DR (ROBERT) IVAN SKINNER 1923 - 2014

The eminent earthquake scientist and engineer, Dr Ivan Skinner passed away suddenly on 19 July in Australia while visiting his daughter's family.

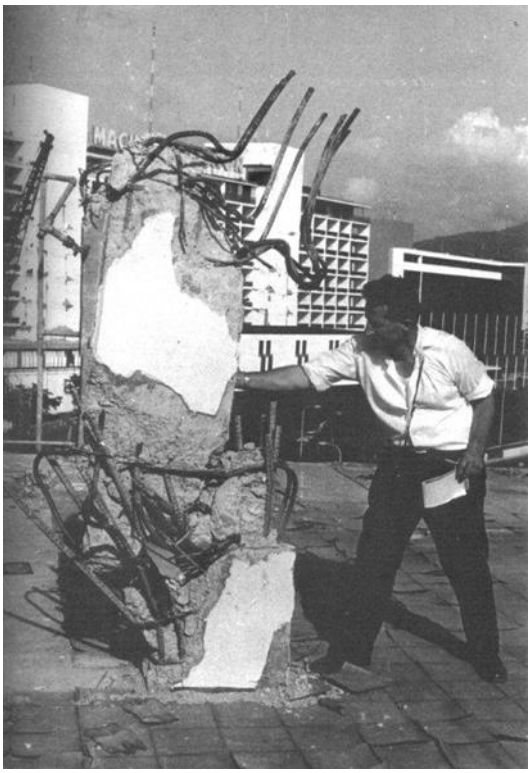
After obtaining a BE (Hons) degree and then his DSc (Cant) at the University of Canterbury in 1951, Ivan worked for Dominion Physical Laboratory [later Physics and Engineering Laboratory (PEL)] of DSIR in Gracefield, Lower Hutt. He began in the basic radar section collaborating on a range of physical and engineering research projects like the adaption of radar systems for auroral and ionospheric research and the development of a system to isolate an electron microscope from background vibrations.

Although he began with a primary interest in electric and electronic research, Ivan soon diversified into the range of physical and engineering activities at PEL. By 1959, he was leading its engineering seismology section. He gave high priority to the development of a high performance severe earthquake recorder for ground level installation throughout New Zealand.

In the early 1960s Ivan, along with an instrumentation engineer, developed the first widely used strong-motion accelerograph in New Zealand, the Skinner-Duflou mechanical-optical (MO) accelerograph. Ivan, Bill Stephenson, Dick Hefford and others from the Engineering Seismology section used this instrument and simple scratch-plate (SP) peak acceleration devices to establish the New Zealand strong-motion network. A scratch plate recorded very strong near-source motions of 0.61g at Reefton in the Inangahua earthquake. Over the years, the MO evolved into the MO2A, the mainstay of the New Zealand strong-motion network until the advent of digital accelerographs. The strong-motion network went on to become part of Geonet.

Ivan became involved as part of a team tasked to develop an analogue computer to calculate earthquake response curves for multi-storey structures. This resulted in analogue calculation of response spectra for some of the early well-known earthquake records (including El Centro 1940 and Taft 1952), as well as acceleration and displacement profiles for many idealised structures that were published in DSIR Bulletin 166 in 1964. These analogue calculations may well have been the first calculations of the dynamic response of structures in earthquake motions carried out in New Zealand. From this background, Ivan went on to contribute to earthquake loadings standards from the 1960s to 1980s.

As his career with the DSIR developed and reputation grew, Ivan was often taken away from the organisation for stints as an earthquake engineering expert for UNESCO, including 20-months at the International Institute for Seismology and Earthquake Engineering in Japan from early 1969. He spent two months at an earthquake institute in Yugoslavia in 1973, worked on setting up an earthquake research institute in Greece, and went on lecture visits and tours to Mexico (1972) and China (1985). UNESCO also supported Ivan's engineering studies of several destructive earthquakes,



Ivan in Caracas 1967

including two that damaged Manila in the Philippines (1968 and 1970).

Other engineering studies of earthquake damage included Rabaul (Papua New Guinea) in 1967 and Caracas (Venezuela), also in 1967. The results of his Caracas study appeared as DSIR Bulletin 191 and detailed a number of findings including that of "dramatic microzone effects" thus emphasising the "urgency of microzone studies". He became a regular figure at national and international conferences, often presenting papers, being a part of the conference organisation, and networking with colleagues. The World Conference on Earthquake Engineering is held every four years, Ivan attended 11 out of 13 of these over a 48-year period.

Ivan is best known for his pioneering work in base isolation. It is understood that his interest in this area arose from his observations of the deformation capacity of steel and its energy dissipation characteristics during earthquake reconnaissance (now referred to as 'learning from earthquake missions'). This led to the development of several types of steel hysteretic energy dissipators, combined with mechanisms such as rocking to provide the base-displacements required to achieve significant energy-dissipation and isolation. This work occurred in the late 1960s and early 1970s, boosted by a sabbatical spent at PEL by Dr Jim Kelly of the University of California Berkeley. Other PEL staff, including Arnold Heine and Cameron Smart, were involved in this phase, with strong support from PEL director Dr Mervyn Probine. Jim Beck was

another involved in the early analysis of base-isolation and rocking systems. Early uses of these devices included a rocking chimney at Christchurch Airport and the South Rangitikei railway viaduct.

Attention then turned to seismic isolation of buildings. Practical systems were developed using rubber bearings to provide base flexibility with energy dissipation provided by various types of bending and torsional steel beams and, later, lead-extrusion devices. The presentation of a paper on these systems at the New Zealand National Society for Earthquake Engineering (NZNSEE) Conference in 1975 led to the Ministry of Works & Development (MWD) Chief Structural Engineer, Otto Glogau, requesting his district structural engineers to each submit a project for consideration of seismic isolation. The William Clayton building, to be the Wellington district office of MWD, was selected as the candidate, with a design team including Trevor Mitchell, Les Megget and Andrew Charleson. The space requirements for the steel dissipaters, involving a part-height additional storey, added to the cost of the system. Mid-way through the design, Dr Bill Robinson and his material science team at PEL solved the problem by developing the lead-rubber bearing which involved simply inserting a lead plug into a laminated rubber bearing that was already used to provide the base flexibility. This system became the first widely used seismic isolation system in the world, although its main use in New Zealand for many years was for bridges rather than buildings. In 1993, Ivan with co-authors Drs. Bill Robinson and Graeme McVerry, summarised this original research in their book An Introduction to seismic isolation. It became an international best seller in the field and has been translated into Chinese and Japanese. In 2010, Ivan Skinner, Trevor Kelly and Bill Robinson revised the text for publication by NICEE in India as Seismic Isolation for Designers and Structural Engineers.

In 1980 Ivan was appointed chief engineer and became one of the three-person PEL management team, a positions he held until 1985. From 1986 he focused strongly on research and applications of seismic isolation in New Zealand. He left the DSIR in 1988 but continued working on projects with them by mutual agreement.

Ivan was appointed the Earthquake Commission's (EQC) Research Director in 1994, holding this position for 11 years. His studious and active directorship ensured that EQC fulfilled its mission to support natural disaster research in New Zealand. The Commission is required by statute to involve itself in natural disaster management, such as facilitation of research. This facilitation includes providing the funding for research projects, relevant academic positions and GeoNet; New Zealand's earthquake hazard monitoring network.

Since Ivan's retirement, EQC has initiated an award - the EQC/NZSEE Ivan Skinner Award for the Advancement of Earthquake Engineering Research. The annual award is funded by EQC and administered by the New Zealand Society for Earthquake Engineering (NZSEE). The first recipient of this award was Dr Stefano Pampanin from the University of Canterbury, and Immediate Past President of NZSEE.

Ivan Skinner was made a Fellow of the Royal Society of New Zealand in 1977 and received the Queen's Service Medal (QSM) in 1990 for "services to New Zealand". Ivan was awarded Life Membership of NZSEE.

New Zealand has been at the forefront of natural disaster risk management for many years, in particular with regard to earthquakes. Knowledge expands, applications are improved and demands become more complex in a never-ending process. Ivan has been at the forefront of this research and provided an immeasurable contribution to the resilience of New Zealand against the effects of natural hazards. From an international perspective, his early research and involvement has facilitated New Zealand's continuing contribution to the world's understanding of the hazards due to earthquakes.

Ivan is quoted as saying, "Returns on research and applications aimed at reducing the impacts of New Zealand and overseas natural disasters are on a steeply rising curve, with some promise of even more rapid advances. Since built environments are increasing in size and complexity, sustained and expanded research to reduce New Zealand natural disaster impacts is fully justified."

Many will continue to remember Dr Ivan Skinner as a gentleman, researcher of the first rank, administrator, a mentor, and friend.

ACKNOWLEDGMENTS

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