composed of NZ Transport Agency, Fletcher Construction, McConnell Dowell, NSP Opus, Beca, Tonkin + Taylor, and Obayashi Corporation) for NZ Transport Agency | AUCKLAND**

The final link in Auckland's Western Ring Route was the \$1.4b Waterview Connection Project. This project joined SH16 and SH20 with 2.4km twin tunnels, associated motorway and ramp infrastructure and established a significant number of community facilities. The project involved vast amounts of resources including a workforce of 250 designers, around 1000 workers and over 8000 drawings.

The tunnel excavation utilised a single tunnel boring machine (instead of two), which involved turning the 87-metre-long behemoth 180° after the first drive. There was just 150mm to spare while the machine was being turned. This is a process that is relatively uncommon on tunnelling projects. The project also included the construction of six road bridges, four interchange viaducts, seven

pedestrian bridges, and a wide array of land retention solutions. Positive innovations for the community included the rehabilitation of Oakley Creek, the completion of 20 hectares of ecological work and plantings plus the construction of basketball courts, playgrounds and skateparks.

The excavation and retention of the geotechnically complex southern approach trench was another significant achievement, overcoming the potential risk of impacting an aquifer, notably without the consenting requirement of a grout curtain. Against a backdrop of critical path pressure, the team initiated extensive additional evaluation, modelling and assessments resulting in a cost saving of \$5m.

The Well-Connected Alliance completed the county's largest roading infrastructure project in 2017 and included a raft of innovative approaches which resulted in substantial cost savings and exemplar outcomes across many different groups. As an incredibly complex and large-scale project, the risks were well managed, and the alliance delivered a high-quality outcome. This project has had a major impact on the New Zealand engineering profession, garnering public recognition and confidence for the industry to tackle mega infrastructure projects. The alliance delivered exceptional outcomes through considerable cross-discipline complexity, high public scrutiny, unparalleled scale, and at the core, incredible consulting delivery.





## Watercare Mangere Wastewater Treatment Plant BNR Upgrade

CH2M Beca for Watercare | AUCKLAND

The Mangere Wastewater Treatment Plant upgrade is a \$144m development that was designed to address current and future population growth in Auckland. This is the largest single-site capital works delivery of wastewater infrastructure in New Zealand since Project Manukau was completed in 2000.

CH2M Beca were engaged for the life of this complex multi-disciplinary project from concept through to construction management and commissioning. There were four early works construction contracts, four supply contracts and the main construction contract with elements of design-build. An international team was engaged from June 2013 to September 2014 and delivered more than 40,000 hours of design and procurement work in four countries.

The construction phase, from October 2013 to October 2017, involved over 2500 staff and more than a million hours on site. The commissioning phase was completed in March 2018 after six months of testing with flows of up to 2 m<sup>3</sup>/s.

To accommodate the upgrade of the plant, land to the south of Island Road was redeveloped, a 2km section of Watercare Coastal Walkway was relocated as part of the Te Arorua Trail, and a new 530-metre road was built to replace the eastern section of Island Road. This new road provides access to the public areas of Puketutu Island, public walkways and the coastal walkway.

The project was both technically and contractually very complex and the consultant effectively brought together their own teams,

the client's team, a range of stakeholders and a number of contracts including a design-build component to achieve a great outcome. They maintained a collaborative and productive relationship with the client throughout. With thousands of hours of design work from multiple disciplines and international expertise, CH2M Beca wove all the varying inputs together, including a wide array of stakeholders and suppliers, to keep this very complex project on track. The consultant's high-quality management and excellence of consulting service was the hallmark of success for this project.





## Waitangi Wharf Upgrade Project

NZ Transport Agency, HEB Construction, Downer, Tonkin + Taylor and AECOM for the New Zealand Department of Internal Affairs | CHATHAM ISLANDS

The Waitangi Wharf is the Chatham Islands' only cargo-handling facility for exports and essential supplies. The wharf was near the end of its structural life and had significant operational constraints that were hampering its ability to continue as a vital lifeline for the community. The project was to make shipping more reliable, improve the health and safety of the wharf operations and future-proof the wharf for the community's expanding export and production requirements. It encompassed the construction of a 163m long breakwater and the reclamation of 9500m<sup>2</sup> of land that would be suitable for new buildings, stock transfer and holding areas, a bio-security area and cargo storage along with new commercial and fishing wharves. A 10,700m<sup>2</sup> area of the harbour and surrounding seabed was to be dredged to

improve berthing for vessels, the establishment of two quarries for reclamation fill and breakwater armour, and establishment of a concrete batching plant. The batching plant was necessary due to the limited availability of local rock suitable for armour stone, the solution to this was an innovative breakwater design featuring single layer, interlocking Xbloc concrete armour units to be used for the first time in New Zealand.

The project progressed from concept design, through consenting and detailed design within 12 months; an extremely tight timeframe for a project of this scale and complexity. The designers, AECOM and Tonkin + Taylor, began the project with no preconceived ideas about the design but undertook extensive

community engagement throughout the process. This enabled smart solutions for the all-weather wharf.

The remoteness of the Chatham Islands added logistical constraints to get material and equipment in place and to manage waste which lead to the implementation of a zero waste solution to ensure that all demolished material was re-used. Decision making during the project always came from the standpoint of "how can this decision make a better community outcome." This project is an outstanding example of a smart and elegant consulting service. So much so, that it has re-shaped the way DIA projects will be evaluated and expected to perform in the future.



# Are you adequately insured?

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# The Silver Awards

The secondary award is the Silver Award of Excellence. This award acknowledges projects that clearly demonstrate an outstanding achievement and service to the client. It is also awarded for smart and innovative technology or project solutions.

Safeswim

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Richmond Terminal Station Upgrade

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Moving Mountains to  
Reconnect Communities

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Tūranga

---

Safer Journeys Risk Assessment  
Tool (Mega Maps)

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Mason Bros. Building

---

PwC Centre - Wellington Waterfront

---

Rehua - University of Canterbury





## Safeswim

Mott MacDonald for Auckland Council | AUCKLAND

Auckland Council's Safeswim water quality programme was originally implemented in 1995 to raise public awareness of the current level of bathing risk at beaches around Auckland. A review of the programme in 2016 identified several limitations and a lack of leverage of recent advancements in data management, modelling analytics, and communication technology. One of the major challenges for the programme was managing significant volumes of streaming real-time data from multiple sources (over 1 billion data points per day) and integrating this with existing models, machine learning algorithms and big data analytics.

Mott MacDonald together with Auckland Council, Watercare and several stakeholder and supply chain organisations based the project development on Mott MacDonald's Moata middleware platform. The platform had previously been developed in New Zealand and was adapted to integrate existing technologies into a common digital environment. The platform has allowed for online technical collaboration that has resulted in significantly improved predictions, a better understanding of water quality and the associated risks of bathing at 84 Auckland beaches and significantly raised public awareness of water

quality issues. The new system has over 80 percent accuracy, whereas previously, 10 percent accuracy was normal.

A key objective of the programme was to highlight the issues associated with ageing water infrastructure and generate public support for the investment required to improve water quality. Feedback on Mott MacDonald's contributions to the project from Auckland Council included the team's responsiveness as the project was adapted to include changing needs and requirements, their willingness and ability to work with the many other organisations involved and their best for project culture.



## Richmond Terminal Station Upgrade

Beca for AusNet Services | MELBOURNE

Richmond Terminal Station is one of the main points of power supply for central Melbourne and a very important node for the wider metropolitan area. A seven-year upgrade began when a need to replace and upgrade most of the 220 kV, 66 kV and 22 kV equipment was identified. The station was already overloaded making permission to hold outages very difficult to obtain and in the early stages, the scope of the job grew with the addition of a temporary 220/66 kV transformer.

Beca became involved in the project in 2009 when AusNet was seeking assistance to find a solution for what seemed an impossible

problem. They required a team which appreciated the importance of this project to the Melbourne region and was able to work comfortably with AusNet on a technically complex operation. The project's main challenges were the confined working space, a heritage building on the site, and major geotechnical and subsidence issues for the area. The changeover involved 18 major stages, which required considerable liaison to ensure multiple stakeholders were not disadvantaged. The project is currently in its final stage with all main new components commissioned and in service.

This was a complex project on a mission-critical site which included wide community consultation, to ensure businesses and residents in central Melbourne were kept informed of possible power outages. Beca delivered an elegant solution with excellent community engagement while developing a high level of trust between the engineers, planners, the procurement team and AusNet.



## Moving Mountains to Reconnect Communities

North Canterbury Transport Infrastructure Recovery Alliance (NCTIR composed of NZ Transport Agency, KiwiRail, Fulton Hogan, HEB Construction, Downer, Higgins, Aurecon, WSP Opus, and Tonkin +Taylor) for NZ Transport Agency | KAIKOURA

Roading infrastructure suffered greatly on 14 November 2016 when a 7.8 magnitude earthquake struck 60km south-west of Kaikōura, damaging 194 kilometres of the road. There were 85 landslides, 1500 damaged sites on State Highway 1, 220 rail sites, and 20 tunnels also damaged on the Main North rail line. Since then, Aurecon, WSP Opus and Tonkin + Taylor have led the professional services team on a massive programme of repairs that included resilience and safety improvements. They have provided multi-disciplinary engineering design services, environmental and stakeholder relationship management, RMA planning, and construction phase support.

This was a challenging project as there were no historical drawings of the affected areas – only photographs were available. The project team deployed aerial drones to scan the land surface, with the images used to develop a 3D model of the quake-affected area. The 3D designer worked closely with the team to allow ‘real-time’ adaptation of the model as slips and other issues were cleared. The rail line was open to freight trains just ten months after the quake and motorists were able to use SH1 after just one year, one month, and one day.

The consultant teams worked integrally with the construction crews to clear massive landslide debris under dangerous and trying

conditions. Together the Alliance developed safe, resilient and efficient solutions throughout the project while respecting the unique coastline which is rich in cultural, ecological and environmental history. The team’s ‘just get on with it’ mentality and empowerment to achieve and advise on the spot literally moved mountains to re-connect communities. This project was an outstanding achievement of collaboration, commitment and engineering excellence.



## Tūranga

Lewis Bradford Consulting Engineers for Southbase Construction | CHRISTCHURCH

Tūranga is the new five storey, 9850m<sup>2</sup> central library located in the heart of Christchurch's Cathedral Square and is now the largest public library in the South Island. It was obvious from the beginning of the design process that something special was going to be required structurally to achieve the performance targets set for the building while preserving the architect's aesthetic vision and meeting the demanding budget constraints.

Lewis Bradford developed an innovative structural design that includes modern low-damage technology which will sustain minimal structural damage during a large earthquake. It includes an inbuilt self-centring mechanism

to return the building to its original vertical position following major shaking. Seismic energy absorbing mechanisms have also been installed to increase seismic energy dissipation and to ensure the building moves in a controlled manner. Several other innovative solutions eliminated the need for a traditional basement and the original requirement for a perimeter fluid damper structural bracing solution.

This design provided the architect with clean, unencumbered external elevations, which were important during the development of the building's stunning façade design. The structural system includes a long span floor

system and feature atrium stairs, which contribute to a breath-taking and important community asset.

In an eight-week competitive design and build tender timeframe, Lewis Bradford took the proposed uneconomic design and transformed it with innovative structural systems using a wide range of different materials. The company employed robust consultation practices with both the contractor and other consultants to achieve an exceptional outcome.



## Safer Journeys Risk Assessment Tool (Mega Maps)

Abley for NZ Transport Agency | NEW ZEALAND

NZTA had undertaken an extensive search of international best practice to discover if there was a network-wide assessment approach that would provide a more consistent way of applying speed management across New Zealand. They found that, while there are many assessment frameworks internationally, they are designed to be applied on a road-by-road basis rather than a network-wide level. Subsequently, it was decided that NZTA's existing Infrastructure Risk Rating (IRR) system should be redeveloped from the ground up to provide a more robust and usable package.

Abley began the development project by utilising existing data points and then developing a geospatial tool that would better utilise the data. The resulting platform, Mega Maps, combines physical and operational transport data along with land use information from an array of sources using complex analytical modelling methods. It then identifies road segments where speed management measures should be prioritised to reduce road trauma and give effect to government policy.

The application of a proactive road risk assessment process over the entire road network of New Zealand is unique nationally and globally. The work is an integral step in the process to establish safe and appropriate speeds on New Zealand's roads and move towards the national road safety vision of a road network free of death and serious injury. NZTA has described this tool as an integral step in establishing safe and appropriate speeds in a consistent manner across the whole of New Zealand's road network.



## Mason Bros. Building

Mott MacDonald for Precinct Properties | AUCKLAND

The Mason Bros. building in Auckland's Wynyard Quarter was built in the 1920s. In 2016, current owners Precinct Properties embarked on a redevelopment project that aimed to deliver a modern, high-quality structure and support the Wynyard Quarter's Sustainability Standards. The designers were tasked with meeting the owner's long-term operational efficiency parameters while delivering a structure that was durable, flexible and provided an enhanced amenity for its tenants.

Mott MacDonald was appointed as the building services, façade and sustainability consultant and led a team from Warren &

Mahoney architects along with members of a wider consultancy group. The resulting 5700m<sup>2</sup> three-level workplace is now a key part of the Wynyard Quarter Innovation Precinct and has been awarded a 6-star Green Star As-Built rating. It is one of only three buildings in New Zealand to receive the rating and the first in over five years. It also has a 5.5-star NABERSNZ base building rating, which acknowledges a 60 percent energy reduction compared to standard offices. This is the only building in Auckland to achieve the NABERSNZ rating and one of only five in the country. The building has been independently verified as

having achieved a 50 percent reduction in global warming potential in construction and operation.

The owners wanted the building to meet existing sustainability requirements, but Mott MacDonald has gone above and beyond design delivery, resulting in an 8 percent improvement in occupant productivity and a 20-25 percent reduction in absenteeism costs. The consultants exceeded expectations and delivered not only smart solutions, but excellent consulting work.



## Rehua—University of Canterbury

Holmes Consulting for University of Canterbury | CHRISTCHURCH

The University of Canterbury Commerce building suffered significant damage during the 2011 Canterbury earthquake sequence. The seismic retrofit of the building was a complex and challenging project, with the assessment and retrofit design phase being undertaken between 2014 and 2016.

A preliminary assessment by Holmes Consulting identified that a preferred weak-beam strong-column mechanism was reliable up to the 1000-year return period for design ground motion. However, the complex offset configuration of the building plan and the flexibility of the existing structure required intensive 3D non-linear time history analysis to adequately capture and understand the interaction of the

key structural weaknesses. A combination of introduced fluid viscous-damped steel frames and buckling-restrained brace steel frames provided significant storey drift reductions. Under Ultimate Limit State seismic demands the maximum storey drift of the structure was reduced from 5 percent, more than twice the Code limit, to a final peak of 1.5 percent. This reduction in deformation was a key element in mitigating the life-safety hazard associated with precast hollowcore floor support loss through much of the building. This is a seismic vulnerability that has been widely noted in many New Zealand buildings following the Christchurch and Kaikoura earthquakes and is an ongoing focus of research.

This project has provided a comprehensive example of how ductile reinforced concrete moment-frames with precast floor systems, a seismically vulnerable but common form of structure throughout New Zealand, can be successfully retrofitted to meet and exceed current Building Code performance requirements. The newly strengthened building, now named 'Rehua', provides leading-edge facilities, featuring large flexible learning spaces and advanced technology—a focal point for UC and a state-of-the-art facility for its many students.



## PwC Centre - Wellington Waterfront

Dunning Thornton Consultants and Tonkin + Taylor for Willis Bond & Co. | WELLINGTON

Willis Bond & Co were the developers of a key site on Wellington's waterfront where they wanted a new building constructed that would become an architectural landmark, would meet unusually high levels of life safety and enhance the waterfront public space. With this design brief, the engineering design team of Tonkin + Taylor and Dunning Thornton Consultants embraced a collaborative design approach. They set out to deliver a building that would perform above and beyond typical Building Code requirements for an office building in Wellington and at a level that is usually only required for hospitals and essential facilities.

The design had to withstand an extreme 2500-year seismic event and had to respond or mitigate the natural hazards of the reclaimed waterfront site including liquefaction, lateral spread, sea level rise and tsunamis. The project team selected a solution comprising of base isolation supported on stiff, effective ground improvement. Several conventional foundations and ground improvement options were assessed and dismissed due to significant constraints near the site, including a major road on one side and a heritage seawall on the other. The concept of ground improvement by a cellular structure of in-ground walls was developed as

an integrated design; mitigating the identified natural hazards, providing support and water cut-off to the basement excavation and providing a stiff foundation system.

Dunning Thornton Consultants and Tonkin + Taylor incorporated other innovative structural solutions within the project, but it is the highly integrated foundation and ground improvement system that makes this project a unique engineering solution.

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# The Award of Merit

An additional award, called the Award of Merit, recognises projects or achievement that demonstrate a standard above that normally expected to be provided. These winners also excel in either innovative project works or great consulting services.

Temaiku Land and Urban Development - Feasibility Investigations

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AUT Mana Hauora

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New Brighton Pier Repair Temporary Works

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Pukete Wastewater Treatment Plant Asset Information Model

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SH77 Rakaia Gorge No. 1 Bridge Deck Replacement and Seismic Strengthening

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Victoria on the River

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Innovating with Segmental Caisson Construction to Build a New Pump Station in Wellington's CBD

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## Temaiku Land and Urban Development - Feasibility Investigations

Jacobs for the Ministry of Foreign Affairs and Trade | SOUTH TARAWA

Jacobs was engaged by the Ministry of Foreign Affairs and Trade to undertake Land and Urban Development Feasibility Studies for a transformative land development on the island of South Tarawa. The studies were designed to assist with climate change adaptation while reducing land pressure and poor health outcomes for the islanders.

The investigation centred around whether the island could be redeveloped and improved to handle forecast population growth. An inspection of 14 potential sites resulted in one being selected as the best option for potential development and the feasibility study was built around this option.

The key innovations include a long-term resilience design using risk weighted criteria based on IPCC scenarios and site-specific hydrodynamic modelling. Water security would be enhanced with the design of an extended freshwater lens, utilising the project area and multiple civil and urban design features. A potential large-scale reclamation (300 hectares) and urban development on this scale is greater than anything undertaken in Kiribati or any other Pacific country and is a potential prototype for climate change adaptation efforts globally.

Working proactively with the Government of Kiribati and the local community, the urban design concept for up to 35,000

people encompasses walkable villages with a waterfront town centre and sustainable infrastructure design elements embedded throughout the site.

Jacobs work on this project drew worldwide attention to the robust expertise of New Zealand consulting engineers with a successful outcome delivered for MFAT and the people of Kiribati.



## AUT Mana Hauora

Beca for AUT University | AUCKLAND

AUT University's South Campus is the first and only university campus in South Auckland. The Mana Hauora project was the first major building in the masterplan which aims to transform the campus, boost the uptake of university education in the area, and accommodate AUT's needs for future flexibility and growth. The project was set sustainable drivers by client and design team which led to an integrated collaborative design approach that delivered a passive façade treatment, high comfort/low energy displacement ventilation system that can be implemented using no fossil fuels for central plant heating. The design also considers efficient future fitout flexibility, including safety in design principles.

Post occupancy building tuning services utilising Beca's B-Tune analytical software has been used to take building services data from AUT's South Campus in Manukau and combine it into one programme that could be used to identify where additional sustainability efficiencies could be made. With community and sustainability at its heart, the outcome is an integrated software package that can monitor, adapt, and quantify building services data. The project has resulted in all the available data being combined in one place, where it can be easily accessed, used and prompted for future savings and improvements.

Constant improvement on the original building design ensured Mana Hauora was already a low energy building, but through fine-tuning with Beca B-tune analytical service, a further 20 percent energy reduction has been achieved to date. Beca pushed the boundaries during this project with "out of the box" thinking that contributed to innovative and integrated solutions, which allow the client to quantify hard cost savings.



## New Brighton Pier Repair Temporary Works

Structex for Fulton Hogan | CHRISTCHURCH

The Canterbury earthquakes of 2010 and 2011 caused significant damage to the iconic New Brighton Pier. Plastic hinging of the columns at seabed level left the piles with less residual strength and susceptible to long-term corrosion issues up to six metres below sea level.

Structex's contract brief involved the design of the contractor's proposed temporary works, required to secure the site before permanent work could begin. The temporary work package consisted of constructing large steel cofferdams which would provide a safe, dry environment for the installation of the permanent jacketing. Project research

showed that this appears to be the first time that cofferdams of this scale have been used within the breaking wave zone anywhere in the world. This was a difficult site to secure, with waves, sand, changing weather, along with temporary plant and equipment – making for challenging conditions to accommodate in the design. The original plan required adaptation as sinking the casings into the seabed to seal the cofferdams became problematic in places due to encountering localised hard-shell layers. Structex were flexible and responsive in accommodating the changing requirements.

This project is an example of how working proactively and collaboratively with the contractor can be critical to solving problems. The development of a BIM model for the temporary works solution allowed the team to respond quickly as site changes were required. Despite the extreme environment adding a level of complexity, the 15-month project was delivered on time and under budget – an outstanding achievement in a difficult environment.



## Pukete Wastewater Treatment Plant Asset Information Model

Beca for Hamilton City Council | HAMILTON

The Pukete Wastewater Treatment Plant Asset Information Model project focusses on the complex problem of collecting, integrating and maintaining information about existing asset stock. The plan was to build a BIM system utilising the plant's existing data, update the data and upload the results to a cloud-based platform. The challenge that confronted the Hamilton City Council and Beca at the beginning of this project centred on accessibility, reliability and completeness of asset information and as-built records.

The solution proposed and implemented by Beca was to break down the problem into smaller, palatable chunks and address each component individually using a range of technologies. This included the use of unmanned aerial vehicles to capture site-wide geometry while laser scanners were deployed to capture building and asset geometry. The team used 3D modelling tools to develop a 3D model, and a web-based integration tool helped create the asset information model. Mobile devices were used to link the digital assets to barcodes on their physical asset counterparts.

This project utilised an unconventional application of BIM technology which paired the 3D model containing asset data with live SCADA information in a web-based environment so that the client could digitally walk through the plant and identify areas of slow performance or identify where any issues may be located.

The successful outcome of this project was due to the development of a high level of trust and collaboration between the consulting team and Hamilton City Council along with the clever way the data is now collated, presented, and used.



## SH77 Rakaia Gorge No. 1 Bridge Deck Replacement and Seismic Strengthening

WSP Opus for NZ Transport Agency | CANTERBURY

The Rakaia Gorge No. 1 Bridge on SH77 is a Category 1 Historic Place constructed around 1882. The 55m span 'Bollman-like' truss is recognised as unique in the world and is one of the oldest wrought iron bridges in New Zealand. NZTA commissioned WSP Opus to design a replacement deck for the bridge to ensure that the structure continued to be a safe and resilient transport route into the future. Access underneath the bridge deck was difficult, but this became an opportunity to undertake seismic strengthening works in parallel with the deck replacement.

During the design phase of the project, there were numerous complexities to be considered including the load capacity of the current structure, the heritage significance and seismic resilience of the bridge along with safety and traffic management of the worksite. An innovative approach was taken in the construction of the new deck through the incorporation of NiuDeck, with steel transoms, as an alternative to traditional hardwood transoms and deck planks. This technology is used throughout Australia, but it is the first time the product has been used on a state highway in New Zealand. A tight timeframe was imposed for the installation of the deck. An existing section of the bridge was removed overnight,

information about the new piece was collected, then the deck was installed, and the bridge opened for traffic again the next morning. The replacement deck is significantly lighter than the original deck, which reduced the extent of seismic strengthening required for the truss and has also allowed heavier vehicles to traffic the bridge.

WSP Opus sensitively balanced the potentially conflicting objectives of state highway operations and heritage preservation during this project. They refurbished the deck and provided seismic resilience while respecting the heritage significance of the structure and following conservation best-practice principles.



## Victoria on the River

AECOM for Hamilton City Council | HAMILTON

Victoria on the River is an amphitheatre-style park situated in the heart of Hamilton's central business district. It is a major part of the council's Central City Transformation Plan. Council had previously approved the development of elevated sections on the site which would provide a platform for the construction of apartments, cafes and restaurants. This left a pocket of space which had been earmarked for the development of a community park. A design contest was held which aimed to involve the public in the development of the facility, and the resulting design was developed by AECOM.

Before park construction commence contaminated land had been removed from the site, and retaining walls were incorporated into the design of the terraced sections. The park design included high-quality paving, complex terracing, bespoke furniture and lighting structures, boardwalks, decked areas, and planting for amenity, biodiversity and bank stabilisation. Not only does the park now offer fantastic views over the Waikato River, but it connects Hamilton's main CBD shopping precinct, Victoria Street, to the river path that has become a favourite for cyclists, walkers and runners.

AECOM was the lead consultant on the project, providing all engineering services, landscape architecture, project management, archaeological, contamination and planning services and worked with council on architectural finishes that would meet their budget. The park has been praised for its design, the high level of finish and accuracy, the selection of materials and its overall ambience.



## Innovating with Segmental Caisson Construction to Build a New Pump Station in Wellington's CBD

GHD for Wellington Water | WELLINGTON

GHD were engaged as part of Wellington Water's panel of consultants to provide investigation, design, tender and construction services for the new pump station at Dixon Street, Wellington City. The location selected by Wellington Water is a very tight location in the heart of Wellington City with significant traffic flows and in close proximity to vulnerable buildings. The pump station comprises a 9m diameter, 7m deep structure sunk 3.5m below the water table.

The consultant enabled an alternative design solution for sinking, using a segmented caisson system, being the first application of its type in New Zealand. This system offered significant advantages enabling a very tight footprint and particularly, providing "game changing" safety advances allowing excavation with no person access required. This proved particularly beneficial as unforeseen groundwater contamination was struck during the build.

The consultant is commended for the close and exemplary working relationship with the contractor and client, resulting in what will likely become the preferred method of construction for similar future installations in Wellington.

## Other Entries

These projects are quality work produced by our member firms and highlight the consulting and engineering industry well. Read on to learn more about the other projects entered into the 2019 INNOVATE Awards.

SH20A Kirkbride Improvement

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Automated Digital Engineering to Help the Government Solve the Social Housing Crisis

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Updated Driveway Design for Urban Cycleways

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Tirohanga Whānui Bridge

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SH1 Western Belfast Bypass

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Ellerslie Acoustic Barriers

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The Madden and Pakenham Streetscape Project

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Justice and Emergency Services Precinct Christchurch

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Tūranga - New Central Library

---

Branxholme WTP Upgrade

---

Kawarau Falls Bridge Approvals and Design

---

iFly Queenstown

---

EntX: Christchurch Entertainment Central

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Tafitoala-Fausaga and Faleata Hydropower Plants

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Wellington Water Supply Resilience Study

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Waterfront House

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Aorangi House Optimisation

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Wellington International Airport Multi-Level Car Park Building

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## Updated Driveway Design for Urban Cycleways

WSP Opus for Wellington City Council | WELLINGTON

Over the last four years, there has been significant investment in urban cycling in New Zealand, with \$330 million alone in the Urban Cycleways Programme.

A key challenge for designers of cycleways is taking them through commercial areas, where there are multiple, busy driveways. Even some of the best international urban cycle paths located next to roadways still face the challenge of being interrupted by multiple driveways, with implications for rider enjoyment, comfort and safety. The greatest risk to riders on dedicated cycle paths next to roadways comes from motorists accessing driveways. This accounts for around 60 percent of all cycle crashes.

This project delivered and evaluated a novel design treatment for driveways along the Hutt Road cycleway. The project integrated human factors psychology, smart traffic engineering, and novel behavioural data to deliver an optimised driveway design. The behavioural data and indicators provided proactive evidence of success without having to wait for a crash history. This showed an increase in driver yielding, slower speeds, more predictable cyclist behaviours, and a reduction in near miss conflicts. The value of the solution is evidenced by its wider uptake across other urban cycleways across New Zealand.



## Tirohanga Whānui Bridge

Aurecon for NZ Transport Agency | AUCKLAND

New Zealand's Tirohanga Whānui Bridge is an architecturally and visually striking 100m structure, spanning State Highway 1 in Albany, north of Auckland. The innovative design is an example of cutting-edge fabrication and erection methodologies with a three-dimensional hybrid truss.

The dual-purpose structure was funded through a partnership between Watercare and the NZ Transport Agency. During the design process, Aurecon developed highly interactive smart 3D models using their VizRT platform and Vive virtual reality headsets. The 3D model was used to give clients and community members a real-world view of what the bridge would look like once completed and aid design development through easily understood operations outcomes.

The collaborative design and construction of this bridge has made an enormous contribution to Auckland's pedestrian and cycling network and provided a great solution for the city's future water infrastructure needs. With guidance from well-known bridge architect, Jeff Wells, and the talented local Māori artist, Graham Tipene, Aurecon has delivered a bridge design that echoes the richness of Māori culture and one which will leave a lasting legacy for bridge design in New Zealand.



## SH1 Western Belfast Bypass

WSP Opus for NZ Transport Agency | CHRISTCHURCH

The Western Belfast Bypass (WBB) is part of the Christchurch City Western Corridor providing access to Christchurch International Airport and links to industrial and commercial centres in the north and south of the city. The WBB is part of the National Roads of Significance programme and is a new four-lane median separated 5km length of motorway bypassing Belfast.

Prior to the WBB, the existing northern accesses into Christchurch were experiencing significant congestion at peak times – causing delays for motorists and freight and reducing safety for all road users.

WSP Opus were engaged by the NZ Transport Agency to provide the detailed design, and monitoring, surveillance, and quality assurance for the WBB. The project comprised three major road overpasses, a pedestrian subway, continuous roadside and median safety barriers, and numerous drainage structures.

WBB was designed and constructed with careful consideration to ensure the route would fulfil its function of reducing traffic volumes, congestion, and improving public health and safety, while also blending with the existing landscape and having a low impact on the local ecological and hydrological environment. The well-thought out horizontal alignment and the overall design philosophy led to an elegant route being constructed safely and cost effectively.



## Ellerslie Acoustic Barriers

GHD for NZ Transport Agency | AUCKLAND

The Ellerslie Acoustic Barriers challenge the normal 'concrete jungle' expectations of highway infrastructure and reinvents what is normally seen as just a wall. The barriers not only serve an environmental purpose but also transform a vertical structure into a symbolic and sculptural piece of art which celebrates the area's rich history.

GHD was engaged by the NZTA to complete the design and construction of the acoustic barrier project. Johnson Witehira, the iwi appointed artist, and White Landscape & Urbanism worked together on the panel design and landscaping elements. Novare completed the structural elements and Fulton Hogan John Holland Joint Venture, Oxcon and CLL were appointed as the main contractors.

The project consists of nearly 1km of acoustic barrier, divided into three sections. There are 233 three metre high panels which have varied extrusion depths between 30mm and 60mm, and a concrete fibre cement footing which varies in dimension to fit the existing narrow corridor. The project required an innovative approach to stakeholder engagement, prototyping using 3D printing, special mould design to replicate the panel design and a new physical works contract arrangement to engage two main contractors to deliver this accelerated project. A noise level reduction of five to six decibels was achieved at a number of monitoring locations behind the acoustic barrier.



## The Madden and Pakenham Streetscape Project

Beca for Panuku Development Auckland | AUCKLAND

The Madden and Pakenham Streetscape Project forms stage three of the extensive Wynyard Quarter redevelopment on Auckland's CBD waterfront. With a capital value of \$13m and covering 1.3 hectares, urban designers LandLAB developed a scheme reflective of the high-end shared spaces previously developed in the Wynyard Quarter precinct. The design met the requirements of the Wynyard Precinct Urban Design Framework. Beca provided a range of engineering services, including civil and structural engineering.

The project has transformed the once contaminated, post-industrial streets into attractive environments that balance the needs of all users, provide important enabling site-wide infrastructure, catalyse redevelopment and provide a meaningful contribution to the public open space network of the Quarter.

Panuku Development Auckland aims to push the boundaries of sustainable design and stimulate innovation to make the waterfront a vibrant, attractive and interesting place to live and work. To strengthen the focus on the sustainability aspect of the design process, Panuku involved the ISCA (Infrastructure Sustainability Council Australia) and incorporated their IS rating scheme. This project was the first to adopt the IS rating tool and the first to achieve a design rating of excellent in New Zealand.



## Justice and Emergency Services Precinct Christchurch

WSP Opus for The Ministry of Justice | CHRISTCHURCH

The Justice and Emergency Services Precinct, Te Omeka, is a major Christchurch rebuild project and articulates design vision and aspirations of the Recovery Plan. The 42,000m<sup>2</sup>, \$340 million precinct houses eight justice and emergency service agencies and is the largest multi-agency government co-location project in New Zealand history.

Purpose-built to an IL4 standard with 72-hour emergency operations resilience, the precinct will be the nerve centre for Canterbury's future management of major emergencies. The project has achieved high standards of resilience, security, communications and technology requirements. A strong partnership was developed with iwi during the project design phase. This is unique, and their contribution to design elements is an outstanding feature of the facility.

The building services are controlled automatically through a sophisticated, highly intelligent building management system with extensive zoning capability, particularly in lighting and HVAC services. Novel seismic solutions for building services were developed and have subsequently been adopted for use at Christchurch Hospital and in California.

WSP Opus embraced the recovery plan vision and aspirations and captured key briefing requirements presented by the Ministry of Justice to successfully deliver a robust and resilient design solution that is now a leading innovative and energy-efficient building services project in New Zealand.



## Tūranga - New Central Library

AECOM for Christchurch City Council | CHRISTCHURCH

Tūranga is the new Christchurch City central library and is one of nine anchor projects that are crucial to the redevelopment of the city following the four major earthquakes. The five-storey 9850m<sup>2</sup> library took two and a half years to construct and is a visually stunning symbol of hope, unity and rebirth that shapes the way residents and visitors experience Christchurch's city centre.

The design process involved consultation with librarians, local iwi, community members, surrounding businesses, the Ministry of Education, social services, residents' associations and the national library. The information gathered from a public survey formed the guiding design objects. Stakeholders called for a cultural hub in the heart of Christchurch, which delivered free and equitable access to skills, knowledge and information. The project also needed to support a strong sense of place, encourage the regeneration of Christchurch and add value to the surrounding area.

Tūranga is the only anchor project that actively sought stakeholder and community input and then AECOM as project managers in partnership with Christchurch City Council and various other stakeholders proactively delivered on those requirements.



## Branxholme Water Treatment Plant Upgrade

Harrison Grierson for Invercargill City Council | INVERCARGILL

The Branxholme Water Treatment Plant (WTP) upgrade has replaced obsolete equipment, increased capacity and resilience, and reduced taste and odour issues in the treated water. The complex plant has two streams of flocculation, clarification and filtration running in parallel. The design, capacity, functionality and hydraulic grades of the process items within these two streams vary considerably creating challenges in controls and hydraulics.

A concept process design prepared by Lutra (formerly h2ope) was developed into a full detailed design for the plant. The implementation of the preselected process design on such a complex plant had to be carefully considered. The upgrade included installing a new pump station, backwash and washwater handling systems, UV reactor, and granular activated carbon filters designed to remove taste and treat odour. Branxholme is one of the first WTPs in New Zealand to use UV and hydrogen peroxide for taste and odour reduction.

Harrison Grierson's key influence on the plant performance was the integrated design of the challenging hydraulics and controls of the unique process units across the plant. They also ensured the design was developed, articulated and implemented to achieve all project objectives and allow uninterrupted operation of the existing plant.



## Kawarau Falls Bridge Approvals and Design

Jacobs for NZ Transport Agency | QUEENSTOWN

The new Kawarau Falls Bridge is a replacement structure located on the outskirts of Queenstown. A new bridge was required to reduce congestion, increase safety and provide more secure access into the Wakatipu Basin along with better walking and cycling facilities.

Jacobs was appointed to develop the 2-lane bridge design to a point where resource consents could be sought and notification of an alteration in the designation could proceed. Jacobs then completed the specimen design of the 252 metre-long, multi-span composite reinforced concrete and steel bridge. The design and planning processes were developed in parallel, meaning a quicker resolution of design and consenting issues. The Kawarau River is the subject of a Water Conservation Order, and it was paramount that the bridge was designed in an environmentally sensitive style while dealing with technical complexities and balancing the community and stakeholder requirements.

During the development of the detailed specimen, design of the bridge was changed from the original complex post-tensioned reinforced arched bridge to a steel I beam structure, which was quicker, easier and safer to build within the sensitive environment. The completed bridge is elegant, functional, and a structure that is appreciated by the local community as well as the many visitors to this region.



## iFly Queenstown

Aurecon for iFly Queenstown | QUEENSTOWN

iFly is a world leader in indoor skydiving, and Queenstown was selected as their first New Zealand site. Aurecon's brief was to create a building that would contain both the machine element and public spaces required for the ride, while successfully integrating an internationally developed specialist adventure system into a New Zealand environment.

The structural design provided support points for the equipment and was required to offer stability for the wind pressures that are developed by the iFly plant. The base structure was designed to be out of resonance with the plant, to avoid damage to the equipment or to contribute uncomfortable harmonic vibrations.

A key driver in the configuration and design of the building was the height of the return air tower and the depth of the basement stem to ensure the volume and speed of the air was sufficient to keep the skydivers aloft. Specialist wind flow equipment was imported from the United States, which imposed millimetre accuracy planning, documentation and construction to ensure that the equipment would fit and work immediately.

The result is a building that succeeds with the engineering design balancing the requirement of form, function, and aesthetics.



## EntX: Christchurch Entertainment Central

Kirk Roberts Consulting for Calder Stewart Developments  
| CHRISTCHURCH

Christchurch Entertainment Central (EntX) is a purpose-built complex containing seven 'state of the art' cinemas and 18 food and beverage outlets located in the heart of the city. The 10,500m<sup>2</sup> development included a three-storey building and had a base build budget of around \$30m. The total project value is between \$45 and \$50 million.

Kirk Roberts Consulting was engaged by Calder Stewart to complete the structural, geotechnical and civil engineering along with the provision of BIM leadership for the project. Throughout the project, Calder Stewart continually expanded the scope of services being provided by Kirk Roberts in the form of temporary works and tenant fit-out structural design. The extension of scope allowed consistent design solutions to be implemented throughout the project from a single contact point.

Acoustic separation between cinema spaces was a critical element in the design which involved isolating structural elements between spaces to prevent vibration and sound transfer. Delivering this required a strong collaborative approach with the acoustic engineers. The engineering solutions developed for EntX have delivered a quality building with minimal environmental impact. The building solution designed by Kirk Roberts has provided Calder Stewart with a cost-effective, reliable building, which has met all the client expectations, including timeframe and budget.



## Taftoaloa-Fausaga and Faleata Hydropower Plants

Stantec for EPC Samoa | SAMOA

The Fausaga-Taftoaloa and Faleata hydropower projects have been constructed on the islands of Samoa. The twin projects are part of a renewable energy programme developed by Electric Power Corporation (EPC) of Samoa and its partners which aims to develop a source of clean, cheap, renewable energy. The programme will also assist Samoa in reaching the goal of having 100 percent renewable energy by 2025.

EPC, Stantec and the contractor, Pernix/MAP JV (including their subcontractors), worked together as an integrated team to deliver the Fausaga-Taftoaloa and Faleata projects. Throughout the planning, design and construction, the team worked together on developing innovative solutions mixing 'old' and 'new' ideas and construction techniques that ultimately led to cost-effective and reliable solutions.

The projects are now in operation, and the people of Samoa are seeing the benefits, not only through potential tariff reductions but a more reliable and stable power grid. Other benefits from the projects include knowledge transfer and upskilling of the local people. Samoa has proven itself as a leader in the development of small hydro schemes and the global fight against climate change.



## Wellington Water Supply Resilience Study

Stantec for Wellington Water | WELLINGTON

The Wellington region has about a one in ten chance of suffering a magnitude 7.5 or greater earthquake in the next 100 years. This would severely damage water supply pipelines and treatment plants and result in a supply shortage for the Wellington region. Widespread damage to the reticulation network would be likely and take many weeks to repair.

Wellington Water engaged Stantec to undertake a resilience study to identify critical areas within its network and determine a skeleton network with water supply distribution points that could provide basic supply during an emergency. The distribution points are to be located so that 90 percent of the affected residential properties are no further than one kilometre away on a flat road, and no further than 500 metres away if the road is steep.

Stantec developed innovative sets of algorithms which analysed the road or walkway network and found the shortest steepness-adjusted route between each property and all distribution points. Another algorithm was then created to determine the best route to connect reservoirs with critical users and distribution points. The study successfully addressed the project requirements and also proposed a programme of investment for critical network upgrades.



## Waterfront House

Structex for Lyttelton Port of Christchurch | CHRISTCHURCH

Waterfront House is a new combined administration and operations building for Lyttelton Port of Christchurch. The building brings the two arms of the port's workforce into a combined location for the first time in decades. The design requirement was for a high-end facility that met the needs of all stakeholders and could withstand the rigours of port life.

The building site was located on the edge of the working port, adjacent to the busy truck entry to the container terminal. Immediately to the west is the waterfront of the inner harbour. While this location provided an ideal interface between the public, administration and operations staff, it created several design challenges. The most significant of these was that a turn of the century wharf structure was buried in the underlying historically reclaimed land.

Structex played a key role in many aspects of the project, predominantly the development of the foundation solution, establishing the seismic performance of the building, structural design, material specification and construction planning. The result is a building that meets the client's vision while maintaining a high level of performance and achievement despite the initial project constraints.



## Aorangi House Optimisation

Beca for Anaro Investment Group | WELLINGTON

First built in 1970, Aorangi House in Wellington was in urgent need of refurbishment. Along with its outdated, leaky façade, there were issues with heating, ventilation and cooling, and the building had been vacant for three years before refurbishment. Beca received a design brief that required the inclusion of the latest green building principles and other major interventions to give the building a new lease on life.

Beca provided building services, environmentally sustainable design, lighting, and structural design services for the retrofit, and worked closely with Studio Pacific Architects to successfully integrate the design into the building.

The Aorangi House Optimisation project combined big data, smart buildings, and analytics to optimise the building's energy performance and reduce operational greenhouse gas emissions.

The project achieved a 64 percent saving on energy consumption and greenhouse gas emissions compared with a typical office building. It was the first 5.5 Star NABERSNZ energy rated building in New Zealand while the upgrade project avoided a significant energy and carbon intensive demolition and rebuild.

Using learnings from this project, Beca has developed a continuous building tuning service to help clients reduce their emissions, operational expenditure, improve occupant conditions and promote proactive maintenance.



## Wellington International Airport Multi-Level Car Park Building

WSP Opus for Wellington International Airport | WELLINGTON

Wellington International Airport contracted WSP Opus to deliver a significant parking upgrade as part of a major re-development of the airport. The client required a multilevel concrete structure that provided 1090 carparks along with a transport and bus hub. These constraints meant the consultant had little flexibility in the placement of design elements; they had to maximise the number of car parks. The carpark is connected to the airport terminal and a new hotel with a network of ramps and elevated road structures.

The design of this eight-storey carpark combines reinforced concrete moment frames and buckling restrained braces. It's unusual to see buckling restrained bracing paired with reinforced concrete. The carpark is located in a complex environment within a working airport and is subject to high exposure to chloride from the sea, which is usually driven by high winds. The carpark has been designed to withstand the rigours of a harsh environment while Wellington's seismic risk meant an elevated level of resilience had to be built into the structure, well over the Building Code minimum.

WSP Opus provided structural engineering services, and Fletcher Construction Company was responsible for the construction of this project as part of the wider team including Archaus Architects, Beca and Aurecon. As the result of a strong design and collaborative approach, WSP Opus delivered an innovative and resilient solution that exceeded client expectations, earning high praise.



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# Introducing concept design for sheet pile walls

## Sheet Pile NZ is helping project managers gain a more accurate build estimation with its new concept design service.

Effectively removing a costly step for project managers, Sheet Pile NZ's concept design is available at a fraction of the price and allows managers to understand the viability of a project much earlier in the process.

Having recently purchased PileBuck SPW911, the sheet pile supplier is now able to offer sheet pile wall concepts for clients.

"This service will only be used for concept design work in the interest of calculating estimate prices for a project in the planning stage," says Sheet Pile NZ manager, David Broad.

"The neat thing about being able to do this is that if a client isn't an engineer, or is an engineer but doesn't have the software, we can complete a concept design along with a project estimate for them," he says.

"By using the sheet piles, we have in stock for the concept design, the client knows it is readily available to them – not overseas with a three to four month wait on delivery. All we require from the client is a brief and the geotechnical report from their soil investigation, as our software uses this in the design calculation.

"We're proud to be able to offer this service to clients at an extremely competitive rate, with 100 percent certainty that the concept design and estimate can be fully utilised immediately for project estimating," says Broad.

Sheet Pile NZ aims to keep delivery times short by maintaining a large base stock level in New Zealand.

"At any one time we have 2,000 tonnes of sheet piling available to clients, stocked over our three yards in Auckland, Hamilton and Christchurch."

As well as the new concept design service, Sheet Pile NZ works to give clients a superior experience by offering free loading and unloading at any of its yards, and a free water blasting service to clients returning their hired sheet piles to the yard.

To discuss your next sheet pile wall concept design, contact **David Broad on 021 500 625** or [david@sheetpile.co.nz](mailto:david@sheetpile.co.nz)



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# Preparing for Climate Change?

More than 75% of New Zealand's population lives within half a kilometre of the coast.

With global temperatures and sea levels on the rise, our coastal communities risk damage to their towns and homes. In the face of such drastic change, it's imperative that we adapt.

Tonkin + Taylor is New Zealand's pioneer in adaptive strategy.

In collaboration with Hawke's Bay Regional Council, Napier City Council and Hastings District Council we've developed a tailored 100-year strategy to proactively manage the current and future effects of climate change for the Clifton to Tāngōio coastline.

Every community is different and needs a specifically catered plan. Our team of specialist coastal and climate change engineers will work with your council to develop an adaptive strategy that understands the likelihood of coastal hazards and the risk to infrastructure - both now and in the future.

Because when it comes to climate change, we need to change with it. Our future depends on it.