

THE HEALTH OF A CITY

by Jed Scott

Exactly 21 years to the day after the foundation stone was laid by Lord Hughes of Hawkhill, on the morning of the 9th of September 1986 I was born by Caesarean section in the maternity unit of Ninewells Hospital. My birth was observed by a crowd of first year medical students who - I'm told - applauded as I was lifted up into the world. It was a straightforward and well practised procedure but the delivery of Ninewells itself, although celebrated in the end, was rather more challenging and not without complications...

The beginning

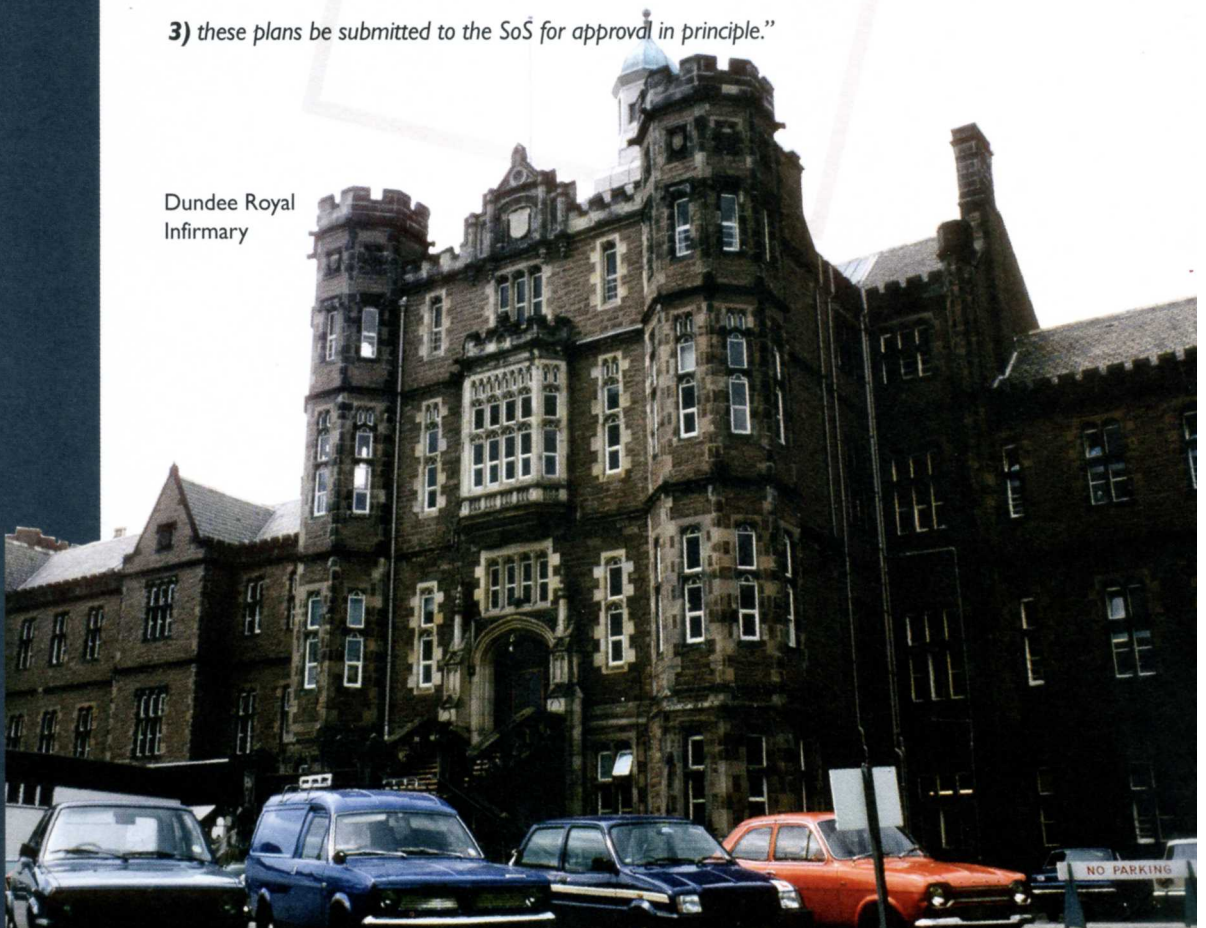
The story of Ninewells starts in July 1948 when the National Health Service (Scotland) Act came into force. Soon after this a nationwide survey of hospital provision was launched by the Department of Health for Scotland. On 3 November 1948 the minutes of the newly formed Eastern Regional Health Board (ERHB) recorded the first tentative steps towards a new hospital for Dundee, to replace Maryfield as well as Dundee Royal Infirmary, whose conversion to a modern hospital was considered almost impossible.

The ERHB Architect was directed, along with Dundee Corporation's City Engineer and City Architect, to prepare a report on suitable sites of between 100 and 200 acres in size that may be available on the periphery of the burgh. On 2 March 1949 this report was presented to the Board and a visit to "various sites in the vicinity of the city" for interested members and their wives was arranged for the following Sunday.

The Board minutes are then regrettably silent on the matter until August 1949, when the Hospital and Specialist Services Committee reported that a letter had been received from the Department of Health "intimating that the Board's formal proposals on this matter should now be submitted for the approval of the Secretary of State." It was accordingly agreed to recommend:

- 1) That the Regional Board should resolve to redevelop the Central hospitals in the Dundee area on a new site with provision for a new Medical School and residential hospital;
- 2) That the site of the new development should be that marked on the plan already considered by the Board and that;
- 3) these plans be submitted to the SoS for approval in principle."

Dundee Royal Infirmary





Invergowrie House

Sadly the plan mentioned in the minutes does not appear to have survived, nor does the report of the ERHB Architect. It seems, therefore, that details of the alternative locations that were considered shall remain a mystery.

The plans were submitted and in September 1949 approval to proceed was granted by the Department of Health. The Board's minutes recorded hopes that planning and construction times "can be kept to the minimum really necessary". So began a saga that would see a further 26 years pass before the first patient was admitted to the new hospital.

The site

Planning for the new hospital got underway in May 1950. The proposed site, centred on Menzieshill Farm, incorporated a large part of the Invergowrie Estate (including the grounds of Invergowrie House itself) as well as a small triangular area in the north east corner of the Balgay Estate. The south-facing plot overlooking the Tay featured a varying slope towards the river of between 1 in 10 and 1 in 20 and this had an enormous influence on the hospital layout.

A strong objection to the proposed location was lodged almost immediately by the Agricultural Executive Committee,

who were concerned by the loss of over 200 acres of prime land and a potential loss of 97,200 gallons per year of milk production. In a letter to the Deputy Town Clerk the AEC helpfully suggested an alternative 160 acre site for the hospital development - Camperdown Park. The Corporation's rebuttal was swift and scathing: "The City of Dundee, while having a considerable number of parks, is not well endowed with large open spaces such as the Camperdown Policies and any loss of ground there would in a very material sense be of the order which the Corporation would not care to contemplate."

However, it seems the Department of Health was nearly swayed by the AEC's argument but after hearing evidence from the Corporation and the ERHB that there really was no other suitable site in the vicinity of Dundee the Secretary of State "reluctantly decided that an area of ground at Invergowrie House should be acquired for development by the Regional Health Board." in March 1951. The large size of the plot was down to the influence of St Andrews University, whose clinical teaching staff rightly anticipated the need to leave room for almost certain future expansion and managed to prevail when the ERHB had, for a time, seemed content to settle for a smaller site. The purchase of the required 226 acres did not begin



"Some people thought I and those associated with me chose the wrong site. The hospital should have been in the centre and the bridge should have been out here. I am still convinced we chose right in both cases."

said Lord Hughes of Hawkhill at the Foundation Stone ceremony, 9th September 1965.

until August 1953. As a Crown building planning permission was not required, and the first piece of land, the Balgay Estate triangle, was purchased in May 1954; the rest of the site was acquired by summer 1956.

The architectural firm Robert Matthew Johnson Marshall and Partners (RMJM) was awarded an initial three year contract on 1 July 1956 for a fee of £50,000 per annum. Robert Hogg Matthew had already designed many noteworthy post war buildings such as New Zealand House and the Royal Festival Hall.

Despite the appointment of an architect the project was hardly any closer to the first sod being broken in 1956 than it had been in 1948. Only the vaguest brief had been produced and for months RMJM were simply being paid to do nothing, while discussions and consultations took

Detailed design

Concurrent with the appointment of the architect in 1956, a joint planning committee was set up by the ERHB and the University of St Andrews to look at detailed design aspects of how the new hospital should function. From the outset this was to be a new kind of facility, incorporating the most up to date medical thinking and modern materials available. The man responsible for much of the early decision making was Dr C Bainbridge, the Board's Senior Administrative Medical Officer. Dr Bainbridge could be regarded as the founding father of Ninewells as it

numbers were specially adjusted to take account of the greater proportion of female labour in the Dundee jute mills. The same figures also suggested that Dundee's total hospital bed provision in 1956 was deficient by 427.

This led to a protracted argument with the DoH, whose own calculations indicated that just 550 new beds were needed; anything above this was considered "excessive, especially when compared with the situation in Edinburgh and Glasgow" where the hospitals were greatly oversubscribed. A battle of wills developed between Dr Bainbridge and the



▲ The Ninewells site c.1964

place over the optimal form of the new buildings and the size of the new hospital. Matthew himself gave a deadline of 1 July 1957 for the full brief to be delivered to allow production of preliminary sketches; if this date were missed then construction could not commence until the 1961/62 financial year. This was an early warning sign of the apparent lack of urgency and slipping schedules that would come to dog the whole scheme.

was he who drove the project forward through the difficult early days.

The planning of Ninewells was much influenced by studies conducted by the Nuffield Provincial Trust, and in particular their 1955 report which was the basis for the calculations on bed numbers and department sizes. The figures used (at this time it was predicted that Ninewells would eventually serve a population of 294,000) indicated that a total of 831 beds should be provided. Interestingly the

Department; the position advocated by Bainbridge was that fewer than 600 beds made Ninewells unviable as a teaching hospital as it would require both Maryfield and DRI to be retained and various small specialties to be split over the three sites. Eventually the DoH capitulated and on 17 December 1957 formally granted permission for the Ninewells project to go ahead as a 600 bed facility.

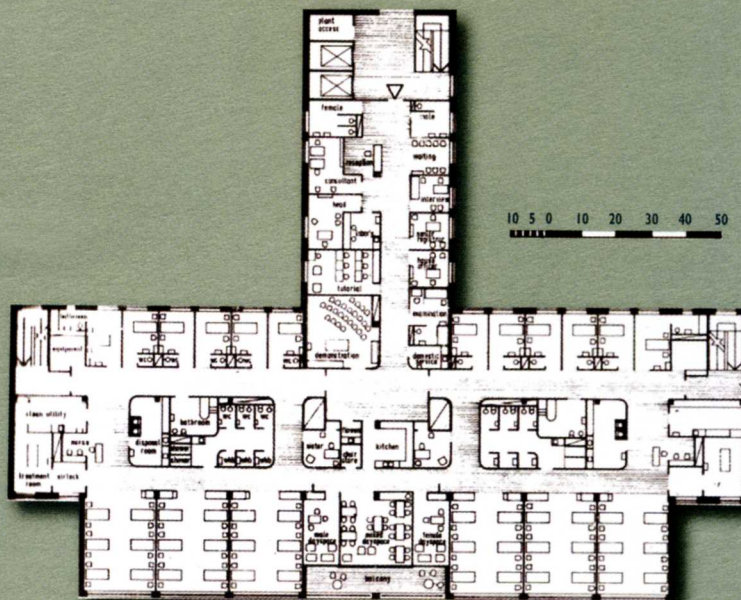
Early on in the process emerged the concept of modular wards that could be stacked and arranged in blocks. Each ward would have provision for almost all clinical and domestic activities within one unit. Beds would be arranged in small bays - a new concept and strikingly different to the traditional ward with rows of beds lined up along the walls. The fixtures and fittings of the standard wards could be modified but the floor plan would remain largely unaltered. This standardised layout had the advantage of being economical to build and simple to plan.

In September 1957 Bainbridge travelled to Geneva and to the Larkfield and Vale of Leven hospitals in Strathclyde, to Cardiff to discuss the new hospital being planned there. This was to be an 800 bed facility with an integrated medical school, modular 32 bed wards. Dr Bainbridge was much taken by the Cardiff hospital, and schedules of its accommodation and floor plans were forwarded to members of the Ninewells committee.

After many iterations of essentially the same basic idea (including lost months of arguing over such vital points as whether the “Housemaid’s closet” should be renamed the “Domestic service room” and whether or not a separate storage cupboard for flowers should be provided) a standard ‘T’ shaped design was settled upon; a 48 bed unit made up of two separate 24 bed sections with a communal day room in between. Six beds in each section would be in single rooms, the rest being arranged in bays of six beds.

A great deal of attention was given to the interior finishes in an effort to reduce any "institutional" character and making them pleasant for staff, visitors and patients alike. The attention to detail extended to the lighting - "colour corrected" cold cathode fluorescent tubes were used in ward bays, with standard tubes in public areas and filament lamps in the ward day rooms in an attempt to add variety and make them more homely. Bespoke rubberised floor tiles were used throughout to reduce noise levels and prevent slips and the build-up of static electricity. As the Detailed Design Report put it; *"We aim to create what may be called a 'quiet atmosphere', one which avoids, so far as possible, the hardness of surface which, for example, glazed wall tiles present. The word 'quiet' is used here with two meanings; in the physical sense it relates to acoustics, e.g. the quietness of tread, the reverberation of sound; in the aesthetic sense it relates to visual calmness and clarity of the interior."*

Forced ventilation was provided with wards and rooms capable of being positively or negatively pressurised as required and 3.5 complete changes of air per hour. No air conditioning was installed, except in the operating theatres, as it was thought that the design temperature of 65°F could be maintained during summer by simply opening windows.



STANDARD WARD UNIT
PLAN-FIG. 11

Four enormous oil fired boilers were installed to provide heat, A total of 33 lifts were installed, with all those in patient areas being sized to fit a standard hospital bed.

The design of the operating theatres at Ninewells was greatly influenced by Professor Sir Donald Douglas, Emeritus Professor of Surgery to the University of Dundee and Surgeon to the Queen. His objective was to make the new hospital the flagship of the whole NHS and he came up with a set of golden rules for operating theatre design which pioneered the modern concept of infection control.

Among these were that there should be a clear physical barrier between the theatres and the rest of the hospital, a clear demarcation of the theatre suite into clean, sterile and disposal areas, exclusion of all unnecessary people from the theatre, the provision of separate theatre clothing and effective changing facilities, and the segregation of septic cases in specialist infectious diseases hospitals.

There was much debate as to whether each specialty should be provided with its own operating theatres located close to the wards, or whether a central group of theatres would suffice. The medical fraternity expressed a strong preference for separate theatres on the grounds of departmental convenience and patient safety, while the ERHB argued that a standalone group would bring significant financial savings but eventually a centralised suite of six main theatres with smaller specialist satellite facilities for ENT, Maternity and Ophthalmology was agreed upon.

The main operating theatre suite at Ninewells was placed in the Centre block on level 6, with the main plant room above and the Central Supplies core and Sterilisation unit directly below. Key to the design was segregation of surgical staff, patients, clean supplies, sterile equipment and waste. The theatres were walled off from the rest of hospital and were provided with their own separate ventilation plant. A 16 bed reception ward and 8 bed recovery ward were provided, beyond which patients had to pass through air locked rooms to access the clean side of the suite. Staff entered and exited through changing rooms.

The air in each theatre was to be filtered and changed 20 times per hour, the sophisticated air conditioning was to allow the temperature to be very finely controlled. Lighting was by colour corrected cold cathode fluorescent tubes, with each theatre equipped with a large "Mark III Super Hanaulux" lamp, supplemented by a spotlight able to be positioned in any location around the operating table. Automatic monitoring equipment mounted in a futuristic chrome fascia provided continuous supervision of the patient's physiological condition, with channels displaying arterial blood pressure, venous blood pressure, body

might look directly down upon the operation area with the aid of field glasses", though another surgeon, Mr Sturrock, thought "the possibility of so-called 'closed circuit television' should not be ignored" - pioneering stuff for 1957!

This feature was quickly abandoned as the students were too far removed from the operating table to clearly see and hear what was going on. The galleries did however lend a very space age look to the circular chrome-and-white theatres, an aesthetic seemingly inspired by contemporary science fiction.



The theatres were circular with separate antechambers surrounding the main room. Disposal of waste was through a dedicated service corridor physically separated from the sterile section. The doors from each theatre to the service corridor were two-leaf stable type to prevent "scrubbed" staff from entering the unclean area; items for disposal would be handed through the open top half of the door.

temperature, electrocardiograph read out and encephalograph read out. These vital signs could also be recorded onto a chart or magnetic disc.

Ninewells is a teaching hospital and the educational needs of students were accommodated for by the provision of high level viewing galleries referred to as "observation domes". Sir Donald had suggested this innovation "so that students

The Layout of the Hospital

Unlike DRI and Maryfield which had, like many other hospitals evolved and changed form over many years, Ninewells was a totally new design. Matthew's firm worked very closely with the ERHB and the Universities to produce a facility which would meet the needs of patients, staff and students; the latest thinking on hospital management and logistics was used to great effect. From the earliest days it was decided that the medical school must be "embedded" within the hospital. The chosen layout comprised three major blocks and a number of annexes; the buildings were arranged horizontally such that closely related departments were in close proximity. The topography of the site, which had been criticised by the press early in the project, was used to great advantage.

This vertical separation divided the buildings into a series of so-called "Streets" that allowed the segregation of the flows of patients, visitors, staff, students, supplies and services, allowing them to move efficiently round the site with minimal conflict. The



A thoughtful study by RMJM noted that the area of the Ninewells site was exceptionally generous. This allowed the option of using large, low buildings which had many advantages. These included construction costs and phasing; minimising travel time between departments; lessening noise transmission; minimising cross contamination; fire safety and potential future development. In particular it was recognised that the slope of the site allowed a degree of vertical separation without the buildings becoming too tall. Additionally, each building could have ground level entrances on separate floors.

highest levels (7 and above) in the Centre block were designated the "Contact Street" and provided circulation space for staff, students and visitors around the car parks, main concourse, medical school, offices and outpatient clinics.

Level 6 was designated the "Treatment Street" where admissions were directed and was home to the main ward blocks and operating theatres. It was seen as important for patient safety that movement of patients between theatres and wards should not involve changing levels. Level 5 was the "Supplies Street" with the Central Supplies Core, the kitchens, the pharmacy and the sterilisation unit. Finally, the level 4 "Services Street" comprised piped services, the service yard, animal house and clean and dirty covered routes to the laundry and incinerator.

The West block housed a large maternity unit, wards for minor specialties such as Paediatrics and Ophthalmology, a small Radiology section (with extra thick

Intensive Care, as well as the clinical and research laboratories.

Directly adjacent to the West block, the Centre block comprised the main concourse, kitchens, a small admissions unit, the medical school lecture theatres and library, mortuary, the central supply core and - directly above - the six main operating theatres. The levels above the concourse were set aside for various administration functions. The Centre block tower housed cold water storage tanks.

Annexes included the Medical Physics department, the "Engineering Group" which housed the laundry, boiler house and incinerator, the Dundee Collage of Nursing and staff residences. The

Nursing provided accommodation for 260 staff, made up of approximately 160 nurses, 38 junior doctors and 27 medical students. A further 40 houses and 60 flats were built for ERHB staff in the far South eastern corner of the site.

The layout of the blocks was intended to give the maximum possible daylight, by arranging the various sections to form a series of internal courtyards with external windows. The wards were positioned on the open south aspect of the blocks with views across to the Tay and beyond, to stimulate patients' senses and help promote a quicker recovery.



shielding walls) and the so-called "Polyclinic" outpatients department. The East block was home to the main general and surgical wards, specialty wards for Psychiatry, Dermatology, Cardiology, the Joint Clinical Investigation ward and

Engineering Group was linked to the rest of the site by a long two level covered walkway. It was located far to the East, in order that the prevailing winds should blow away the products of the boiler house and the incinerator. The College of



Construction

Building began in 1964 and without final contracts in place! Completion was scheduled for early 1971. There were many cost increases and delays some of which were caused by the need to accommodate medical advances that took place during the lengthy construction period for the 1.5 million square feet of the development. The contract was also characterised by virtually continuous disputes between Cruden - the contractors - and EHRB who were the clients.

Commissioning and 'M' day

In November 1973 the first plans were drawn up for the commissioning of the new hospital. The various buildings had been substantially complete since the summer and had been in the process of fitting out ever since, while parts of the Engineering Block had been in use since May 1972. An opening date in the last week of January 1974 was agreed. This was termed "M' Day" and became the fixed point around which a complex logistical schedule was planned.

In preparation for the opening, Maryfield would close to all but emergency and very short term admissions at 'M' minus one week. A temporary A&E department would open in DRI which would last until the permanent facility was complete in late 1974. On 'M' day itself Ninewells would have one operating theatre and seven wards - for a total of 178 beds - available. Waiting list admissions were due to start on 1 February.

As the opening date approached, thoughts had turned to how the move would be handled. Staff were directed to make up inventories of everything at Maryfield and DRI. Although most

of the equipment at Ninewells would be provided new, a bewildering array of items were selected to be brought from existing ERHB premises. These included "3x patella hammers" from Ashludie; "1x table (small)" from Board HQ at Dudhope House; "58x chairs, stacking" from Bughties nursing home; "1x tuning fork" from Kings Cross; "3x Olivetti 82 typewriters" from DRI and "1x three piece suite, moquette, green" from Maryfield.

An interesting question arose over whether or not to transfer the Christmas decorations and ward pianos(!) from Maryfield. The answer to both was "Yes, please bring." But only one piano was considered necessary; around ten others were apparently given away or sold to staff.

Pickfords placed a van, driver and two men at the Board's disposal to transfer equipment between sites at a cost of £6.50 per hour. Each ward had a representative nominated to co-ordinate the move and supplied with tea chests for packing records and paperwork.

The movement of patients was described as "relatively simple to organise", but elicited a great deal of discussion. Intriguingly the Scottish Ambulance Service (SAS) advised that its very strong preference was for all patient moves to take place on a Thursday, although no reason was given for this seemingly abstruse request. This meant 'M' day would be Thursday 31st January 1974.

The SAS provided six ambulances, each with a nurse escort. A total of 100 patients were to be moved from Maryfield, though a few were destined for DRI. Walking cases were to be transported by the Board's fleet of buses leaving the ambulance service to ferry the stretcher cases.



Official opening of Ninewells Hospital by Her Majesty Queen Elizabeth the Queen Mother.

The first ambulance left Maryfield at 08:20 on 'M' day and arrived at Ninewells at approximately 08:50; transfers were complete by around midday and seven wards, the intensive therapy unit and both operating theatres at Maryfield Hospital were closed. A new era for health care in Tayside had begun.

A delegation from the ERHB were present to receive the first patients, in front of a large crowd of reporters. The first female patient, Mrs Jeanie Stewart of Arklay Place, was overwhelmed when presented with a bouquet of flowers on behalf of the Board - "I feel like a queen for an hour. I was only told I would be the first woman patient before the ambulance doors opened. I can't believe it." while the first male patient, Mr William Sturrock of Strathmartine Road, stated more tersely, "If it is as pleasant here as it was at Maryfield it will be alright". The Chairman of the Board told the assembled press, "This is not only the finest hospital in Scotland but in Great Britain and possibly in Western Europe". The delays and contractual wrangling which had beset the project from the outset were temporarily forgotten.

The final section of the initial Ninewells development was completed in May 1974, some 26 years after planning first began. The hospital was officially opened by the Queen Mother on 23 October. The ERHB and Crudens continued to dispute claims for overruns and delays until reaching a final settlement for £2.3 million. By the end of 1974 the total cost of the project had risen to over £25 million and it had overrun by nearly five years.

Conclusion

On 9 September 2016, my 30th birthday and exactly 51 years to the day after the foundation stone was laid, I visited Ninewells to seek it out. Following the directions I'd been given I travelled down in the lift to level 4 and soon found myself standing in front of the stone itself: a big circular piece of polished marble around three feet in diameter, a sort of eau de nil colour.

In the distance I could hear the buzz of the working hospital but the stairwell I was standing in was deserted. It seemed no one was interested in marking the anniversary. I knelt and touched the stone,



cool and glassy smooth against my hand, and wondered about the people

whose circumstances had brought them here. The planners, the builders and Lord Hughes when he laid the stone; countless staff who worked here; the medical students who had made Dundee their temporary or permanent home; generations who, like me, had been born here and those who had died here; the people who had been given good news and those who had heard the worst; thousands whose lives had been changed irrevocably, and all of them unknown to me.

What came to mind was that a hospital isn't just a collection of rooms or buildings, but an integral part of the fabric of society. Since 1974 Ninewells has bound the citizens of Dundee together and very few will pass through life without having some sort of contact with it. The conception was difficult, the labour slow and challenging. But the end result is something the city can be justly proud of, even all these years later.

After a minute of silent reflection I left to get lunch, just as William Hughes did back in 1965.