CE News

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This issue

UNIVERSITY OF CANTERBURY
CHRISTCHURCH • NEW ZEALAND

Departmental Staff

Academic

Larry Bennett	Engineering management
John Berrill	Geomechanics, engineering seismology
Andy Buchanan	Timber and fire engineering, Head of Department
Des Bull	Structural concrete design, earthquake engineering
Athol Carr	Structural dynamics, finite element analysis
Bente Clausen	Hydrology, impacts on ecology
Nigel Cooke	Structural design (bridges), structural masonry
Rob Davis	Geomechanics, continuum mechanics
Bruce Deam	Earthquake engineering, timber engineering
Charley Fleischmann	Fire engineering
Bruce Hunt	Groundwater flow, analytical analysis
Kevin McManus	Geotechnical engineering, foundation engineering
John Mander	Structural and earthquake engineering
Mark Milke	Solid waste management, uncertainty analysis
Peter Moss	Structural dymanics, timber engineering
George Mullenger	History of civil engineering, continuum mechanics
Alan Nicholson	Transportation planning, traffic safety
Roger Nokes	Fluid mechanics
José Restrepo	Earthquake engineering, structural concrete
Michael Spearpoint	Fire engineering
Alex Sutherland	Sediment transport, coastal engineering
Hai-Jing Wang	Fluid mechanics
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

Secretarial

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

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, or contact staff

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Ray Allen	Workshop
Colin Bliss	Structures lab
Melody Callahan	Graphics/Web
Peter Coursey	Computing
Nigel Dixon	Stores and purchasing
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
Alan Poynter	Model Structures lab
Ian Sheppard	Fluids lab
Stuart Toase	Structures lab
Mike Weavers	Electronics lab
Kevin Wines	Structures lab

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

The Head's Memo

Welcome to Another Edition of CE News.

The year 2000 has been a busy year in the Department of Civil Engineering, with a mix of business-as-usual and new developments. There have been changes of staff and a lot of new projects are on the drawing board.

The only academic staff resignation this year has been Professor David Elms who has been a member of the Department for 36 years. His contribution to the department is greatly valued and he will be hard to replace, but the search is well under way.

There are a number of new or impending arrivals. Professor John Mander arrived in July to fill the structural engineering chair vacated by Bob Park last year. John is a Canterbury graduate who has returned after 13 years at the State University of New York at Buffalo in the United States. There are lots of movements in the fluid mechanics area: Dr Hai Jing Wang has been with us on a one year contract, Dr. Roger Nokes arrived from Nelson in December 2000, and Dr. Mark Davidson will start in July 2001. These arrivals will fill the positions previously held by David Wilkinson and Bob Spigel. Dr. Moffreh Saleh arrived late in December 2000 to take up the pavements position which has been empty since the departure of Bryan Pidwerbesky.

Among the Technical staff we have farewelled Mark Stuart-Jones and Paul Murphy, and we have welcomed new staff members Colin Bliss and Kevin Wines.

This year we revisited our Strategic Plan, with the help of a two-day Planning Workshop for all staff and postgraduate students in April. We were very pleased that several members of our Professional Liaison Committee were able to attend and make a valuable contribution. The workshop has resulted in a number of new initiatives, including reviews of curriculum, proposals for new Masters degrees, and better communication within and outside the Department. Another workshop will be held in April 2001.

During the year the Department hosted many visitors, including Professor Daryl Le Grew, Vice-Chancellor of the University. After a productive discussion with the academic staff members, Professor Le Grew was shown around the laboratory facilities to get a feel for the scope of experimental research and teaching carried out in the Department.

Dr Andy Buchanan pointing out details of a reinforced concrete specimen to the Vice-Chancellor, Professor Daryl Le Grew, in the structures laboratory.

A new development was the appointment of Michael Kerkham as the School of Engineering's first honorary adviser to high schools. Michael has offered to visit every high school in the Nelson-Marlborough region at least once a year. He is talking to final year students about professional engineering careers and encouraging younger students to study science throughout high school. Michael is a civil engineer (graduated in 1980) with a background in engineering, teaching and farming. He has already had considerable success encouraging bright students to study engineering at Canterbury. We are looking for advisers in other regions of New Zealand. Please contact me if you can help.

Michael Kerkham, honorary adviser for the School of Engineering.

Budget cuts will make 2001 more difficult. Most departmental budget items will have to be reduced, but I am confident that we can run the department with the funds available. The only sure way of reversing the budget cuts is to directly obtain money from outside sources, so we will have to move towards a departmental overhead on external contracts and industry funded research.

I look forward to a productive and exciting year in 2001. In July there will be an academic review of the Department and a moderation by IPENZ, which will help us to establish future plans.

Please visit our website at www.civil.canterbury.ac.nz and tell us how the Department looks from the outside world. Comments and suggestions are always welcome.

Andy Buchanan
Head of Department

Transport Engineering in the Fast Lane

New Masters Degree Established

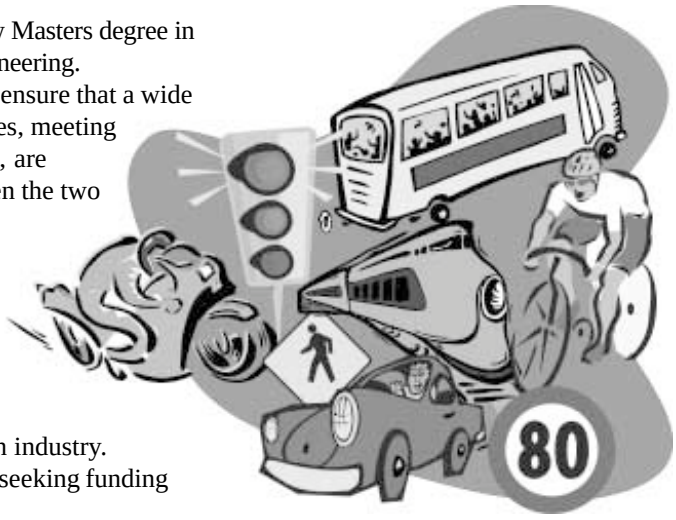
At the Department's planning workshop in mid-April, the Department was advised to pay more attention to transport engineering. By the end of April, the Department had submitted an application to the University for a grant from its "New Initiatives Funding" to allow the establishment of a Masters Degree in Transport Engineering. The University received 22 applications from various departments, of which only 8 were successful. The Transport Engineering proposal was ranked top and is receiving the largest grant of $75,000.

Discussions with the transport industry and the Univ. of Auckland's Department of Civil and Resource Engineering revealed a strong desire for the two departments to co-operate in establishing such a degree. The departments have subsequently developed a Memorandum of Agreement to jointly offer new Masters in transport engineering degrees at each university. We have also developed a joint proposal seeking financial support from the transport industry, and detailed discussions with industry are under way. A grant of $100,000 has been received from the Road Safety Trust, on the recommendation of the Land Transport Safety Authority.

The move to collaborate much more closely with the Univ. of Auckland is a continuation of existing work between Alan Nicholson and his Auckland counterpart, Roger Dunn. Alan and Roger, with assistance from Wolf Homburger (formerly Asst.Director of the Institute of Transportation Studies at the Univ. of California, Berkeley), have jointly taught seven five-day Continuing Professional Development courses on the "Fundamentals of Traffic Engineering" since 1991. That course has attracted almost 250 participants over the nine years, including a group of 15 Taiwanese traffic engineers who attended in 1999.

Under the Memorandum of Agreement between the universities, the departments have agreed to:

- Establish a new Masters degree in Transport Engineering.
- Collaborate to ensure that a wide range of courses, meeting industry needs, are offered between the two departments.
- Design course delivery methods to encourage part-time participation by engineers in industry.
- Collaborate in seeking funding from industry.
- Participate in exchanges of staff.
- Accept courses from the other university for the degree.
- Offer some of the new courses to final year undergraduate students.



It is hoped that the new degree will be the first of many such co-operative activities between the departments and the two Schools of Engineering in the future. ◆

Forestry and Civil Share the Road

Dr Robert Douglas (PEng) (pictured below), recently appointed to the School of Forestry, has been allocated space in the Department's transportation lab. Previously on the Civil Engineering and Forestry staffs of the University of New Brunswick, Rob has strong interests in geomechanics, trucking and unsealed roads. With no appropriate laboratory space in the School of Forestry, it was agreed that accommodating Rob in the Transportation Lab would be mutually beneficial. He and the Civil Engineering Department will share existing equipment and new equipment he purchased with an equipment grant.

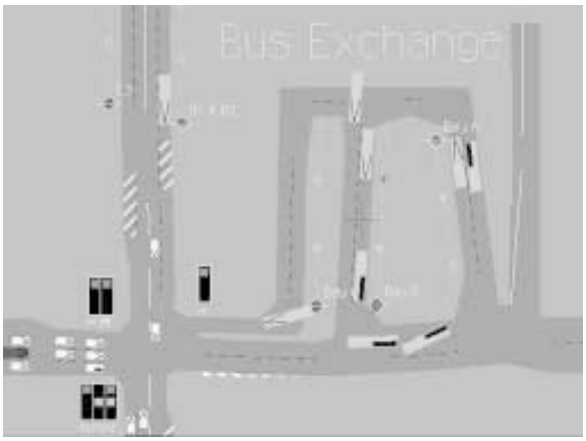
Rob is assisting with the teaching of the Pavement Engineering course and looks forward to doing research at CAPTIF (the Canterbury Accelerated Pavement Testing Indoor Facility). His research interests include the use of novel and marginal materials and aggregrates in access roads, the design of roads with geosynthetics, the stability of slopes, the use of central tyre inflation systems for heavy hauling, and the prediction of the performance of extremely heavy haul trucks. With his knowledge of unsealed roads (about 38% of the length of roadway in NZ is unsealed), his expertise will complement the sealed roads expertise of Dr Moffreh Saleh, soon to join the Department. ◆

Transport Engineering in the Fast Lane

Traffic Modelling

In CE News last year, it was reported that Assoc. Professor Alan Nicholson was undertaking research using the Paramics microsimulation model, which involves the simulation of individual vehicles within a road network. Since the behaviour of individual vehicles is modelled in fine detail, much more accurate and detailed information is provided for traffic planners than was previously possible with traditional models.

Development of a Paramics model for the road network around the University has been completed. The results were so impressive that the Christchurch City Council indicated an interest in developing a Paramics model for the area around the new central-city bus exchange (in Lichfield Street, just to the east of Colombo Street). The bus exchange is expected to provide a timely boost for public transport, given the growing concern about the adverse environmental effects of traffic and the increasing costs of fuel. There was some concern, however, regarding the impact of extra bus movements in and out of the bus exchange on the performance of the road network in the vicinity and the adequacy of the arrangements for the buses to enter and leave the bus stops.



New bus exchange in Christchurch, New Zealand

Axel Wilke, who completed his BE(Hons) in 1998 and was working for the City Council, decided to return to the Department and study for an ME, and develop a Paramics model for the network around the bus exchange. In the UK, where Paramics was developed, each bus service has its own, dedicated bus stop. In NZ, however, a bus stop is generally used by several services. The Paramics software was modified for the University (the licence-holder) by SIAS Ltd (the owners of the program), with the cost being met by the City Council. The study has shown that with a few minor design modifications, there should be no real problems.

Katja Berdica, a Doctoral student at the Royal Institute of Technology, Stockholm, has recently commenced a visit to the Department. She will do a couple of ME courses (one on Road Safety and one on the Environmental Impacts of Traffic) and work with Professor Nicholson on an investigation into the use of Paramics for modelling a road network subject to short-term reductions in link capacities. She will be using the Paramics model for the area around the University, along with SATURN and TRACKS models for the same area (both traditional models, developed by another ME student, Zarko Andjic) to assess the appropriateness of using traditional models for such problems.◆

The Virtual Presenter

How do you give a presentation overseas when there is no travel budget? Axel Wilke, a Masters student in Transportation Planning, was asked by the German Scientific Transportation Society (DVWG) to talk about the life of a traffic engineer in New Zealand.

Every few years, the DVWG organises a meeting for expatriates and current members. Having been in New Zealand for 5 years now, Axel is the expatriate furthest away from his homeland. As attending in person proved too costly, the idea of a multi-media show was born. Axel produced a 16-min video about his professional and academic life and spiced it with some recreational shots.

An automated Powerpoint presentation was also set up, supporting the content of the video and including a video clip of a microsimulation traffic model of the new inner city bus exchange that opened on 20 November, which is part of Axel's research. The feedback received was quite enthusiastic. "All 60 attendees enjoyed the show that was very informative, with lots of content and very well done!"

Axel writes: "Thanks for the support of the department (Melody Callahan and Ian Sheppard) and Audio Visual Services (Mike Shearing) for the technical equipment. It's been an interesting and different project. It shows what one can achieve with a lot of time and a small budget of $100 (of which $65 was for getting wheel clamped)."◆

Awards and Recognition

Scott Medal Awarded

It was a case of better late than never for Emeritus Professor Bob Park who received a Royal Society of New Zealand medal in September 2000.

Prof. Park was awarded the R J Scott Medal for his work on earthquake-safe buildings in November 1997. Unfortunately, presentation was delayed until September this year because of a problem with striking the medals.

In the citation, the Royal Society said the medal was for leadership and meritorious contributions in the field of seismic design and in the performance of concrete structures, including bridges, buildings and precast concrete elements.

Professor Scott was New Zealand's first professor of engineering. He was in charge of the School of Engineering, founded at Canterbury College in 1888, a position he held until his retirement in 1923. ◆

IPENZ Millennium 2000 Award

Emeritus Professor Bob Park was awarded the Institution of Professional Engineers New Zealand (IPENZ) Millennium 2000 Award for Building and Construction. The presentation was made at the Millennium 2000 Awards Ceremony held at the IPENZ Congress in Christchurch on 4 March. The citation for Prof. Park said the Award was presented for his leadership of structural engineering research and his determination to achieve sound answers to difficult challenges. Prof. Park's generous and unstinting efforts to pass on his knowledge to engineers in so many countries and his massive contribution to his chosen profession in New Zealand were also acknowledged in the citation. ◆

Recognised Value in Science Fair Exhibits

The Department participated in the 2000 Canterbury-Westland Science and Technology Fair by giving $100 in book certificates to two students. One lecturer, Mark Milke, and a postgraduate student, Haran Arampamoorthy, had the difficult task of choosing the best two projects with relevance to the Department of Civil Engineering.

In the end, Haley Price of Heaton Intermediate School won for her project, "Beware, fire's here". In her project she investigated the time to combustion of various materials. Her attention to detail and concern over the definition of "combustion" showed insight into the problem. The project closely matches a ME research project being conducted by Andrew Coles, under the supervision of Charley Fleischmann.

Olga Nikora (shown above) of Christchurch Girls High School won for her project on "Canterbury streams: hydraulic geometry and channel stability". She combined a literature review with a sophisticated statistical analysis of Regional Council data. ◆

Environmental Conservation Best Paper Prize for 1999

This was awarded to Dr Mark Milke and Seth Guikema (ME with distinction in civil engineering, 1999) from the Foundation for Environmental Conservation.

The paper entitled: "Quantitative decision tools for conservation program planning: practice, theory and potential" was published in *Environmental Conservation.* Mr Guikema, whose ME was supervised by Dr Milke, is now undertaking a PhD at Stanford University. ◆

SERVICE TO HIGH SCHOOL RECOGNISED

Technical Staff member, Ian Sheppard, was a recipient at the Multiserve Education Trust National Service and Project Awards Presentation at the Aotea Centre, Auckland on 3 November 2000.

Ian's award, presented by Dame Susan Devoy, was in recognition of his 12 years service to Riccarton High School as PTA and Board of Trustees member. He was nominated for his input to the school as PTA president, BoT Works subcommittee chairman, Intellectualy Disabled Unit Management Committee member and special projects work considered to be above and beyond normal expectation. ◆

Summer Holiday Work

Students in Civil Engineering are required to carry out 120 days of practical work before they can graduate at the end of their studies. The first practical work period is 60 days of *Civil Labouring* and the second period is 60 days of *Approved Practice*. The students have to submit reports on both practical work periods.

Athol Carr writes: Over the past few years we have been dismayed to hear some students are having difficulty getting practical work. Some of the larger engineering practices in New Zealand say that they no longer take students for *Approved Practice*. We very much appreciate the efforts made by those practices that do provide practical work, and in particular those small, one and two engineer firms.

The *Civil Labouring* periods are proving difficult as there does not appear to be the same quantity of construction work that there was some years ago. A further problem is now approximately 20% of the students are women, who on approaching construction firms are told 'we do not have anything suitable for young ladies'. We would be pleased if any engineers, who wish to help the department, could provide a little persuasion to contractors to make opportunities available.

The practical work experience is of immense value to the students as future engineers. The *Civil Labouring* enables them to see the fulfilment of the engineer's design and note the possible pitfalls and difficulties that good design may avoid. Students can also appreciate the accuracy of their calculations in terms of the tolerances of construction and design concepts.

The *Approved Practice* provides the students with an insight into their future careers and provides the engineering practices with an opportunity to assess possible future employees.

If the difficulties of obtaining practical work become a bottleneck in the completion of the student's university degree, we might have to abandon the compulsory practical work experience. This would be a great disservice to our graduates and the engineering profession in New Zealand. I urge you all to give our students all the help during this and the following summers to come. ◆

Good Employers

The following list recognizes firms that have been good employers of students for practical work. The list includes both large and small organizations that have regularly employed students.

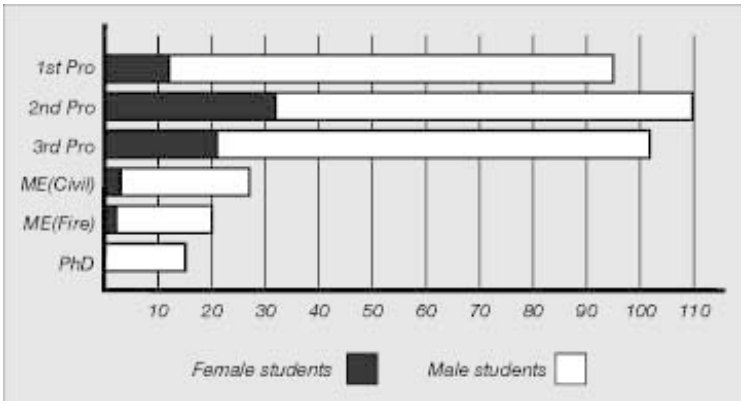
Aquaheat Industries Ltd
Beca Carter Hollings & Ferner Ltd
Brian Perry Ltd
Calcon Asphalt Ltd
Christchurch City Council
Connell Wagner Ltd
Dunedin City Council
Fletcher Challenge Energy Taranaki Ltd
Fletcher Construction Ltd
Fulton Hogan Ltd
Gabites Porter Consultants
Hutt City Council
Masterton District Council
Montgomery Watson NZ Ltd
Napier City Council
Naylor Love Limited
(Structural Steel Division)
Opus International Consultants Ltd
Palmerston North City Corporation
Pan Pacific Forest Industries (NZ) Ltd
Port Nelson Ltd
Primary Producers Co-operative
Society Ltd
Sawrey Lane Consulting Engineers
Tauranga District Council
Upper Hutt City Council
Waimakariri District Council
Wellington Regional Council
Works Infrastructure Ltd

If your company's name is not on the list and you would like to see it there, please contact us. ◆

Our Student Body

The bar graph shows that we have about 100 students per professional year, and about 60 postgraduate students. The long term plan is to keep undergraduate numbers fairly constant, but significantly increase the number of postgraduate students, in both research degrees and taught masters degrees.

We strongly encourage women students to enter our programme.



People People People

Roger Nokes

Roger Nokes has been appointed as a senior lecturer in fluid mechanics and joined the Department in December 2000. Roger writes:

"Joining the department is a little like coming home for me. In 1986 I completed my doctoral studies in the Department under the supervision of Professor Ian Wood. My thesis considered a number of problems in turbulent dispersion in open channel flow. These problems, which included two and three-dimensional turbulent mixing of neutrally and non-neutrally buoyant contaminants, were modelled both analytically and experimentally. The big flume in the fluids lab was once mine!

My involvement with civil engineering in general, and fluid mechanics in particular, is very much due to the encouragement of Ian Wood. Firstly, he persuaded me to undertake my fourth year physics honours project in the department (I was studying for a BSc Honours at the time), and then, he tempted me back to the Department to study for a PhD under his supervision after spending two years as a nomadic chess professional in Europe.

Since completing my PhD my career has been anything but linear. In 1986 I joined the Geophysical Fluid Dynamics group within the Research School of Earth Sciences at the Australian National University, becoming involved in projects ranging from crystal settling in convecting magma chambers, to exploring the effects of breaking internal gravity waves on mixing in the abyssal ocean. 1988 found me in Auckland taking up a lecturing position in the then Dept. of Theoretical and Applied Mechanics (now Engineering Science). There I taught mathematics, fluid dynamics, and computing for seven years. My research interests continued in the areas of open channel mixing, and small scale mixing processes in stratified fluids.

Currently I am the academic leader for the School of Computer and Office Technology at the Nelson Marlborough Institute of Technology (formally Nelson Polytechnic). Within the school, which I joined in 1995, I have had various roles including head of school, and I have been responsible for the establishment of an information technology degree. My teaching and research interests have been in the area of object-oriented design and programming.

So, in many ways I have come full-circle. Since, finishing my PhD, joining the Department of Civil Engineering has been a secret ambition of mine, and I am delighted to have the opportunity to fulfil that ambition, and to rejoin friends and colleagues within the Department." ◆

Colin Bliss

Colin Bliss started as a technician in the Structures Lab in March 2000. Colin and his family have settled in Christchurch from Te Anau. Colin is a fitter/machinist by trade but has worked for a number of years as an operator at Meridian Energy's Manapouri Power Station. His experience in fabricating, machining and welding have been put to good use since starting on Jeff Matthews PhD project. Colin's interests are building and flying radio control aircraft ◆

Mofreh Saleh

Mofreh Saleh has been appointed to the Pavement Engineering position vacated by Bryan Pidwerbesky and will be commencing work in the Department in January 2001.

Mofreh completed a BSc (Civil Engineering) at Cairo University in 1990. He then worked at Cairo University for six years as an Assistant Lecturer, teaching pavement engineering and highway geometric design. In 1994 he received an MSc (Civil Engineering) from the Cairo University. From 1997 to 1999 he studied for his PhD in Civil Engineering at Arizona State University, his thesis topic being "Development of a Mechanistic Performance Model Based on Vehicle-Pavement Interaction". During 2000, Mofreh has been working as a Pavements Engineer with the California Department of Transportation.

Mofreh has a particular interest in pavement performance under dynamic loading and intends pursuing further research on the topic using theoretical models and CAPTIF (Canterbury Accelerated Pavement Testing Indoor Facility), which is well-suited to such research. ◆

Kevin Wines

Kevin Wines started as a technician in the Structures Lab in March 2000. Kevin and his family came to settle in New Zealand in 1994 from Zimbabwe.

He brings excellent machining and workshop skills that have already been utilized on the Jeff Matthews PhD project. His interests are hot air ballooning, tennis and sailing. ◆

People People People

John Mander

The newly-appointed Professor of Structural Engineering, John Mander, is a Canterbury graduate who has spent the past 12 years on the staff at the State University of New York (SUNY) at Buffalo.

He began his career in civil engineering with a New Zealand Certificate in Engineering from Christchurch Polytechnic, followed by a BE(Hons) in civil engineering with first class honours. His PhD thesis on the "Seismic Design of Bridge Piers", was supervised by Prof. Nigel Priestley and Prof. Bob Park.

After graduating, he worked from 1983-86 as a systems engineer on the North Island Main Trunk Electrification Project, then in 1987 as Strategic Property Manager with the New Zealand Railways Corporation's Property Business Group. He spent a year at SUNY's Buffalo campus as visiting assistant professor prior to being appointed assistant professor and promoted in 1995 to associate professor.

Prof. Mander has extensive teaching, supervision and research experience and has published widely. He is a member of 8 professional bodies and was associate editor of the *Journal of Structural Engineering* from 1995 to 1998. While at SUNY Buffalo, he developed a practice-oriented ME degree programme in structural design and earthquake engineering. In its inaugural year he supervised 18 graduate students through their engineering project, which consisted of designing a major bridge crossing the Niagara River between the United States and Canada.

Prof. Mander also has a strong record of securing research grants and has worked as a research consultant for the United State's Applied Technology Council and National Institute of Building Sciences. He was the major advisor for 11 PhD and 51 Masters students.

Much of his research activity remains in the area of concrete structures and earthquake engineering. However, he has had forays into several other areas including risk assessment of transportation systems, the seismic vulnerability of steel and timber bridge structures and the development of passive energy dissipation systems for buildings and bridges. He has several patents pending in the United States and France that relate to the use of shock absorbing dampers in buildings and bridges.

Since arriving at Canterbury in July 2000 he has taught at a number of different levels from 1st Pro Structural Mechanics through to a postgraduate course in structural concrete. He and others in the department obtained a grant from ERAU to re-develop the department's undergraduate programme of instruction. Says Prof. Mander, "This is one of the most challenging tasks of my career, as it may well affect how engineers are educated in New Zealand and abroad for the next 100 years". ◆

Hai-Jing Wang

Hai-Jing Wang was appointed for a one-year lectureship in Fluid Mechanics. She writes "When I arrived in Christchurch in June (2000) to take up the lectureship in Fluid Mechanics, I was prepared to take up the second winter of the year as well. Fortunately the mild winter in Christchurch is almost nothing compared to the joy of having two springs in a year.

Born in Inner Mongolia and growing up in an industrialized part of Tianjin, one of the four major cities in China, I have been witnessing the changes that modern industrialization makes to the natural environment. In the late 1980's when I was going to university, environmental engineering became a popular subject in China although at the time not many people knew what it was about. So when I was admitted into the Department of Environmental Engineering at Tsinghua University, Beijing, I did not know that environmental engineering had nothing to do with scenic design around the buildings, which was my initial reason to apply.

In 1993 I obtained my undergraduate degree and won a scholarship from National Education Commission to go to Hong Kong for graduate studies. There have been two major changes in my life since then, the education media from Chinese to English, and my research focus from wastewater treatment to mixing process in natural water systems. I completed my master and doctoral studies at the Hong Kong University of Science and Technology under the supervision of Dr. Mark J. Davidson in environmental fluid mechanics. My PhD thesis is entitled "Jet Interaction in a Still or Moving Environment", which is an important part in understanding the basic mixing and interaction mechanism among neighbouring discharges above ocean outfall.

Before coming to Canterbury, I worked as a consultant specialist at ERM (Environmental Resources Management) on a large dam evaluation project for Asian Development Bank. I am delighted to move across half of the Earth and start my first teaching experience at Canterbury. Coming to the Department is like finding my academic roots (my PhD supervisor is a graduate of the Department). I look forward to a productive academic year as well as the great outdoor adventures in New Zealand." ◆

People People People

Seismologist John Taber Appointed Senior Adjunct Fellow to the Department

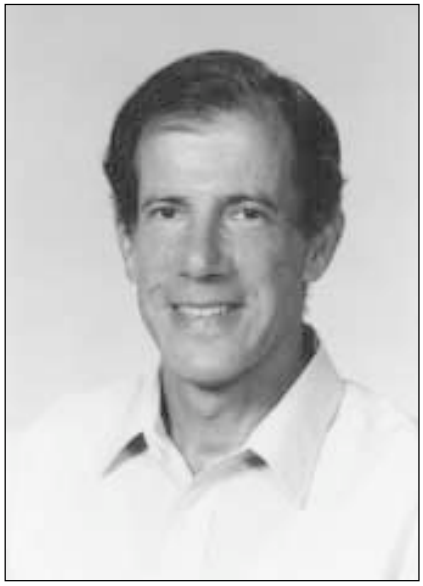
Dr John Taber of the School of Earth Sciences at Victoria University of Wellington has been appointed as a Senior Adjunct Fellow in Civil Engineering. Dr Taber has worked with Rob Davis, Jarg Pettinga (Geological Sciences) and John Berrill on a number of projects over the past several years, and they welcome this honorary appointment in recognising John's contribution to research and teaching at Canterbury.

Dr Taber with students Brian Adams and Caroline François

Most recently, Dr Taber has helped supervise the doctoral project of Brian Adams, which examines basin-edge effects with special reference to ground shaking in the Lower Hutt Valley (see article in last year's CE News). He is currently an associate supervisor of Caroline François, who is studying the optimal deployment of accelerographs to capture an Alpine Fault earthquake and its effects on the central South Island.

Dr Taber is the Earthquake Commission (EQC) Fellow in Seismology at Victoria University, is a past president of the NZ Geophysical Society and is active in the affairs of the NZ National Society for Earthquake Engineering. ◆

Bob Spigel Appointed Senior Adjunct Fellow to the Department



Dr Bob Spigel, a scientist at the National Institute for Water and Atmospheric Research (NIWA) in Christchurch, was appointed as a Senior Adjunct Fellow in Civil Engineering in January 2000, at about the same time he started work at NIWA. For more than 21 years prior to that time, Bob was a member of the academic staff of the Civil Engineering Department, where he lectured in hydrology, hydraulic engineering and fluid mechanics. He has worked on projects with Ian Wood, Alex Sutherland, Bruce Hunt and Bente Clausen, and retains strong links with the department.

Bob is presently supervising two postgraduate students; Nick D'Adamo, a PhD candidate, and David Plew, an ME candidate (who plans to continue as a PhD candidate when he finishes his ME). Nick is presently employed in the Department of Conservation and Land Management in Perth, Western Australia. Nick is finishing his thesis on the hydrodynamics of Cockburn Sound, a coastal embayment south of Perth that is seasonally affected by nutrient enriched runoff from the Swan River. Bob took over supervision of Nick's work following Prof. David Wilkinson's untimely death.

David Plew is working on a study of flow and channel morphology in meandering streams. His findings will be incorporated in a model Bob is developing for urban streams as part of a larger study being undertaken by NIWA. A significant part of the funding for David's ME was provided by NIWA, and NIWA will also provide support for David's field and laboratory work for his PhD. For his PhD, David will be studying how aquaculture structures influence the circulation and mixing in coastal embayments. Understanding in this area is urgently needed, for example, to assess the impact of establishment of very large mussel farms in some parts of the Marlborough Sounds.

Bob is hopeful that such joint research efforts, which benefit both NIWA and the University, will provide valuable experience and opportunities for students and will continue to develop and expand after Roger Nokes and Mark Davidson arrive to take up their positions in the Department. ◆

People People People

Des Bull Appointed Senior Adjunct Fellow to the Department

Des Bull has had a long association with this department. From 1993 until 1999 he held the position of Cement and Concrete Association Fellow, initially from full-time, later part-time after he took up employment with Holmes Consulting Group. This year he is engaged as a part-time lecturer and is actively involved in several major research projects.

Mr Bull's work with the Holmes Consulting Group involves matters relating to structural design with an emphasis on concrete structures (commercial buildings, bridges and wharves) and the performance of concrete materials in a variety of environments and in-service conditions. Part of his duties involve marketing and development of structural engineering services for the company. As part of these activities, he reviews a number of alternative building products and innovations in design and construction applications.

Des is responsible for initiating and co-supervising certain research programmes in structural concrete at the Department. This research includes: evaluation of concrete floors acting as diaphragms, "gravity" or "secondary" frames subjected to seismic loading, the instability of thin wall panels subjected to gravity and in-plane seismic forces, performance of partially filled concrete masonry walls subjected to out-of-plane face loading and the ductility evaluation of light weight aggregate concrete.

Des has been recently appointed as Chair of the Standards Association NZ Review Committee for NZS 3101: Design of Concrete Structures. Mr Bull has eight years on the Management Committee of the Structural Engineering Society of NZ (SESOC), is a Past-Editor of the SESOC Journal and is a Past President of the NZ Concrete Society. Des has authored and contributed to over 50 papers, articles and design guidelines on aspects of design of concrete structures. ◆

Bob Park Delivers Hopkins Lecture

Emeritus Professor Bob Park spoke on improving the resistance of structures to earthquakes at this year's annual Hopkins lecture on 16 August at the Christchurch Town Hall. Run in association with the University and the Canterbury Branch of the Institution of Professional Engineers New Zealand, the lecture is designed to encourage discussion within the engineering profession and promote public understanding of issues.

Earthquake damage, lessons drawn from structures damaged by seismic activity, and methods for earthquake design were the focus of the presentation. Prof. Park said there was a strong likelihood of future earthquakes in the Canterbury region, judging by past activity along fault lines. "The Alpine Fault line has experienced massive movement every 200 years, last time was 300 years ago. That would indicate we could experience movement soon". He said continued education of the profession and the community would ensure the necessary responsiveness to cope with an earthquake in the region.

Prof. Park has made a major contribution to the earthquake safety of New Zealand buildings and bridges over the past 40 years. ◆

Bob Park being thanked by David Hopkins after the lecture

Professor Peter Hills (Erskine Fellow)

Professor Hills visited the Department from 8 July to 14 October. During that time, he taught a Master of Engineering course on "Transport and the Environment", involving 33 hours of lectures and tutorials. Eight students did the course for credit, and several others participated as "cultural enrollers". The course was very relevant and timely, given the concern about the adverse environmental effects of transport, and the lecture material is expected to be incorporated within the transport engineering teaching in the Department. He also presented several seminars to various groups.

He and Associate Professor Alan Nicholson collaborated on a research project on the interaction of supply and demand of transport and uncovered evidence that contradicts the conventional wisdom regarding that interaction. It is expected that after further work, the research results will be published. ◆

Fire Engineering

New Zealand Fire Service Commission

The Fire Engineering programme at the University of Canterbury was established in 1993 with the financial assistance of the New Zealand Fire Service Commission through a five year contract. Since then the University of Canterbury has established a Masters Degree in Fire Engineering, has produced 68 graduates and has almost 20 current students. The University has also provided a state-of-the-art laboratory and has established a permanent full-time position for Dr Fleischmann. The New Zealand Fire Service Commission continues its investment in the programme, with a second five year contract funding a new lecturer, and research scholarships to assist efforts to reduce fire deaths and fire property losses in New Zealand.

Mike Spearpoint was appointed to the New Zealand Fire Service (NZFS) Commission Lectureship in September 1999. The following is a summary of Mike's activities over the past year with particular focus on liaison with the New Zealand Fire Service.

He has had discussions with Principal Fire Engineer, Dr Paula Beever, with regard to his role within the University and its relationship with the New Zealand Fire Service. He has been in close contact with Regional Fire Engineer, Mark Chubb, regarding fire risks in New Zealand. They have set up a research project examining the risk of fire in the New Zealand hospitality industry. One of the fire engineering Masters degree students is conducting an analysis of the relevant NZFS statistics in which they hope to be able to identify the major causes of fire in hospitality establishments.

He also spent a week at the Sockburn Fire Station on the night watch in order to gain experience with the various activities conducted by operational fire officers.

More generally, Mike has developed the Masters level course in Risk Assessment with Mark Milke, and created a novel 'project-based' course in Fire Safety Systems. He also contributed to the undergraduate 3rd Pro course on Timber & Fire Engineering.

Foundation for Research Science and Technology

In addition to the Fire Service support, the fire engineering programme relies heavily on research funding from other sources including the Foundation for Research, Science and Technology (FRST). Two years have been completed of a major six year research contract with FRST, titled "*Improving Fire Safety in New Zealand Residential Buildings*". There are three inter-related objectives; 1. Fire hazard of residential furniture, 2. Modelling smoke movement in residential buildings, and 3. Severity of post-flashover fires. The application was strongly supported by the New Zealand Fire Service and the Building Industry Authority. An end user Advisory Group has been established to ensure relevance of the research projects.

Demand for Graduates

The demand for graduates from the ME(Fire) degree at Canterbury continues to be very high. As fire engineering becomes a more recognised discipline, there are an increasing number of job opportunities throughout New Zealand, Australia, and beyond. The degree involves twelve months of full-time intensive study, consisting of six courses between March and September, followed by an individual research project from October until February. The courses include aspects of fire e dynamics, heat transfer, structural fire engineering, risk assessment, human behaviour, fire safety systems and fire engineering case study. The entry requirement is an engineering degree in any discipline, or a science degree with appropriate experience.

PhD projects

Jason Clement has just completed his PhD thesis, studying the flow of smoke and hot gases through door openings between rooms, using experimental and analytical methods, in order to better understand smoke hazards from fires in houses. He has made a comparison between his own salt-water modelling experiments and the NIST large eddy simulation model. This programme is funded by FRST under the supervision of Charley Fleischmann.

Ee Yii is continuing to develop an improved computer model to predict the gas temperatures in post flashover compartment fires. This helps provide better input for analysis of structural members exposed to fires. He is extending existing models to improve the prediction of heat release rate and to allow multiple vent openings in the walls and ceiling under the supervision of Andy Buchanan and Charley Fleischmann.

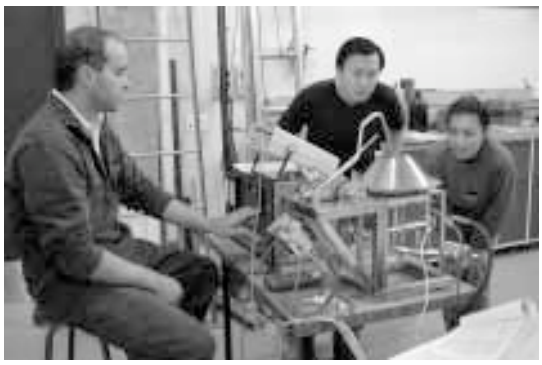
Tony Parkes is continuing the investigation of the fire hazard of domestic furniture in a major project funded by FRST. Tony is a previous graduate who has returned to the university after three years in industry. He will be extending the work in Tony Enright's recently completed thesis, under the supervision of Charley Fleischmann.

Mike Spearpoint is examining the developments of web-based database systems and how they might be applied to an online database of design fire information. For such a database to be viable, the structure of the information needs to be carefully examined. Issues such as transparency, flexibility and extendibility are important. Once completed, the database will be used to provide guidance to fire engineers on possible worst-case fire scenarios for fire modelling applications.

Fire Engineering

Visitors

Dr Jean-Marc Franssen from the University of Liege in Belgium visited the Department for 3 months in early 2000 as an Erskine Visitor. Dr Franssen taught half of the Structural Fire Engineering course with Andy Buchanan and gave industry seminars in Auckland, Wellington, and Christchurch on the SAFIR program, of which he is author. Dr Franssen's computer program is one of the best programs in the world for calculating temperatures in structures exposed to fires, and analysing the structural performance.



ME students work with the new ignition apparatus built by fire technician Grant Dunlop.

Conferences

Dr Andy Buchanan presented two papers on the problem of fire following earthquake at the 12th World Conference on Earthquake Engineering in Auckland in February 2000. One of these papers was co-authored with Russ Botting from Telecom NZ and the other with Michael James, consulting engineer in Auckland, based on their Fire Engineering research projects.

For more information on study, research, scholarships or publications, contact:

Charley Fleischmann at Charley@civil.canterbury.ac.nz or Michael Spearpoint at mike@civil.canterbury.ac.nz

Research Reports Online

In order to increase access and reduce printing costs, all new fire engineering research reports are being made accessible from the department's website as downloadable PDF files. Our web address is www.civil.canterbury.ac.nz, then go to the Fire Engineering section.

Web Based Distance Learning

In order to meet the needs of the continually expanding area of fire engineering next year we will pilot a new part-time ME(Fire) degree based on the World Wide Web. Unlike our previous initiative, the new programme is designed to be more flexible and does not require regular attendance of lectures.

The programme will be a combination of guided self-study and two 3-day intensive block visits per course. The courses will make use of the latest World Wide Web teaching software, WebCT, to increase our capabilities and flexibility along with improved access to the lecturers.

This year Dr Charley Fleischmann will be teaching Fire Dynamics and Advanced Fire Dynamics using this method. In the future other courses will be available using this method of presentation. More information is available under the Fire Engineering section at www.civil.canterbury.ac.nz.

Fire Engineering Research Reports

2000/1	Fire Spread on Exterior Walls	Felix Bong
2000/2	Fire Resistance of Lightweight Framed Construction	Peter Collier
2000/3	Fire Fighting Water: A Review of Fire Fighting Water Requirements (A NZ Perspective)	Simon Davis
2000/4	The Combustion Behaviour of Upholstered Furniture Materials in New Zealand	Hamish Denize
2000/5	Full-Scale Compartment Fire Experiments on Upholstered Furniture	Nabil Girgis
2000/6	Fire Rated Seismic Joints	Michael James
2000/7	Fire Design of Steel Members	Kathryn Lewis
2000/8	Stability of Precast Concrete Tilt Panels in Fire	Linus Lim
2000/9	Heat Transfer Program for the Design of Structures Exposed to Fire	John Mason
2000/10	An Analysis of Pre-Flashover Fire Experiments with Field Modelling Comparisons	Christian Nielsen
2000/11	Fire Engineering Design Problems at Building Consent Stage	Patrick Teo
2000/12	A Comparison of Data Reduction Techniques for Zone Model Validation	Simon Weaver
2000/13	Effect of Surface Area and Thickness on Fire Loads	Jennifer Yii
2000/14	Home Fire Safety Sprinklers	Peter Byrne
2000/15	Accounting for Sprinkler Effectiveness in Performance Based Design of Steel Buildings	Martin Feeney
2000/16	A Guideline for the Fire Design of Shopping Centres	Jenny McMillan

Most of the above reports are available for download as PDF files from our website or for purchase at NZ$35 each, postage included. If interested, please contact Catherine Price at c.price@civil.canterbury.ac.nz.

Why Do A Masters Degree?

A Masters degree is becoming a world-wide requirement
emphasis on continuing education in New Zealand, the M
develop their careers, and for mid-career engineers wishi

Types of Masters Degrees Available

Masters (Thesis - typically 18 months)
Masters (6 courses and project - typically 12 months)
These are based on full-time study, but all can be done part time.

We currently offer a specialised ME(Fire) degree, which has been very successful. Next will be an ME(Transport) degree, offered in collaboration with the University of Auckland in 2002. Others on the drawing board are ME(Earthquake) and ME(Environmental) degrees.

Additionally, we are considering a Professional Masters Degree, which will be mostly coursework and perhaps more suitable for practising engineers.

There are other postgraduate degrees available as well, including a Postgraduate Diploma and a PhD.

Who and When

If you have completed a BE (Hons) degree you are eligible to apply for postgraduate study (although second class honours or better is desirable). You can carry on straight from your BE (Hons) degree, which might be the easiest time financially. However, the advantage if you are already working is you have had time to consider what you want to study and are more focused. This can help you find an external supervisor and funding.

2001 Postgrad

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Please see the Postg
our website www.civi
more information

for a career in Civil Engineering. With the increasing
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Systems

rad Info section of
l.canterbury.ac.nz for

Funding Your Studies

These are possible ways to fund your studies:

Scholarship: If you are thinking about doing postgraduate studies, then you should apply for any relevant scholarships. Information can be obtained from www.canterbury.ac.nz/student/scholarships or the Scholarships Officer in the Registry (most scholarship applications close in October).

Teaching Assistant: At the start of each year, you can apply for teaching assistant positions. These involve helping run laboratories, tutorial sessions, or marking undergraduate assignments. Students can earn up to $5000 annually this way.

Employer Contribution: an employer may be willing to fund part or all of a ME programme, especially if the research is linked to the employers needs. Emplyers benefet in the long-term from the upskilling of the employe.

Distance Learning

There is an increasing demand for continuing education from professional engineers. There are plans to offer more postgraduate courses to practising engineers, through a combination of block courses in Christchurch and distance-learning over the web. These will be available to any qualified engineer in New Zealand or Australia.

A pilot programme in Fire Engineering will be offered in 2001, with other subjects including Transport Engineering in 2002.

Students/Alumni

Civil Engineering Prizes

The department wishes to congratulate the following students who were awarded prizes for their excellent results in 2000. These prizes are made available by the generous support of the industry sponsors.

NZ Concrete Society Prize - Sarah Dye

RW Morris Prizes in Hydrology or Hydraulic Engineering
Lauren Stewart and Richard Galloway

NZ Pavement & Bitumen Contractors Assoc. Prize in Pavement Engineering
Nigel Hogg

NZ Automobile Assoc. Prize in Traffic Eng. - Jeremy Gibbons

Traffic Design Group Prize
2nd Pro - Jeremy Gibbons
3rd Pro - Rachel Grantham

Works Infrastructure Ltd Prize in Civil and Roading Construction Mgmt
2nd Pro - Katherine Butler
3rd Pro - Ross Parry

Structural Engineered Timber Manufacturer's Association (SETMA) Award - Kirsti Carr

Tonkin & Taylor Prize in Geomechanics
Damian Grant and Peter Stafford

Montgomery Watson/Jim McFarlane Memorial Prize - Bruce Galloway

Holmes Consulting Group Structural Engineering Prize - Damian Grant

Graduates in Otira

Canterbury graduates have been involved with the reconstruction project on State Highway 73 for decades with Otira Gorge road upgrade planning. That initial involvement is continuing now that construction is underway. Barry Lennon (late 1960's) is Opus International Consultants' Engineer to the Contract, and Deane McNulty (1992) is the Engineer's Representative. Alan Black (1979) is the project manager for Fulton Hogan Civil Ltd. Peter Kerr (early 1960's) is special advisor to Transit New Zealand for this project.

The project involves widening an 850 m length of the highway between Candy's Bend and Starvation Point. The work utilises New Zealand 'firsts' for two overhead rock protection structures, as well as two half bridges (one cantilevered; one propped), cuts in unstable, jointed rock up to 30 metres high, and a two lane bridge on a colluvial slope. The project will cost $11M, and has to be constructed while traffic continues to use the existing single lane road bench. ◆

◀ *Photo courtesy of Deane McNulty, Opus International Consultants*

A Bridge How Strong??

This annual competition forms part of Engineering Design 1, a basic design course for 1st pro students. Students, in groups of 3 to 4, are given the challenge to design a bridge, built using processed wood sheets and steel wire, which holds 120 kgs.

This year students were asked to come up with a design for a cable stayed bridge simply supported at one end and supported on a mast half way through the span, and having a 800 mm long cantilever at the other end. A scoring system was devised to grade the bridges. An optimum weight at failure was 120 kg. The score decreased if the weight which caused failure was below or above 120 kg.

We can't have over-engineered this, can we? ▲

How many KGs were added to break our masterpiece? ▶

The winning team was awarded the NZ Aluminium Smelters Prize. This prize is awarded for "project work which demonstrates a high standard of conceptual design, innovative application of theory, concern for the human interface in the context of safety and quality, and concern for sustainable development". ◆

Playing in a Giant Sand Pit

As part of the research for a Masters of Civil Engineering supervised by Bob Spigel, David Plew has been experimenting in the sand pit in the civil engineering laboratory. The sand pit, which is 14 m long and 3 m wide is used to study sediment transport and erosion in rivers. David has been studying river bends, in particular the motion of the fluid through the bend, and the resulting erosion and deposition of material. The sand pit was used to simulate the channel shape in river bends. To do this, a meandering channel was formed, then water was allowed to flow through the channel. Characteristics of real rivers were recreated on a smaller scale by the transport of sediment by water, including formation of sand bars, pools and runs.

In order to measure three-dimensional velocity patterns, streams larger than could be created in the sand pit were required. Water velocities were measured in bends of the Avon and Waimari streams using an acoustic doppler velocimeter (ADV). This device is able to accurately measure downstream, cross-stream, and vertical velocities, unlike a standard current meter. A simple portable and robust rig to support the ADV probe was devised by fluids technician Ian Sheppard, making use of an aluminium ladder, surplus photographic equipment, and various pieces of wood. ◆

Experience Found in Nepal and India

During the summer of 1999-2000, two Third Professional year students, Jared Pettersson and Ann-Marie Mulligan, carried out some of their practical work experience in India and Nepal. Jared writes:

"I arrived in Nepal mid-November and began work at His Majesty's Government of Nepal's Department of Hydrology and Meteorology in Kathmandu. This department operates the national hydrologic and meteorological data collection network . One of the main end users of the hydrological information are the hydropower development organisations; hydropower is Nepal's number one natural resource. My main task was working on data processing for the nationwide low flow report, which was to provide a model for low flow estimation in ungauged catchments."

In January Jared met up with his class mate, Ann-Marie, in Delhi. From here they travelled 200 km north to the Alternate Hydro Energy Centre (AHEC) at the University of Roorkee. Ann-Marie and Jared report:

"While at Roorkee we both worked on hydropower-based hydrology projects, Ann-Marie on hydraulic modelling for ungauged catchments, and Jared on catchment assessment for micro-hydropower stations in the Darjeeling area. We also visited the Kanva Ashram Micro Hydro Project on the Malin canal, Kotdwar, that AHEC is working on. When construction is completed the power stations will each generate 50kW and serve a nearby village of approximately 200 houses.

The experience of working overseas in a different culture, especially one so far removed from ours was an eye-opening experience and we both recommend it strongly to other students. Not only did it increase our technical skills but also increased our knowledge of other cultures and how to interact and work within them. Thank you to both Bente Clausen and the School of Engineering for the help and support that made this experience possible."

The director for AHEC, Arun Kumar, has kindly agreed to host another two students this summer. Brynmor Quilter and Thomas Parsons, who have just completed their Second Professional year, have just left Christchurch at the time of writing. We hope they are enjoying their stay and thank Arun Kumar and AHEC for their invitations. ◆

Phytoremediation Research Takes Root

Petroleum contamination is a common problem worldwide and it can be found at fuel depots, manufacturing industries, refineries, vehicle repair yards, rail yards, petroleum exploration sites, and fuel spills. Wastes from these sites have in the past been sent to landfills, treated expensively with physical or purely microbial methods, or simply left until a better solution could be found.

Ongoing research in the Departments of Civil Engineering and Plant and Microbial Sciences is using plants to clean up petroleum-contaminated soils. The clean and very green approach of using plants to treat wastes is called phytoremediation, and interest in the topic has blossomed over the past ten years, although there has been little research into its application to petroleum contamination.

It has been long known that soil microbes can aid in degrading some contaminants. The use of grasses, shrubs, and even trees (such as poplars) has been found to lead to more rapid decontamination of organic wastes than can be achieved with purely microbial methods. The roots of the plants can support a complex environment where specialised bacteria are able to enhance degradation. In addition, the plants are able to improve the soil structure allowing for better water, oxygen, or nutrient use by the microbial system.

Phytoremediation can be a less expensive option for petroleum decontamination because it does not require as much equipment or labour as either a physical process, such as vapour extraction or incineration, or as a microbial process, which can involve sophisticated monitoring and control of optimum conditions. Phytoremediation can also be favoured because the vegetation involved can reduce the chance of contaminated soils being moved offsite by rainfall or wind, or because of the improved aesthetics of having plants covering contamination. On the other hand, phytoremediation can cause problems because many contaminants can be toxic to plants at concentrations that do not affect other treatment methods. In addition, the need for case-by-case trials can increase costs.

The PhD research of Frank Hou focused on the use of ryegrass in the phytoremediation of two petroleum wastes: diesel-contaminated soils and sludge produced in oil refining. Tests were conducted using small cups and, later, larger containers in a controlled, constant-environment room to optimise growing conditions.

The fibrous nature of the ryegrass root system provides a large root surface area, which facilitates degradation. The importance of the roots has been a key finding of the research: the depth, density, and health of the roots have been found to be crucial in understanding the extent of degradation. The results show that, even when the grass shoots are stunted or appear unhealthy, substantial degradation of contamination can occur, providing the root system is healthy.

Initial trials showed that contamination above certain levels caused seeds to fail to germinate, stopping the phytoremediation process at the first stage. Research elsewhere has looked to transplanting small plants to avoid the toxic effect on germination, while at the University of Canterbury, the use of seed coatings to limit toxicity during germination has been explored. Experiments have shown that coating the seeds with polyethylene glycol can allow germination in more highly contaminated soils.

Further experiments by Joelle Vouillamoz from the Ecole Polytechnique Federale de Lausanne (Switzerland) have shown that the addition of compost to contaminated soils can help in establishing a healthy ryegrass, petroleum-degrading soil system. The benefits of compost on soil structure and water retention have been long known, but in mixing the compost with petroleum wastes there was a concern that the compost would tightly bind the petroleum, inhibiting degradation. This did not occur; in fact, the high microbial content in the compost seemed to kick-start the degradation process.

Taken together, the results point to a number of potential improvements in the application of the technology. Previous to these studies, practitioners would have been inclined to dilute some contaminated soils with clean soil prior to trying phytoremediation. This research shows that highly contaminated soils could be amenable to treatment without the need for diluting with clean soils, thus lessening the total volume requiring treatment.

The results should help future practitioners to couple phytoremedation and traditional physical/microbial systems. In a coupled system, an intensive physical/microbial treatment would be used to treat the waste down to a target level, then a phytoremediation treatment would be used to provide a slower, more complete decontamination. On-going research is examining ways of optimising the use of phytoremediation in such coupled treatments. ◆

Mark Milke

Communication

Argentina Collaboration

Andy Buchanan and Prof. Carlos Llopiz signing the agreement

The Civil Engineering Department has signed an agreement for international collaboration with the Faculty of Engineering of the University of Cuyo, Mendoza, Argentina. We already have a connection with the university as Dr Francisco Crisafulli, who recently completed his PhD at Canterbury, is now on the academic staff at Mendoza

The agreement will encourage teaching and student exchanges between the two universities, especially in earthquake and structural engineering.

While in Christchurch to sign the agreement, Prof Carlos Llopiz also visited with Prof Park and inspected the Department's structural engineering laboratories. ◆

Planning Workshop

The Department held a successful Planning Workshop in April 2000. This is the first time that all academic and secretarial staff, technicians, and postgraduate students have been together for a strategic planning workshop. The workshop was held over two days, off-campus. Keynote speakers included the Vice Chancellor Professor Daryl Le Grew, John Rutledge, CEO of Opus International Consultants, and John Webster, CEO of Unitec. Several members of the Department's Professional Liaison Committee attended and made valuable contributions, including Peter Smith from Spencer Holmes, Getchen Kivell from Otago University, Kieran Devine from Beca Carter Holings and Ferner, Ian Robertson from Montgomery Watson, and John Rutledge.

Several new initiatives have developed from the workshop, including increased collaboration between the various groups in the Department and establishment of study groups for re-building the postgraduate programme, restructuring the undergraduate curriculum, and improving laboratory planning.

The postgraduate students have set up their own committees for social and technical activities and for the production of a new Postgraduate Handbook. ◆

ADOPT-A-SCIENTIST

James Beck of class 3JV at Lincoln High School is very interested in bridges, so he adopted Dr Nigel Cooke to help him with his research project "Which Common Bridges are the Strongest?"

James is part of a group of students who are given the opportunity to undertake an individual research project into an area of science and engineering that interests them. Their choices were very wide ranging and included the Stirling Engine, electrical circuits and topics in astronomy, sports medicine, animals, food and psychology.

James "researched bridge structures from an engineering book and made four truss bridges and four girder bridges from uncooked spaghetti, a thin sheet of balsa wood and glue". He tested them to destruction and concluded "that the average model truss bridges are stronger than the girder bridges".

The projects were presented orally in front of parents and scientists one evening in November. The presentations were competently delivered and everyone had a very enjoyable evening. James was proud to receive an "excellent" result from his teacher, Dr Sue Jarvis. ◆

Current Research

M.E. 2000/2001

Name	Supervisor(s)	Project Title
Robert Baxter	Cooke/Bull	Out-of-Plane Behaviour of RC Masonry Walls with Window Openings
Damon Ho	Restrepo/Cooke	Effects of Vertical Acceleration on Prestress Members
Tony Holden	Restrepo/Mander	Seismic Performance of Precast Concrete Walls Prestressed with Partially Unbonded Tendons
Matthew Lander	Bull/Mander	Analysis of Tilt-up Concrete Walls
Neng Ung	Wareham/Dakers	Septic Tank Effluent Chloroform Reduction in Sand/Gravel Media

M.E. with Thesis 2000/2001

Name	Supervisor(s)	Project Title
Zarko Andjic	Nicholson	Development of SATURN and TRACKS models
Kuang Hwa Chu	Carr	Soil Interaction of Masonry Infilled Frame with Openings
Alice Grace	Milke	The Use of Multivariate Analysis in Classifying Secure Groundwater
Michael Jacka	Berrill	Seismic Lateral Spreading
Chris Lyons	McManus	Liquefaction Effect on Pile Foundations
Pierre Malan	Berrill	Directional Effects in the 1994 Arthurs Pass Earthquake
Marcelo Martinez	Restrepo/Mander	Performance Based Assessment of RC Structures Subjected to Earthquakes
Jeffrey McLean	Milke	Roll-out Lawns for Treating Petroleum-Contaminated Soils
Adam Milligan	Nicholson/Elms	Safety and Risk Management Using Indicator Diagrams
David Plew	Spigel	Sediment Transport Model for Urban Streams
Ander Pontesta Gomez	Deam	Seismic Analysis of RC Structures using Performance-Based Methods
Maree Stockman	Park/Restrepo	Behaviour of Pre-1975 Buildings under Seismic Loads
Tim Strang	Wareham	Optimization of Rock Filter Design for Maturation Ponds
Axel Wilke	Nicholson	Evaluation of the Paramics Microsimulation Model: Central City Area and Urban Arterial Case Studies

PhD. Students 2000/2001

Name:	Supervisor(s)	Topic
Brian Adams	Davis/Berrill	Wellington Fault (Two-dimensional Site Effects - Similarities to Kobe)
Chris Allington	Bull/Park	Ductility Performance of Structural Light-weight Concrete Subject to Seismic Loading
Haran Arampamoorthy	Nicholson	Analysis of Spatial Distribution of Accidents
Shahinez Bakir	Elms/Mander	Risk Management and Life Line Engineering
Rolando Castillo	Carr/Restrepo	Torsional Response of Ductile Structures
Nick D'Adamo	Spigel	Seasonal Dynamics of Cockburn & Adjacent Coastal Waters, Western Aust.
Ping Dong	Carr	Seismic Damage Analysis for Reinforced Concrete Ductile Framed Structures
Mark Ellis	Wareham	Biological Denitrification Using Coconut Shells in a Fluidised Bed
Caroline Francois	Berrill/Taber/Pettinga	Design & Establishment of a Seismometer Network in Canterbury/West Coast
Katherine Hill	Davis/Berrill	Seismic Liquefaction Trigger Mechanisms
Joseph Holman	Wareham	Use of Online Real Time ORP to Control Biological Nutrient Removal
Aizhen Liu	Carr/Park	Seismic Assessment of Pre-1970s Existing RC Building Frames
Jeff Matthews	Bull/Mander	Floor Diaphragm Forces Following Seismic Damage to the Supporting Beams
Liping Pang	Hunt	Modelling Contaminant Trasport in a Few Selected NZ Subsurface Systems
Gina Rocco	Nicholson	Origin-Destination Matrix Estimation: The Choice of Traffic Count Location
Dean Saunders	Restrepo/Carr	Pushover Analysis for Reinforced Concrete Frames' Inelastic Performance
Bruce Steven	Davis	Pavement Performance Model Suitable for Use with New Zealand Materials
Luis Toranzo	Carr/Restrepo	Behaviour of Partially Infilled RC Frames Under In-plane Lateral Load
Jaichen Wang	Carr/Cooke/Moss	Non-linear Seismic Response of Highway Bridges with Pile Foundations
Sugeng Wijanto	Carr/Restrepo	Seismic Assessment of Unreinforced Masonry Buildings
Bahir Zaghlool	Carr/Moss	Modelling Multi-Storey 3D Structures Under Orthogonal Seismic Excitation
Jianjing Zhang	Carr/Moss	Seismic Soil Structure Interaction

Current Research

Fire Engineering M.E. 2000/2001

Name	Supervisor(s)	Project Title
Andrew Coles	Fleischmann	Flammability of upholstered furniture using the cone calorimeter
Flora Chen	Fleischmann	Radiant ignition of New Zealand upholstered furniture composites
Tzu-Yin Chen	Spearpoint	Statistical analysis of hospitality fire experience
Bevan Jones	Buchanan/Moss	Behaviour of gypsum plasterboard assemblies exposed to real and standard fires
Jenny McMillan	Buchanan	A guideline for the fire design of shopping centres
CK Ngu	Fleischmann	The ignition properties of New Zealand timber
Jenny Seputro	Buchanan/Moss	The effects of support conditions on steel beams at elevated temperature
Adeline Teo	Fleischmann	Validation of an evacuation model currently under development
Richard Welsh	Buchanan/Moss	Two dimensional analysis of composite sections under thermal loading
C Ruth Wong	Fleischmann	Contribution of upholstered furniture to NZ residential fire fatalities
Shao Wu	Spearpoint	Fire safety design of apartment buildings

PhD. In Fire Engineering 2000/2001

Name	Supervisor(s)	Project Title
Jason Clement	Fleischmann	Verification of the hydrodynamic model within the large eddy simulation fire code
Linus Lim	Buchanan/Moss	Restraint in Fire-exposed Concrete Floor Systems
Tony Parkes	Fleischmann/Spearpoint	Compartment fire growth histories
Ee H Yii	Buchanan/Fleischmann	Severity of Post-Flashover Fire

Fire Model Verification

The fire engineering program within the department has undertaken a six-year research program to investigate fire safety in New Zealand residential buildings. One objective of the research program is to assess the potential of smoke detectors to save lives. This life safety assessment will be conducted in the near future by modelling fire growth and smoke spread within typical residential buildings.

The fire growth and smoke spread will be modelled using a Computational Fluid Dynamics (CFD) program called Fire Dynamics Simulator (FDS). The FDS was released on the Web in February 2000 and is at the forefront of fire model development internationally. However, in preparation for using the computational model in the residential fire safety investigation, it has been necessary to determine the accuracy of the model predictions. Thus, Jason Clement, one of the fire engineering doctoral students, has conducted research to assess the accuracy of the FDS.

Jason utilised the similarity between fire induced smoke flow and buoyant saline flow in a freshwater environment to assess the accuracy of the hydrodynamic model that is contained within the FDS. In his research, he conducted a series of salt water experiments and then simulated those experiments with the computational model.

A salt water experiment to model smoke flow through doorways
(invert picture - it looks like smoke)

The comparison of the experimental measurements with the computational predictions was used to assess the accuracy of the hydrodynamic model. Two types of buoyant salt water flows have been studied; a spilling plume that contains a natural laminar/turbulent transition, and a series of salt water flows that resemble the smoke flow induced by a fire within a residential building.

The research provides information on the accuracy of the FDS as a function of grid resolution, as well as providing guidance on the selection of the appropriate boundary conditions. A copy of the research documentation can be downloaded as a pdf file from the departments web page http://www.civil.canterbury.ac.nz, under Fire Engineering, Residential Fire Safety. The research was funded by the Foundation for Research, Science and Technology (FRST). ◆

Environmental Engineering

Nutrient Removal Research

Several postgraduate students are specialising in this area:

Mark Ellis (BE 1995, ME 1998) who is doing a PhD looking at the removal of nitrates from potable water sources using coconut shell as the carbon source. Investigations have been done to try and stimulate the release of carbon from the coconut shell and now a fluidised bed reactor system is running with coconut providing both a support media for growth of bacteria and as the carbon source for denitrification.

Fluidised bed reactor with coconut shells

Joseph Holman (BE 1997, ME 2000) is continuing his Masters work and attempting to control the aerobic denitrification process using the oxidation-reduction potential (ORP) probe as a process control parameter.

Tim Strang (BE 1997) is investigating the design criteria for the installation of rock filters in oxidation ponds, and in particular their ability to remove nitrogen. This latter project is being done in conjunction with Beca Steven of Christchurch and is supported by a Technology New Zealand Graduates in Industry Fellowship (GRIF) grant and a University Internal Research grant. ◆

New Ion Analyzer

Encouraging news is that the Environmental Engineering Laboratory this year received a University Internal Equipment Grant for $60,000.00. When coupled with the Department's grant of $20,000.00, this will allow the purchase of an automated ion analyzer. This machine will be enormously helpful in supporting the biological nutrient removal research program as it has the capability of measuring ammonia, nitrate, nitrite, ortho-phosphate, total phosphate, and total kjeldahl nitrogen simultaneously. ◆

Engineering Education Conference - Dave Wareham

In February of this year, I travelled to Hobart, Tasmania to present a paper entitled "Re-thinking Water Quality Laboratories for Large Classes" at the 3rd UICEE Annual Conference on Engineering Education. The paper was co-authored with Dr. Mark Milke and described the advantages of the synoptic water quality lab that is run in the course ENCI 381 Environmental Quality Engineering. Those of you who have taken the course in the last 5 years or so will understand that it has strong advantages over the traditional way of having everyone in the class do alkalinities, hardness etc. Instead, it focuses on the ability to evaluate a set of water quality data rather than focussing on the test method itself. There was much interest at the conference in this method as it simulated more what an engineer actually does than the standard series of labs. ◆

Course has 25% Increase in Numbers in 2000

Although starting small, the postgraduate Environmental Impact class experienced a 25% increase in numbers (from 4 to 5) in 2000. Each year the class has a weekend field trip to the Hinewai Reserve on Banks Peninsula to build class spirit and to learn of the work being done to return 1100 ha of land into indigenous vegetation.

One of the class, Merri Pintaria, was expecting a baby about two weeks after the trip but baby had other ideas and arrived on Saturday evening! This necessitated an ambulance dash from Hinewai over the hill to Akaroa Hospital. There were communication problems, which meant that the ambulance overshot Hinewai on the outward trip and took about half an hour longer to arrive than expected, with the result that baby Samuel arrived just fifteen minutes after Merri reached the hospital.

Since then, as the photograph shows, "mother and baby are doing well"! (Except for Samuel the class seems pretty happy also!!)

The Environmental Impact Class of 2000 marks the end of the course and toasts the health of Samuel. Back row: Hugh Thorpe, Tahifisi Vehikite. Front row: Bill Nicoll, Merri Pintaria with Samuel, Tom Jolly

Erskine Leave Report – Bente Clausen

I was grateful for the opportunity to spend six weeks in Europe in June/July 2000 on an Erskine Fellowship. During this time I participated with an oral presentation (Ecological Flow Variables in Danish Streams) in the 25th Nordic Hydrological Conference in Uppsala in Sweden, visited and worked with colleagues at the National Environmental Research Institute (NERI) in Denmark, and gave a presentation at the Eighth International Symposium on Regulated Rivers (EISORS) in Toulouse, France.

The presentation in France was a summary of my work on streamflow variability and benthic biota in New Zealand rivers. ◆

New Environmental Masters course

A new interdisciplinary course (Instream Flow Methods) on hydrology and freshwater ecology was offered in our department last year. The course looks at ways of prescribing flows in rivers to maintain a stream ecosystem against the demands of other in-and out-of-stream water users. These are methods that planners and engineers use when considering water consents, and they involve general knowledge about freshwater systems and consideration of biological, physical and legal issues.

Ecological issues are becoming increasingly important, and we hope to give new engineers awareness of these issues by offering courses like this one.

The course is run by Dr Bente Clausen, and this year there will contributions from experts from NIWA (Ian Jowett, Cathy Kilroy) and the Dept. of Zoology (Dr Angus McIntosh). There will also be practical hands-on and a one-day field trip to the Opuha River.

See time table and more information on www.civil.canterbury.ac.nz under Postgrad Info, 2001 course offerings. ◆

Fresh Perspectives Conference in Christchurch

Civil Engineering well represented at the conference. L to R: Alice Grace, Mark Milke, Bente Clausen, Liping Ping, Bruce Hunt and Tom Jolly (Not pictured: Hugh Thorpe, Julian Weir and David Plew)

The first joint conference, named Fresh Perspectives, of the New Zealand Hydrological, Limnological and Meteorological Societies was held at the University of Canterbury on 20-24 November 2000. The conference had an international flavour to it by including a South East Asia meeting of the Regional Steering Committee for the International Hydrological Programme (IHP) under UNESCO. More than 400 delegates from New Zealand and overseas attended the conference, including approximately 70 from South East Asia.

The conference was opened by The Honourable Mrs Margaret Austin, Chancellor of the University of Lincoln and Chair of the New Zealand National Commission for UNESCO, who stressed the need to strengthen scientific capacity in New Zealand.

The conference had six parallel sessions on a diverse range of topics, such as floods and droughts, land use impacts, meteorology and forecasting, invertebrates and fish, lakes, stream management and health, surface water and groundwater quantity and quality, air pollution, wetlands and lakes.

Presentations on studies that have been carried out in our department were given by Alice Grace and Mark Milke (Using multivariate analysis of groundwater quality records to assess groundwater security); Liping Pang and Bruce Hunt (Scale-dependent dispersion in groundwater contaminant transport, Scale-effects on pore-size exclusion for microbial transport in large-pore aquifers); David Plew and Bob Spigel (Secondary currents in river bends); Julian Weir, Bruce Hunt and Bente Clausen (Stream depletion from groundwater pumping). Congratulations to Julian for winning a student prize for his presentation.

The conference was chaired by Richard Ibbitt from National Institute of Water and Atmospheric Research (NIWA). The organisation of the conference was carried out by a group of people from NIWA, Environment Canterbury and the University of Canterbury, including Bente Clausen from our department. ◆

Julian Weir with Paul White after winning the student presentation award. Photo courtesy of Nelson Boustead, NIWA.

Earthquake Engineering

12th World Conference

This was held in Auckland from 30 January to 4 February 2000, the venue being the Aotea Centre together with the Town Hall. Professor Bob Park chaired the organizing committee, which also included Kevin McManus. Bob Park was also the convenor of the Technical Committee. Some 1760 full registrants attended along with 200 students and 200 accompanying partners.

Among these registrants were eleven staff from the Department and six postgraduate students. Seventeen papers in all were presented by members of the Department either as oral presentations or in the poster sessions. The topics of these papers covered engineering seismology, foundations, fire effects, structural analysis and design, and risk management. A list of papers presented by members of the Department is as follows:

Modelling Site Effects in the Lower Hutt Valley, NZ *B Adams, J Berrill, R Davis & J Taber*

Kinematic Soil-Micropile Interaction *J Yang, K McManus & J Berrill*

Building Design for Fire after Earthquake *R Botting & A Buchanan*

Fire Resistance of Seismic Joints *MJames & A Buchanan*

Rating Seismic Bracing Elements for Timber Buildings *B Deam*

A Simple Displacement Compatibility-Based Seismic Design Strategy for Reinforced Concrete Buildings *T Paulay*

Inelastic Behaviour of Three-Dimensional Structures Under Concurrent Seismic Excitations *B Zaghlool, A Carr & PJ Moss*

Nonlinear Seismic Soil-Structure Interaction by Using a BE-FE Method in the Time Domain *J Zhang , A Carr & PJ Moss*

Seismic Analysis & Design of Building Structures with Supplemental Lead Dampers *Xi Lin , PJ Moss & A Carr*

Theoretical Crack Angle in Reinforced Concrete Elements Subjected to Strong Earthquakes *J-H Kim & J B Mander*

Tilting Failure of Retaining Walls Including P-Delta Effect and Application to Kobe Walls *R Richards Jr., K L Fishman, J B Mander & D Yao*

Structural Pounding of Adjacent Multi-Storey Structures Considering Soil Flexibility Effects *A Rahman, A Carr & PJ Moss*

Refinements to the Newmark Sliding Block Model *David G Elms*

The Effect of Flexible Horizontal Diaphragms on The Seismic Torsional Resistance of Systems with Ductile Walls *M Murakami, P Moss, A Carr & M Inayama*

Capacity Design of Infilled Frame Structures *F Crisafulli, A Carr & R Park*

Seismic Behaviour of Existing Moment-Resisting Frames with Plain Round Reinforcing Bars Designed to Pre-1970s Codes *A Liu & R Park*

Evaluation of the Shear Strength of Beam-Column Joints of Reinforced Concrete Frames Subjected to Earthquake Loading *J Restrepo & C-M Lin*

Recent Developments in the Use of Advanced Composite Materials for Seismic Retrofitting *J Restrepo, Y-C Wang, P Wymer & R W Irwin*

Risk Management & Lifeline Engineering *S Bakir, D Elms & J Lamb*

Leicester Steven EQC Lectureship

Bruce Deam, the Department's Leicester Steven EQC Earthquake Engineering Lecturer, begins his second year of teaching in 2001. Last year he taught the Introduction to Design section of 1st Pro, seismic design of multi-storey buildings in the 3rd Pro. Structural Concepts course and wind and seismic design of timber buildings in the Timber and Fire Engineering course. Bruce's teaching will be more focussed on earthquake engineering in 2001 including structural dynamics in the 3rd Pro. Structural Theory course.

Bruce and John Mander will offer a new course on seismic design of bridges and low-rise buildings, including applications of Bruce's structural analysis software. Bruce will contribute to a new course in earthquake engineering, with John Berrill and Prof Ezio Faccioli, an Erskine visitor from Italy. This course will include seismology, lifeline engineering and structural engineering as well as a number of less technical aspects such as disaster management and insurance issues in earthquake engineering.

A valuable innovation, which Bruce introduced into the Department this year, was a 1½ day seminar for staff and postgraduate students on experimental methods for earthquake engineering. This will be extended into a full ME course by 2002.

Bruce has also been investigating methods of making technical earthquake engineering information more accessible to both students and practising engineers. He has developed a web accessible database with the tables of contents for the NZSEE Bulletin and the SESOC Journal as well as most of the proceedings of the New Zealand earthquake and timber engineering conferences held in the last 10 years (have a look at http://www.civil.canterbury.ac.nz/deam/CEPubs). A long term plan is to add other New Zealand civil engineering publications and provide a subject index.

Most of Bruce's research energy has been in areas where he has strengths – seismic analysis, experimental testing, and seismic design of buildings – developed during his previous employment at Building Research Association of NZ (BRANZ). Bruce's research includes computer modelling and pseudodynamic testing of timber buildings subjected to earthquakes. He intends to enhance his computer model using the results of shaking-table tests in our laboratories, and the results of a large series of international tests. This computer model will be used by code-writers to develop more accurate methods of designing buildings for seismic forces, initially for houses and other timber buildings up to four or five storeys high.

He has improved the operation of the Department's shaketable to reproduce higher frequency accelerations more accurately and has plans to improve this further in the coming months. New research projects include in-situ measurement of inter-storey deformations of multi-storey buildings in earthquakes, and a possible PhD project on earthquake resistance of houses on timber piled foundations. ◆

Earthquake Load Test

This project is investigating alternate load paths for floor diaphragm forces following severe seismic damage to the supporting beams. It is one of the largest experimental concrete projects undertaken in New Zealand. The test specimen is a portion of a full-scale precast concrete frame building.

Test specimen ready for load frames to be attached

The project is being carried out by PhD student Jeff Matthews under the supervision of Des Bull and John Mander. More details and recent photos of the project can be viewed in the Current Research area of our website, www.civil.canterbury.ac.nz.

Over the last two decades, the use of precast concrete construction has become very common in New Zealand. This is mainly due to the speed of erection and increased precision obtained from having the components constructed off site, which results in the most economical alternative. Some areas of concern have been raised by the industry as to the performance of these precast buildings during severe seismic attack. In the recent 1994 Northridge earthquake, some serious deficiencies were exposed.

A major concern is with the attachment of precast hollowcore units to the lateral load resisting system. If the connection between the hollowcore unit and the perimeter beam fails, due to the hollowcore unit losing its seating support, sections of the floor could collapse. Such a collapse endangers lives as well as imposing large reconstruction costs. The designer uses a "capacity design" approach to prevent the collapse of the building from happening but the performance of these floor-to-frame connection details is not greatly known.

The aim of this research is to evaluate the performance of floor-to-frame connection details under severe seismic attack. The project will look at the overall performance of a portion of a building rather than the behaviour of single isolated connections, which have been tested in the past.

The study will involve two testing programmes. The first, using details commonly used in New Zealand over the last 10-15 years, will commence in early 2001. A second test programme will follow, incorporating modifications made using data collected during the first test.

The project aims are to:

Evaluate: The effect beam elongation has on the floor diaphragm, especially on the hollowcore units and the performance of modified connection details.
Observe: New load paths established following the onset of beam elongation.
Determine: The performance of building details from the late 1980's and early 1990's, and the effect that diaphragm reinforcement has on the perimeter beams' negative overstrength moment. ◆

People People People

A Retrospective
by David Elms

From the time I was eight or nine years old, and living in Wales, I always liked making things. Or destroying them. No clock in the house was safe. When I was eleven, I emigrated to England and went to school, concentrating on science, rowing and scouting in equal proportion. Scouting was good training for New Zealand.

Next came a year as an apprentice with the De Havilland Aircraft company. What I learnt about metal working on the shop floor was a great help in my later theoretical ideas. Next came three years at Cambridge University. I revelled in music, the arts, politics and just about everything else. I also did engineering. We didn't specialise in any particular branch until the final year when I chose Structures.

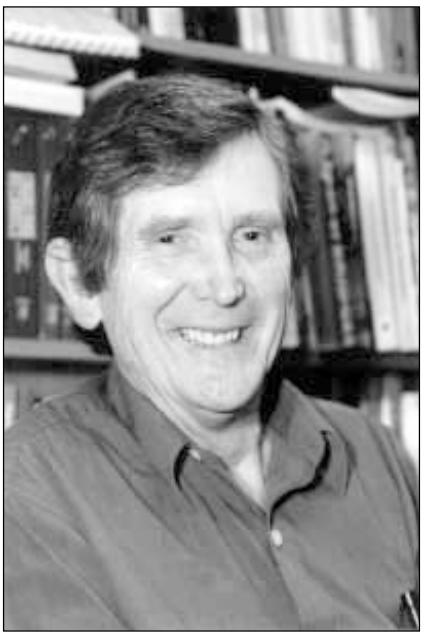
After university came three years as a structural engineer at De Havilland's. I became, of all things, dynamics king of the structures section, using matrix methods on very early steam-driven computers.

Next stop was Princeton in America and a Masters degree in geomechanics. I loved the life. I changed direction again and did a PhD on the behaviour of shell structures, with David Billington, who was enthusiastic, insightful, and had great breadth and boundless energy. I was fortunate indeed to work with him. I probably worked harder and played harder in that period than at any other time of my life.

What to do next? Serendipity struck again in a letter from Robin Shepherd, where he asked me if I'd be interested in coming here. So in early 1964 I arrived.

The department was very different in those days. There were many lectures, few notes, no computers, and Harry Hopkins ruled supreme. The slide rule ruled supreme. I taught structures. The structural texts were appalling, so I thought I could do better. The result was the book *Linear Elastic Analysis* which came out in 1970. At this point, John Robinson of the Ministry of Works told me I ought to look at systems engineering, which was something for the future.

To find more about systems approaches, I went off to MIT for a year in 1971-72. I didn't learn much about systems; I did



learn a great deal about risk and safety. When I got back to Canterbury, I fairly threw myself into developing a systems course.

Gradually I came to see that, in practice, the conceptual ideas of systems engineering were far more important than the analytic techniques. Civil engineering is full of large, broad and ill-defined problems which don't lend themselves to easy quantification. These are the sorts of problems that arise in the interface between technical matters and the human, ecological, political and economic environments. So in the systems courses, I began to drop quantitative methods and replace them with conceptual and qualitative discipline, ideas and attitudes.

Risk, of course, was a major area in which I could apply systems principles. This took me into fire engineering, with Andy Buchanan, and earthquake engineering, with Toby Richards.

The mixture of risk and systems approaches certainly led me into a number of interesting jobs, including development of the New Zealand Loadings Code (NZS4203), safety and risk in New Zealand Rail (later Tranz Rail), the Prime Minister's Special Committee on the safety of nuclear powered ships in 1992, and more recently, the ministerial inquiry into the INCIS project of the New Zealand Police.

I was also able to achieve a few good things at Canterbury. I was of course Dean of Engineering for a few years, and started the Hopkins Lecture. I chaired the School of Engineering Centennial in 1987, resulting in a history of the School of Engineering, *Design for a Century*, written by Diana Neutze and Eric Beardsley, and the founding of the Centre for Advanced Engineering. I continue to be very much involved with CAE as a member of the Executive Committee of the Board.

Much to my surprise, now that I have retired, I find life busier than ever. I write papers, do research, work with CAE, the Royal Society, represent IPENZ and the WFEO Committee for Engineering and the Environment. Most fun, though, comes from being a consultant, working with Optimx Ltd on risk analysis and risk management. Finally, and at last, real engineering ◆

The department has come a long way since we were in this building.

Interested in finding out a bit more about our history? Then please visit our website's 'About Us' area and download the pdf file **Our History**.

Our website address is:
www.civil.canterbury.ac.nz

Communication

2001 VISITORS

Dr Shanka Banerji	Environmental Engineering Missouri, USA
Prof Jean-guy Belivea	Structural Dynamics Univ. of Vermont, USA
Prof I Idress	Geomechanics Univ. of Calif, Davis
Prof John Turner	Geomechanics USA
Prof Johan Blaauwendraad	Finite Elements Delft Univ. Tech
Prof Ezio Faccioli	Seismology Politechnico di Milano
Dr Young Wook Lee	Seismic Engineering Kunsan National Univ. Korea
Dr David Mahalel	Tranportation Engineering Technion, Isreal
Dr Edward McBean	Environmental Engineering Canada
Prof. John O'Connor	Fluids H20'C Columbia, Missouri
Prof Nigel Priestley	Structures Univ. of Calif, San Diego
Prof Otto Stein	Seismic Engineering Univ. of Montana, Boseman
Prof Yoginder Vaid	Geotechnical Engineering Univ. British Columbia

Continuing Education

Professor Larry Bennett is working with the university's Centre for Continuing Education to provide a series of Project Management training sessions for Opus International Consultants.

Prof. Bennett, a two-year visitor from Alaska, spent four days in early November meeting with groups of future project managers, their mentors, and their regional managers. After those introductory sessions at Auckland, Hamilton, Wellington, and Christchurch, the participants are working on a series of written assignments as part of two distance learning modules. Then, Bennett will conduct another workshop in each location, after which a final two modules will be completed. A wrap-up workshop will follow, and each successful participant will be granted a Certificate of Completion.

A total of sixty-four Opus employees, selected because of their potential roles as successful managers, are taking part, in addition to sixteen Opus mentors, each of whom has several years of project management experience. ◆

Departmental Research Reports

2000-1	Seismic behaviour and design of reinforced concrete interior beam column joints. Cheng-Ming Lin, J Restrepo, R Park
2000-2	A two dimensional study on the seismic response of the Aburra Valley, Medellin, Colombia B Adams, R Davis, J Berrill
2000-3	Retrofit of reinforced concrete members using advanced composite material Yung Chih Wang, J Restrepo
2000-4	Earthquake resistant precast concrete buildings: wall-slab coupling effects in low-rise buildings J Restrepo, M Rodriguez, D Saunders
2000-5	Seismic performance of cantilever walls prestressed using unbonded tendons A Rahman, J Restrepo
2000-6	Earthquake resistant precast concrete buildings: floor accelerations in buildings M Rodriguez, J Restrepo, A Carr
2000-7	(Not available)
2000-8	CPT and seismic cone site investigation F Cassassuce, J Berrill
2000-9	Safety of single storey straight stair-flights with mid-height landings under seismic displacements P Simmons, D Bull
2000-10	Application of microsimulation traffic modelling to a New Zealand road network J Laird, A Nicholson
2000-11	Liquefaction susceptibility of selected lifeline sties in the Wairarapa region H Wicks, J Berrill
2000-12	The seismic response of drilled shaft foundations A Chambers, K McManus

Reports may be ordered by contacting Louise Fitzgibbon via email on l.fitzgibbon@civil.canterbury.ac.nz

Commercial Testing

The Civil Engineering laboratories are available for commercial testing, provided that space and equipment is not being used for teaching or research projects. The Department is most interested in projects which have a research component that can feed into our postgraduate programme. Enquiries are welcome.

Liaison Committee

The Professional Liaison Committee meets once or twice a year to offer advice on the overall direction and quality of the Department. The Committee is chaired by Peter Smith of Spencer Holmes Ltd. Other members are Kieran Devine (Beca Conslt), Chris Ellis (Fletcher Eng.) Gretchen Kivell, Ian Robertson (Montgomery Watson) and John Rutledge (Opus Conslts.). Their significant contribution is acknowledged.

Visiting Lecturers

The Department often asks visiting lecturers from industry to assist with teaching. Visiting lecturers make a valuable contribution to undergraduate and postgraduate courses. Some firms offer lecturers at no charge, as a contribution to the development of the Department, which is greatly appreciated in a time of shrinking budgets.

How can you interact with us?

Funded Positions

The Department relies heavily on funded positions to enhance the range of subjects we can offer in courses and research programmes. These positions allow the funding agencies to further their commercial or strategic goals by supporting the education of the country's future engineering leaders. The current investors are:

- New Zealand Fire Service Commission
- EQC Earthquake Commission
- Cement and Concrete Association
- Transport industry

Prizes and Scholarships

Several commercial organisations offer prizes and scholarships to students at various stages through the degree programme. This is an excellent way of recognising high achievement and enhancing industry profile. See page 6.

Research Projects

Most of the research carried out in the Department is focused on industry needs. Through collaborative research, the university can assist development of innovative ideas which affect many aspects of society. This collaboration is vital! Please contact us if you have any R&D projects which we may be able to help you with.

Practical Work Experience

A significant point of industry contact is practical work experience for students, usually carried out in the summer months. This experience provides students and employers insight into future careers. See page 7.