

**The Birth
of the
Cyclone Testing Station**

Personal Recollections

George Walker

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**Prepared as a Contribution to the 30th Anniversary Celebrations of the
Founding of the Station in November 1977**

In The Beginning

In 1958 the North Queensland town of Bowen was hit by its first cyclone in 76 years. It caused major damage. A young Sydney architect, Kevin Macks, had just joined an architectural practice in Townsville and became involved in some of the reconstruction.

A Developing Relationship

The University College of Townsville was initially established on a temporary campus adjacent to the Pimlico High School. For its permanent campus the Townsville City Council made a grant to it of over 600 acres at the foot of Mount Stuart in the proposed suburb of Douglas, on which over a period of time permanent buildings were established for the different Departments. The design of the first stage of the Engineering Building was commissioned in 1967 with Kevin Macks as the principal architect. In addition to lecture rooms, offices and small laboratories, this phase included two major laboratories, a hydraulics laboratory and a structures laboratory.

It was a time when structural engineering research was synonymous with testing large structural components and assemblies, and Hugh Trollope was determined that his Department would have the proper facilities to do this. The funding for the building was insufficient for what he wanted so he approached the Queensland Government Co-ordinator General, Charles Barton, arguing successfully that there was a need for a facility in North Queensland to test full scale bridge beams. In this he had the support of a local consulting engineer, John McIntyre. John McIntyre had come to Queensland from New Zealand as a young civil engineer shortly after graduating from the University College of Canterbury in Christchurch, New Zealand, following studies that had been interrupted by service in the 2nd World War. By the mid 1960's he was well established as the head of North Queensland's largest local firm of consulting engineers, and was a person of considerable influence within both the engineering profession and the community. Not many bridge beams were tested, but the resulting strong floor facility was to prove invaluable for the testing of building components and sub-assemblies on which the Cyclone Testing Station was to be based.

A seemingly unrelated event at this time was the appointment of a new staff member. In addition to pioneering the teaching of soil mechanics in Australia, Hugh Trollope played a pioneering role in extending the scope of it to include rock mechanics to produce the discipline known today as geomechanics. His first ambition after arriving in Townsville was to make his new Department the leading centre of rock mechanics research in Australia, recognising its importance in relation to mining activities in northern Australia, and Mount Isa in particular. To get it started he brought with him from Melbourne a young graduate student, Ted Brown, encouraged staff with relevant expertise to join in his endeavour, and in seeking new staff sought staff who may be able to contribute. He had persuaded Baden Best to specialise in the newly developing field of stress analysis known as the finite element method and apply it to the analysis of the behaviour of jointed rock, so when seeking an additional structural engineering academic, he included dynamics in the prescription, with a view to getting someone who may be persuaded to undertake research on the dynamic aspects of rock mechanics. It attracted a young New Zealand engineer working in the United Kingdom in the nuclear power industry who had a PhD in earthquake engineering. The new staff member was George Walker. He never got interested in rock mechanics, but in due course the appointment was also to prove significant in the establishment of the Cyclone Testing Station.

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When suggestions were made that there were lessons to be learned from Cyclone Ada, the house building industry in Townsville reacted negatively, saying the problem was with the local building regulations and their enforcement in the Whitsunday Islands. To George Walker it did not seem to be the sort of problem

(BRE) in the UK. One of the major projects being undertaken at BRE involved full scale measurements of wind loads on an experimental house in a new housing estate in Aylesbury along with complementary wind tunnel studies. In September 1974 George Walker departed for a year's sabbatical leave to work with Keith Eaton on this project which was seen as a good way of quickly acquiring state of art knowledge of wind engineering in respect of houses. About the same time John Holmes was engaged to strengthen the wind engineering research group with his first task being to design and construct the wind tunnel.

By December 1974 Hugh Trollope and Kevin Macks could both feel very satisfied with the way things were going, with programmes in place that augured well for the future development of the University and Townsville as leaders in the research, development, education and implementation of cyclone resistant methods of housing construction. Neither would have had any idea how quick this development would be.

The Defining Event

On Christmas Day 1974 Cyclone Tracy hit Darwin causing the greatest destruction of any sudden onset disaster in Australia's history. For those involved with the wind engineering research programme at James Cook University as well as many others life would never be the same again.

Hugh Trollope's first response was to contact the Acting Prime Minister, Jim Cairns and offer the University's services for investigating the damage utilising the experience gained in investigating Cyclone Althea. His second response was to look for somebody to go to Darwin. George Walker would have been the obvious person but he was in England. Other staff were approached but his approaches were turned down. In desperation he sent a telegram to George Walker saying 'Can you get to Darwin? Please ring. Trollope'. At the time George Walker was away visiting friends in the Midlands and found the telegram under his door on his return 2 or 3 days later. On New Year's Eve he boarded a plane for Australia - eventually getting to Darwin on January 2nd following an aborted flight from Brisbane to Darwin when the Hercules on which he was aboard was forced to divert to its base at Richmond in New South Wales because of engine failure.

In Darwin he was briefed by Charles Bubb, who at the time was Assistant Chief Structural Engineer for the then Commonwealth Department of Housing and Construction. Charles had led the initial investigation of damage with a team of hastily assembled wind engineering experts and academic and professional engineers and architects. Subsequently George Walker was commissioned by Norm Sneath, the Chief Structural Engineer of the Commonwealth Department of Housing and Construction, to lead the detailed investigation of the damage, including co-ordination of the inputs from a range of other experts and professionals. The output was a 3 volume report, Volume 1 being the main report written by George Walker, and Volumes 2 and 3 containing the detailed reports of all the other investigators who contributed to the study – including one by two experts from the CSRIO

tested to loads similar to those which would have been experienced in Tracy and the tie down systems had been well designed – so well none of them actually failed. What Tracy did was highlight problems that had not been exposed in Althea, particularly the importance of racking strength and of fatigue loading in the vicinity of the fasteners of the recently introduced high tensile steel roof cladding – which had replaced the thicker mild steel roof cladding used up to the time of Cyclone Althea. It was clear that applying a piecemeal approach by just fixing problems that been exposed, which had been the traditional approach to housing design for extreme events, was flawed. The major recommendation arising from the investigation was that houses in cyclone prone regions should be subjected to the same level of structural design for wind as was applied to the design of larger buildings.

At the time this was a revolutionary recommendation and there were many in the building industry who believed it was impractical. The systems used for housing were different than those used in larger buildings with which structural engineers were familiar. The basic technical knowledge of the behaviour of these systems that was required for analytical design did not exist in many cases and the only recourse was to testing, and in many cases the test methods did not exist. Through the influence of its senior engineering public servants such as Norm Sneath, the Commonwealth Government delayed all reconstruction until the necessary research and testing had been undertaken. Had it not had the strong support of these engineers in the Commonwealth Department of Housing and Construction the recommendation may never have been implemented – in which case it is likely there would have been no Cyclone Testing Station, for it was the demand for testing created by this recommendation that led to the creation of the Station.

There was another significant failure in Cyclone Tracy which did not get much mention in the report because it was a very minor contributor to the overall damage, but was to be of major significance in the birth of the Cyclone Testing Station. Monier Colourtile had opened a concrete tile factory in Darwin shortly before Cyclone Tracy. Only a few houses had been built using the tiles, fixed with the new tile clips developed in association with James Cook University. The new tile clips proved to be no match for Cyclone Tracy, to the dismay of both Theo Wilkinson and George Walker, who had been involved in their development. (It was also big surprise to Theo Wilkinson as he had been initially informed by his local staff that they had performed well, sending him photographs demonstrating this – photographs which had been judiciously taken from an appropriate angle that made it look as if they had performed well!) George Walker investigated them closely, and discovered that most of the clips had become dislodged from the tiles as a result of the vibration of the tiles due to the same fluctuating wind pressures that had caused fatigue failure of the metal roof cladding. Theo Wilkinson responded immediately by suspending the production of the tile clips and initiating the development of a modified clip which could not be dislodged by vibration. To test the new clip Monier developed a unique tile testing machine capable of testing a small panel of tiled roofing under the fatigue loading regime recommended in the Commonwealth Government's report on Cyclone Tracy – a machine that in modified form was subsequently to be used for many years by the Cyclone Testing Station for fatigue testing of roof cladding systems.

Conception

Even prior to Cyclone Tracy the recommendations arising from Cyclone Althea had led to an increasing demand for the University's structural testing facilities that was placing significant demands on the academic staff. Hugh Trollope recognised that after Cyclone Tracy these demands were likely to increase much more, and he did not want to be in a position of having to turn such testing away. Theo Wilkinson was already working with the University on the modification of his tile clip, and was himself becoming a fervent believer in the need for such facilities to service the needs of an industry with a background of low involvement in technical activities. They discussed the problem together and with Kevin Macks and John McIntyre, leading to a documented proposal by Hugh Trollope. In it he wrote:

'It is a feature of academic employment that priority must be given to the teaching and research facilities with the result that the world is not always fully recognised that

'If this is to be financially supported by industry, then in order to be successful, it must gain the confidence of industry in a relatively short time. The proposal that has been put forward and so actively pursued by Mr. Theo Wilkinson of Monier Colourtile Pty. Ltd. to raise \$100,000 will in effect provide, in today's inflationary situation, for about three years operation. The scale of the operation is also seen as a minimal one. To ensure that adequate account is taken of industrial factors and needs it has been suggested that the operation of the unit should be overseen by a management committee and a possible composition of this committee has been suggested as follows:-

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| 1. Private industry | 2 members |
| 2. Royal Australian Institute of Architects | 1 member |
| 3. The Institution of Engineers Australia | 1 member |
| 4. Local Government | 1 member |
| 5. James Cook University | 2 members |

The function of this committee would be in effect to act as a "Board of Directors" who would look at the overall policy and programme of the unit but would not be concerned with day to day operations.'

It is an amazing document for its clarity of vision, the use of plain English to convey great ideas, and its lack of the waffle and exaggeration of benefits that is a feature of many research proposals. If there was a date at which the Cyclone Testing Station was conceived it was 7 May 1975 with the documentation of this proposal. Over thirty years on the Station still exhibits the ideas embodied in it. However it was to be another two and a half years before the proposal became a reality.

Gestation

The proposal was endorsed in principle by the Vice-Chancellor, Ken Back. Hugh Trollope, Theo Wilkinson, Kevin Macks and John McIntyre, together developed a plan for getting industry support. In the process they gave the unit a name. Formally it was to be known the 6.5 -1 TD -0Wov

not been called for some time. This is mainly my fault and for this I must apologise to you. To get this project moving I am notifying all concerned that a meeting will be called for 2.30 p.m. Thursday, 22nd January, 1976. The meeting will be convened at the Queensland Master Builders Association Rooms, 417 Wickham Terrace, Brisbane.

This meeting should have the following objects:-

- (1) Establish a steering and finance committee to temporarily handle the affairs of this project until it is established.*
- (2) Approve a prospectus for mailing to industry describing the Cyclone Testing Station and also including the appropriate information for fund raising for the project.*
- (3) Arrange a schedule for the steering and finance committee to meet formally on a monthly basis until the James Cook Structural Cyclone Station (sic) is properly launched with the final establishment of a permanent organisation with its associated committees.'*

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The Birth

By mid 1977 with approximately \$60,000 having been raised or promised the Interim Management Committee decided it was in a position to appoint an engineer and technical assistant as envisaged in the original proposal. The engineering position was advertised nationally and a good response was received. Two candidates stood out from the rest. Both had been very involved in the investigation of damage following Cyclone Tracy as Commonwealth public servants involved in building research and both were highly regarded. Although having different personalities there was little to choose between them with each having different strengths. It would have been great to employ both, but the funds didn't allow that. Indeed there were only sufficient funds to guarantee two years employment so it required a considerable act of faith to take on the position. By a narrow decision Greg Reardon was appointed.

Hugh Trollope was fond of saying many decisions are 51%:49% at the time but having made them they must become 100%. So it was with the appointment of Greg Reardon. Once appointed the Interim Management Committee gave him their 100 percent support and he didn't let them down. He went on to develop the Cyclone Testing Station in a way that reflected his own style and personality. Had the appointment gone the other way it would probably have been equally successful, but some of its characteristics may have been different.

Greg Reardon took up his appointment on 1 November 1977. Keith Abercrombie, a former coach builder in the Queensland Railways, and later a draughtsman in a consulting engineering firm, began a few weeks earlier, filling in the interim time until Greg took up his position as a temporary technical officer in the Civil Engineering Department.

When Greg Reardon was appointed he had no title. He was appointed to be a research engineer in charge of the Cyclone Testing Station. Nor did Hugh Trollope have any particular position in the Station, except that Greg Reardon reported to him on a day to day basis, with Hugh Trollope performing this role on behalf of the Interim Management Committee. It was not until a meeting of the Interim Management Committee on 8 September 1978 that the situation was formalised with Hugh Trollope being appointed as Director of the Station and Greg Reardon being appointed as Technical Director reporting to the Director.

The James Cook University Cyclone Structural Testing Station is generally regarded as having come into existence on 1 November 1977, as this is the date it commenced operations. However it was to be another two years before everything was properly formalised. Prior to Greg Reardon being appointed the Interim Management Committee had been considering a

The final meeting of the Interim Management Committee was effectively held on 13 July 1979. At this meeting Theo Wilkinson tendered his resignation as a consequence of health problems. It was received with great regret. The next meeting is also described in the minutes as being of the Interim Management Committee but in effect it was now the Management Committee specified in the Constitution with a number of new members as required by it. Kevin Macks was the Acting Chairman, a position in which he was subsequently confirmed. In all respects the Cyclone Testing Station was now fully established and under way.

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