

Mistakes marked thus -



School of Surveying

SILVER JUBILEE



The University of New South Wales

**The School of Surveying
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FOREWORD

In late October, 1981, a notice headed "Proposed 25-year Celebration - Bachelor of Surveying Course" emanated from Peter Angus-Leppan's office. The first sentence read, "A meeting is being called to plan a celebration of the 25 years (Silver Jubilee) of the Bachelor of Surveying Course. As the first class was in 1957, the end of 1982 will see the 25 year mark reached."

Between the time of that first meeting on 10 November, 1981 and the highlight of the celebrations - the Silver Jubilee Dinner on 18 September, 1982 - a huge amount of time and energy was invested in the project. The original committee consisted of G.G. Bennett and P.V. Angus-Leppan (Directors), J.C. Trinder (Dinner), A.J. Robinson (Fund Raising), I.P. Williamson and G.J. Hoar (Surveying Graduates' Association), and A.H.W. Kearsley (Printing and Publications). As planning progressed the Committee expanded to involve, at first, all members of the staff of the School and later, when the fund raising drive started, a graduate of each graduating year as Year Representative and another as Contact Representative. A graduates address list was placed onto the School's word processor (at that time, and even still, the School must have had the most up-to-date address list of any within the University), and this became the means by which each graduate was informed of the activities of the Jubilee Year. The wives of the members of academic staff were also involved in decorating the Roundhouse for the Silver Jubilee Dinner.

The focus of all this activity, apart from the general one of celebrating a successful twenty-five years of the Bachelor of Surveying degree course, was to raise funds for student scholarships in order to assist worthy students in the pursuit of their studies in Surveying. The fund raising activities were two-fold. The first was in the form of donations directly to the Scholarship Fund; the second, a raffle of a beautifully crafted silver plumb-bob, specially created for the fund raising.

At the outset it was unclear how much money would be raised, and therefore how best to use the funds. A figure as high as \$100 000 was mentioned in the optimism and enthusiasm of the earlier meetings. However, as the year progressed (and the economic recession deepened) it was clear that a much more modest amount than this would be raised. The final figure for 1982 was about \$12 000, with many donors to the Scholarship Fund promising to repeat the donation in 1983 and 1984. The School is indeed grateful to all those who supported it in this fund raising activity and their names are listed toward the back of this Silver Jubilee publication. It is especially grateful to those who were particularly generous, including Dr B.P. Lambert (Canberra) \$1 000; Mr Peter Freeburn (Penrith) \$1 000; Mr R.B. Alderton (Sydney) \$500; Rygate and West Pty Ltd (Sydney) \$500; G. Scarratt & Associates (Kiama) \$300; and the New South Wales Division of the Institution of Surveyors, Inc. \$250.

The School, and surely the students who in the future will benefit from the Scholarships, also wish to thank all those who helped so greatly in the Fund Raising and in the celebrations. Without their support, the Silver Jubilee Year could not have succeeded. As it was, it must go down as the most exciting and memorable year in the history of the School of Surveying.

Bill Kearsley
Publications
School of Surveying Silver Jubilee



The solid sterling silver 16 oz. plumb-bob which was raffled to raise funds for the Silver Jubilee Student Scholarships

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TWENTY-FIVE YEARS OF THE BACHELOR OF SURVEYING DEGREE COURSE

In 1957, the New South Wales University of Technology established the Bachelor of Surveying degree course. For the surveying profession, it was a momentous event, and the culmination of many years of negotiation by the Institution of Surveyors.

Efforts to establish a degree course in surveying can be traced back to the years before World War II, but the Institution found the University of Sydney unreceptive to the concept of a separate degree in surveying. So it was the infant University of Technology, founded in 1949, which responded to the profession's requests. Civil Engineering had been one of the first courses offered at the University, and Crawford Munro, the Foundation Professor of Civil Engineering, deserves the credit for sponsoring the new course.

The Silver Jubilee of the establishment of the surveying degree course was celebrated in 1982 by renewing contacts with all graduates, and by the organization of a Silver Jubilee Fund and an Open Day with the Jubilee Dinner as the climax. At this dinner, the President of the New South Wales Division of the Institution, Mr David Lorsch, and the University's Vice Chancellor, Professor Michael Birt, both spoke of the events which led up to the introduction of the degree course. They gave interesting highlights of those early negotiations, from the viewpoints of the Institution and the University. Their speeches are reproduced in this Jubilee Publication, which commemorates the event of 1957.

It was only a year later, in 1958, that the decision was made to broaden the scope of the University to include the humanities and medicine and to change its name to *The University of New South Wales*.

The year 1962 was significant as it saw the graduation of the first Bachelor of Surveying graduands. They were:

John Allman, now an Associate Professor in the School of Surveying;

Ron Benjamin, now a Senior Surveyor with the Crown Lands Office, Sydney;

Brian Kent, now a Senior Surveyor with Gutteridge, Haskins & Davey Pty Ltd;

Tony Robinson, now a Senior Lecturer in the School of Surveying; and

Jim Sheaves, now Secretary to the Australian Police Ministers Council.

Their graduation was marked on the evening of the ceremony by a graduation dinner, followed by the University Graduation Ball. In the years since then, support for the Ball has waned and it has been discontinued. However support for the dinner has grown: every graduation since 1962 has been accompanied by an Annual Surveying Graduands' Dinner. At first it was an all-male, formal dinner with dinner suits and black ties, but in recent times it has grown more relaxed and evolved into the present informal dinner which includes wives, girl-friends and parents of the graduands.

The staff of Surveying in 1962 consisted of Dr Stewart Armstrong, a structural engineer, as Acting Head of the newly formed Department, Desmond O'Connor, Oliver (Ollie) Ward, and three surveyors who had worked until a short while before in the Snowy Mountains Authority:

George Bennett, Peter Richardus and Henry Werner. In addition, Dave Pearson was seconded to the Department from the Technical College. In June 1962 the Department lost a staff member through the unfortunate death of Ollie Ward. August 1962 saw the arrival of a newcomer from South Africa, Peter Angus-Leppan. The longest serving staff member was, and still is, John Allman, who had started in 1955 on the non-academic staff as a Photogrammetric Assistant. The staff member who has served longest in an academic position is George Bennett.

A period of rapid growth followed, with staff and student numbers increasing, and the scope of the staff activities broadening to include a wide range of research and active involvement in the profession.

The first Visiting Professor was Edgar Miskin, from University College, London, who spent a year in the Department in 1963. Early in 1964, Peter Angus-Leppan was appointed as Professor of Surveying, the first chair in Australia, and, for the next 11 years, the only one. The appointment of a professor was a bold move on the part of the University, and one which helped considerably in the development of the young Department. Also in 1964, Jack Freislich joined the Department from the University of the Witwatersrand, adding maturity and stability to the very young group who made up the staff.

A number of important events occurred in 1966: Professor Harry Biesheuvel, from the University of Natal, was Visiting Professor; a new lecturer, Ron Mather, joined the staff, and the Civil Engineering School and the Department moved from the Technical College site in Ultimo to a new building on the bare upper campus at Kensington.

The Department was becoming well known and well regarded in Australia, but events over the next few years brought recognition in other countries, and contributed to the international reputation which the School now enjoys.

Professor Gottfried Konecny of the University of New Brunswick was Visiting Professor in 1967, and, during his visit, the first of a series of international scientific conferences was organised. This was called "Control for Mapping" and was followed in 1969 by the REF-EDM Symposium ("Refraction Effects in Geodesy and EDM"). In 1973 the School was host to the Symposium on "The Earth's Gravity Field and Secular Variations in Position", sponsored by the Australian Academy of Science and the International Association of Geodesy. This attracted a large number of overseas participants and broke new ground in the scientific spheres, in the area of four-dimensional geodesy. Adam Chrzanowski, from the University of New Brunswick was at the School as Visiting Professor in 1968.

Ron Mather had begun gravimetric research immediately on arrival at the University, and for five years he used every university recess for his field expeditions, gathering gravity data in specified locations for his research, as far afield as the Kimberley region. Both students and staff participated in these expeditions, accompanying Ron and assisting in the field observations.

At the end of 1968, a research grant was received from the U.S. National Science Foundation to undertake research in the Antarctic. George Bennett and Peter Angus-Leppan carried out research projects at the three U.S. Antarctic bases at McMurdo, Hallert and Byrd to test gyrotheodolite performance at high latitudes and to measure atmospheric refraction over snow and ice surfaces. Peter Angus-Leppan participated in research expeditions on the Juneau Icefield, Alaska in 1966, 1968, 1970 and 1975.

The Department had begun to attract graduate students and staff were involved in research in many areas of surveying. They were not only publishing their results in international journals, but were also attending international conferences to present papers, often travelling at their own expense to do so. The first postgraduate degrees in surveying were awarded in this period. The first doctorates awarded were the Ph D's of Peter Richardus (1963), John Allman (1968) and Ron Mather (1968). A complete list of the Doctor of Philosophy degrees awarded in surveying is given on page 42. The list is noteworthy for the number of eminent names included and because it represents a substantial proportion of all doctorates in surveying awarded in Australia.

July 1970 brought a milestone for surveying: the Department was established as an autonomous School, becoming, alongside Civil, Electrical and Mechanical Engineering, one of six schools in the Engineering Faculty.

The history of enrolments in the Bachelor of Surveying degree has been affected by cycles in the national economy. First there was a long period of steady growth, with first enrolments increasing from 14 students in 1957 to 116 in 1966. The introduction of the Wyndham scheme caused a temporary lull, but the growth continued again, peaking in 1974 with an intake of 146. These high enrolments resulted from the excellent employment market and were affected by the introduction of free tuition. With the quieter period in surveying activity which followed, and the first signs of a tightening of university finances, the numbers contracted down to 130 in 1975 and 50 in 1979. There was a similar low intake in 1980 and 1981, but in 1982 the numbers increased again to 82. The current first year quota is 70, and it is expected that first year enrolments will remain close to this quota in the future. The long term needs of the profession for new graduates has been carefully calculated, and the quota set so as to fill this need. In order to deal with the increasing student load, new staff members were recruited. These included Pratap Amin, who came from Kenya in 1974, Ganeshan from Sri Lanka in 1975 and John Pollard from South Australia in 1977.

+ 4 ds Greenbank + Greg How

The original degree course tended to be theoretically oriented and included a wide range of engineering subjects, not all of which were relevant. The topics in the surveying subjects were also rather theoretical. This course was first modified in 1966. After years of discussion and planning, a further major revision of the Bachelor of Surveying was introduced in 1971. The revised course tried to redress the imbalance in the selection of subjects and subject matter, to make the course more practically oriented. The part-time course was replaced by a sandwich course in which the pattern was 'one session on - one session off'. The full-time course included one session of professional experience.

The early 1970's was a period of continued expansion. Ron Mather's research activity was thriving and he became the leader of an active group of researchers. In 1974, on the basis of his publications, he was awarded the senior doctorate, the D Sc. It was the first ever awarded by the University in the Engineering Faculty.

The eminent photogrammetrist, Professor E.H. Thompson of University College London, spent a period as Visiting Professor in the School in 1974 and undertook a series of lectures.

In 1975 Dr. Bob Forrest from the Bendix Corporation, U.S.A. was appointed as Professor. The School was divided into three Departments, Geodesy under Professor Peter Angus-Leppan, Photogrammetry under Professor Bob Forrest and Surveying under Associate Professor George Bennett.

The rare award, an Honorary Ph D, was conferred by the University on Bruce Lambert, soon after his retirement as Director of National Mapping, for "having put Australia on the map". The School initiated this award.

For some time the School had been expecting its permanent home to be in a new building to be erected as an extension to the Civil Engineering Building on the upper campus. However continued cuts in funds for capital expenditure made it clear that the Civil Engineering extension would be postponed indefinitely. Following negotiations with the University authorities the School took over three floors of a newly completed extension wing to the south of the Mechanical Engineering Building. The building was not specifically planned for the School and some of the laboratory space is unsuitable, but it is nevertheless a great improvement on earlier accommodation. The wing is now known as the Geography and Surveying Building - GAS for short.

An unexpected and tragic event marred 1978. Associate Professor Ron Mather, on his way to an international scientific meeting in Paris, died of a sudden heart attack. He had been incredibly active and effective in research in his 12 years in the School and had made important contributions in other fields. He was well known in international geodetic circles and universally admired. His loss was a sad blow, and in memory of Ron and his contributions to the School, his colleagues organised an appeal to support an annual prize in his subject, Geodesy.

A further course revision was undertaken in 1977 and implemented in 1978. The sandwich course had not been well supported and was modified. The professional training session was phased out. There was a significant development in a group of subjects centred on land development and an increase in their time allocation. The other subjects were brought fully up-to-date and a range of elective subjects was introduced.

Peter Angus-Leppan took a leading role in the organisation of a major international conference held in 1979. He was Chairman of the Australian National Committee on Geodesy and Geophysics when it made the decision to invite the IUGG (International Union of Geodesy & Geophysics) to hold its General Assembly in Canberra in 1979. He successfully issued the invitation to the IUGG in Grenoble in 1975 and became Chairman of the Organising Committee, with Dr Bruce Lambert as Executive Director. At the General Assembly, 2000 attended, mostly from overseas, and it was considered a very successful meeting. Members of the School were full participants in the event, and presented 14 scientific papers. Peter Angus-Leppan is now First Vice President of the International Association of Geodesy.

Associate Professor John Trinder (who graduated with the second B Surv group in 1963), has played a parallel role in relation to the International Society of Photogrammetry. He is President of Commission 1 of the Society, and successfully organised the conference of the International Society for Photogrammetry and Remote Sensing Symposium, Commission 1, Primary Data Acquisition at Canberra in April 1982.

For the teaching of computing and measuring techniques in surveying, the School consistently adopted the policy of purchasing as wide a range of the equipment as possible. Due to lack of funds this policy was difficult to implement in the early years. Special arrangements were made in 1962 for the purchase of 2 photogrammetric plotters. The first EDM equipment, 3 Tellurometer MRA 101's, were purchased in 1966 while desk-top computers were first available in the School in 1970. There have been regular purchases of these types of equipment to the present day. The largest purchase by the School has been an analytical plotter for analytical photogrammetry in 1978-79. This equipment has subsequently been expanded to include a computer graphics capability. In 1980 two Magnavox MX1502 doppler satellite positioning receivers were purchased by the School for teaching and research into methods of doppler positioning.

Throughout its development the Department and School of Surveying has enjoyed a remarkably close and amicable relationship with the Institution and the whole profession. The Visiting Committee, a group representative of a range of interests in the profession has met regularly to review events and offer advice. Staff of the School have held office in the Institution of Surveyors and in other professional groups. Associate Professor George Bennett was elected on to the N.S.W. Divisional Committee of the Institution in 1966 and was re-elected annually until 1980, serving as Vice-President in 1976-78 and President in 1979. Others elected to the Committee in different years were Joe Holden, Tony Robinson, Henry Werner, Peter Angus-Leppan and Jack Freislich, who was Editor of the Australian Surveyor for many years.

Peter Angus-Leppan was appointed to the Board of Surveyors in 1967 and has remained a member ever since, while George Bennett has been an elected member of the Board representing the Institution of Surveyors, since 1976. Other staff members have held office in professional associations such as the Institute of Cartographers, the Photogrammetric Society and AURISA. They include John Trinder, Lynn Holstein, Len Berlin, Bruce Forster and Joe Holden.

The School has become well known overseas through its research and its publications. It publishes an international journal, the 'Australian Journal of Geodesy, Photogrammetry and Surveying', with Bill Kearsley as Managing Editor. This is supported by teaching departments in all Australian States and overseas. The School also publishes special research reports and books designed as texts for students.

Research has been an integral part of the activity in surveying from the start, and it has been pursued with such success that the School soon assumed a leading position in Australia. Over the years it has earned an international reputation for its research in a number of fields. In a brief review it is not possible to list all research projects, but a few will be mentioned as examples.

The earlier years saw John Allman starting his investigations in error theory and geodetic adjustment, Peter Angus-Leppan working on geodetic refraction and related topics, George Bennett developing new observation systems with the gyrotheodolite, John Trinder investigating the fundamental precision of photogrammetric pointing and Henry Werner delving into the history of surveying. In more recent times satellite Doppler position fixing has been investigated by a team including Greg Hoar, Gary Jeffress, John Allman and Peter Angus-Leppan; Len Berlin has developed novel and efficient computer programs for photogrammetric block adjustment;

Lynn Holstein has worked on computer aided cartography; Bill Kearsley has studied collocation and the geoid; Jean Rüeger has investigated the characteristics and calibration of EDM in great detail; Tony Robinson has designed the EDM baseline at Regents Park; and Ian Williamson has analysed and compared cadastral systems in the Australian States and overseas.

Two developments, in remote sensing and in geodesy, deserve special mention. The Centre for Remote Sensing was established in October 1981 as an interdisciplinary centre for teaching and research. The School made a major contribution in the negotiations leading to its establishment. Bruce Forster is Associate Director of the Centre, which is located in the School. Research in remote sensing is being undertaken by Bruce Forster and John Trinder.

The School has taken up a special niche in Australian geodesy as the centre for scientific analysis of geodetic observations. A team led by Artur Stolz is reducing and analysing satellite laser ranging to the LAGEOS satellite, and computing geodetic baseline vectors from the VLBI observations taken in a joint project by the CSIRO Division of Radio Physics and other groups. Both these are approved as U.S. National Aeronautical and Space Administration projects, while the latter is also sponsored by the U.S. Jet Propulsion Laboratory. Since 1980 Artur Stolz has been Chairman of the Sub-Committee on Geodesy of the Australian Academy of Science. Since 1972 John Allman has been working on the readjustment of the Australian geodetic network. This has culminated in the two adjustments, GMA80 and GMA82, the latter carried out at the request of the National Mapping Council. These adjustments are a world first as they combine terrestrial observations with positions and baselines from satellite geodesy.

Outside support for research has come almost exclusively from the Australian Research Grants Scheme. This has grown steadily from \$20 000 per annum in the mid-1970s to over \$90 000 in 1983. In addition the University has granted special computer facilities to the School, in recognition of its unique research role. It is unfortunately difficult for the School to attract support from other outside bodies, but renewed efforts are being made.

In reviewing the activities of the School, the important contributions made at various levels by the support staff, should not be overlooked. Stella Lennon, the longest serving member of the support staff, joined in 1967 as the Department's only typist, and has earned a unique position in the School's organisation.

In 1982 the School's most important event was the Silver Jubilee. The celebrations of this event have included a drive to complete an accurate address list of all graduates, a raffle and an appeal for funds for Scholarships, an Open Day in the School and the culminating event, the Silver Jubilee Dinner.

In 1982 there were 800 Bachelor of Surveying graduates, while the number of postgraduate degrees awarded is 50. Like all educational institutions the School has recently had its staff and funds pared down, but the staff are reacting positively and morale in the School is excellent. In these difficult times it is more important than ever that graduates should

develop closer links with the School. As the Vice Chancellor said in his Jubilee speech, the wholehearted support of the graduates is not only desirable, it is essential.

The graduates and staff of the School can take stock of the situation, 25 years after the degree course started, and be proud of the School which has grown up, the excellent degree which it offers, and the reputation in research which the School has earned. Above all, we can be proud of the excellent links which have been built up between profession and School, and the support given by the graduates. With these as our mainstay, we can step forward with confidence into the next 25 years.



STAFF and FOURTH YEAR of the BACHELOR OF SURVEYING,
1962

Back Row: J.S. Allman; A.J. Robinson; B. Kent; R. Benjamin;
J. Sheaves

Front Row: Mr P. Richardus (lecturer); Dr S. Armstrong (Head of
Dept. of Surv.); Professor C. Munro (Head, School of
Civil Engineering; Mr G.G. Bennett (Lecturer)

Taken in the entrance to the original Civil Engineering Building,
Mews St., Ultimo



FOURTH YEAR of the BACHELOR OF SURVEYING, 1982

Taken on the steps of the School of Civil Engineering -
Kensington Campus



OUR FIRST LADY GRADUATE -
29 April, 1983

Rosilah M. Sani, B Surv , (Hons II, Division 2)

SILVER JUBILEE CELEBRATIONS

To help celebrate the 25th Anniversary of the 'birth' of the Bachelor of Surveying Degree, the School organised a number of activities including a fund raising drive to establish undergraduate scholarships and an Open Day. The Open Day preceded the Silver Jubilee Dinner, the highlight of the celebrations.

In the weeks preceding the Dinner, representatives of each graduating year contacted their classmates in an appeal for funds for the student scholarships. One of the means for raising funds was the raffling of a specially crafted plumb-bob, made of pure silver mounted on a wooden stand. Considering the employment situation in the profession at this time, the results of that appeal were pleasing. About \$12 000 was raised from donations and the proceeds of the raffle of the silver plumb-bob.

Many of those making a donation promised to make further contributions in 1983 and 1984. Some members of the profession, even though they were not graduates, gave generously to the scholarship appeal and two prominent instrument companies donated instruments for subsequent fund raising.

All those who gave so generously to the scholarship fund are thanked. Their names are recorded in the back of this Silver Jubilee Publication.

On the morning of Saturday, 18 September 1982, the School held an "Open Day" for all the profession and friends. Demonstrations of equipment, recently acquired by the School, were given. This equipment typified the advances made in modern surveying. Visitors saw a laser interferometer which is designed for measuring distances up to 60 metres with an accuracy of a micrometre, remote sensing equipment which portrays and analyses the results of data scans from LANDSAT satellites, a modern "total station" and a computer controlled image data analysis system for use in analytical photogrammetry.

Later that same day the School held its Silver Jubilee Dinner in the Roundhouse at the University. Over 350 graduates and guests attended - a very creditable attendance considering that many of the 800 graduates of the School are working in country areas of N.S.W., other States and overseas. As well as the graduates with their wives and friends, attending the Dinner were the present Vice-Chancellor and Mrs Birt, the former Vice-Chancellor, Emeritus Professor Sir Rupert Myers and Lady Myers; a former Dean, Professor P.T. Fink and Mrs Fink; Mr Bill Kennedy, Commonwealth Surveyor General; Mr Jack Darby, New South Wales Surveyor General and Mrs Darby; Mr Ray Holmes, Victorian Surveyor General; together with students and staff and their partners and guests.

The Dinner was a gala affair, with the tables and the Roundhouse decked out in mainly red and green - the colours of the degree. The Vice-Chancellor, Professor Michael Birt, was the main speaker and he spoke of the need for active support from the alumni in these troubled times in tertiary education.

On the lighter side, he recalled some of his surveying experiences as an agricultural science student when called on to make a survey in a paddock occupied by a large Hereford bull. The bull had stood on the measuring tape for most of the day frustrating the efforts of the would-be surveyors.

Other speakers were Mr David Lorsch, our President, who spoke of the early support which had been given by the Institution in establishing the degree course. The Head of School, Professor Peter Angus-Leppan, responded by saying that the success of the course had fully justified the bold steps taken by the then University of Technology.

The full text of the three speeches can be found in the following pages.

At the end of the speeches, Mrs Birt drew the raffle for the silver plumb-bob. The winning ticket was held by Dr. Bruce Forster of the staff. Bruce was away at an overseas conference at the time and his wife, Jan, accepted the plumb-bob from Mrs Birt.

Among the apologies received for the Dinner was one from Henry Werner, who could not attend because of sickness. He told of his disappointment in not being able to attend and admonished the School for its poor latin. A plumb-bob was traditionally made of lead (plumbum) and therefore the name was wrong and it should have been called an "argo-bob", from the Latin for silver (argentum). Apologies to Henry.

The evening ended with the release of the green and red balloons, suspended by netting from the ceiling of the Roundhouse. Then the Ensemble, Tony Ansell and Company gave their music full rein, and dancing continued well into the night.

The evening ended with everyone judging it to be a success, and agreeing that it would be a good scheme to repeat the exercise to celebrate the Golden Jubilee (if not before!).



The winner of the Silver Plumb-bob Mrs Jan Forster, with Pam and Peter Angus-Leppan, and Mrs Birt and Professor Birt

SPEECHES AT THE JUBILEE DINNER

The Profession - Mr D. Lorsch

Distinguished guests, ladies and gentlemen:

I am very pleased to be able to represent the Institution of Surveyors here tonight, and thank you for the opportunity to address you.

On behalf of the Institution, I congratulate everyone previously and presently associated with the School of Surveying for their efforts, which have established the worldwide reputation for academic excellence of the School for much of its twenty-five years.

Many here tonight have come to renew acquaintances, and remember their experiences here at the University and associated activities elsewhere. Of course, this is partly the purpose of Silver Jubilee functions. Therefore, it is appropriate for me to recall the relationship between the School of Surveying and the Institution of Surveyors.

It had always been my understanding that the Degree course in Surveying was commenced following representations from the Institution. Accordingly, in attempting to research the course and nature of those initial efforts, I referred to the Institution's records - specifically the minute books of committee and general meetings, and the official journal "The Australian Surveyor". It was surprising to find that the effort over many years towards obtaining the course was scantily documented there. A more exhaustive research and recording than I have made would be an interesting and worthwhile service for some surveyor or student to undertake. However, it should not be long delayed, as much of the history remains only in the minds of men, from which the detail and reliability may be lost.

Until the end of 1961, one could enter the surveying profession in New South Wales by serving a period of practical training with a registered surveyor, and private study to pass examinations set by the Board of Surveyors. This system was little changed from that originating late in the previous century. Then, to provide additional surveyors to delineate crown land for alienation, which had been exclusively the government surveyors' function, the Department of Lands awarded a licence to those successful at its examinations. Subsequently, the Surveyors Act, 1929 provided a Board of Surveyors, inter alia, to conduct the examinations. For many years, the examinations in all subjects had to be successfully completed in one sitting after completing the mandatory period of training under articles. Technical colleges provided some courses to assist students, but with few exceptions, the Board did not accept a pass in the college course as adequate for an exemption from its own examination. Some surveyors in private practice conducted correspondence courses or lectures to assist students prepare for the Board examinations.

Although the Board's prescribed subjects included geodesy, astronomy, photogrammetry and engineering surveying, the prime objective was to ensure competence in land boundary surveying. The public's perception of a surveyor was (and still largely is) that of a person who measured, marked and reported upon land. However, many surveyors developed proficiency in other areas for which the qualification "Registered Surveyor" was not considered appropriate. These people thought that a university degree,

such as those available to kindred professions, would be more acceptable evidence of their competence. It was also their desire to formalise the student's education in a more regular manner, and to achieve a high academic standard. Another objective sought was to remove students from the prey of unethical surveyors, who exploited them as an alternative source of labour when field hands were scarce.

Mr Jim Curdie, an Honorary Fellow of the Institution and a man of mature years, told me that he can recall advocating as early as the mid-1920's for the Institution to press for a formal academic course for its students. Many eminent surveyors over many years pursued that objective, but there were numerous obstacles to overcome. Some surveyors did not see the need for high academic standards, or were only interested in practical land surveying aspects, and they advised the authorities against a university course for surveyors. Other professions, such as engineers, also considered such a course unnecessary and lobbied against it. Sources of funds to mount the course were uncertain and other demands on university facilities were heavy. Mr Curdie recalls extensive discussions with Professor Aston of Sydney University, both before and after World War II. The Professor advised the Institution that there should be a special Degree in Surveying, rather than a degree in some related field, such as engineering or geology, majoring in surveying. Despite his interest, Professor Aston could not obtain funds to commence a course. At the Ninth Interstate Conference of Surveyors in Melbourne in October in 1948, Mr Curdie reported "that N.S.W. had done all it possibly could during the last two years ... The matter of the University Degree Course had been taken up with the appropriate authorities, and it was expected that something would be done in this regard by 1950. At present, university courses are too overcrowded and facilities are used to their utmost...."

As mentioned earlier, the Board of Surveyors is the body charged with regulating land surveyors in N.S.W. Therefore, it was the body responsible for formally advising other authorities of the educational requirements of surveyors. That is partly the reason why the Institution has little documentation of the developments leading to the Course. However, successive presidential addresses to Institution meetings from 1950 foreshadow an early start to the course, despite continuing difficulties including, it appears, some caused by the actions of the Board of Surveyors.

Finally, in the December 1956 edition of "The Australian Surveyor", the following announcement appeared (intriguingly, in the middle of a re-print of the most recent Land Surveyors' Examination papers):

"DEGREE COURSE IN SURVEYING AT THE
NEW SOUTH WALES UNIVERSITY OF TECHNOLOGY

It is with pleasure that Sydney Division records that the Degree Course in Surveying at the N.S.W. University of Technology has now been established, and commences with the first term in 1957. This is the culmination of many years of hard work and conferences, and the Course is very full and complete, covering all branches of surveying. The Syllabus has been drawn up in consultation with an Advisory Committee on which both the Institution and the Board of Surveyors are represented, and has the full approval of both bodies.

The Full-time Course occupies four years, the first three years of two terms each and the final year a full three terms. Students will be given about six months practical experience during each of the first three years.

There will also be a Part-time Course - night lectures - covering seven years. Each year occupies three terms and field excursions are provided for.

Students should have brought before them the advantages of the Course and should be encouraged to enrol with the University."

Since the end of 1961, the Board of Surveyors has required students to attend the University to obtain their education, and since 1970, has required a Degree in Surveying as a prerequisite to attempting the practical and oral examinations for a Certificate of Competency as a surveyor for land boundary purposes.

The Institution has maintained strong links with the University since the degree course in surveying was commenced. There are Institution representatives on the School's Visiting Committee. Through this medium and others, the Institution offers advice on the course content, student training and the like. Institution members act as guest lecturers, and many academic staff are also members of the Institution, serving on its committees.

Having recalled past objectives as part of this "Jubilee Reminiscence", I should conclude by noting what has been accomplished and what remains to be done. Certainly the academic standard of the graduates is higher than that of the former "article" trained surveyors. After a reasonable period of practical experience, the graduate surveyor is generally more proficient than his predecessor, due to his wider and more advanced education.

On the other hand, many organisations still give precedence to the title "Registered Surveyor" over Bachelor of Surveying, even for staff not engaged in land boundary surveys. Long established practices change slowly! Specialists in fields such as photogrammetry become known as photogrammetrists, geodesy as geodesists, etc., and tend to lose their identification with the more general fields of land and engineering surveying. They become known by their specialist title, rather than as a "Surveyor".

Because it is still the community expectation to look for the title "Registered Surveyor", most new graduates undertake articulated training to progress to registration. Some still fall prey to unethical practitioners, who exploit them for cheap labour during times of decreased economic activity when there are no alternative sources of employment. Human nature does not change!

Of course, new university courses in surveying provide employment opportunities for some graduates in an academic career. But such courses produce even more graduates, so the employment problems recur when the national economy stops expanding.

These and other problems are not of the School of Surveying's making. But they are problems for the profession in its efforts to better serve society, so of course the School's staff, as responsible professional people themselves, incur an obligation to try and overcome them.

While the School of Surveying at the University of New South Wales has achieved a reputation for excellence for its graduates and staff, there are still many avenues for surveyors to pursue to improve their service to society and their position in the community. I hope that all associated with the School will continue their cooperation with the Institution of Surveyors. We *must* be able to achieve more corporately than individually, or through special interest groups which seem to be in fashion.

Ladies and gentlemen, I again congratulate everyone connected with the School of Surveying for their achievement of high academic standards and service to the profession for twenty-five years. I look forward to a cooperative and fruitful future.

This occasion is to celebrate the Silver Jubilee of the Bachelor of Surveying Degree in the University of New South Wales.

My qualifications for honouring this jubilee are dubious in the extreme; nevertheless, I am proud to have an opportunity to salute twenty-five years of significant achievement.

Let me recall, briefly, some of the history of those years. First, as to the quantitative index of growth. In 1957, when the undergraduate course began, there were three full-time and twelve part-time enrolments. By 1960 the total enrolment had grown to 61, half full-time and half part-time. The number doubled in the next two years (1960-1962), doubled again in six years (1962-1968) and again after eighteen years reaching its high water mark in 1976 with 433 enrolments. Thereafter there has been some decline, to about 220 enrolments in 1982. In the period to which I have referred (1957 to 1982) the School has produced 800 Bachelor of Surveying graduates. Not a bad performance for twenty five years of activity, starting from scratch!

That twenty-five years of growth is part of a very long history of man's attempt to make accurate measurements of earth surfaces. I am told that surveying had its origin, in all probability, in ancient Egypt. The great pyramid at Gizah, built about 4½ thousand years ago, is exactly 755 feet long and 480 feet high; and so accurately square and so perfectly oriented to the cardinal points of the compass, that it is said to be striking evidence to the command that the ancient Egyptians had of surveying. Similar evidence for the development of this skill comes subsequently from the fertile valleys and plains of the Tigris, Euphrates and continuing around the Nile. By 300 B.C., the Greeks were recording distances along the coast as they sailed from the Indus to the Persian Gulf. The Romans learned from both Egyptians and the Greeks and (inevitably) added their own "new technology" - the water level and the plane table; and about 15 B.C. the architect Vitruvius developed an instrument for measuring distance travelled - in effect, an odometer. We have only to think of Roman roads and Roman aquaducts to recognize the extent to which that great civilization had mastered many of the basic skills of surveying. And now of course - to jump forward nearly two millenia, surveyors have to hand satellites, computers and a whole new series of measuring devices. An old profession ... though perhaps not the oldest!

Let me now return to the history of our degree.

In the 1950s, surveying was restricted to subjects in the third and fourth years of the Civil Engineering Degree course at the University of New South Wales, supplemented by an annual survey camp (of which I am told tall tales are still circulating), and it was left to the legendary Professor Crawford Munro (the then head of the Department of Civil Engineering), to make the running on paper to introduce degree training in surveying. Crawford was not hesitant about speaking his mind; and when it came to written submissions about new proposals he inundated the Faculty of Engineering and the Professorial Board with lengthy arguments as to why there should be university training in surveying in this State. (It is interesting to note that in his submissions Munro was much taken with the degree courses then existing in South Africa - it might indeed be said that there has been a certain influence from that country in the School over the years!)

At that time the only training available for surveyors in New South Wales was at the technical college certificate level and this was regarded as inadequate to "qualify men" (clearly a male dominated profession?) for national mapping - Munro described the then state of national mapping as deplorable! - and for civil engineering survey work.

There had, however, been sporadic discussion in the previous twenty years between representatives of the surveying profession and Australian university authorities. In 1947 the New South Wales Premier received representations from the Prime Minister, on behalf of the National Mapping Council, on the need for a degree course in surveying in this State. At that stage, the New South Wales University of Technology was still in its formative stages and no finality was reached on the request. Again, in 1948, the New South Wales Department of Lands was pressing for higher level training than the certificate course - but again no positive action was taken. The Lands Department was nothing if not persistent - and in 1952 the Minister wrote to the Premier pointing out that attempts over a number of years by the Board of Surveyors to secure the introduction of a Surveying Degree course at the University of Sydney had been unsuccessful. The Vice-Chancellor there indicated that he could not see any possibility of introducing such a degree in the foreseeable future. The Board of Surveyors now urged that the development be taken up with the new University of Technology and these representations led to the introduction of the proposals for the surveying undergraduate degree.

The Munro proposals for the degree finally came before the Faculty of Engineering on 20 July 1955. After some re-casting they were finally accepted by Faculty on 9 November 1955, when the four year full-time and the seven year part-time Bachelor of Surveying courses were recommended for approval. Then started the Professorial Board deliberations, the Board in the first instance insisted on having the views of Civil Engineering and Surveying Advisory Panels (now Visiting Committees). In May 1956 the Professorial Board accepted the courses as suitable for the training of professional surveyors; but "requested that they be not implemented until such time as existing courses in Sydney and country centres were adequately staffed and provided with materials, accommodation and equipment. The Board realises that there is an urgent need for highly qualified surveyors, but feels that with the finance available at the present time, the implementation of any new courses would seriously affect the educational standards reached in existing courses." (1956 was obviously not a very good year! These remarks have a very modern and uncomfortable ring to them.)

The then Vice-Chancellor, Philip Baxter, was obviously not to be deterred by such advice and pressed on. In September 1956, the University Council approved the Surveying Degree course for implementation as soon as practicable, the proposal having taken fourteen months to consider from its first introduction to Faculty. (Again, by modern standards, that is not a bad record!) The Vice-Chancellor was advised by the University Accountant that no additional funds were required in the 1956/57 financial year to introduce the course, though they would be thereafter. Accordingly he gave the green light for action and the first students were accepted in 1957 - as I have said.

In 1967, 1973 and 1979 major revisions to the course were implemented, although the basic aims remained unchanged. These were firstly to provide a sound foundation in the sciences, suitably reinforced by practical experience, (in order to give sufficient breadth to allow graduates a wide and informed career choice in surveying and related disciplines); and secondly to provide continuing guidance about changes in technology and in the surveyor's role.

From 1976, the "sandwich course" was introduced in order to phase out the part-time Bachelor of Surveying and to provide a more flexible arrangement for students wishing to intersperse professional training with university studies. A new form of sandwich course was introduced from 1979, involving a system where, after taking the first year on a full-time basis, the student was able to alternate study with periods of employment, by taking leave of up to two consecutive sessions at a time thereafter. In this form, the course can be taken in a maximum period of seven years.

Nevertheless, and although the sandwich concept is supported by the profession, sandwich student numbers have not been particularly high.

In September 1980, and on the recommendation of the School of Surveying, the Faculty, and the Professorial Board, Council approved the introduction of a Bachelor of Surveying Science, an additional first degree to cater for specialization in one or more of the disciplines associated with the School. Although small numbers were always envisaged, little interest has been shown in this course to date. I understand that the Visiting Committee in Surveying will continue to monitor this position closely.

It will be clear that the School has been fortunate in having strong support from the profession and an active Visiting Committee since the course was first introduced. It has strongly supported the concept of professional experience acquired by students as part of their training. In turn, employers have virtually unanimously approved of the performance and application of UNSW graduates. Many members of the profession have employed our students wherever possible, often in lieu of experienced field hands.

Munro, although an engineer, not only promoted the introduction of the surveying degrees, but also the independence of the discipline. He was very clear about its claims to establish a separate academic identity from that of Civil Engineering. I quote from a supporting statement which he provided when regulations for a Degree of Master of Surveying were being considered, "professors of civil engineering were invariably specialists in structural design and tended to take a narrow view of the meaning of civil engineering. Due to this neglect the real property surveyor was entrusted more and more with major national responsibilities in engineering survey work and a separate Institution of Surveyors was set up quite divorced from the Institution of Engineers Australia and the two professions have grown up side by side as completely separate entities. This may not be logical - but it is a fact."

The creation of a separate School of Surveying was first mooted in the second half of 1968. At that time, Professor Vallentine was about to assume the headship of the School of Civil Engineering and it was believed that the temporary retention of surveying in the School would contribute to its "stability". According to reports, matters "stabilized" to the extent that in May 1970 Council was able to accept the proposal that a separate School of Surveying be created. Professor Peter Angus-Leppan was appointed Head of School from 1 July 1970, a position he has held since - after coming to us as a Senior Lecturer in 1962 and being appointed to the Chair of Surveying in 1963.

One of the arguments used when the Council adopted the proposal to create the independent School was that "we have the largest and most active Surveying School in the English speaking world". The University, I have no doubt, was then and still is proud of the vigour and breadth of its work in

surveying. Clearly, its activity is very consistent with the University's special charter to foster work in the sciences and technologies and their application, for the community's good, in industry and commerce. This is particularly important for us now. Earlier this week, I dined with my colleague Vice-Chancellors and the Prime Minister. In the discussion, he made it clear that while he fully accepted that universities had responsibilities for the long term future development of Australia, and for keeping alive areas of research and teaching for which there was little immediate relevance, they also had a responsibility to assist Australian society to meet the present needs of industry and commerce. In that sense, it is very important that the work of the University should embrace fields which are quite clearly directly relevant to the present needs of our community. As I understand it, the School of Surveying straddles both domains of the university world. The School is active in a great variety of fundamental research projects; but it also works on problems of current importance, and at the same time it provides a professional training of the highest quality for graduates who are prepared to go out and work now in the service of the country. The survival of this University - and indeed of the University system in the next few years - depends critically on the balance which is represented in this work being maintained and visible to Government and to the public.

Ladies and Gentlemen, I am sure you will understand why I began by remarking that I was pleased indeed to be able to salute the School of Surveying on this 25th Jubilee of the introduction of its degree programme. I know that I speak for you all in offering congratulations to all those who have contributed to its successful development and maintenance; I remark also with great pleasure that Professor Rupert Vallentine, who was Head of School when it was first introduced is still a member of the University, though to the regret of us all, in the last few days of his active service. Among many other reasons for feeling content and proud of his University career, he must look back on this particular development with great satisfaction - and rightly so. And he must also feel very pleased indeed that Professor Angus-Leppan led the School into its new independent life, is still very much in charge of it in its ripe adulthood.

I have no doubt that it will continue for many years to come to serve the University, the profession and the nation.

The School - Professor P.V. Angus-Leppan

Mr. Vice Chancellor, President, distinguished guests, ladies and gentlemen:

Thank you all for joining in our Silver Jubilee celebration. By your participation you are making it a great event. We have had an overwhelming response, with over 350 people attending this dinner. However it is not only the numbers but the warmth of the response, which is so impressive. In the twenty-five years since 1957, surveying has grown from a small undefined section of Civil Engineering, first to a Department, and then to a School of surveying. In the university, in Australia, and internationally, we have achieved a reputation which we can all be proud of. We have 800 bachelor of surveying graduates and 50 higher degree graduates.

In the birth of the degree and in its growth, innumerable people and organisations have helped and supported the School in its development. We have tried to represent them at our main table this evening. We have David Lorsch, the President of the New South Wales Division of the Institution. Dave told us of the early efforts to set up a surveying degree and we readily agree that without the efforts of the Institution, the Bachelor of Surveying would not have started. Dave mentioned the efforts by Jim Curdie and I would also like to mention the name of Bob Alderton who was active in those days before the degree course started and who is still a staunch friend of the School, and the Chairman of our Visiting Committee. It is perhaps not so widely appreciated that a very significant step in favour of our surveying degree was the decision, by the profession, to make the degree a requirement for entry to the profession in place of the old on-the-job training.

Of course the support of the profession for our degree and for the graduates from the degree, was not always unanimous. You can imagine those early days when the profession, the people who had trained the hard way, on the job, were first called on to employ graduates, they were very suspicious. It took some time before it was generally realised that the graduates brought advantages. They might not be apparent immediately after they left the university, but they soon showed up, and in the long run they were very significant. Well, the profession was won over with the help of stalwarts like Jim Curdie, and Bob Alderton, and many others, and today we enjoy and appreciate the wholehearted support of the Institution and the profession.

Also at the top table we have Professor Michael Birt, the Vice Chancellor of the University and also the former Vice Chancellor of the University, Emeritus Professor Sir Rupert Myers, better known to most as Rupert or perhaps, 'Prince Rupert'. Our school has always had the most sympathetic treatment from the University.

Dave Lorsch has told us how the degree course could logically have been started at the University of Sydney. It was indeed a bold step to start the course at the University of Technology. The Institution planted the idea and this was taken up by Professor Crawford Munro, the Foundation Professor of Civil Engineering. We invited his widow, Mrs Grace Munro, to this dinner but unfortunately she is not well enough to attend. Supporting Professor Munro was the Deputy Head of Civil Engineering, Professor Rupert Vallentine, and many others from that School. We have with us Jack Darby, the Surveyor General of New South Wales. He represents the Government surveying organisations, of which there are very many. Also

present here this evening are Mr Bill Kennedy, the Commonwealth Surveyor General and Mr Ray Holmes, the Surveyor General of Victoria. The Government Departments were very strong supporters of the Bachelor of Surveying in its early days. I would like to recall that in the first few years of the degree, more than 80% of the students were Cadets which means that they earned a salary from a Government Department and in return they were bonded to work for that Department for a period after graduation. This was very important support for the young degree course in those early years.

Also present is Professor Tom Fink, Dean of the Faculty of Engineering during a vital period in the School's growth, and at all times a staunch supporter. We are delighted that these distinguished men have come tonight to take part in the celebration. We are delighted too that they have brought their charming partners. I would like to mention a special guest among the women, Mrs Gwen de Graaff-Hunter, widow of the famous geodesist Dr James de Graaff-Hunter. He was President of the International Association of Geodesy, and when he came to Sydney after his retirement, he helped to develop geodetic research in the School.

To place the founding of the degree course in its proper perspective, I should mention that it was in 1948 that the New South Wales University of Technology was started with the degrees of Electrical, Mechanical, Mining and Civil Engineering. In 1953 the first Vice Chancellor Professor Philip Baxter was appointed. Of course he is now Emeritus Professor Sir Philip Baxter. In 1957 the Bachelor of Surveying degree was started and only one year later, in 1958, did the University take up its new title of the University of New South Wales. In 1962 we had our first group of Bachelor of Surveying graduates. We have what is perhaps an omission from the main table. It would have been appropriate to have somebody representing the graduates, and who better than the graduates from the 1962 year. There are too many to have them all here but I would like to present to you this evening the first group of graduates, who are seated at the table next to the main table.

In 1964 the Chair of Surveying was filled. Over the years the student numbers increased steadily and staff and post graduate students began undertaking research. For instance the first Ph D was in 1968. In 1970 the School of Surveying was established as an independent entity. Student numbers increased and the School began to achieve its international reputation for research work.

Coming to 1982, the most important event for the School has been the Silver Jubilee Celebration. Graduates will be aware that there has been an appeal for funds to support student scholarships. I would like to thank all those who have contributed to the appeal. The contributions have included three particularly generous donations of \$1000.

Another Silver Jubilee event was the Open Day held today at which visitors could see the most modern equipment on display. Besides EDM total stations, and computers, specialized equipment included for example, a graphical display unit in the Centre for Remote Sensing. This system can depict images from LANDSAT satellites, can move them around, change the colours, the size and focus on an individual point. The system can undertake classification and analysis of all the wavelengths of the LANDSAT.

The School, when it found that money was not available to purchase an analytical plotter, built one in its own workshop. The result is a computer controlled analytical plotter which is now working on a number of research projects. In the display of surveying instruments we showed a laser interferometer, a highly precise distance measuring instrument which

can measure down to the nearest micrometre.

And what of the future? At the moment the School, in spite of all the economic difficulties, is doing well. It will continue in its job of producing graduates suitable for the profession. It will produce a small number of specialists with post graduate degrees. The School's research is flourishing, with considerable support from bodies outside the university.

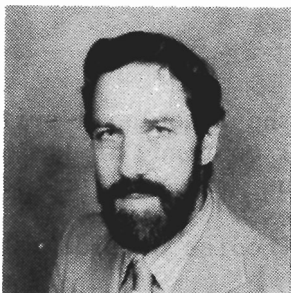
What I would like to see from our graduates, our Alumni, is the formation of a Surveying Chapter of the Alumni Association. Our group of graduates is by far the most active in all the University but other schools and faculties are moving ahead of us in setting up their own Alumni Chapters. The School needs the support of its Alumni, it needs to keep close links so that it is aware of what is happening in the profession and what will happen in the future. This advice is particularly important when it comes to revision of the course, which occurs at regular intervals. In other ways the School needs to be kept aware of the professional activities and we would like to do this on an informal basis as well as through the members of the Visiting Committee. Another way in which the graduates can help the School is in publicising the surveying profession, and the degree course, so that we can gain recruits who are suitably qualified.

Finally, I would like to thank our speakers. Mr Lorsch, thank you for your speech and for your review of the early history of the Institution's support for our degree. We appreciate this support and we are thankful that we can expect it in the future. We certainly pledge that we will keep up the close links with the Institution.

Professor Birt, thank you for your entertaining speech. We appreciate the support which we have had from the university in the past and we thank you for your promise of support in the future. I would like to say to all of you that I look forward to seeing you at our Golden Jubilee celebration.

ACADEMIC STAFF PROFILES

Current Staff



Peter ANGUS-LEPPAN, Head of School

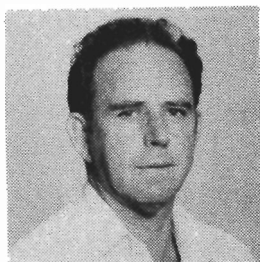
Employed 1962 - present

BSc(Eng) *Rand* PhD DipTP *Natal*
FISAust MILS(Natal) MAIC

Registered Surveyor (South Africa). Lecturer/Senior Lecturer, University of Natal. Senior Lecturer/Foundation Professor, University of New South Wales. Canadian Commonwealth Research Fellow; Consulting Geodesist, US Army Engineers Topographic Laboratory; Alexander von Humboldt Fellow, W. Germany; Consultant, Canadian Geodetic Survey.

Teaching interests: geodesy, land development, professional orientation and seminars, computing. Research interests: surveying education, refraction effects in geodesy, micrometeorology and energy balance, geodetic levelling, satellite positioning methods.

Special Interests: Member, Board of Surveyors, N.S.W., 1967 to present. Chairman, Geodesy Sub-Committee 1968-1980. Chairman, Australian National Committee on Geodesy and Geophysics, Australian Academy of Science 1974-1980. Member, Australian National Committee on Solid Earth Sciences 1980 - present. Chairman, Organising Committee, General Assembly of International Union of Geodesy and Geophysics, Canberra, 1974-1979. Third Vice-President 1975-1979, First Vice-President 1979-1983, International Association of Geodesy.



John ALLMAN

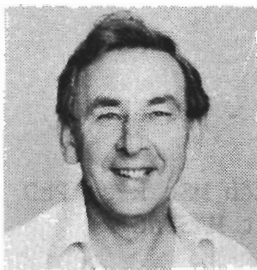
Employed 1955 - present

BSurv PhD *NSW* MAIC MISAust

Photogrammetric Assistant/Lecturer/Senior Lecturer/Associate Professor, University of New South Wales

Teaching interests: survey computations, geodetic adjustments. Research interests: geodetic adjustments, Doppler positioning, geoid determination. Currently readjustment of primary geodetic network of Australia, including Doppler and VLBI distances.

Special interests: Chairman, Working Group of IAG Commission IV on "Education in Geodesy in Australia and Pacific". Member, three IAG special study groups on geodetic adjustments.



George BENNETT

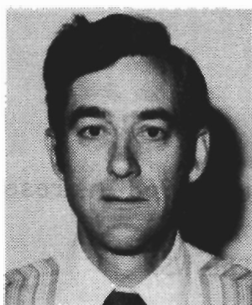
Employed 1959 - present

BSurv MSurv *Melb* PhD NSW MIN
RegSurv (NSW) FISAust

Staff Surveyor Snowy Mountains Hydro-Electric Authority; Lecturer/
Senior Lecturer/Associate Professor, University of New South Wales;
Alexander von Humbolt Fellow, W. Germany.

Teaching interests: surveying, astronomy, mining surveying, hydrographic surveying. Research interests: geodetic astronomy, geodetic adjustment, use of gyro-theodolite.

Special interests: Member, Council and Committee, Institution of Surveyors, N.S.W. Division 1966-1980; Vice-President 1976-1978; President 1979. Elected Institution of Surveyors member, Board of Surveyors, N.S.W., 1976 - present.



John TRINDER

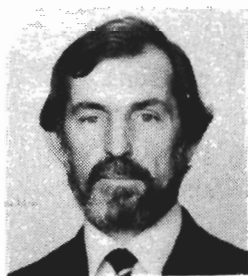
Employed 1965 - present

BSurv PhD NSW MSc *I.T.C.Delft* :
RegSurv (NSW) FISAust

Registered Surveyor in N.S.W. Lecturer/Senior Lecturer/Associate Professor, University of New South Wales. Holder of Netherlands Government Scholarship

Teaching interests: surveying, photogrammetry, photogrammetric adjustments. Research interests: image quality of photography and remotely sensed data, rectification of remotely sensed data, photogrammetric adjustments.

Special interests: Adviser to Board of Surveyors of N.S.W., 1978 & 1982. Chairman, Sub-Committee of Reciprocating Survey Boards to Investigate Needs of the Profession, 1970-74. Member, ISP Working Group, Commission I. 1976-1980. President, Commission I, International Society of Photogrammetry and Remote Sensing, 1980-84.



Bruce FORSTER

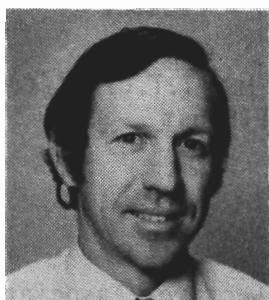
Employed 1975 - present

BSurv MSurv Melb MSc R'dg PhD NSW
LS(Vic) MISAust MASPNG

Cadet Surveyor/Surveyor, Victorian Forestry Commission. Lecturer/
Senior Lecturer/Acting Head, Department of Surveying, Papua New
Guinea University of Technology. Senior Lecturer, School of
Surveying and Associate Director, Centre for Remote Sensing,
University of New South Wales.

Teaching interests: land information systems, land use surveys, land
inventory and land development, remote sensing. Research interests:
urban applications of remote sensing, integration of remotely sensed and
auxiliary data, atmospheric corrections.

Special interests: Council Member, AURISA, 1978. Member, Working Groups
Commissions I and VII, International Society of Photogrammetry and Remote
Sensing, 1981-84. Australian Regional Secretary, Remote Sensing Society.
Member, N.S.W. Government Remote Sensing Committee and Remote Sensing
Technical Working Group, 1981 - present.



Bill KEARSLEY

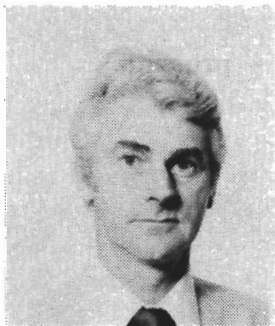
Employed 1968 - present

BSurv MSurvSc PhD NSW
MISAust

Assistant Trigonometrical Surveyor, 1961-65; Senior Computer, 1965-68
Department of Lands, N.S.W. Senior Tutor/Lecturer/Senior Lecturer,
University of New South Wales. Research Fellow, Dept. of Geodetic
Science, The Ohio State University, 1977.

Teaching interests: geodesy, survey computations, integrated surveys.
Research interests: gravimetric solutions of geoidal parameters,
extension of gravity fields, introduction of integrated surveys.

Special interests: Managing Editor, Australian Journal of Geodesy,
Photogrammetry and Surveying. Publications Officer, School of Surveying,
University of New South Wales. Member, IAG Special Study Group 4.70.



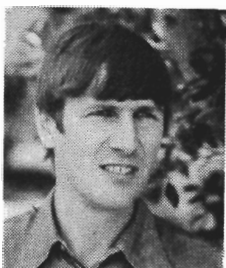
Tony ROBINSON

Employed 1964 - present

BSurv MBA PhD *NSW*
RegSurv(NSW) MISAust MAIC

Staff Surveyor, Department of Lands NSW. Teaching Fellow/Lecturer/
Senior Lecturer, University of New South Wales. Research Officer,
Hewlett Packard Co., USA.

Teaching interests: surveying, astronomy, mining surveying,
management. Research interests: electronic distance measurement,
design of EDM base-lines, management in private practice.



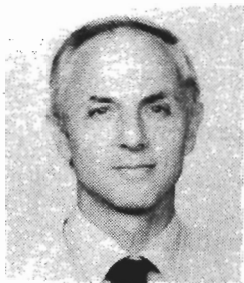
Jean RUEGER

Employed 1975 - present

Dipl-Ing *E.T.H.Zurich*
SIA LS(Switz) MISAust

Professional consultant in surveying firms and University in
Switzerland. Lecturer/Senior Lecturer, University of New South Wales.

Teaching interests: surveying. Research interests: calibration of
electronic distance meters, analysis of deformation surveys, inertial
surveying systems. Author of book on electronic distance measurement.



Artur STOLZ

Employed 1969 - present

BSurv PhD NSW
RegSurv (NSW)

Staff Surveyor, Department of Lands, N.S.W., Lecturer, South Australian Institute of Technology. Professional Officer/Lecturer/Senior Lecturer, University of New South Wales.

Teaching interests: geodesy, surveying. Research interests: lunar and satellite laser ranging, radio interferometric techniques in geodesy, earth rotation, geodynamics.

Special interests: Member of NASA Crustal Dynamics Investigators Working Group, Corresponding Member of Working Group of the Inter-Union Commission on the Lithosphere. Chairman, Geodesy Sub-Committee, Australian Academy of Sciences, 1980 - present.



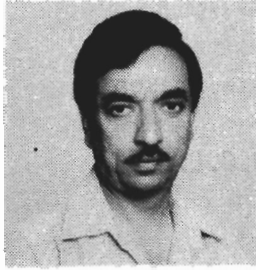
Ian WILLIAMSON

Employed 1976 - present

BSurv MSurvSc NSW
RegSurv (NSW) MISAust

Surveyor, Department of Main Roads. Surveying, engineering and photogrammetric consultant, USA. Consultant, N.S.W. Lecturer/Senior Lecturer, University of New South Wales.

Teaching interests: cadastral surveying, land development and administration. Research interests: cadastral systems, land administration, land information systems.



Pratap AMIN

Employed 1974 - present

BSc *I.T.C.Delft* MSc *Lond.*
MISK CLSEA ARICS

Surveyor, Survey of Kenya. Consultant, private practice.
Lecturer, University of Nairobi. Lecturer, University of New South Wales.

Teaching and research interests: surveying, photogrammetry.



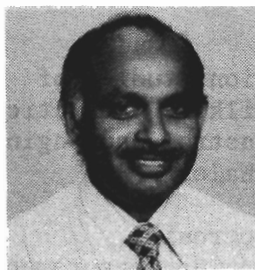
Len BERLIN

Employed 1970 - present

BSc(LS)*Cape T.* BSc *I.T.C.Delft*
RegSurv(Cape Town)

Consultant surveyor, South Africa, Israel, England. Lecturer, University of Nottingham. Lecturer, University of New South Wales

Teaching interests: surveying, photogrammetry. Research interests: adjustment of large geodetic networks, photogrammetric block adjustments, solution of large systems of equations.



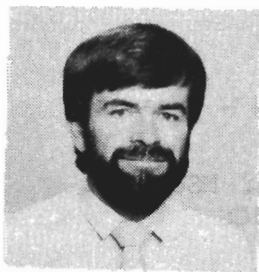
Sabapathy GANESHAN

Employed 1975 - present

BSc *Ceyl.* MISAust

Assistant Superintendent of Surveys, Ceylon Survey Department.
Lecturer, Ceylon University of Technology and Institute for Surveying and Mapping Ceylon, 1971-73. Lecturer, University of New South Wales.

Teaching and research interests: engineering surveys, survey computation, computing, geodesy, astronomy, Doppler position fixing.



Lynn HOLSTEIN

Employed 1977 - present

DipPhotogram U.C.L.

Consultant Surveyor, New Zealand, Queensland and New South Wales;
control surveyor, mapping, Australia and Thailand. Lecturer/Senior
Lecturer, North East London Polytechnic. Lecturer, University of
New South Wales.

Teaching interests: photogrammetry, land law and cadastral surveying,
land information systems, computer-assisted mapping, remote sensing.
Research interests: large boundaries, computer-assisted mapping, computer
graphics, design of land information systems.

Special interests: Secretary, Commission I, International Society of
Photogrammetry and Remote Sensing; Secretary, Australian Photogrammetric
Society (N.S.W. Division).



John POLLARD

Employed 1977 - present

BSc Qld BTech SAIT

Airborne geophysical exploration, radio propagation studies of
VHF and UHF, ionospheric sounding (one year in Wilkes, Antarctica),
acoustic sounding of the lower atmosphere. Cadastral and engineering
surveying. Lecturer, University of New South Wales

Teaching interests: precise surveying, EDM, electronics.
Research interests: atmospheric effects on surveying measurements,
laser interferometry.

Past Staff



Stewart ARMSTRONG

Employed 1958 - 1962

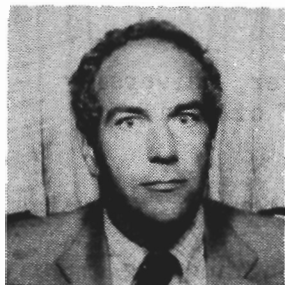
BScTech Manc. PhD *Sheffield*

Experience over a period of forty years: engineer; Lecturer in Manchester College of Technology, Universities of Sheffield, Bristol and New South Wales. Head, Department of Surveying, during his stay at University of New South Wales. Assistant Director, South Australian Institute of Technology. Director, Huddersfield Polytechnic.

Teaching interests: civil engineering, concrete structures. Research interests: concrete, the role of women in engineering.

Current position: Stewart Armstrong has "retired" several times. However he currently has a position with the University of Leeds where he is responsible for preparation of video programs.

Special interests: problems of education and assessment methods. Drama.



Fritz BRUNNER

Employed 1974 - 1982

Dipl-Ing Dr.Techn *Vienna*

Lecturer/Senior Lecturer, University of New South Wales.
Alexander von Humboldt Fellowship holder in West Germany.

Teaching interests: surveying, survey computations, geodesy.
Research interests: effects of atmospheric refraction on geodetic measurements, determination of crustal strains from geodetic data.

Current position: Leader "Basic Research Projects", F&E Geodesy Department, Wild Heerbrugg Ltd., Switzerland.

Special interests: President, Special Study Group 1.42 of IAG
"Electromagnetic wave propagation and refraction in the atmosphere".



Andrew CAMPBELL

Employed 1968 - 1975

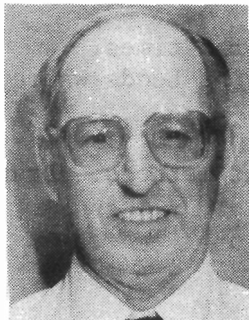
BSurv MSurvSc NSW
MISAust MAIC

Tutor, University of New South Wales. Consultant Surveyor, N.S.W.

Teaching interests: surveying, photogrammetry.
Research interests: temperature of steel bands.

Currently: Director, King and Campbell Pty. Ltd., Port Macquarie.

Special interests: Member, Institution of Surveyors Inc. New South Wales Division. District Governor, Apex.



Frank CLARKE

Employed 1963 - 1971

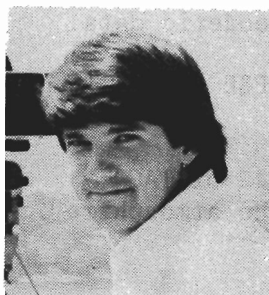
BSurv NSW PhD N'castle
RegSurv (NSW)

Registered Surveyor, N.S.W. Senior Instructor/Lecturer, University of New South Wales. Senior Lecturer/Head, Department of Civil Engineering & Surveying, University of Newcastle.

Teaching interests: surveying, geodesy. Research interests: physical geodesy.

Currently: Senior Lecturer and Head, Dept of Civil Engineering & Surveying, University of Newcastle.

Special interests: Responsible for planning, development, implementation and staff recruitment for the introduction of the Bachelor of Surveying degree at University of Newcastle in 1977.



Paul COVELL

Employed 1976 - 1981

BSurv NSW

Tutor, University of New South Wales.

Teaching and research interests: surveying, EDM

Currently employed in private practice.



Laurence EEKHOUT

Employed 1964 - 1967

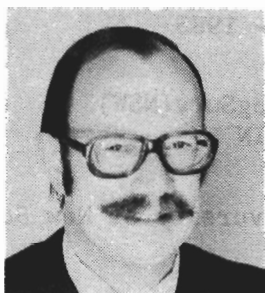
BScEng *Wits* BSc *I.T.C.Delft*
MSurvSc *Natal*

Lecturer, University of New South Wales. Senior Lecturer, University of Cape Town. Professor, University of Fort Hare.

Teaching interests: photogrammetry.

Currently: Professor, Land Surveying, University of Fort Hare, Republic of Ciskei.

Special interests: integrated surveys, land information systems.



Bob FORREST

Employed 1975 - 1981

BA *Minn.* DGeodSci *Ohio State*

Advanced Mapping School, St. Louis, Missouri. Research Scientist in Antarctica and Puerto Rico. Senior staff position at Bendix Research Laboratories, Michigan. Professor, University of New South Wales.

Teaching interests: photogrammetry.

Research interests: advanced applications of photogrammetry, digital control techniques, image processing, analytical plotters.

Currently: photogrammetric consultant, USA.



Jack FREISLICH

Employed 1963 - 1975

BSc(Eng) *Rand* FISAust

Mine surveyor, land surveyor, South Africa; Lecturer/Senior Lecturer, University of Witwatersrand, Johannesburg. Senior Lecturer, University of New South Wales.

Teaching and research interests: surveying, astronomy, mining surveying.

Special interests: Editor of South African Survey Journal. Member, Council, Institution of Land Surveyors, Transvaal. Editor, Australian Surveyor. Member, Council, Institution of Surveyors, N.S.W. Division

Currently: Retired.



Ids GROENHOUT

Employed 1975 - 1980

BSurv MSurvSc NSW RegSurv(NSW)

Staff Surveyor, Dept. of Railways(SRA); Teacher, Dept. of Civil Engineering Sydney Technical College; Lecturer, University of New South Wales.

Teaching interests: surveying, astronomy. Research interests: engineering surveys, statistics, astronomy.

Currently: Senior Surveyor, Snowy Mountains Engineering Corporation.



Greg HOAR

Employed 1975 - 1983

BSurv PhD ~~NSW~~ RegSurv(NSW)
MISAust MAIC MRIN

Consultant private practice N.S.W.; Lecturer, University of New South Wales; geodetic consultant, Magnavox, USA.

Teaching interests: surveying, astronomy. Research interests: network adjustments, Doppler positioning.

Special interests: general aviation and marine navigation.

Currently: Geodetic Consultant, Magnavox USA.



Joe HOLDEN

Employed 1968 - 1981

DipPhoto Lond PhD NSW
FRGS FRICS MISAust MAIC

Major, Royal Engineers, British Army; Lecturer, Department of Surveying, University of Otago; Lecturer/Senior Lecturer/Associate Professor, University of New South Wales. Professor and Head of School of Surveying, South Australian Institute of Technology.

Teaching and research interests: surveying, photogrammetry, cartography, orthophotography.

Currently: Professor and Head, School of Surveying, South Australian Institute of Technology, Adelaide.



David LAMB DEN

Employed 1968 - 1972

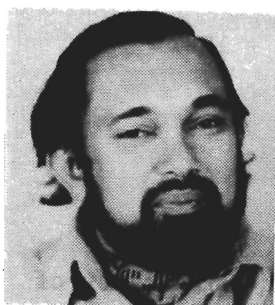
BScF *New Br.* DipTCP *Syd.* DLS(Canada)
RS(NZ) MISAust MNZIS ARICS

Surveyor and planner in Canada, Australia, California and New Zealand.
Lecturer, University of New South Wales. Professor, University of Toronto.

Teaching and research interests: land studies.

Special interests while in Australia: Co-editor and Business Manager,
The Australian Surveyor.

Currently: Professor of Studies in Survey Law in the Department of Survey
Science, University of Toronto, Canada.



Ron MATHER

Employed 1966 - 1978

BSc *Ceylon* PhD DSc NSW FISAust

Assist. Superintendent of Surveys and Officer in Charge, Survey Training
School, Ceylon Survey Department. Lecturer, South Australian Institute
of Technology. Lecturer/Senior Lecturer/Associate Professor, University
of New South Wales. Resident Research Associate/Senior Research Associate,
NASA Goddard Space Flight Center, U.S.A.

Teaching interests: geodesy, general surveying and computing. Research
interests: gravimetry, the boundary value problem, geoid studies, earth
tides, reference systems, satellite altimetry, sea surface topography.

Died: Paris, September 1978.

Special interests: Member, Sub-committee on Geodesy, Australian Academy
of Science. President, Section V, International Association of Geodesy.
Member, Directing Boards of International Gravity Bureau, International
Centre for Earth Tides, and International Centre for Recent Crustal
Movements.



Maurice MAUGHAN

Employed 1966 - 1975

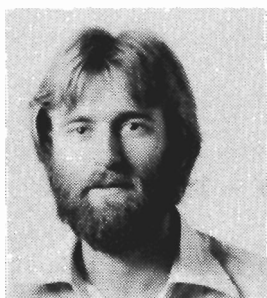
BSc Lond ARICS(Land Survey)

Staff Computer, Staff Surveyor, Uganda; Assistant Commissioner in charge of Mailo Surveys (Native Estates); Deputy Commissioner of Lands & Surveys; Acting Commissioner of Lands and Surveys, Uganda.

Teaching interests: mathematics, surveying, computations.

Research interests: mathematical methods in surveying

Currently: retired.



Tom MORRISON

Employed 1977 - 1981

BSurv NSW

Staff Surveyor, Department of Lands, N.S.W. Tutor, University of New South Wales

Teaching and research interests: surveying, geodesy

Currently: Private practice with Southern Aerial surveys.



Salvatore NASCA

Employed 1973 - 1978

DottScGeol Florence MSurv NSW
DipTop&Cart (IGMI Florence)

Retired Major of Italian Army Survey Corps. Exploration geologist and environmental scientist. Senior Tutor, University of New South Wales.

Teaching and research interests: surveying, cartography, topographic map revision from spacecraft imagery.

Currently: In private practice



Desmond O'CONNOR ^Y

Employed 1954 - 1963

BE *Syd* ME NSW MSc I.T.C. *Delft* PhD *Ill.*
RegSurv (NSW) (WA) (NT)

Lecturer/Senior Lecturer, University of New South Wales. Research Director and Scientific Advisor, US Army Engineering Topographic Laboratories, Fort Belvoir, USA. Chief, Environmental Sciences Office, The Pentagon, and Member, Army Research Council. Foundation Professor/Dean of Environmental Studies, School of Environmental and Life Sciences, Murdoch University, Western Australia. Visiting Fellow, Centre for Strategic and Defence Studies, Australian National University, Canberra.

Teaching and research interests: barometric altimetry, photogrammetry, surveying.

Special interests: Deputy Chairman, Environmental Protection Authority, Western Australia. Vice-President, Royal Flying Doctor Service, Western Australian Section. Hon. Councillor, Perth Chamber of Commerce. Licensed Commercial Pilot.

Currently: Foundation Professor (formerly Dean), School of Environmental and Life Sciences, Murdoch University, Western Australia.



Bob PATTERSON

Employed 1975 - 1979

BSurv MSurvSc BSc MStats *NSW* MISAust

Survey Corps. Department of Lands, N.S.W. Senior Tutor, University of New South Wales. Lecturer, University of Tasmania. Lecturer, University of Queensland.

Teaching and research interests: surveying, application of statistical theory to surveying and geodesy.

Currently: Lecturer, University of Queensland.



Peter RICHARDUS

Employed 1957 - 1965

GradGeodEng(Delft) ME PhD NSW

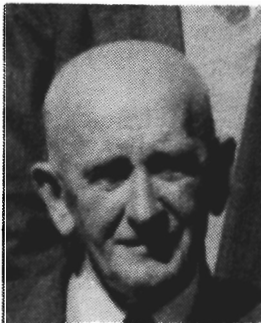
Control surveys, West New Guinea, Snowy Mountains Hydro-Electric Authority.
Lecturer/Senior Lecturer, University of New South Wales.

Teaching interests: surveying, geodesy, adjustments, map projections.

Research interests: application of diffractive light to survey measurements,
deformation measurements, design of networks.

Special interests: Chairman, Study Group on Doppler satellite positioning,
Dutch National Geodetic Commission. Member, Study Group, Geophysics and
Geodesy, European Council of Sciences. Member, International Pamir-Himalaya-
Karakorum Geophysical Expedition 1978. Visiting Professor, Ohio State
University, Graduate School of Geodetic Sciences and University of Parana,
Curitiba, Brazil.

Currently: Professor, Department of Surveying, Photogrammetry and Remote
Sensing, Agricultural University, Wageningen, Holland.



Ollie WARD

Employed 1953 - 1962

LS(NSW) MISAust ARICS

Royal Australian Army Survey Corps. Lecturer, Sydney Technical College.
Lecturer, University of New South Wales.

Teaching interests: surveying, survey computations, cadastral surveying.

Oliver Ward was associated with the original discussions with the University
and Institution of Surveyors to establish the Bachelor of Surveying degree
at the New South Wales University of Technology.

Died in 1962.



Henry WERNER

Employed 1960 - 1978

Dipl.Ing *Bonn* FISAust

Archaeological and Engineering Surveys, Bonn. Engineering surveying, hydrology, Snowy Mountains Engineering Authority. Lecturer/
Senior Lecturer, University of New South Wales.

Teaching interests: history, land utilization, surveying. Research interests: refraction, history of surveying, settlement and deflection of Sydney Opera House, integrated surveys.

Special interests: Institution of Surveyors, metrication, integrated survey system, New South Wales. Steam locomotives, outdoor activities.

Retired: December 1978.

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DR. STEWART ARMSTRONG
IN ENGLAND, ON THE 18TH NOVEMBER 1983

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DOCTOR OF PHILOSOPHY DEGREES 1963 - 1982

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1971	BENNETT, G.G. FRYER, J.G. TRINDER, J.C.
1973	STOLZ, A
1974	MITCHELL, H.L. ROBINSON, A.J.
1975	HOAR, G.J. HOLDEN, G.J.F.
1976	ANDERSON, E.G. KEARSLEY, A.H.W.
1977	BRETREGER, K.
1980	RIZOS, C.
1981	COLEMAN, R. FORSTER, B.C.
1982	LARDEN, D.

GRADUATION PRIZE WINNERS

University Medal

1963	Kurt LAMBECK	1974	Karl BRETREGER
1968	John Graham FRYER	1975	Christopher RIZOS
1969	Frank Leslie CLARKE	1980	Bruce Raymond HARVEY
1970	Harvey MITCHELL	1981	Robert John WILLIS
1972	Ian Charles LLOYD		

Board of Surveyors Medal

1970	Frank Leslie CLARKE	1977	Geoffrey Alan COOK
1971	Harvey MITCHELL	1978	Glen Harris COX
1972	Ian Charles LLOYD	1979	Peter Robert HOLLAND
1973	Terry Robert COOKE	1980	Roderick Talisker MACLEOD
1974	Karl BRETREGER	1981	Robert John WILLIS
1975	Christopher RIZOS	1982	Ben Michael SENESE
1976	Ken BULLOCK		

R.S. Mather Prize

1980	(Bruce Raymond HARVEY (Gregory John WILLIAMS
1981	Robert Charles LOUDON
1982	Ben Michael SENESE

Association of Consulting Surveyors Prize

1982	Ben Michael SENESE
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