



PRIME MINISTER OPENS THE NEW OPUS RESEARCH FACILITY

On 24 June, the New Zealand Prime Minister, Rt. Hon. John Key officially opened the new Opus Research facility in Petone, Wellington. The facility also accommodates Opus' Environmental Training Centre. The Prime Minister also cut the ribbon for our brand new wind tunnel to mark the occasion.

We're delighted with the new and much more modern premises, and the official opening was a great way to showcase the facility to many of our clients and other stakeholders. In his short address at the opening, Opus' Chief Executive David Prentice emphasised the importance of research to Opus' business which is reflected in the long term and significant investment Opus has made in the Petone facility.

We're very proud of our new 25 metre long wind tunnel (see page 2) which is the only commercially operated wind tunnel in New Zealand utilised for a wide variety of applications and projects, including evaluating the design of, and measuring wind forces on building and structures. The tunnel was designed in-house and manufactured and installed by local Hutt Valley engineering company, Twin Lakes.



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IN THIS ISSUE

- | | | | |
|----------|--|----------|--|
| 2 | <i>Our new, purpose-built wind tunnel is now operational</i> | 4 | <i>Progress Report: Seismic impact on underground infrastructure</i> |
| 3 | <i>Opus presents at the International Disaster & Emergency Management Conference</i> | 5 | <i>New to the Team</i> |
| | | 6 | <i>Opus Research launch</i> |



Part of the Auckland city model set up in the wind tunnel for a force balance test to measure wind loads on the building structure and building acceleration levels



The Prime Minister officially opens our new wind tunnel



Waitomo Caves Visitor Centre

OUR NEW, PURPOSE-BUILT WIND TUNNEL IS NOW OPERATIONAL

Opus Research has over 40 years' experience in carrying out wind and industrial aerodynamic research and analysis to support a wide range of projects around New Zealand. An exciting new era has just begun for us in this field, with our recent decision to invest in a brand new, state-of-the-art 25m wind tunnel which has been purpose-built to meet our clients' current and future needs and to fit comfortably in our new premises in Petone. The new tunnel is now operational and replaces the large 1970s-era wind tunnel at Gracefield, which had reached the end of its useful life.

Our new wind tunnel facility is an efficient recirculating tunnel configuration with a 3m x 1.5m cross section and a maximum wind speed of 15 m/s. Higher speeds can be achieved by adding additional air flow constrictions. The new tunnel is supported by our extensive specialist in-house reference library, computer-controlled data acquisition systems, and a comprehensive range of instrumentation, all of which contribute to high experimental efficiency.

We maintain complete and accurate scale models of the Wellington and Auckland CBDs, as well as a number of other locations across NZ.

At Opus Research, our aerodynamics engineers specialise in the analysis of wind effects on buildings, structures and the environment. We undertake wind engineering and industrial aerodynamics analysis and research to find practical solutions to wind and aerodynamic problems in the built environment and in the construction and transport industries.

Many of our past commissions have related to the environmental effects of buildings, and wind-induced loading and motion. Significant projects have included Te Papa, Westpac Stadium, Waitomo Caves Visitor Centre, Scott Base in Antarctica and two of New Zealand's tallest commercial buildings – the Majestic Centre in Wellington and the Coopers & Lybrand Tower in Auckland.

Our wind engineering team has also completed a wide variety of wind engineering research projects, with the results having been published internationally and in some cases incorporated into the Australasian Loadings Code. In addition, Opus Research staff have pioneered the use of advanced aerodynamics techniques in structural and vehicle design.

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OPUS RESEARCHERS PRESENT AT INTERNATIONAL DISASTER AND EMERGENCY MANAGEMENT CONFERENCE

IN MAY, PRINCIPAL RESEARCHER DR FELICITY POWELL AND BEHAVIOURAL SCIENCES RESEARCH MANAGER DR JARED THOMAS PARTICIPATED IN THE AUSTRALIAN AND NEW ZEALAND DISASTER AND EMERGENCY MANAGEMENT CONFERENCE IN AUSTRALIA.

The conference brought together more than 380 delegates from Australia and New Zealand who are involved in the prevention and management of, and recovery from emergencies and disastrous events. Keynote presentations and conference papers examined what has been learnt in the past few years and offered professionals an opportunity to examine the expertise, competencies and systems relating to preparedness and the ability to recover quickly and efficiently.

For the past six years, Felicity has been following the outcomes for Gisborne's business community arising from the 2007 earthquake, and she reported on the latest phase of this investigation at the conference.

Key findings from the Gisborne study have been:

- Important contributory factors for long-term recovery include having sufficient insurance in place and investment in structural strengthening of business premises before an earthquake occurs
- Factors that are currently complicating the recovery process include:
 - High insurance premiums
 - Uncertainty around building regulations
 - Heightened demand from tenants for commercial buildings that comply with the new building standard



Jared presented to the conference about his work on how to support those with increased vulnerability, such as the elderly or people with disabilities, in an emergency. Outside of an emergency, people with increased vulnerabilities can be difficult to reach and encourage to be prepared. These people live complex lives, a complexity that is only increased in an emergency. A key concern raised by people with specific needs is “not hearing a voice I’m familiar with”.

Community-based organisations have existing, trusted relationships and understand the unique needs of the people they support. This research shows that support workers are a great existing resource, they are keen to put emergency management preparedness on their agenda, and they have an excellent client reach. They just need to overcome key barriers around coordination, and to be provided with some training and material resources prior to an event.

For more on the research go to:
<https://ajem.infoservices.com.au/items/AJEM-29-02-06>

For more practical guidance on how to apply the research in your community go to:
<http://www.getprepared.org.nz/sites/default/files/uploads/Supporting%20vulnerable%20communitiesFINAL%20DEC13.pdf>

Jared also presented work on public perceptions of building safety in an earthquake, including work in Wellington where about 1 in 5 people are seismically anxious. The findings suggest people overestimate the likelihood and effects of earthquakes and that improved knowledge is needed to off-set some of the anxiety.

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PROGRESS REPORT: SEISMIC IMPACT ON UNDERGROUND INFRASTRUCTURE

OPUS RESEARCH WAS AWARDED \$2.54M OVER FOUR YEARS FROM THE MINISTRY OF BUSINESS, INNOVATION AND EMPLOYMENT IN OCTOBER 2012, TO CONDUCT RESEARCH INTO THE “SEISMIC RESPONSE OF UNDERGROUND SERVICES”. THE PROJECT IS NOW NEARLY AT THE HALF-WAY MARK.

The study involves determining the impact of seismic shaking on underground infrastructure such as water and wastewater pipe networks, and telecommunications cables. Typically, damage to this ‘invisible’ infrastructure – which is critical to the efficient functioning of any modern city – is difficult to determine and can easily be overlooked when damage to above-ground infrastructure such as roads and buildings is more evident.

Philip McFarlane has recently been appointed as Project Leader and brings to this role his longstanding background and expertise in water asset management, condition assessment, trenchless technology, reticulation design and management of large and/or complex infrastructure projects. Ros McLachlan will continue her involvement with this project, but due to other commitments has stepped down from the Project Leader role.

As with many Opus projects, this research initiative directly involves a wide team of Opus staff from many different parts of the country – and it is this inter-office approach which is a key project strength. A number of team members and key stakeholders are based in Christchurch, where the direct impact of seismic forces on underground infrastructure is an important part of data collection and analysis for the research. The team also incorporates expertise from GNS Science and the SCIRT team in Christchurch.



The shake table ready for pipe testing

There are three main aspects to the research: compilation of a damage database, identification and analysis of the behaviour of underground utilities under seismic loading, and implementation of the research findings.

To date, the team has completed collection of all relevant damage data from Christchurch, and this has been collated onto a specially developed map. The team now has a damage map with layers showing where infrastructure damage occurred and other layers identifying relevant geological information. The next step is to further interrogate this highly detailed database to create an understanding of how best to prioritise areas for further assessment.

Also underway is an in-depth investigation into utility behaviour under seismic loading. This is involving a combination of 3D finite element analysis and physical in-lab modelling. The team is currently investigating a series of case studies and has also undertaken a series of scenario

assessments to ensure the process is sufficiently robust before actual analysis gets underway.

Findings from the research will be implemented at the earliest opportunity throughout the analysis phase. One specific focus of the study will be to better understand the residual life of damaged assets. The longer-term aim is to provide stakeholders with a series of guidelines and recommendations with directly applicable national relevance.



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CHANGING OF THE GUARD FOR THE OPUS RESEARCH PAVEMENTS TEAM

Our widely-respected Principal Research Engineer – Pavements, John Patrick, retired in June, after starting out with Opus Research's predecessor Central Laboratories as a Technical Officer in 1963. During the course of his career, John has undertaken a huge variety of research and technical projects, as well as publishing many refereed reports and technical papers. He was appointed to his current role in 1995.

John's work has spanned a very wide range of specialist engineering research, including project management and hands-on research for the adaptation of AUSTROADS pavement design criteria to New Zealand conditions.

With John's retirement, William Gray has recently been appointed to provide technical leadership to our pavements team as Opus Research's Technical Principal – Pavement Research, Design and Construction.

William is a chartered professional civil/geotechnical engineer who has

worked for Opus and our predecessor organisations for over 30 years. He was elected a Fellow of IPENZ in 2011, and earlier this year he received the IPENZ Turner Award for ongoing commitment to the self-regulating profession. William is also an invited member on the National Pavement Technical Group, which assists the Transport Agency to comment on current practice, and to review and develop technical specifications and guidelines.

For many years William has presented technical courses and workshops for IPENZ and NZIHT. During 2013, he was invited to deliver a series of workshops for IPENZ on "Geomechanics in support of land development in New Zealand". For NZIHT, William delivered pavement materials and earthworks construction courses between 2000 and 2011 as part of the Diploma of Highway Engineering and BTech (Hiways) qualifications, and earthworks design and construction and engineering material theory courses between 1997 and 2000.

William is very much looking forward to his new role with Opus Research, and the opportunity it offers to encourage others to see the true value of good engineering, and to assist the team to continue to deliver relevant and high quality research to clients.



William Gray (left) and John Patrick

NEW TO THE TEAM



CHRIS BOWIE

Chris joined Opus Research in April as an urban studies researcher. He has an MSc in Geography from Canterbury University, with a

specialist focus utilising GIS techniques to better understand the impact of urban environments and transport systems on the health outcomes and behaviours of individuals, communities and populations. Before joining Opus, Chris was employed by the University of Canterbury's GeoHealth Laboratory, and was involved with research for the Ministry of Health.

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MAGGIE TROTTER

Maggie is our new senior researcher within our Behavioural Sciences team. She is currently in the final stages of completing a PhD

through Monash University, Melbourne. Before joining Opus, Maggie spent six years as a researcher with the Human Factors team at the Monash University Accident Research Centre (MUARC). This involved a wide range of projects and clients, with a significant focus on organisational and systems safety.

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JEREMY WU

Jeremy recently joined our team as a senior pavements scientist. He has a PhD in glass-ceramics research from

Imperial College, London, and six years' experience working as a materials scientist at Callaghan Innovation (formerly known as Industrial Research Limited). Jeremy's current focus is on projects relating to the development of a performance-based bitumen specification, and the fatigue cracking of chipseal surfacings.

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OPUS RESEARCH FACILITY LAUNCH



The Prime Minister and Opus NZ Managing Director Peter Mathewson



The Prime Minister with two Opus Research staff, Nobuko Mori and Maggie Trotter



The Prime Minister experiencing our Audio Tactile Profile Driving Simulator



Opus Chief Executive David Prentice



*Terry Webb (GNS Science)
Richard Templar (Callaghan)
Murray Poulter (NIWA)*



David Edmonds, Felicity Powell, Kathryn Edmonds and Roger Fairclough

Photos by Lance Lawson Photography