



News

**Number 16
February 2003**

A Publication of the
Civil Engineering Department
University of Canterbury

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Te Whare Wānanga O Waitaha



Current Departmental Staff

Academic (full-time)

John Berrill	Geomechanics, engineering seismology
Andy Buchanan	Timber and fire engineering
Athol Carr	Structural dynamics, finite element analysis
Bente Clausen	Hydrology
Andres Dantas	Transportation engineering
Rob Davis	Geomechanics, continuum mechanics
Mark Davidson	Fluid mechanics
Bruce Deam	Earthquake engineering, timber engineering
Charley Fleischmann	Fire engineering
Bruce Hunt	Groundwater flow, analytical analysis
Jason LeMasurier	Systems, engineering management, risk
Kevin McManus	Geotechnical engineering, foundation engineering
James Mackechnie	Concrete materials
John Mander	Structural and earthquake engineering
Mark Milke	Solid waste management, uncertainty analysis
George Mullenger	History of civil engineering, continuum mechanics
Alan Nicholson	Transportation planning, traffic safety
Roger Nokes	Fluid mechanics
David Painter	Water resources engineering
Stefano Pampanin	Structural engineering
Mofreh Saleh	Transportation engineering
Michael Spearpoint	Fire engineering
Alex Sutherland	Sediment transport, coastal engineering
Warren Walpole	Structural steel design, earthquake engineering
David Wareham	Biological nutrient removal, waste treatment

Emeritus

David Elms	Risk analysis
Bob Park	Structural engineering
Tom Paulay	Structural design
Ian Wood	Fluid mechanics

Technical

Colin Bliss	Fluids lab
Melody Callahan	Graphics/Web
Peter Coursey	Computing
Grant Dunlop	Fire lab
Siale Faitotonu	Geomechanics lab
Frank Greenslade	Transport lab
Gary Harvey	Concrete lab
Brandon Hutchison	Computing
David Macpherson	Environmental lab
Russell McConchie	Structures lab
John Maley	Structures lab
Richard Newton	Electronics lab
Russell Peoples	Structures lab
Alan Poynter	Model Structures lab
Ian Sheppard	Fluids lab
Stuart Toase	Structures lab
Mike Weavers	Electronics lab
Kevin Wines	Structures lab

Academic (part-time)

Chris Allington	Structural concrete design
Nigel Cooke	Structural engineering
Des Bull	Structural concrete design, earthquake engineering
Roger Dawe	Surveying
Ian Mason	Waste management
Peter Moss	Structural analysis
Hugh Thorpe	Groundwater, ecological engineering

Support

Louise Fitzgibbon	Postgraduate administration and enquiries
Denise Forbes	Financial manager
Catherine Price	General and fire engineering enquiries
Pat Roberts	Undergraduate administration and enquiries

Credits:

Cover photo: Wing testing, pg 13

Editor: Bente Clausen

Layout and Design: Melody Callahan

Printer: Caxton Press

Many thanks to all those who contributed articles and photos in the making of CE News

Be sure to visit our web site at:
www.civil.canterbury.ac.nz

Here you can just browse around,
catchup with fellow alumni, see who's
doing what research project, view
course outlines or contact staff

Message from the Head

Welcome

Welcome to another bumper edition of CE News. I hope that this will give you an exciting window into some of the activities in the Department of Civil Engineering during 2002. Many thanks to Bente Clausen for editing this edition, with help from Melody Callahan.

Successful year

2002 has been a very successful year in the Department. Academic staff changes have seen the retirements of Peter Moss and Nigel Cooke, whom we will miss. However we have bright new staff recently installed or on the way. Jason Le Masurier (management), Andre Dantas (transportation) and Stefano Pampanin (structures) and Erica Dalziell (risk) have already made an impact on the Department. Interviews for three additional vacancies are being conducted. Plus, 95 new civil engineers will graduate shortly.

Successful activities during the year include the annual planning workshop at Living Springs, good progress on a review of our undergraduate curriculum, and the start-up of the new Masters degree in Transportation Engineering. Thanks to Mofreh Saleh for his efforts with a range of publicity activities to attract more students.

New initiatives

There have been a number of new initiatives in the Department this year. We have re-organised the committee structure, with three new committees. I want to thank Alan Nicholson, John Mander, and Roger Nokes for chairing the new committees and for their assistance in major decision-making in the Department.

Thanks to Siale Faitotonu and Hugh Thorpe for helping to establish a support group for Maori and Pacific Island students, with assistance of Kepa Morgan from the University of Auckland.

Several new functions have been introduced to better inform Intermediate students about Civil Engineering. These include an information evening sponsored by Fulton Hogan, MWH and Opus



International Consultants, and a re-vamped bridge testing competition organised by Chris Allington.

Collaboration with Auckland

In a major bid to stake our claim as the premier providers of four-year civil engineering degrees in New Zealand, the Departments of Civil Engineering at Canterbury and Auckland have begun several collaborative activities. Following a visit from six Auckland staff including the Head of Department (Bruce Melville) and the chair of their Advisory Board (Ian Parton of Meritech), the two departments will share resources to develop new programmes in teaching, research, and marketing.

Changes ahead

Great changes are in store for 2003 and beyond. The Department welcomes the recent appointment of Professor Roy Sharp as the University's new Vice-Chancellor. The University Council has decided to re-structure the University into six faculties, each with an Executive Dean. The new Executive Dean of Engineering and Forestry will have much greater powers and responsibility than the existing Dean, with many administrative changes, which will create new opportunities for the Department. It has now been agreed that the B.E.(Natural Resources) degree will move from Lincoln to Canterbury and two new staff members will be employed for that purpose.

The challenge

Our most alarming statistic in 2002 was a 15% drop in the number of new students in the 1st Professional Year. We have space for 100 students, but there were only 85 qualified applicants. This drop has occurred at a time when employers are desperate for civil engineering graduates who can make a major contribution to national and international development. There is a massive "information gap" between the excellent career opportunities in civil engineering, and the poor perceptions of professional engineering in high school science classrooms.

This a challenge to every reader - to promote civil engineering as a great professional career to young people, their teachers, and their parents, wherever they may be.

*Dr Andy Buchanan
Head of Civil Engineering*

CE News congratulates Andy Buchanan with his promotion to Professor from the beginning of 2003. As a Head of Department over the last three years, and the years before that, Andy's car/bike has often been the last to leave the car park at night. It is good to see that the burden of administration has not prevented him from progressing his teaching and research. Well done!

Fletcher Construction MERIT Competition

A successful addition to the construction management course in 3rd Pro this year was the MERIT Competition. MERIT is a acronym for Management, Enterprise, Risk, Innovation and Teamwork. It is a construction management computer simulation that provides the essentials for construction professionals to augment their technical knowledge with the managerial skills required to run a modern construction company.

In teams, participants learn to manage their own virtual companies by making decisions that affect various functions of the business, such as marketing, tendering, finance, overheads, personnel and project management. Operating as a board of directors, each team runs the company for 8 periods, competing in a simulated construction market, which is updated each period to reflect the changing industry conditions.

MERIT is run as an annual competition in the UK construction industry – 150



teams took part in 2002. The University of Canterbury competition involved eleven 3rd Pro student teams, and whilst it was not concurrent with the UK competition, it followed the same format allowing comparisons to be made. Our winning team 'Shellberite' ranked 3rd out of the 150 taking part in the UK, with

many of the other teams ranking in the top 20 at various stages during the competition. This was a very impressive result given the level of competition and reflected the students' enthusiasm – it was rated by some students as the best thing they had done at University.

Course coordinator Dr Jason Le Masurier secured sponsorship for the competition entry fee from Fletcher Construction. The

winning team members – Kieran McCall, Adrian Hii and Hamish Gray – are pictured here with their prizes of \$150 each, which were presented by Alan Orange (2nd from left), General Manager for Fletcher subsidiary Brian Perry Civil, along with Andy Buchanan (left) and Jason Le Masurier (right).

Editorial

On the gender balance – A personal view



We have not had a CE News Editorial before, but after six years in the job and on sabbatical leave in 2003, I thought this was a good opportunity to start a new tradition. The topic is what naturally lies in my

sphere of interest now that I am the only female academic in the Department. The topic is addressed several places in this issue, see Gretchen's article on page 16 and Kirsten's note on Women In Engineering on page 5.

There is a lack of women in civil engineering, without question. In this Department, and in the Engineering Faculty as a whole, female students make up approximately 15% of the student body. In a recent report it was stated that to have a group properly represented, it needs around 30% participation. Thus, we are only halfway. When we look at the number of female academics in the Department, things are even worse. The maximum we have had so far is one woman out of 25, or 4%! I look forward to seeing the next one turning up soon.

So what are the implications of this unbalance in gender numbers? We probably all know examples of female and male cultures, take for example nurseries, childcare institutions, the military, and – engineering!

Positive aspects of typical female cultures are good and helping communication, flexible decision-making, feelings of understanding and empathy/sympathy with each other, and a warm and grounded atmosphere. However, too much feminine and a lack of masculine elements (from women as well as from men) can exaggerate these aspects and turn them into negative feelings-relations, too much gossiping, and a lack of direction and objective decision-making (in general a 'low' and 'too warm' atmosphere).

Positive aspects of typical male cultures are clear and objective thinking, discipline, hard work and straight-lined actions. However, too much masculine and a lack of feminine elements can exaggerate these into too much discipline and hard work, too much objectivity and competition, and a lack of feelings-relations (in general a 'cold' and 'too high' atmosphere). This is perhaps particularly

dangerous when combined with a scientific environment, where intellectual, objective thinking is encouraged, and it is easy to 'lose the ground'.

Thus, the female and the male elements need each other, and a better balance than what we have now is desirable, for women as well as for men. So what do we do to avoid this unbalance? Well, to me the answer is pretty straightforward: We need some more female academics in the Department, more female technicians, more females in general in civil engineering. More women lecturers would attract more female students, and 'Women in Engineering' is doing such a great job (thanks Kirsti, Renee, Kirsten, and all the others) visiting schools and showing school children that there are women in engineering. I think the change has to come from the top before it can spread further among students and eventually to the rest of the profession.

Luckily I think there is an increasing recognition within the Department that we need to take more active steps to increase the number of women in civil engineering. Any comments or suggestions from readers are most welcome.

Bente Clausen

What is WIE?

Women in Engineering (WIE) is a club within the Engineering School that aims to provide support, encouragement and social activities for all students studying engineering at Canterbury University. WIE also actively promotes engineering as a possible career to potential future students, especially female students, by having existing students visit high schools around New Zealand and assisting at careers expos around Christchurch.

Many civil engineering students actively participate in WIE: Caroline Ballard (Masters) as President, Fiona Cochrane (3rd Pro) as Vice President and Kirsten Norquay (3rd Pro) as Educational Officer.

Females are traditionally underrepresented in engineering disciplines and so WIE hopes to provide a support network for female students and also to raise the profile of opportunities for women in engineering. Last year there were several wine and cheese evenings, which were all well attended, and several established female engineers came and gave inspiring talks about their engineering careers.

Outreach to high schools

In 2002 several engineering students, all from different departments, visited high schools in the Christchurch area and gave informal talks about engineering. The aim of the talks was to give high school students an understanding of what engineering students study at university and the type of work that is available to engineering graduates.

There has been an overwhelmingly positive response from all schools about the visits, with several students from each school now seriously considering engineering as a future career. The students enjoyed the demonstrations, like the mini shake table that were taken to some schools, because they could play with them and actually see what was happening. The new engineering careers poster was also a great success, as students could see what different types of engineers do and how the different engineering disciplines relate to one another.



Between a Rock and a Hard Place!

This photo, taken by Hugh Thorpe in November 1975, won the historical section of the photo competition run by the NZ Hydrological Society in 2001.

The hydrological event was cyclone Alison in early 1975, which hit the Ruahine ranges very severely and generated a massive debris flow in the upper catchment of the Waipawa River. The debris moved as a series of smaller "waves", which progressively buried trees alongside the river to depths of up to 5 metres, so that they were not pushed over. This can be determined because bark on the upstream side of the tree trunks was abraded by moving gravel to that height.

In debris flows the larger rocks "float" on the smaller ones. By this process the big rock lodged in the tree fork at the height of the storm. Subsequently lower flows selectively removed smaller rocks and left the monster perched spectacularly in the tree and threatening Pat Grant. Pat is a former scientist for Water and Soil Division of MWD and a foundation member of the NZ Hydrological Society, which began in 1961.

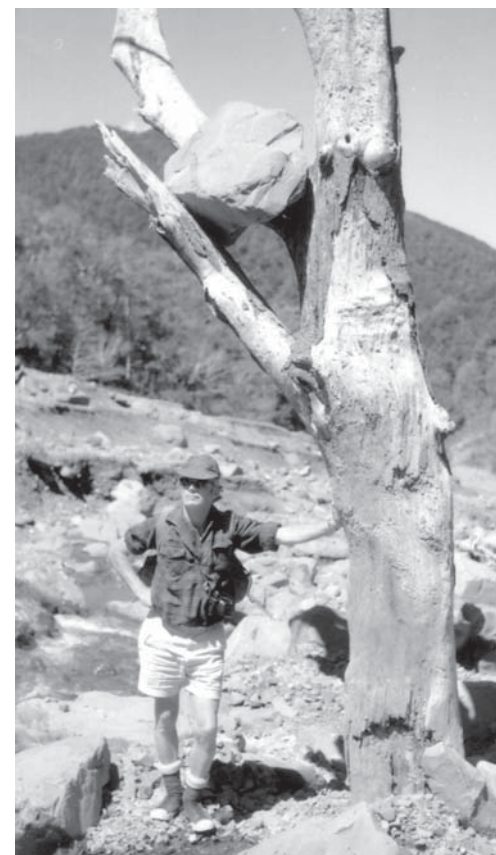


Members of the WIE committee in 2002 and 2003

'Back to School' packs

Because of the success of the school's visits in the Christchurch area, a 'back to school' pack was put together last year. The pack contains an outline of possible topics to cover in the talk, a brief description about each engineering department and possible careers, as well as posters, pamphlets and CD-ROMs about the different departments. Last year 'back to school' packs were given out to third pro students returning to their hometown, to take to their old high schools. The aim is that more high school students across the country will know more about what engineering is and seriously consider a career in engineering.

*Kirsten Norquay, Educational Officer,
Women In Engineering*



Revitalised Fluid Mechanics Laboratory

The department's fluid mechanics laboratory has seen a flurry of activity during the second semester of 2002. Not only has the lab been busy with undergraduate laboratory classes for civil, mechanical, and chemical engineering students, but it has been the second home to six third professional civil engineering students undertaking final year research projects in environmental fluid dynamics (EFD) under the supervision of Drs Roger Nokes and Mark Davidson.

3rd Pro projects

Charlotte Brown's research project has focussed on the issues of dynamic similarity for laboratory models of waste stabilisation ponds. She examined the effect of inlet Reynolds number on flow structure and short-circuiting time-scales. A small model pond, approximately 2m x 1.5m in size, was built specifically for her dye experiments, where 'waste water' was injected through an inlet, located

in one corner of the pond, with the outlet in the opposite corner (see photo). The EFD group's new particle tracking software system was used to measure the flow velocities in the pond.

Caroline Ballard and Gustaaf Kikkert undertook extensive experimental programmes exploring the dynamics of surface and bottom gravity currents, using the 5m tilting flume. Caroline's results have brought into question much of the currently perceived wisdom in this area. It is frequently suggested in the literature that a free surface acts like a rigid boundary in retarding the flow of light fluid underneath it. Caroline's experiments show quite clearly that this is not the case, although interestingly, while the surface does move with the current, it does not necessarily move at the same speed.

Mike de Boer and Bruce Galloway's projects looked at the mixing of effluents in turbulent open channel flow. Mike was interested in the effects of secondary currents on the spread of the plume, while Bruce attempted to quantify the effect of ambient turbulence on the dynamics of a turbulent jet.

Matthew Ellis chose to work with Dave Plew on his PhD project looking at the effect of aquaculture structures on fluid flows. Matt and Dave have been the first to use the department's new 2W laser, in conjunction with the particle tracking software, to explore the flow structure behind models of mussel-farm long-lines.

3rd Pro students as tutors

An innovation in the teaching arena this year has been the use of third professional year students as laboratory supervisors for first and second pro students. This has been a great success, with both the tutors and the students benefiting from the experience.

▲ *Top photo: from left, Roger Nokes, Mark Davidson, Charlotte Brown, Colin Bliss, Ian Sheppard and Dave Plew watch the start of a dye-tracking experiment. Charlotte's innovative surface drogues (golftees!) can be seen on the surface.*

▶ *Right: A typically busy day in the fluids laboratory. The Fluid Lab is managed by Ian Sheppard, who has been joined this year by Colin Bliss.*



Best lecturer again!

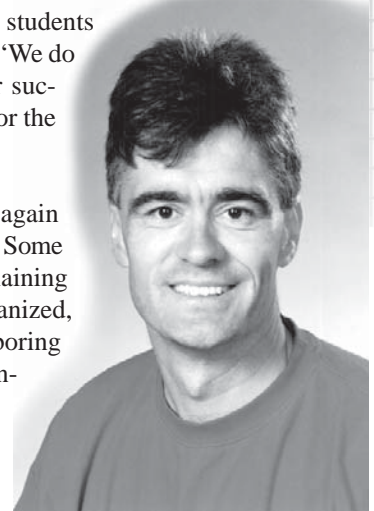
No doubt that Roger Nokes is popular among the students. In his first year of lecturing at Canterbury (2001), Roger won the UCSA (University of Canterbury Student Association) 'Best Lecturer of the Year' competition. Not only was he voted the 'Best Lecturer in Engineering', but he was also voted the overall 'Best Lecturer of 2001 at Canterbury'.

The letter to Roger from UCSA stated: 'We must stress that the poll is not sci-

entific as we have a strong suspicion that some students voted more than once'! However, it carried on: 'We do not see this however as distracting from your success as plural voting indicates a strong desire for the nominee to win'.

This year Roger repeated the success and was again voted 'Best Lecturer in the Engineering Faculty.' Some of the students' comments were: 'Clearly explaining everything and being respectful', 'Funny, organized, enthusiastic and interesting!', 'Makes a very boring subject just boring', 'Makes a boring subject interesting', 'Awesome', 'No competition' and 'He is a champion – na, seriously'.

Congratulations! We are lucky to have such a good lecturer in the department.



Bob Park still busy

Emeritus Professor Bob Park has been the Deputy Chair of Commission 7 : Seismic Design of the International Federation of Structural Concrete (*fib*) during the period from 1998 till today. *fib* is headquartered in Switzerland. Bob Park has also been co-convenor of the Task Committee of Commission 7, which is preparing a state-of-the-art report on the *Seismic Design of Precast Concrete Buildings*. This report has 32 contributors from eight different countries. Professor Park presented a keynote address on seismic design and a report on the work of the Task Committee to the *fib* Congress in Osaka, Japan, in October 2002.

B.E.(Natural Resources) Degree

The Department of Civil Engineering will play a major role in continuing the B.E.(Natural Resources) degree at the University of Canterbury.

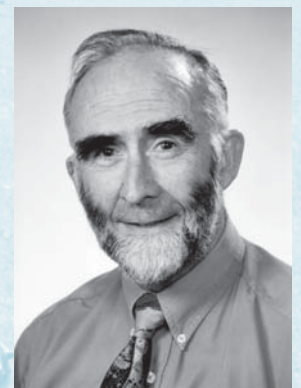
The natural resources engineering degree grew out of the agricultural engineering degree which was offered through Lincoln College when it was a constituent college of the University of Canterbury. When Lincoln split off to become a stand-alone university, the B.E.(Nat.Res.) degree remained a University of Canterbury qualification, but more than half of the teaching was done by Lincoln University staff, using Lincoln facilities.

Lincoln University announced in late 2002 that they planned to stop supporting the degree, leading to the possibility of its demise. The School of Engineering at Canterbury launched a rescue mission, supported by the Dean of Engineering, Dr Alex Sutherland, and the Acting Vice-Chancellor, Prof Bob Kirk.

Natural resources engineering is a branch of professional engineering concerned with enhancing the management of a wide variety of resources including water resources, energy resources, agricultural resources, mineral resources and waste resources. Natural resources engineers are sympathetic to natural processes and ecological systems. There is a very strong demand for graduates from regional councils, national and international engineering consultants.

There are overlaps between natural resources engineering and civil engineering, but they remain distinctly different. As its name suggests, natural resources engineering is more closely related to natural materials and ecosystems, often in the rural environment, whereas civil engineering provides much of the infrastructure required for modern living in industrial and urban environments.

David Painter has been appointed a member of the continuing academic staff and will co-ordinate the Natural Resources Engineering degree within the Department. David has a distinguished career in Water Resources Engineering and in University teaching and research. David was part of Lincoln's efforts in Natural Resources Engineering for many years.



The Department has received approval to hire two additional academics to support the increased undergraduate teaching resulting from the movement of the degree to Canterbury.

People People People



Andres Dantas

Andre Dantas joined the Department in May 2002 to take up the Transfund New Zealand Fellowship in Transportation. He is currently involved in the Master of Engineering in Transport (MET) Programme, teaching transportation planning and modelling.

Andre recently received his PhD from the Nagoya Institute of Technology, Nagoya, Japan, where he has also been a teaching assistant

since April 1998. Prior to that he was a GIS instructor at the University of Brasilia, where he received the degree of Master in Urban Transportation (1998). Andre also has a Bachelor in Civil Engineering (1995) from the Federal University of Minas Gerais in Belo Horizonte, Brazil.

After becoming chartered in 1995, Andre worked as a consultant in different parts of Brazil. He was involved in traffic engineering and transportation planning projects, which mainly comprised planning and execution of origin/destination surveys, design of traffic system and public bus transportation.

Andre specialises on the development of neuro-geo-temporal models for transportation planning using Geographical Information Systems (GIS), Remote Sensing (RS) and neural networks. He has published over 30 papers in international journals and conference proceedings. In 2001, he was awarded the Yasoshima's Prize for best paper in the 4th Eastern Asia Society for Transportation Studies (EASTS) Conference, Hanoi, Vietnam. Andre's research interests are in the area of transportation modelling (passengers and goods).

In addition to his academic activities in New Zealand, Andre is a keen soccer player. Just after his arrival in Christchurch, he has joined a Sunday league team.



Stefano Pampanin

Stefano Pampanin recently joined the Department of Civil Engineering as a Senior Lecturer in structural engineering. He received his Laurea Degree "cum laude"* in Civil (Structural) Engineering at the University of Pavia (Italy), a MSc in engineering science (structural engineering) at the University of California at San Diego, UCSD (USA), and a PhD in earthquake engineering at the

Technical University of Milan (Italy). His main research activities are related to seismic design, assessment and retrofit of reinforced concrete (either precast/prestressed or cast-in-place) ordinary structures.

After classical studies at high school (Classical Lyceum in Pavia), he was selected as a student of the Collegio Borromeo (www.collegioborromeo.it), the oldest university college in Italy (1561). As a complementary education during his doctoral studies, he attended the Advanced School for Integrative Education (SAFI) under the University Institute for Advanced Studies (IUSS) in Pavia and completed the requirements for the diploma. In 1998 he was awarded a Fulbright Scholarship to spend one year as a visiting scholar at the University of California San Diego (UCSD), where he joined the PRESSS (PREcast Structural Seismic Systems) research team during the last project phase of the pseudo-dynamic large-scale test of a five-story, precast concrete building.

Stefano Pampanin received the PCI (Precast/Prestressed Concrete Institute) 'Martin P. Korn Award' 2000 for the article *Preliminary results and conclusions from the PRESSS precast 5-story test building*. He is an active member of the *fib* (Federation Internationale du Beton) working group WG 7.3/7.4 'Seismic Design of Precast Concrete Buildings'.

Faithfully agreeing with the ancient Romans wisdom '*Mens sana in corpore sano*', (i.e. *Sane mind in a sane body*), Stefano has always preferred those competitive sports (e.g. tennis, soccer, volleyball) where you can play with or chase a ball (with a nice and regular spherical shape...far away from rugby!).

* Laurea is the name for the Italian undergraduate degree. For the engineering degree it consists of five years of courses plus thesis work, thus approximately corresponding to a MSc. degree. 'Cum laude' is given to first class students in addition to the maximum final grade (110/110).



Russell Peoples

Russell Peoples joined the Department in 2002 as a fitter and turner technician in the Structures Lab. Russell completed a tool-making apprenticeship in the plastics industry in Auckland in the mid 1980s. During the next five and a half years he worked throughout Australia as a mechanical fitter on mine sites. He then decided to return to New Zealand and based him-

self in Fairlie, from where he worked in a variety of jobs over the years, including construction work on the Opuha Dam, fabrication and machining work for Fulton Hogan, and more recently as a mechanical fitter on the hydropower stations in the MacKenzie country. In 2001 Russell completed two years full-time study at Christchurch Polytechnic with a NZCE (Mechanical Design). Russell enjoys the outdoor, hunting and tramping. He also enjoys motorcycle touring, has an interest in flying and is very close to completing his private pilot license.

People People People

Nigel says Farewell



On March 1, the Department held a tribute function for Nigel Cooke after 29 years in the Department. Nigel was one of those who took up the University's offer of voluntary severance at the end of 2001. Head of Department, Andy Buchanan, thanked Nigel for his enormous contribution to the Department, including his five years term as Head. Nigel was recognised as one of the best teachers in the Department and his departure is a big loss.

Andy read out a letter from Harry Hopkins to Nigel, dated 1972, in which he offered Nigel a position as Senior Lecturer in structural engineering and described the expected lecturing load, with far fewer lectures than we do now. Despite admitted doubt, Nigel accepted the position and quickly gathered a reputation for excellence in teaching, and his lecture notes were looked on as models of craftsmanship. He also began to play a major role in administration. Nigel was Assistant Dean of Engineering (1980-1983), and from 1983-1987 he was Honorary Secretary of the Organising Committee of the Centennial of School of Engineering, held 8-10 May, 1987. When Bob Park resigned in 1992 as HOD to move into the position of Deputy Vice Chancellor, Nigel was unanimously elected HOD.

Nigel was head during the turbulent period when the new engineering building was under construction. The department was split between the few old offices that escaped demolition and the new offices in the 'temporary' buildings on Creyke Road. It was a major undertaking to keep the department functioning as a unit, and then to oversee the move into the new building. After the dust finally settled, Nigel stepped down as head in 1997. However, he continued to produce his model lecture notes and lectures, and shouldered a greater and greater share of the departmental administration, especially that involved with students.

Although Nigel's retirement officially took place at the end of 2001, the Department was lucky to be able to draw on his expertise during 2002, to help overcome a severe staff shortage in the structures area. Nigel was retained on contract to teach intermediate year and 2nd Pro students.

Nigel will be remembered for his excellent teaching, his tactful diplomacy as Head of Department, his dry British humour and, especially, his Yorkshire-ness. We all join in wishing him a long and happy retirement.

A Retrospective:



Associate Professor Peter Moss retired in 2002 after 34 years in the Department. Peter looks back:

"Little did I imagine as a student

finishing final exams in November 1957 that I would have a continuing involvement with the University (at that time the Canterbury University College), and would retire some 44 years later.

My initial experience was gained as a structural engineer in the Christchurch office of the Ministry of Works. From 1961 to 1965, I studied at Imperial College, London, firstly for a diploma (DIC) in concrete structures, and then for a Ph.D. on the buckling of thin shells. Back with the Ministry of Works in Christchurch in 1965, I carried out site supervision and design of some of the new university buildings at Ilam. I also worked on the structural design for the Library buildings and the Chemical Engineering building.

My appointment to the University started in February 1967. The department at this time was headed by Prof. Harry Hopkins and was much smaller than it is now. Much has changed in the B.E. (Civil) course since then. In my student days there was a fixed set of subjects with a two-day final design exam (just then reduced from 15 days!). Now, the

nature of the whole B.E. (Civil) course is undergoing considerable discussion about changes needed to keep the degree relevant for the years ahead.

During the earlier part of my time in the department, I was involved in a range of testing as a service to NZ manufacturing and construction firms. In addition, I have acted as consultant to several N.Z. engineering consulting firms, manufacturing firms, local authorities, and the Inventions Development Authority.

My research interests have covered the fields of structural analysis, earthquake engineering, timber engineering and design though I have strayed outside these topics; hence my co-supervision of a Ph.D project investigating the analysis of wool yarns by finite element techniques. Recent research interests have included seismic pounding of adjacent buildings, performance of seismic isolation bearings and steel plated structural walls for seismic rehabilitation of earthquake damaged buildings, seismic performance of typical Japanese houses, analysis of bolts epoxied into glued-laminated timber, seismic soil-structure interaction and base isolation, and the seismic behaviour of bridges.

For ten years from 1987, I was the Editor of the quarterly Bulletin of the New Zealand National Society of Earthquake Engineering and a member of the Management Committee. This has also meant involvement in the organization of several Pacific Conferences on Earthquake Engineering and editing the Proceedings for them. It was an honour to be awarded a Life Membership of the Society last year.

Since 1995 I have been a member of a joint Australian and New Zealand Standards committee formed to produce a code of practice for the 'General design requirements and loading on structures' to be used in the design of buildings in both countries. Several parts of this standard are now in use in Australia and the full standard should be completed within the next year."

Peter is still active in the Department with research and supervision of post-graduate students.

CE News
approached six of our
2001 graduates one year
after they finished their
degree. Here is what they
have to say...

SAM M. WILKIE BE (Hons)

Research Engineer for Transportation,
Opus International Consultants, Lower Hutt,
New Zealand
Email: samuel.wilkie@opus.co.nz

What do you do?

I am at Central Laboratories,
Opus international consultants. Here, much varied
engineering research and
testing happens. I am in the
transportation and road
safety section with two
others. I have had quite
diverse roles so far includ-

ing: experiment design,
traffic modelling, statistical analysis (go the
stats301 project!), and web design. The
projects range from behavioural stuff like
what engineering features cue priority for
different mode groups to database design
and interrogation, to designing a method-
ology to audit existing roads based on
'hard' engineering features. The latter
involved developing a model based on
past research of specific elements, gener-
alising these specifics to enable
identification of elements at drive over
speeds, trialling the method, and the
results are now being checked against
accident occurrence as a coarse form of
validation. The variety of clients (central
and local government, consultancy) and
their particular goals make for interesting
analysis problems for site specific, regional
and national levels.

What do you like most?

The human side to transport and safety is
interesting to me as it involves a
multidisciplinary approach. So I get to work
with a people from a variety of different
backgrounds. Working a problem to its
implementation stage is great in itself, and
it also questions your approach.

What do you find most challenging?

Switching between the broad scope of a
project to the details, or the analysis, and
back again, without getting tripped up by
the logic of Microsoft Windows (if it exists).



SARAH C. DYE, BE (Hons)

Environmental Engineer, Beca
Carter Hollings and Ferner
Ltd., Auckland
Email: sdye@beca.co.nz

What do you do?

Having graduated from Canter-
bury last year (2001), I joined the Water Section in
Beca's Auckland office in January as a hydraulics
engineer. I expressed an interest in modelling and
have been given a number of hydraulic modelling
opportunities as they have come up during the
year. I have modelled the hydraulics and hydrology
of a stormwater system using MOUSE, a sewer
system using XP-SWMM and the dispersion of
wastewater from outfalls into the ocean and rivers
using PLUMES and CORMIX. I have also done a
number of smaller jobs such as setting up an
erosion monitoring program for a stream in the
North Shore, designing pumps as part of a
groundwater supply system and carrying out a
review of a benchmarking study for Auckland's
wholesale water company.

What do you like most?

I like the fact that I am using the knowledge and
skills that I learnt at University to solve real prob-
lems to which the answers have not been
predetermined.

What do you find most challenging?

I have found this year to be a very steep learning curve, both
in terms of technical skills and job management skills, which
has been very challenging, but also very rewarding.

ROSS W. PARRY, BE(Hons), MEFireE

Fire Safety Engineer, Holmes Fire & Safety, Wellington
Email: ross@holmesfire.com



What do you do?

I'm working in Wellington for Holmes Fire & Safety, a
consulting firm specialising in fire engineering and part
of the Holmes Group of companies. I've faced a steep
learning curve since graduating and have worked my way
through an extraordinary number of projects. I've moved from
doing nothing but site visits and building consent reports to
filling my days with fee proposals, design reports, specifications, design meetings and
queries. Compared to most other engineering disciplines, fire engineering involves
rapid turnover of projects and doesn't involve a lot of detailed design. Instead fire en-
gineers spend more time writing reports, talking to clients and authorities and develop-
ing designs at a more conceptual level.

What do you like most?

The best things about my job are the excitement of being involved in people's build-
ing working with a small but smart team of three engineers back at the office.

What do you find most challenging?

There are plenty of challenging aspects to my work, from technical challenges to
keeping track of all of the projects I'm involved with is challenging too.

SEAN GARRETT

Structural Design Engineer,
Holmes Consulting Group
Email: seang@holmesfire.com

What do you do?

I have been working for
since mid-January this
engineer. Since the be-
be challenged by and
dollar Christchurch Wo-
sculptures and building
coming these is what
involved with the design
growing to include pre-
supervision. In the futu-
ship and company ma-

What do you like most?

The single thing I like most
contact with all sorts of
projects successful. I have
friendly bunch of charac-
and the experiences I have

What do you find most challenging?

The most challenging part
made and constructed
ourselves on pushing the
of doing things, to prov-

GRANT

Site Engineer,
Auckland
Email: grant@holmesfire.com

What do you do?

I am an
\$100 million
Auckland
project
look
role
C

DINER, BE (Hons)

Engineer,
Group, Christchurch
group.com



What do you do?
I joined Holmes Consulting Group in Christchurch in my first year (2002), where I work as a structural design engineer. Beginning, Holmes has provided me with some awesome projects to work on, from residential to commercial, and I have taken ownership of. I have worked on everything from the new, multi-million dollar Women's Hospital to commercial and industrial buildings, from houses to artwork gallery renovations. Each job has its own, different obstacles and challenges, but overall it makes the job both interesting and rewarding. At this stage I have principally been doing structural calculations of specific building elements and details. My role is progressively moving from preliminary design and feasibility studies as well as project management and site supervision to more responsibility in the individual projects, team leader-managerial roles.

What do you like most?

The most about my job is the great people you meet along the way. There is personal satisfaction in meeting people, from all sorts of backgrounds, with all sorts of jobs, all trying to make these projects work. I have personally found my co-workers to be the most interesting, supportive and motivating characters you will ever meet, and they have been invaluable to my continued learning and growth over the past nine months.

What do you find most challenging?

The most challenging aspect of my job seems to be the details. There are so many ways things can be done and the "best" way is not always obvious. As consulting engineers, we pride ourselves on pushing the boundaries, expanding on what we know, and finding new and innovative ways to provide cost effective, time efficient and structurally sound solutions.

J. THOMAS, BE (Hons)

Engineer, Britomart Station Project, Downer Construction (NZ) Ltd,
thomas@downerconstruction.co.nz



What do you do?

Employed as a site engineer by Downer Construction on the \$204 million Britomart railway station on a 5.2ha site in downtown Auckland, part of a major transport, urban renewal and heritage project for Auckland City at a total cost of \$204 million. I am one of three engineers currently working on the station after the structural works and architectural fit-out for the main station structure. In my role I am responsible for coordination of activities, materials, quality assurance, Downer Construction personnel and sub-contractors in my areas of the station. I deal directly with the architects, consulting engineers, and the Auckland City's project managers to sort out any design/construction issues as they arise. I assist with temporary works designs and investigate alternative designs and methods of construction in an effort to achieve cost and time savings. I also look after programming and monitoring the progress of the whole project using SureTrack Project Manager software.

What do you like most?

In my job I like seeing the physical progress that the project team have made, transforming what was a barren piece of land into a showpiece for Auckland City and New Zealand.

What do you find most challenging?

The most challenging aspect of my job is working with the large variety of people from all walks of life that are involved with the project. For want of better words, the engineering is simple and the people are complicated.

JONQUELLE M.C.T. LOW, BE (Hons)

Reservoir Engineer
Shell International Exploration and Production B.V.,
The Netherlands
Email: jonquelle.low@shell.com

What do you do?

It is not long ago that I was cramming like mad and preparing for the final five exams of my 3rd Pro Civil year. However, solid waste management, nonlinear ordinary differential equations and earthquake engineering are far from the Unix based reservoir simulators and African oil fields I now deal with daily. I am a Reservoir Engineer for Shell International Exploration and Production B.V. (almost). I say 'almost' for the simple fact that I graduated last year but am now re-training (on the job) into Reservoir Engineering. When I say 'reservoir engineering' I do not mean the engineering involving large bodies of water but rather the kind that deals with hydrocarbon reservoirs (oil and natural gas). My work involves many things including doing detailed analyses of how hydrocarbon reservoirs behave, fluid analysis and characterization, field development planning and reservoir management. I work in integrated project teams alongside people from a variety of different disciplines (and nationalities) - geology, engineering, and economics to name but a few. Together we work on integrated studies for the different Shell operating units around the world.



What do you like most?

I live in The Netherlands, at the moment I work on things in Africa, I get sent to the USA on training and occasionally take weekend trips to Geneva or some other European destination. I can definitely say that the most enjoyable part of my work is getting to travel and of course getting to work with a truly international group of people.

What do you find most challenging?

Well, lets just say the re-training into a completely new engineering discipline, dealing with a multitude of different nationalities and working on some highly political projects sometimes has its moments!



Fire Engineering

News

The web-based distance-learning programme continues to attract new students from around the country and further afield. Currently we have students enrolled in Auckland, Wellington, Nelson, Invercargill, Dunedin, Melbourne and Brisbane.

This year we have been able to obtain a new laboratory and office space for our small-scale apparatus such as our cone calorimeter and ISO ignition apparatus. Currently the laboratory is being fitted-out and it will hopefully be on stream in the new year.

A new student chapter of the SFPE has been started this year. A special thanks goes to Tony Parkes who did much of the work in getting this set up.

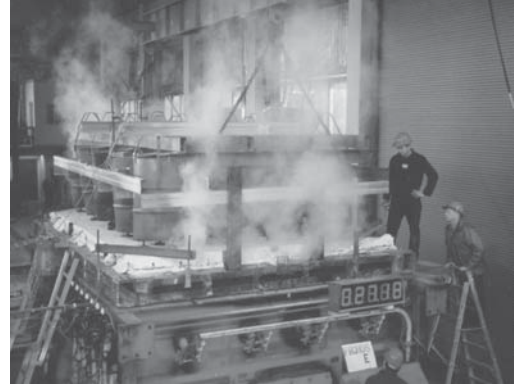
Visitors

As usual we had a number of visitors to the department over the year. Dr John Bryan, from the University of Maryland gave a five-day workshop on human behaviour in fires to the ME students. Also from the Univ. of Maryland, Dr Jim Milke gave a lecture on design fires. Roger Harrison from BRE gave a presentation on the smoke ventilation of fire-fighting shafts. Colleen Wade from BRANZ gave a seminar on using the BRANZFIRE software. Continuing the exchange schemes with Lund Univ. in Sweden, Cecilia Persson attended classes at Canterbury.

Dr Jim Milke, Mr Gordan Cooke and Mr Charles Clifton gave a hugely popular public lecture on the fire and structural engineering issues surrounding the World Trade Center (WTC) collapse. Over 300 people came to hear the lecture and the presenters were interviewed on national television, radio and in the newspapers. In a separate public lecture, Dr John Bryan spoke on the behaviour of the people in the WTC during the collapse and the 1993 bombing incident. Again interviews were aired on local and national television.

PhD Research

Linus Lim is investigating the effects of compressive restraint and tensile membrane action on the fire behaviour of concrete floor slabs. Linus' research is supported by the *BHP NZ Steel Research Scholarship*. The study on the effects of compressive restraint was performed on one-way concrete slabs using a non-linear finite element program, SAFIR. The results of the analyses were presented at the *Structures in Fire (SIF'02)* workshop in March 2002. The fire tests at BRANZ were organised by the University of Canterbury in conjunction with HERA and a number of industry partners led by BHP NZ Steel. 3D finite element analyses with SAFIR showed very good agreement with the test results. A paper on the fire tests and the computer modelling was recently published in the *Structural Engineering Society of New Zealand (SESOC)* journal.



SiF '02 - Second International Workshop Structures in Fire

In March the University hosted the highly successful Second International Workshop on Structures in Fires (SIF'02). During the two days, nearly 30 papers were presented on a variety of topics. Over 45 experts attended the workshop representing 13 countries. A full set of conference proceedings are available on CD-ROM for \$NZ 20.

Fire Service links

A number of fire visits were made this year as part of the ME(Fire) course. These visits included the aftermath of fires at Christchurch Polytechnic, a fish processing factory, several domestic properties, a pharmaceutical storage facility and retail premises. Two students, Michael Huynh and Ben Hume, attended the two-day Breathing Apparatus training course run by the Fire Service. In addition, a group of students took part in a house burn in Rakaia for the local volunteer fire-fighters. The support from the NZ Fire Service is appreciated in particular Gary Luff, Alan Taylor and Alan Merry for organising these visits.

Honour for Fire Engineering Programme

When he was awarded the Queens Service Medal for Public Services in the Queens Birthday honours list, Dr Andy Buchanan said that this was not just a honour for him, but an honour for the whole Fire Engineering Programme, including Charley Fleischmann, Mike Spearpoint, support staff and the 70 graduates who have been awarded the M.E.(Fire) degree over the past eight years. Andy was presented with his medal by the Governor General at the official investiture in Wellington. He also attended a celebration at the Fire Service Headquarters, where Dame Margaret Bazely, chair of the Fire Service Commission, praised the fire engineering work in the Department.



Fire Engineering Research Reports

2002/1	Performance of expanded polystyrene insulated panel exposed to radiant heat	G Baker
2002/2	Comparison between predicted & actual behaviour of domestic smoke detectors	D Brammer
2002/3	Bench-scale testing development of sprinkler & smoke detector activation/response time	K S Chin
2002/4	The effect of door angle on fire induced flow through a doorway	L R Clark
2002/5	Implementation of a glass fracture module for the BRANZFIRE compartment fire zone modelling software	R Parry
2002/6	Assessing the feasibility of reducing the grid resolution in FDS field modelling	N Patterson
2002/7	Fire safety design of Ferrymead Heritage Park	M Rangi
2002/8	Experimental results for pre-flashover fire experiments in two adjacent ISO compartments	L Rutherford
2002/9	Measurement of magnitude and direction of hot gas flow in a fire compartment with a five-hole probe	J Schulz
2002/10	Assessment of the current false alarm situation from fire detection systems in New Zealand and the development of an expert system for their identification	Y F Tu
2002/11	Performance of unprotected steel and composite steel frames exposed to fire	C Wastney
2002/13	Equivalent fire resistance ratings of construction elements exposed to realistic fires	J Nyman

Many of the above Fire Engineering reports are available for download as PDF files from our website at <http://www.civil.canterbury.ac.nz> under Fire Engineering Research. If you wish to purchase hard copies, please contact Catherine Price at c.price@civil.canterbury.ac.nz, for pricing and availability.

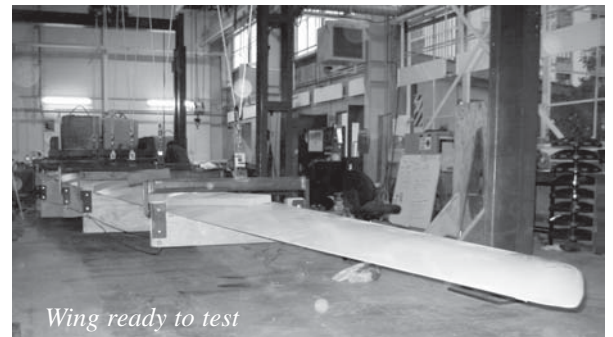


Canterbury testing blades

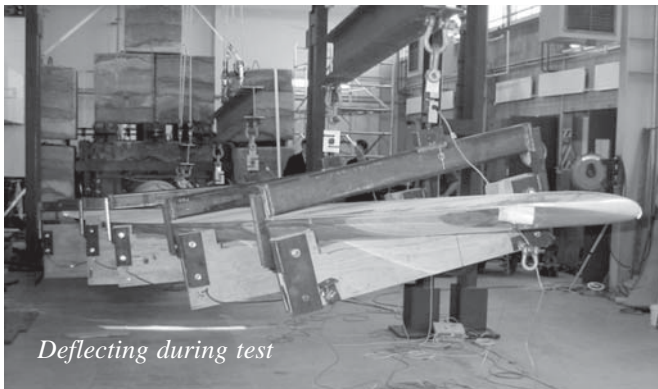
Windflow Technology Limited contracted the Civil Engineering Department to test a full size blade from their 500 kW wind turbine. To confirm the blade's design, testing was required under two levels of proof loading followed by a third loading cycle to failure. The blade was constructed from LVL (Laminated Lumber Veneer), expanded foam and fibreglass epoxy. It was the first turbine blade constructed in the southern hemisphere and one of only a

handful in the world that had been tested to destruction.

The blade itself measured 16.1m long and weighed approximately one tonne. The wing was tested upside down to allow the wing to deflect upwards during the testing. Two mobile winches and an overhead gantry crane were used to apply the load to the wing. A series of strain gauges and linear potentiometers were used to record the internal stresses and strains in the blade. To resist the overturning moment imposed by the loading approximately 45 tonnes of concrete were used to secure the blade to the floor of the testing laboratory.



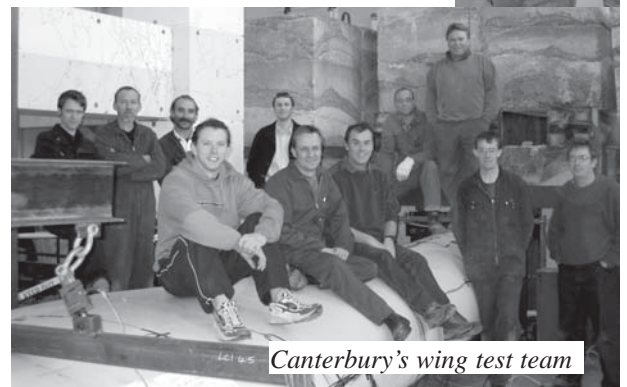
Wing ready to test



Deflecting during test

Testing was completed in front of an audience of approximately 300 visitors from industry, students, and external auditors from Lloyds of London. Television news cameras were installed to capture the testing from PrimeTV, TVOne, and TV3. The blade failed in an explosive manner under an imposed load of approximately 10 tonnes with a maximum tip deflection of 2.3 m. The failure load exceeded the expectations of Windflow. Based on the results from this test, the blades have gone into mass production with the first prototype expected to be installed in Christchurch by mid-2003.

The total project was completed in the very short period of two months. Many thanks must go to the highly talented team of technicians from the department who worked on the project, often after hours and on the weekends. The project was managed by Chris Allington, Des Bull and Jeff Matthews and given the full support from the Department.



Canterbury's wing test team

Students

Students visit bridge construction in Bangladesh

Two 3rd Pro students, Bridget Doran and Logan Aves, went to Bangladesh in April 2002 to visit a massive bridge construction. The bridge will cross the Padma River (the Ganges River, renamed Padma when it enters Bangladesh) near Paksey. The bridge will be approximately 2 km long. The bored concrete piles are reputedly the largest of their type in the world, being 3.1 m diameter, four piles per pier, and will be cast over 90 m into the riverbed, with the reinforcing bars 57 mm in diameter.



During the students' visit, a huge pier cap concrete pour was underway - around 960 m³ of concrete, taking around 24 hours to complete. Contractors from Bangladesh and China stood around in the 10 metre deep casing, directing the concrete around the steel cage. Pre-monsoon thunderstorms delayed proceedings for a short time during the night - all part of the challenges of working in this part of the world.

River training works are being carried out while the bridge is being constructed. This involves large concrete blocks, geotextiles and reinforcing soil set on the banks to ensure the river does not deviate from its current course. Approximately one half of the project cost is on these training works.

The Materials Engineer for the project, Logan's father Robert Aves, made sure that the two students saw all the interesting parts of the project. Bridget says: 'It was an amazing experience to see the combination of first world expertise and vision, matched with Bangladeshi climate and conditions - an awesome challenge for the engineers, and definitely an inspiration for students.'

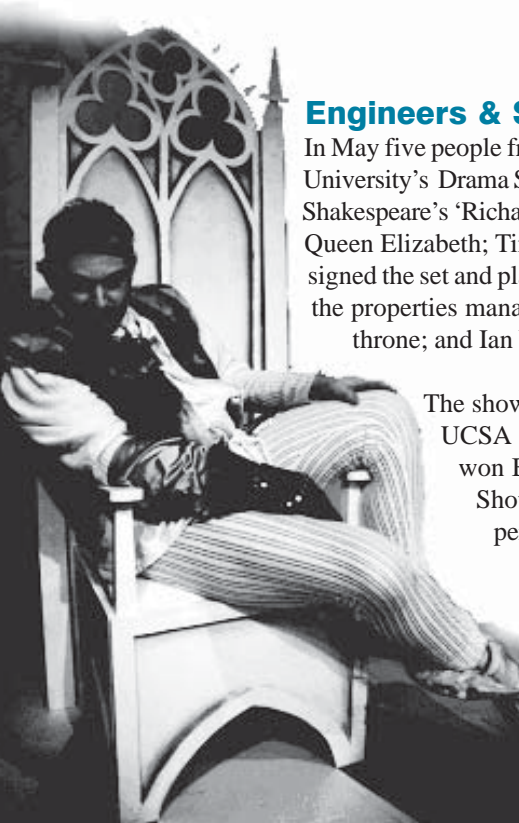
Engineers & Shakespeare

In May five people from the 3rd Pro Civil class were involved in the University's Drama Society's major production for the year, William Shakespeare's 'Richard III'. Jane Jerram played a lead female role as Queen Elizabeth; Tim Taylor was the production manager, co-designed the set and played the part of Ratcliffe; Anna Bridgman was the properties manager; Caroline Ballard designed and made the throne; and Ian Warren was a member of the stage crew.

The show won a huge number of awards at the annual UCSA 'Madcaps'. Of special note was that the show won Best Drama, and the Supreme Award for Best Show; Jane won Best Supporting Actress for her performance; and the set won Best Set Design.

Jane and Tim have both been heavily involved in Dramasoc over the rest of the year. Tim helped to create 'Fou' at Orientation, they both performed in '3some02' in September, and they both served on the club committee.

Richard on his engineer-designed throne



Civil Engineering Prizes

The department wishes to congratulate the following students who were awarded prizes for their excellent results in 2002. These prizes are made available by the generous support of the industry sponsors.

Civil Engineering Prize: (joint winners) Adrian Hii and Bruce Galloway

NZ Concrete Society Prize: Kathryn Robertson

RW Morris Prizes in Hydrology or Hydraulic Engineering: Gustaaf Kikkert (Hydrology), Bruce Galloway (Hydraulic Eng.)

NZ Pavement & Bitumen Contractors Assoc. Prize in Pavement Engineering: Victor Gin

NZ Automobile Assoc. Prize in Traffic Eng.: Melanie Henry

Traffic Design Group Prize
2nd Pro - Lucy Coe
3rd Pro - Deborah Miller

Works Infrastructure Ltd Prize in Civil and Roading Construction Mgmt
2nd Pro - Corrina Gibbons-Hurinui
3rd Pro - Adrian Hii

Structural Engineered Timber Manufacturer's Association (SETMA) Award: Gareth Husband

Tonkin & Taylor Prize in Geomechanics: Melanie Henry

Montgomery Watson/Jim McFarlane Memorial Prize: Sandra Shewan

Holmes Consulting Group Structural Engineering Prize (2001)
Didier Jarg Pettinga

Montgomery Watson Geotechnical Eng Prize (2001): Adrian Hii



Silver medal winner in our midst

Peter Stafford is enrolled as a PhD candidate working in the Geotechnical group of the Civil Engineering Department. Peter's study is based around the undertaking of a seismic hazard assessment of an area around Westport on the South Island's west coast with a view to estimate ground motions at specific sites. Peter graduated from the Civil Engineering department in 2000 and began work in Christchurch for a local consultancy before being lured back to academia in 2002 by this interesting project. His studies are very generously funded by Solid Energy International, a company headed by another Canterbury engineering graduate, and the project has expert supervision from Dr John Berrill (this department) and Dr Jarg Pettinga from the Dept. of Geological Sciences.



Recently Peter attended the seventeenth Commonwealth Games held in Manchester, England where he was a member of the successful New Zealand men's hockey team. The team had three weeks touring through Germany, Belgium and Holland before heading to the games where they were eventually beaten by the awesome Australian team for the Gold. Peter says "The entire trip was an amazing experience and the medal was just reward for many months of intense training." Prior to the games Peter was training fifteen times each week and only had a brief respite before the National Hockey League started.

Student wins prize for final-year project

Grant Thomas (a 3rd Pro. Student in 2001) won the Minister of Transport's Award for the "best student project in a transport subject" completed in NZ in 2001.

Grant completed a project on "Rural Roundabouts and their Application in New Zealand", under the supervision of Alan Nicholson. The research topic was identified in consultation with Marten Oppenhuis (MWH), who provided valuable practical advice throughout the project.

The research involved critically reviewing design guides for rural roundabout from several countries overseas and proposing some guidelines for their use in NZ. Grant's report has been well-received by practising engineers, and he was invited to present his report to a workshop on road design, organised by Transit NZ. It is expected that Grant's report will form the basis for industry guidelines.



Grant receives his award from Hon Judith Tizard the Associate Minister of Transport.

Third Pro students outdoors

Some of our students are certainly keeping up their outdoor activities as well as their studies. The annual Avalance Peak challenge attracted several third pro students, some completing the race in astonishingly short times. The course was shortened due to bad weather, so competitors were required to run up the mountain and straight down, via Scott's track, to finish at Arthurs Pass village. Aaron Prince was the second in the "runners" section to reach the peak just under 50 minutes and finished in the village 74 minutes after the start, only three minutes behind the winner. Hilary Lough made it first in the women's "tramp" section (2 hours 22 minutes), and Bruce Galloway came second in the men's "tramp" section (1hour 32 minutes).



Jason Davidson was yet another student who took up the challenge and states that he will be back next year. As a result of the pounding downhill, those who competed could easily be identified during the next week limping between lectures with very sore legs.

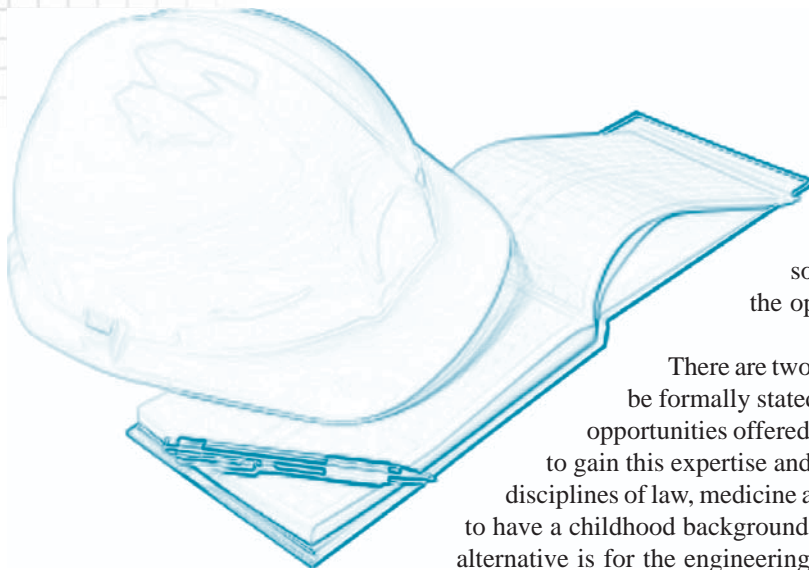
The event is just one of many for Aaron Prince, who was invited to Japan in the middle of the year to compete in a 24-hour multi-event (run-bike-kayak-abseiling-and-much-more) in a team including his sister. As a passing remark, Aaron spent last year as an exchange student at Lund University in Sweden and says that the visit was well worth while.



▲ Above: Bruce Galloway emerges from the mist on Avalanche Peak.

▶ Right: Aaron Prince competing in the Coast to Coast, finishing 8th with a time of 12 hours and 35 minutes.

Engineering and Women: Does it work?



Gretchen Kivell has been a member of the Advisory Board of the Department for some years. She has recently resigned from this position, and offered these thoughts on the role of women in professional engineering.

“We are now getting results from very competent research that is interesting, disturbing, and immensely useful in pointing the directions for change within the profession and particularly those nurseries for the profession, the engineering schools. I could talk about the depth and breadth of this work for hours and with great enthusiasm. Instead, I’d like to give two small and very specific examples. These ones show aspects of the very strong culture of engineering schools that makes them unwelcoming to women and, incidentally, other minority groups.

Interviews with large numbers of men engineering students have shown that almost all had had engineering related hobbies at school - cars, model making, working with dad in the workshop, building electrical circuits, pulling apart computers and all sorts of other equipment. The researchers call this ‘tinkering’. None of the men interviewed thought their hobby interest was significant in their choice of career. Yet when they got to engineering school they found the environment fitted them like a glove. The academic staff, engineers and therefore tinkerers themselves, assumed their students knew about con rods,

three phase power, circuit boards, springs, levers, pulleys ... The engineering curriculum implicitly assumes that students have this background.

You can understand how non-tinkerers - most women who enter the profession, most Asian students, and yes there are male non-tinkerers too - feel on the back foot, that there is something they need to catch up on but can’t find the opportunity to do this at university.

There are two solutions to this problem. Firstly, tinkering could be formally stated as a pre-requisite to studying engineering, with opportunities offered to those who do not have experience in tinkering to gain this expertise and knowledge. But as the researchers point out the disciplines of law, medicine and dentistry do not require commencing students to have a childhood background of hobbies related to their choice of career. The alternative is for the engineering curriculum to be based on the assumption that students will not necessarily have an informal background in mechanical and electronic tinkering. This will be an interesting challenge to academic staff and will certainly affect the curriculum.

As a second illustration I point to a tradition in engineering classes that is not common in other university classes. This is a generally disruptive behaviour in class, often described as ‘mucking about’ and including pranks, tomfoolery, inattention and ‘general boyish behaviour’. Interestingly some academics interviewed, themselves engineering students some time ago, accepted this behaviour and seemed unaware of its affects on other students. Worse still, neither staff nor students who condoned ‘mucking about’ saw it as evidence that students weren’t learning, that there was something seriously awry with the teaching and learning process.

These seem small things, yet they have a disproportionate effect on the quality of learning for the various groups and individuals studying engineering. Some, who conform to the culture study easily and well, while others - including many with skills engineering needs so badly - wonder while they’re finding their chosen vocation so difficult. If such little things are discouraging, then I could go on at length about many really big issues, such as whether such things as the self-protective group behaviour, the academic and social environments, the workload, curriculum and assessment, the teaching styles, and the content-oriented curriculum that is reductionist rather than problem and context-based are equally empowering of all who could be studying engineering, whether we are encouraging diversity in our profession.

All of the work and actions of every engineer are affected by the unstated values and assumptions we have absorbed at engineering school and in our practice. This culture, which was right for the times as our profession developed, is now leading us away from relevance, away from influence and leadership, away from doing well what we do best because we aren’t equipped to take notice of the context and the implications of our work.”

*Excerpt from: ‘May the Force be with us’
IPENZ Presidential Address 5 February
1999.*



Rural highway safety design

New Zealand relies largely on two-lane rural highways for its inter-regional land transport network. Many of these highways are far from optimal in terms of consistency of design and thus present safety hazards. To counter this, various improvements are investigated and constructed, including realignments and road widening. As many of the “easy fixes” (e.g. black spots) have been implemented, more sophisticated road models may be required to identify the effects of subtle changes in roading alignment or cross-section. These will allow incremental improvements to the relative safety of rural roads to be better identified and incorporated into designs for future works.

Glen Koorey, a Canterbury civil engineering graduate, has been investigating the safety and efficiency of rural highways for some years, at Opus Central Laboratories in Lower Hutt. In 2001, taking study leave, Glen returned to Christchurch to start a PhD on this topic. Because almost half of all rural crashes occur on curves, his focus is on understanding what affects driver behaviour at curves, particularly the chosen speed and positioning. As well as desktop analysis of road geometry and crash data, Glen will investigate using automated measuring devices for recording vehicle movements through selected curves. He plans to develop a model that can be used to assess the relative safety of both existing and proposed road alignments.



Industry Advisory Board

The Professional Liaison Committee has been re-formulated as an industry Advisory Board, under the chairmanship of Dr Don Elder (CEO of Solid Energy). The board members include Peter Smith (Spencer Holmes), Kevin Thompson (Opus), Ian Robertson (MWH), Grant Wilkinson (Holmes Consulting). At the November meeting we welcomed two new members, Rick Pridmore (NIWA) and Dave Faulkner (Fulton Hogan). The Board meets four times a year and has already made a significant contribution to the Department.

Major items discussed at recent meetings include the current proposals for re-structuring of the University, strategic and business planning within the Department, and difficulties over spending financial reserves for major capital expenditure items.

Gretchen Kivell (Otago University) served as a member of the Board from its inception as a Liaison Committee until late this year. Many thanks are due to Gretchen for her major contribution during this period, including much useful advice on strategic planning, re-positioning of the Department, and her continuing concerns that we should do more to welcome women into the Department.

Glen has been awarded doctoral scholarships from Canterbury University and the Road Safety Trust. He also continues to work part-time for Opus Central Labs. Some of his PhD research has also been linked to work by Opus Central Labs for Transfund NZ, the Land Transport Safety Authority, and the Foundation for Research Science & Technology (FRST).

Postgraduate Courses Available in 2003

Courses to be taught in Block mode are identified with (B).
Full-time or part-time enrolments are welcomed.

First Semester

(B) Risk Assessment	Milke / Spearpoint
Structural Dynamics & Earthquake Eng	Carr / Deam
Foundation Engineering	McManus
Nonlinear Structural Mechanics	Mander
Groundwater Flow	Hunt
Water Chemistry	Wareham / Milke
Environmental Fluid Dynamics	Nokes
(B) Accident Reduction & Prevention	Nicholson / Visitor
(B) Advanced Pavement Design	Saleh
(B) Transport Planning & modelling	Dantas / Visitor
(B) Structural Fire Engineering	Buchanan
(B) Fire Dynamics I	Fleischmann

Second Semester

Introduction to the Theory of Plasticity	Davis
Finite Element Methods	Carr
Concrete Materials and Practice	Mackechnie
Ecological Engineering	Thorpe / Milke / Visitor
Biological Nutrient Waste Treatment	Wareham / Visitor
Wastewater Disposal	Davidson
(B) Contaminant Hydrogeology	Milke / Visitors
Traffic Management	Nicholson
Pavement Management Systems	Saleh / Visitor
Fire Safety Systems	Spearpoint / Fleischman

Transportation Engineering Programme in Full Swing

As a result of funding supplied by Transfund NZ, the Road Safety Trust and Land Transport Safety Authority, three new Postgraduate qualifications became available in February 2002; the Doctor of Philosophy in Transportation Engineering and Master of Engineering in Transportation degrees, and the Postgraduate Diploma in Transportation.

2002 Courses

During 2002, four one-semester Transportation Engineering Postgraduate courses were taught:

- Accident Reduction & Prevention
- Traffic Management
- Low Volume Roads
- Transport Planning & Modelling

Full-time students also did a number of other courses in the Department of Civil Engineering, including Risk Analysis, Geographic Information Systems and Pavement Engineering.

The course on Low Volume Roads was taught by Dr Rob Douglas (School of Forestry, University of Canterbury) and a Visiting Erskine Fellow, Andrew Dawson (Centre for Pavement Engineering, University of Nottingham). Two experienced practitioners made short

contributions to the Transportation Planning and Modelling course.

Three courses were taught in block-mode. This involved two three-day blocks of lectures, tutorials and project work, with additional assignments and project work to be completed during the rest of the semester.

Student participation

A total of 18 students were enrolled for one of the three Transportation Engineering qualifications in 2002. This is about three times the typical number studying Transportation Engineering in recent years. In addition 27 students have enrolled for the 2003 year.

Industry liaison

The inaugural meeting of the National Industry Liaison Committee, involving representatives of various sectors of the industry, plus the Auckland University and Canterbury University staff teaching Transportation Engineering, was held in Wellington in July 2002. This meet-



Transport engineering staff (l. to r.) Andre Dantas, Alan Nicholson and Bruce Steven with visitors Dr Diew (far left) and Dr Andrew Dawson (2nd from right).

ing was preceded by a meeting of the University staff, during which opportunities for closer collaboration were explored.

The composition of the Local (Christchurch) Industry Liaison Committee was agreed at the National Committee meeting, and various people have been invited and agreed to participate.

Plans for 2003

It is planned to offer six courses in 2003: Transport Planning and Modelling, Traffic Management, Accident Reduction and Prevention, Advanced Pavement Design, Pavement Management, and a Special Topic. Three overseas experts in Transportation Engineering will contribute:

(1) Dr Nicholas Garber (University of Virginia) will teach half of the "Accident Reduction and Prevention" course;

(2) Dr David Boyce (University of Illinois at Chicago) will teach half the "Transport Planning and Modelling" course;

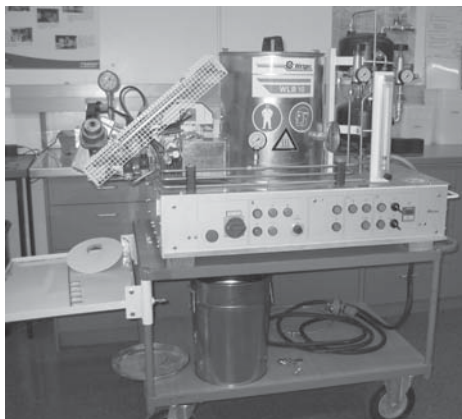
(3) Dr Martin Snaith (University of Birmingham) will teach half the "Pavement Management" course during first of three annual visits, funded jointly by Canterbury and Auckland Universities and Transit NZ.

These overseas experts will teach in block-mode, to maximise the opportunity for practitioners and part-time students to participate and interact with them.

For further information, contact A.Nicholson@civil.canterbury.ac.nz or visit the Department's web page www.civil.canterbury.ac.nz.

New TRANSFUND funded project

The Civil Engineering Department has signed a contract with Transfund to carry out a project on pavement materials. The project will use a new technique for stabilising unbound materials using foamed bitumen. It involves using a piece of hi-tech equipment, pictured below, where cold water is injected into bitumen which is very hot at about 180°C. The bitumen expands to about 20 times its original volume and loses its viscous status. Due to its very low viscosity, the foamed bitumen can coat the fine particles, working as a mortar, which will bind large aggregates together, improving the shear strength and minimizing the moisture susceptibility of the stabilised material. This foaming bitumen machine is the only one of this type currently in New Zealand.



Publications

Elasticity and Geomechanics in English and Arabic

Rob Davis and Patrick Selvadurai have jointly written another book. This one is called *Plasticity and Geomechanics*. It is a sequel to the “wildly popular” *Elasticity and Geomechanics* Rob and Patrick published in 1996. *Elasticity and Geomechanics* is so popular in fact that it has been translated into Arabic. Several people have commented that it is just as easy to understand the translation as the original English version. Surprisingly, no one has yet offered to purchase the movie rights.

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شماره چهارم / کتابخانه راه‌های استخوانی

اگر جابجایی شعاعی مورد نظرمان باشد، جابجایی du_r همواره به سمتی خواهد بود که $P.r.d\theta$ در آن سمت واقع می‌شود. همچنانکه بار نقطه‌ای را در ناحیه R حرکت می‌دهیم، راستای تأثیر فوق تغییر می‌کند لذا مشاهده می‌کنیم که بررسی جابجایی قائم، ساده‌تر از مطالعه جابجایی شعاعی می‌باشد. همچنین باید توجه نمود که معمولاً جالبترین کمیت در محاسبات مربوط به پی، تعیین کمیت نشست قائم می‌باشد. در مرحله بعد، جابجایی قائم در کناره یک بار دایره‌ای را در نظر می‌گیریم. مرکز محورها مختصات را به نقطه‌ای بر محیط دایره مطابق شکل ۶-۴ حرکت می‌دهیم. در این حالت فرض می‌کنیم که فاصله شعاعی بین بار نقطه‌ای و مرکز محورها مختصات، k باشد. مساحت المان سطحی برابر با $sd\Omega ds$ خواهد بود که نقش آن در میزان جابجایی قائم از رابطه زیر به دست خواهد آمد.

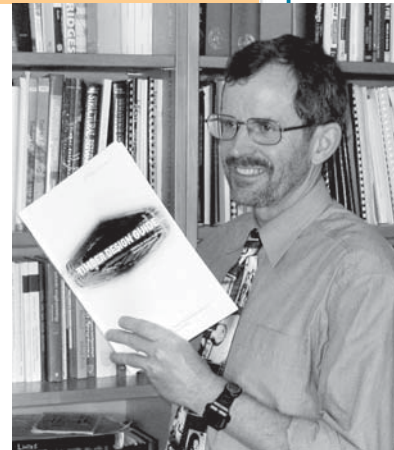
$$du_z = \frac{(P.s.d\Omega ds)(1-\nu)}{4\pi Gs}$$

با انتگرال‌گیری از دو سمت معادله اخیر به رابطه زیر خواهیم رسید.

$$u_z = \int_R \int \frac{(P.s.d\Omega ds)(1-\nu)}{4\pi Gs}$$

Timber Design Guide

Dr Andy Buchanan has recently edited the Second Edition of the *Timber Design Guide*. This 250-page book



provides essential design information for structural engineers and architects involved in many aspects of timber construction. It includes new material on leaky buildings and high strength epoxied connections, as well as information on subjects such as surface finishes, durability and treatment, fire resistance, and acoustics in timber buildings, as well as structural calculation methods for many types of timber building. The *Timber Design Guide* is used as a textbook for courses in Engineering Materials and Engineering Design. Copies are available from the Timber Industry Federation, Wellington.

Rethinking Construction NZ

Prior to joining the Department last year Jason Le Masurier was involved with a UK Government sponsored initiative called Rethinking Construction, which engages with the whole UK industry supply chain to promote and facilitate innovation in construction. This has a particular focus on more efficient, integrated approaches to delivering projects such as alliancing and partnering. Jason has been working with the Centre for Advanced Engineering (CAE) and key companies and individuals in the industry to set up a similar initiative here. Industry response has been positive and there appears to be great potential for this initiative to help improve efficiency in the construction industry. Jason is currently working with four ‘demonstration projects’ which have adopted innovative approaches to project delivery, including the Grafton Gully project in Auckland (pictured right) and the Lyttelton Fast Coal Project. The aim in the coming year is to obtain wider industry and government support for this initiative. Further background information is available on the website www.rethinkingconstruction.com.



in February 2002 on ‘The Contract in Successful Project Management’ to highlight the latest developments in contract forms from around the world. Jason Le Masurier jointly edited a book on this conference with Ernesto Henriod (both pictured left), which was published by CAE in October 2002.

For more details on this book please contact CAE on +64 3 364 2478 or email books@cae.canterbury.ac.nz.



Associated with the drive for improved project delivery mechanisms, the CAE held a conference



Civil Engineering Alumni News

Reunions

Wonder what your classmates are up to? Have you thought about organising a reunion for your class? The University's Alumni Office can assist you with all aspects of the planning and organising, including tracing your classmates, publicity and promotion, suggesting activities, venues & caterers, etc.

The Civil Engineering Department will also support your event in the following ways:

- Hosting a special website for your class
- Providing access to lecture rooms and labs
- Providing tours of the labs

Please contact the Alumni Office on phone: +64 3 364 2913 or email at alumni@canterbury.ac.nz, for more information and for a copy of the "Alumni Office Reunion Guide".

CE Communicator

We are improving communications with alumni during 2003 by giving graduates and friends of the department access to the internal 'CE Communicator' web pages. These pages provide a personalised view of departmental events, allow users to contact former classmates via e-mail and edit their own information describing their whereabouts and work. We are also looking for volunteers to collate news pages for each graduating year.

Please visit the departmental web site <http://www.civil.canterbury.ac.nz/> and select 'Alumni' to access CE Communicator. Your personal access details will be sent to you by e-mail.

The Department of Civil Engineering is embarking on a major exercise to plan enhancements to teaching and research programmes, laboratory space and staffing requirements for the next five years. This will create opportunities for alumni and friends to make contributions to the next stages of growth of the Department. Accordingly we have set up the Civil Engineering Fund to be administered by the University of Canterbury Foundation.

I would like the Head of Department to contact me, to discuss:

- support for a named infrastructure project support for a named professorship
 a bequest

Yes, I would like to support the Department of Civil Engineering. (All donations are tax-deductible.)

I would like to make a donation of \$ _____ to be directed to the Civil Engineering Fund.

If paying by cheque please make payable to University of Canterbury OR

Please charge my credit card Bankcard Visa Mastercard

Card Number:

Expiry Date: _____ / _____ Signature: _____

Name of cardholder (in full): _____

Address for receipt: _____

Send to: Shelagh Murray, Development Manager, Registry 5
University of Canterbury, Private Bag 4800, Christchurch 8020, New Zealand