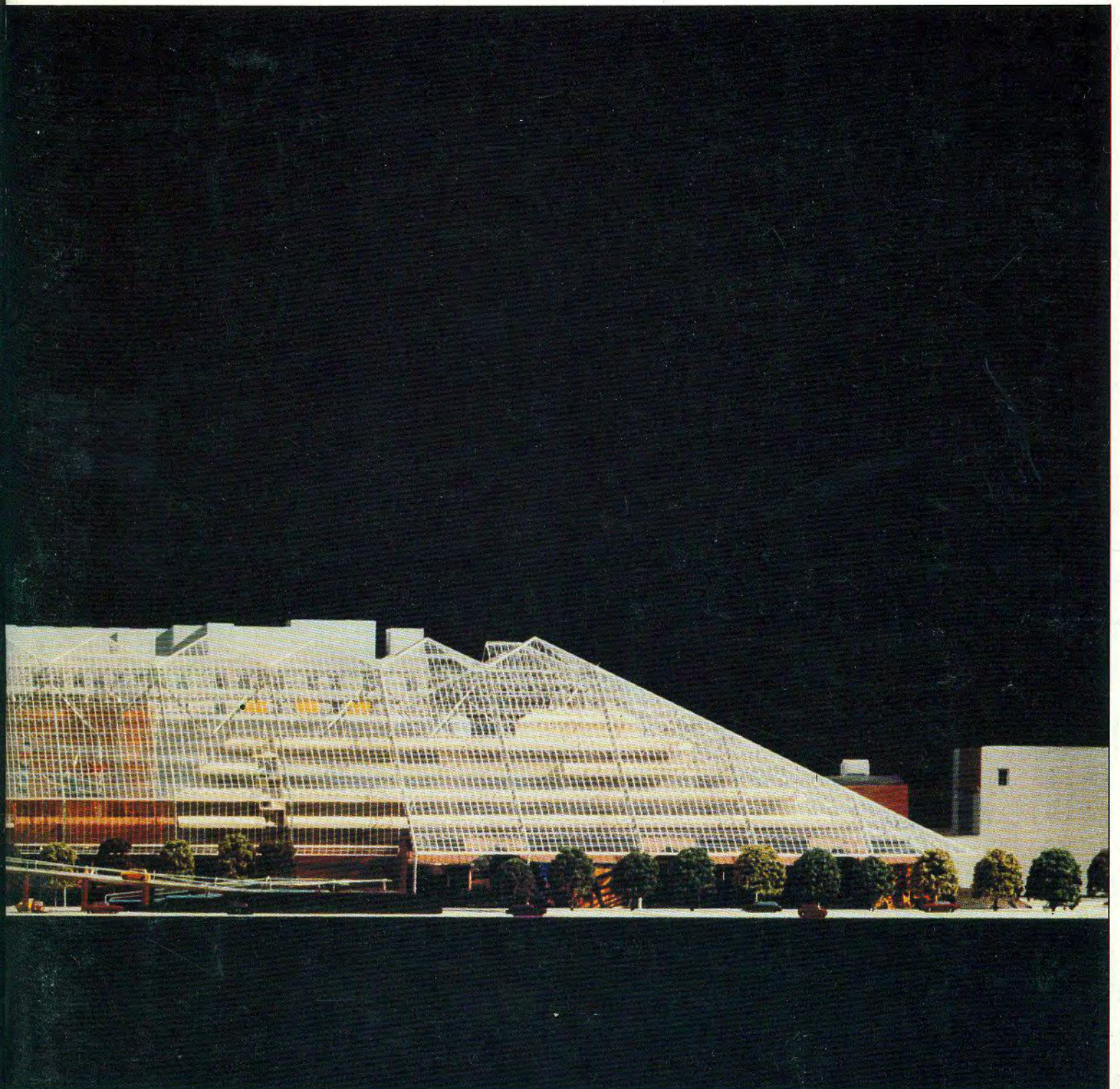


THE ARUP JOURNAL

SCOTLAND 25th ANNIVERSARY

SPRING 1985



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Scotland Anniversary Issue 1985
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Editor: Peter Hoggett
Art Editor: Desmond Wyeth FSIAD
Assistant Editor: David Brown

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Front and back covers: Model of St. Enoch Development, Argyle St., Glasgow (Photo: courtesy of Reiach & Hall/GMW Partnership)

25 years of Arups in Scotland 1960-1985

Tom Ridley

Preface

We are celebrating our first 25 years in Scotland with this special issue of *The Arup Journal* to record our work. Our history since 1960 is closely linked to an exciting period of development in Scotland. A visitor will pass through some of the loveliest scenery in the world and visit townscapes of outstanding architectural quality. He will also discover that the work of architects and engineers in Scotland over the last quarter of a century has produced some remarkably good examples of high quality buildings and other structures. We are proud of our involvement in some of these projects. We hope that this issue of *The Arup Journal* will help to support the record of modern architectural history, and illuminate our dedication to contributing to it.

Arups' early reputation had been derived from its sensitivity in design. This approach tried to combine an awareness of the aims of the architectural philosophy with the search for quality and delight in architecture. As structural engineers, Arups had become involved in a wide range of post-war buildings, where the use of modern materials had produced interesting structures and new structural forms. The growing reputation of a number of

Scotland's leading architects, and the prospect of significant development in the offing, made an Arup office in Scotland a worthwhile aim, needing only the right circumstances for its introduction. When Robert Matthew returned to Scotland in 1953 there was undoubtedly the promise of a new spirit abroad in the architectural scene. The potential programme of mass housing, medical care, education, industrial and urban renewal was as challenging a future as could be found anywhere at that time.

By the late 1950s plans were being made to change the characteristic feature of Scotland's main closely-knit urban communities, in particular Aberdeen, Dundee, Edinburgh and Glasgow. The change was not being prompted so much by industrial development as by a combination of population growth, decaying buildings and the need to modernize urban services such as transport, water supply and drainage.

Planning solutions had to be found for housing, schools, hospitals and commercially viable development for shopping and office needs. The problems were being tackled by a combination of New Town developments and urban clearances of old buildings to make the necessary space for wider and more efficient roadway and services systems.

In Scotland the unique legal procedures, feudal system of land ownership and strict procedures for planning controls had protracted the time taken to achieve new solutions compared to other parts of the United Kingdom. By 1960 there were sufficient signs of activity to provide confidence that scope existed for interesting work by architects and engineers.

The prospect in 1960 was a daunting one for a structural engineer keen to use modern materials in Scotland. The appearance of huge masses and expanses of ashlar courses, built from the sandstone or granite quarries surrounding the old city boundaries, gave a classical feature to every urban scene. Outside the centres the countryside had very few signs of greenfield developments which often mark the upsurge of growth and prosperity on which modern architecture can thrive. Where old industries were seen to be still in good state, their renewal and growth had been provided mostly by unimaginative buildings.

Our introduction to Scotland

Although other Scottish cities had started earlier in this phase of development work, it was in Dundee that we found our first opportunity. As has been remarked many times before, 'All history resolves itself very easily into the biography of a few stout and earnest persons.' The history of Dundee at that time was being written by Lord Provost Hughes, who had achieved a commitment to rebuild the centre of the city and a new road bridge over the River Tay. In his capacity as Chairman of the Eastern Regional Hospital Board he was able to obtain the far-sighted decision to buy 270 acres of agricultural land to build a new 1000-bed teaching hospital.

The proposed new Ninewells Hospital resulted in the appointment of Robert Matthew as architect in 1958 and Arups as structural engineers in 1960. As Ove Arup said at an inaugural lunch in March 1960 at which the clients met the design team, 'a place with a major new bridge and major new hospital to tackle needed talented designers of the

highest order, and it was a pleasure to have been invited.' Unfortunately, and unknown to us, the appointments for the major new bridge had already been given to another engineer but Ove's concept for it eventually found expression in his famous footbridge over the River Wear at Durham. Our introduction to Scotland was thus to share in one of the few major new greenfield projects being commissioned at that time. In line with Arup policy, we located our new office in Edinburgh to be near to the architect's office.

Although our involvement in the Ninewells Hospital actually brought us to Scotland, we had been very close to other possibilities which were now considerably strengthened. Perhaps the most interesting was the link with Basil Spence who, as the winner of the Coventry Cathedral competition in 1956, had invited Ove Arup to accept the appointment of structural engineer. This had led to a collaboration with Povl Ahm in London which became increasingly fruitful. Basil Spence's links in Edinburgh were still very significant in 1960 and his Scottish partners Peter Ferguson and Hardie Glover became strong allies in our new venture. We had also been in contact with Tom Scott and Dick De'Ath of Keppie Hendersons in Glasgow who had been commissioned for the Western Infirmary Redevelopment. At a meeting with Peter Dunican in late 1959 the possibility of working with them had reinforced the prospects of a new Arup office in Scotland.

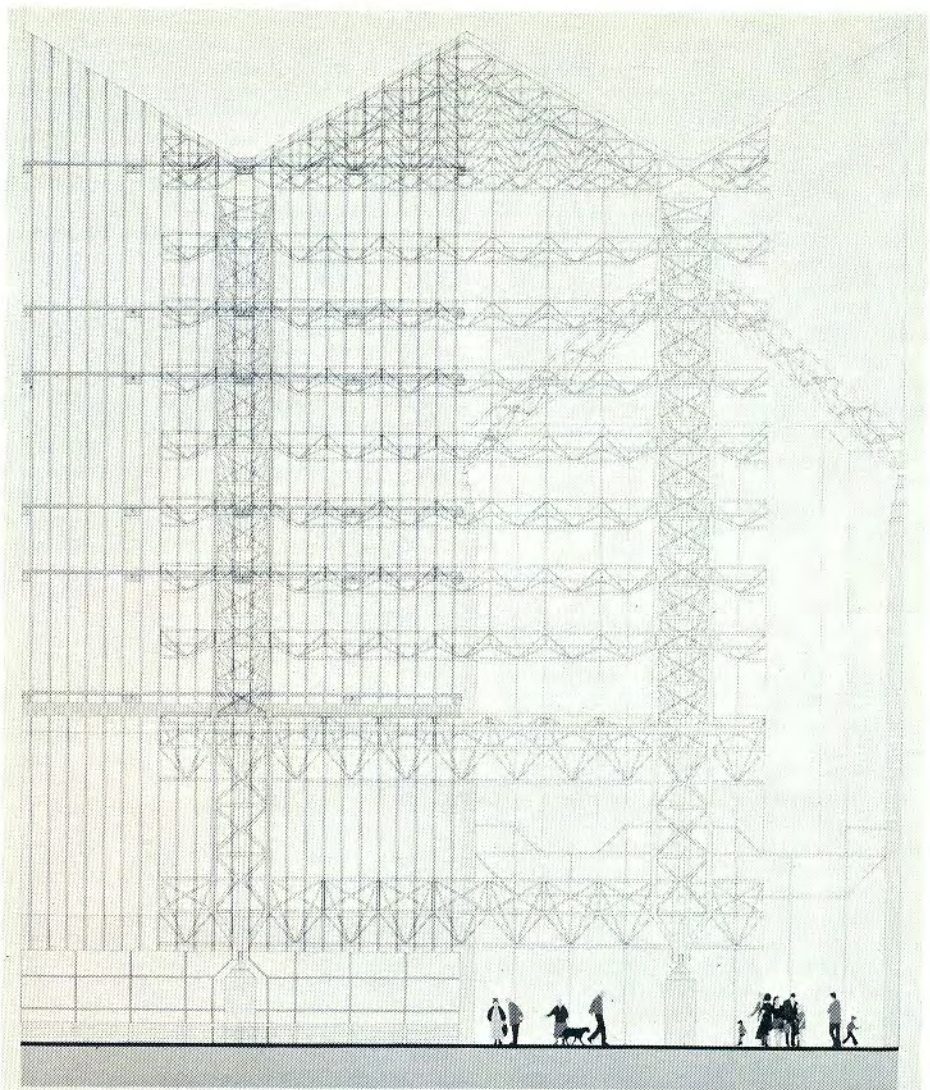
Edinburgh, 1960-67

Our early experience in Scotland led us to recognize that the 1960s introduced two major factors into the architect's vocabulary of structural concepts, viz: greater heights and larger spans. The former were needed to deal with the mass housing programme and this led to keener awareness of both structural resistance to major wind forces and highly sophisticated structural building operations. The larger spans were needed to cater for more complex user requirements where a high degree of planned flexibility in floor areas made it necessary to limit internal load-bearing elements. Bearing in mind that our design approach has always been to take a keen interest in the building as a whole, then these structural factors helped us to become closely involved in the early planning stages of building concepts.

At this time in Scotland the lack of availability and unattractive economics of using structural steelwork made the use of structural concrete an appealing solution. The long experience of Arups in concrete design gave us a considerable lead since this material had not had much previous structural application in Scotland. The fact that concrete also offers elegant solutions to the problems of greater height and greater span, with the added possibility of an attractive exposed surface texture without the need for extra fire protection, gave architects the incentive to seek our enthusiastic support for new ideas.

We did not neglect the use of structural steelwork, when appropriate, and our design approach to large-span roof structures has been consistently to develop ideas using this material. We became particularly involved in the way economical roof structures could be carefully integrated with the distribution of engineering services within large volume buildings.

The increased variety in our work during this period led to two new areas of interest which were to stretch our skills during the next era of our work in Scotland. These were related to the introduction of mechanical and electrical engineering services into our practice, and our attempts to use our structural skills in a greater range of specialist work. In the former case we were encouraged by some of our architect friends to extend our established



Section through St. Enoch Development, Glasgow

interest in the design of the overall building to incorporate the complete building/engineering approach. In the latter case we had seen signs of exciting possibilities arising from North Sea oilfield developments which hinted at scope for new offshore structures and large-scale onshore engineering development.

The idea of a building engineering service appealed to us enormously. It offered the attraction of multi-disciplinary design work within our office, with the scope to develop our established links amongst the architects we had grown to know. During a period when the technical demands on the building services systems have become very complex, we have managed to keep abreast and even lead some developments. The lesson we have learned is that a building engineering project takes longer and hence requires a greater commitment from us than our structural work. Our building engineering service celebrates its 15th anniversary this year.

Laboratory type buildings have proved, in our experience, to be the most difficult in which to achieve an integrated design approach with the structure and engineering services elements. This type of building gave us the opportunity to apply our new building engineering skills when we became involved in a number of specialized laboratory building projects with the Architectural Research Unit of the University of Edinburgh. Our aim is to prepare both structural and building services design in a completely integrated multi-disciplinary group of engineers. We try to achieve the development of solutions with the architect, so that the quality of the building becomes enhanced, and the progress of design information is vastly improved by precise details of the services lay-

outs. As our experience has grown with further building engineering commissions we have found this objective very demanding. Our conviction has increased that this design approach is worthwhile for specialized buildings and gradually we have included offices, public buildings, factories, schools, exhibition halls and sports buildings in this method of working.

Edinburgh, Glasgow and Dundee, 1967-79

We were now working all over Scotland, and in particular had grown in Glasgow by the opening there of our second office in 1967.

This had been prompted by the very close link we had formed with Keppie Henderson and Partners, and their large volume of work in hospital planning and design. This link had introduced us to a lively expanding practice which meant that our work in Glasgow was initially dominated by a succession of large hospital projects. These were being planned by the Western Regional Hospital Board under the direction of its Chief Architect, Tom Astorga. The redevelopment of the two major teaching hospitals, Western and Royal Infirmarys, (the latter with Sir Basil Spence, Glover & Ferguson in Edinburgh) gave continuity to the experience we had gained from Ninewells Hospital. In addition the considerable volume of development in district hospitals together with the city centre redevelopment proposals meant that our expansion into Glasgow became an integral part of our future plans in Scotland.

Our structural engineering work continued to thrive on the programme of large-scale public works still in progress in other parts of Scotland. Existing hospitals were being rebuilt, universities were expanding, schools and colleges were needed for growing

numbers and housing needs continued to be of major priority. We were fortunate to have become established by this time with many of the clients and architects serving the public sector, and some of our early projects were completed and found favour. In Dundee, Ninewells Hospital had been completed. Despite some serious contractual difficulties, it was acknowledged to be an outstanding success in medical care. In 1969 we were invited by Thoms & Wilkie to work on Dundee's new College of Education, and this gave us sufficient confidence in the area to persuade us to open our third office in Scotland.

From the start of our work in Scotland, we had quickly learned to appreciate that everything below ground level is not always rock! We realized that we could not confidently rely on the secondhand information about soils that is conveyed through specialist site investigation contractors, and made up our mind to form our own geotechnical team to supervise this type of work. The fact that this team has been overstretched ever since is some measure of the variety of foundation design skills needed to cope with the site problems we have found everywhere in Scotland. We have established a large volume of knowledge of ground conditions, including the very special problem of dealing with the many sites affected by mineral workings.

During the early 1970s we initiated the Arup interest in the idea that offshore oilfields in the North Sea could be developed using concrete production platforms. We were prompted by the fact that these giant structures were being built in Norway and, along with many other designers, we believed that Scotland offered excellent construction sites as well. Our contractor friends appeared to agree with us and we embarked on a most enthralling series of complex design studies over a period of three years to provide designs for tendering to oil companies.

The race to build these structures was eventually won for Scotland by others, but having taken part we found our engineering skills had been tested and strengthened in many ways. The most important of these was the introduction of new computer analysis techniques which were essential for offshore structures, and were quickly adapted to assist our more usual work. By equipping ourselves with the most up-to-date range of desk top computers we have been able to develop a wide range of problem-solving procedures. All our staff have access to computers, and can use them in all their design tasks. We have continued the development of computer applications over all our engineering activities and have initiated a considerable range of new software programs for this type of computer.

From this experience we began to take more seriously our interest in projects where we were acting as the client's prime agent. The obvious area for this is in traditional civil engineering work, but we were keen to try a different approach based on our exposure to the work of architects. This was based on an appreciation of their sensitivity to design quality coupled with a concern over social issues affecting community life in Scotland.

These noble ideals are perhaps never fully realized, due to the many compromises found necessary, but we shared the aims and hoped to emulate this in our prime agency work. Our first opportunity arose with the redevelopment of old docks at Methil where severe unemployment from coal pit closures made it necessary to find new ways of attracting industry to the area. This project brought us into contact with the recently formed Scottish Development Agency and their Land Renewal Unit.

During this period we also began to work outside Scotland and became involved in such

projects as the Royal Victoria Infirmary in Newcastle, Robinson College in Cambridge and university libraries in Liverpool, Aston and Dublin. This work followed from the success of Scottish architects winning commissions outside Scotland and we have always encouraged this initiative wherever possible! Our work with Peter Womersley on the new hotel in Repulse Bay, Hong Kong, (unfortunately abandoned) led us to take an early interest in overseas activity but this has not been developed strongly.

Edinburgh, Glasgow, Dundee and Aberdeen 1979-Present

Our story started by considering our close links with architecture, and during our first 25 years in Scotland architecture has changed in many ways. Some of the changes have arisen from the wide publicity given to such spectacular buildings as the Sydney Opera House and Centre Pompidou in Paris, for which we have had to offer many explanations to our architect friends in Scotland. In Patrick Nuttgens' recent book, 'The story of architecture', he describes the present architectural scene as having to embody the most advanced technology of its time, now drawing on the lessons of the space age! The success Scotland has achieved in attracting high technology industries has brought the space age to the door of its architects and engineers. Anyone who has witnessed the elaborate manufacturing techniques for microprocessor production, in which the workers wear space suits to avoid contaminating the chips, can only feel that a new architecture is needed to embrace this new revolution in our building needs.

In understanding the changes affecting every business and government organization of size we can see that new styles of management, based on wide-ranging computer service, are already influencing an architecture in Scotland. As engineers we are finding this period of change very stimulating, but one which is challenging many of our previous judgements on design approach.

Perhaps the most significant of these is our long-standing commitment to the view that design is only a prelude to construction, and as designers we must do everything we can to simplify the construction problem. Although there are many alternative forms of contract procedure to allow early involvement of the construction team, and we have always been advocates of this approach, the real issues arise in the design concepts. With such rapid advancement in manufacturing techniques we see a great need for designers to absorb a more positive role in this part of the building process before full advantage can be taken of all the possibilities for a new architecture in our buildings.

The early 1980s have already been years of considerable importance to us in the evolution of our practice. Problems experienced in earlier years, of achieving close working between members of a design team are now happily resolved on nearly every project. Lessons have been learned of working within the confines of very tight cost budgets without sacrificing too many design standards. Projects now on the drawing board reveal a greater involvement with the private sector client than ever before, a sign of the change in political policies influencing our professional lives. The element of financial risk can loom large in this climate, where the objectives are not as strongly based on the social and community needs as the public sector client.

Nowhere is this more obvious than in the oil-related sector, which has now become one of our major interests. The oil companies, having so successfully explored and developed the offshore gas and oilfields, now have the long-term production and distribution of these products to maintain a new major

industry for Scotland. On the strength of this position we opened our fourth office in Scotland in Aberdeen in 1979. This was particularly to offer to the oil company clients and their suppliers an on-the-spot engineering service for both offshore and onshore needs. It has needed a certain amount of persuasion to encourage our engineers to embark on helicopters for distant offshore assignments!

Perhaps our next office in Scotland may be located on one of these offshore platforms, whose architecture leaves much to be desired! Our staff there will certainly need to be specially trained, and maybe therein lies a lesson in this rapidly changing world for designers like ourselves. We are confident that we have the facility to adapt to change, and the ability to learn new skills, which will continue to test our resources to meet new challenges in the future.

The thrill of construction

What follows is a presentation of the projects in Scotland on which we have contributed our engineering skills. They range over the work of our Edinburgh, Glasgow, Dundee and Aberdeen offices and are presented in a geographic sequence for ease of reference. Some have been shared with other parts of Arups, with whom we have always enjoyed the closest links. Each project has contributed its own share of headaches, drama and rewards, and we have rich memories from them all. In many examples of projects it is difficult to illustrate how the engineering contribution has been made. More often than not this is difficult to understand in the completed work, especially in a building project where the engineering plays a secondary role to the overall concept.

However, to an engineering designer there is perhaps one significant moment on each project where his ideas are about to be proven, and this thrill is at its best during the early construction stage. Particularly on structural work these moments are typical of the time when construction work is executed to the information provided largely by the engineer.

His calculations have been completed, every aspect of construction considered, it is hoped, in the choice of materials and detailing, and now the final test is about to be made!

As the construction advances the ideas entertained during the design stage become reality in solid materials, and the thrill is shared with the other designers involved. It is the fascination of transferring design ideas to construction reality which is both the reward and anxiety of the work of consultants. Perhaps it is the problem of our use of mind over matter which is the source of the constant challenge in the way we work. Thank goodness the perfect solution has not yet been found!

Conclusion

Although the spirit of our firm was generated by the philosophy of Ove Arup, it is now revitalized by a large number of people who are still dedicated to his high ideals of excellence. It is a spirit which is becoming increasingly difficult to sustain as times change and human attitudes become more complex to understand. In Scotland we believe that we have fully shared in the spirit of Ove Arup's philosophy, during our 25 years. We have found that this approach has always been welcomed by those clients and architects with whom we have worked. It will be our objective to keep this alive in our work through the efforts of all those present and future involved. To adapt the words Ove said at our inaugural lunch in Dundee 'A place with major projects to tackle needs talented designers of the highest order and it will always be a pleasure to be invited.'

The Edinburgh Office

Jim Hampson

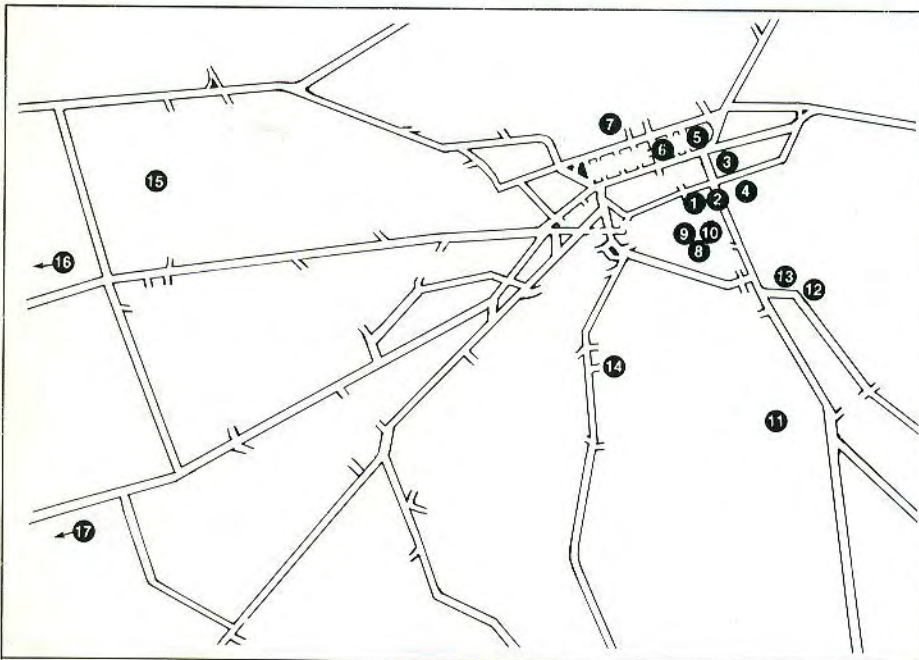
Edinburgh is a city in which it has always been a privilege to live and work. Renowned for the quality of its classical architecture, and cultural activities, it is a city which poses considerable problems for the location of a modern office. In the central area nearly all of the suitable buildings have been developed for domestic or small-scale commercial use as shops or merchants' offices. In April 1960 the choice for our new office became the top floor of 90 George Street which offered open attic-type space with good rooflighting. This was typical of the city centre where ground and first floor levels of main streets are largely devoted to retail shops. We regarded this location as a temporary home until a clearer view could be taken of our longer-term needs and the pattern of our potential growth.

By 1964 we had become established and decided to buy a piece of land at South Queensferry to build ourselves a new office to be called Scotstoun House. We hoped to locate the Arup presence in Scotland at a place where all parts could easily be reached. We had grown to be about 60 strong and the existing office accommodation had spread out into five separate small office units around the George Street area. It was considered very important to bring the whole office into one building, and this led to the idea of a single-floor office. The design was the work of Peter Foggo and David Thomas of Arup Associates and it has been well written up in *The Arup Journal*. Ove Arup erected the first concrete wall slab, driving the mobile crane which was used at our foundation ceremony. We moved into Scotstoun House in December 1966.

From the Edinburgh office we offer services in building engineering, structural engineering and the work of our prime agency group

including the geotechnical engineering service for all offices in Scotland. We also have extensive computer services with computer-aided draughting facilities. The extensive non-technical facilities include a large specialist library on engineering subjects.

Having everyone in a single office building at Scotstoun House and at one level has proved to be of enormous benefit to the ease with which we can use all our engineering and non-technical resources and share work interest between project groups. With the quality of the office and country environment around us, there is every inspiration to produce good work! When it comes to ease of contact with city life and other offices, we are at some disadvantage even though the distance from central Edinburgh is only eight miles. However, we would like to think that the high quality of our Edinburgh office and its environment rubs off in our approach to our work and the impression it gives to our visitors.



Projects in the City of Edinburgh

The Old Town

- 1 St Giles Cathedral
- 2 Tron Kirk
- 3 Arts Centre
- 4 High Street

The New Town

- 5 St. James Centre
- 6 British Home Stores
- 7 Jamaica Street Housing

The South Side

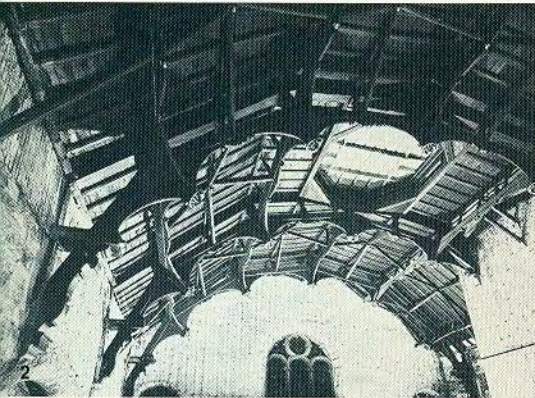
- 8 University Library
- 9 Medical Sciences
- 10 Student Centre
- 11 Kings Buildings
- 12 Commonwealth Pool
- 13 Scottish Widows Office
- 14 Glen House

The West Side

- 15 College of Domestic Science
- 16 Department of Agriculture and Fisheries
- 17 Heriot-Watt University Library

Below: the Edinburgh Office
Scotstoun House





1. St Giles Cathedral, High Street

Client:

The Minister and Kirk Session of St Giles Cathedral

Architect:

Feilden & Mawson and Simpson & Brown

For almost 900 years a church has existed on the site of St Giles but, in common with many buildings of this antiquity, the passage of time has seen many significant modifications and additions to suit continually changing requirements. A programme of renovation has involved repairs to the steeple and the provision of a new hall under the church floor to provide a social centre. We have advised on all building engineering aspects.

2. Tron Kirk, High Street

Client:

City of Edinburgh District Council

Architect:

Andrew Renton and John Paterson

The Tron Kirk dates back to 1637, but little of the original structure remains. After remaining unused for many years and falling into a serious state of disrepair the church was acquired, and donated to the City of Edinburgh on the condition that it should be renovated and preserved. The work is being undertaken in two phases, the first involving the restoration of the main fabric of the building and the second, the actual conversion to an exhibition and display centre. Restoration has involved major structural work including repair of the outstanding hammer beam roof.

3. City Arts Centre, Market Street

Client:

City of Edinburgh Department of Recreation

Architect:

City Architect: Brian Annable

The conversion of this former Victorian fruit warehouse has provided the City of Edinburgh, for the first time, with a gallery in which to display its extensive collection of Scottish fine art. The building itself dates from 1899 and was constructed to provide warehousing facilities for the Edinburgh Fruit Market, with offices on the upper floors. The lower five floors have been converted to accommodate the arts centre, whilst the upper floors are still used as offices. The internal space was completely restructured by the removal of the internal wall, stairs and lift shafts, and the construction of new ones.

4. 199 High Street

Client and Architect:

City of Edinburgh
District Council

Rehabilitation of 18th century tenement building to provide flats, involving the complete replacement of internal walls, floors and roof and extensive remedial work to external walls.

5. St James' Centre, Leith Walk

Clients:

Department of the Environment
Ravenseft & Murrayfield Scottish Developments

John Lewis Partnership

Shell Mex

Scottish & Newcastle Breweries

Architect:

Hugh Martin and Partners

This is a large shopping and office complex consisting of an office block of 30,000m² with conference suites and restaurants, a 160 bedroom hotel, and a department store with a floor area of 20,000m². In addition there are two public houses, a shopping centre comprising 75 shops of various sizes and a multi-storey car park for 600 cars. In situ concrete was used for the lower levels of the buildings, while the office block was designed entirely in precast concrete to speed construction.

6. British Home Stores, Princes Street

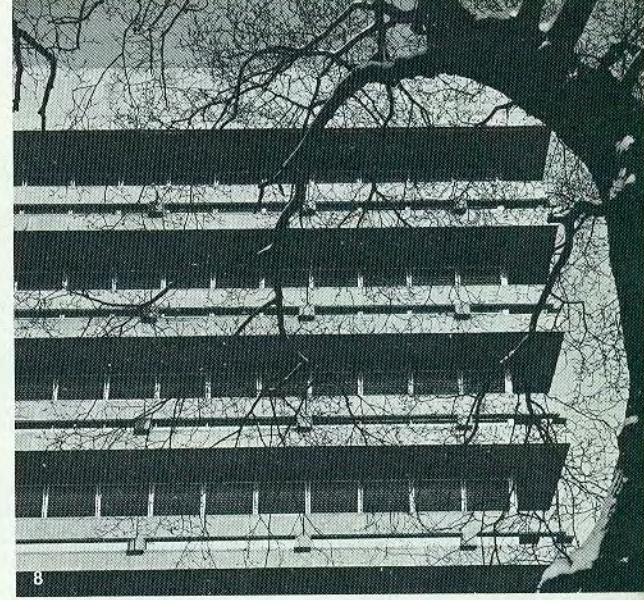
Client:

British Home Stores

Architect:

Robert Matthew, Johnson-Marshall and Partners

A new store on Princes Street with three shopping floors, stockrooms, plantrooms and staff accommodation. Extensions were completed in 1978, and these incorporated a service road over shopping areas, with a high level link bridge.



7. Jamaica Street Housing

Client:
Link Housing Association
Architect:
Phillip Cocker & Partners

To provide for this housing development it was necessary to deal with foundations on demolition rubble, and we offered a solution using vibro-flotation techniques.

8. University Library, George Square

Client:
University of Edinburgh
Architect:
Sir Basil Spence, Glover & Ferguson

Edinburgh University Library is one of the largest university libraries in Britain, with a capacity of two million books. Its five floor levels make up a total area of 27,700m² and its design has been highly commended. The floor slabs are of precast reinforced concrete and span between shallow cast in situ concrete beams supported on cast in situ concrete columns. Exposed concrete columns at ground and first floor level have a high quality, smooth grey finish. Balcony soffits comprise large precast concrete slabs with a ribbed finish produced from glass-fibre moulds.

9. Hugh L. Robson Building, Medical School, George Square

Client:
University of Edinburgh
Architect:
Walter Ramsay & Partners

This building includes biochemistry laboratories, research and teaching facilities and our building engineering work included a large air-conditioned animal house. A medical library is incorporated in the building shell which was designed by Sir Basil Spence, Glover & Partners.



10. Students' Amenity Centre, Bristo Street

Client:
University of Edinburgh
Architect:
Morris & Steedman

This project provides an auditorium, small chapel, library, office space, and accommodation for the Royal Medical Society, a health centre, and student refectory.

The centre is partly 3-storey and partly 6-storey, and has an in situ concrete frame with coffered floor slabs, providing a total floor area of 9500m². An atrium structure has been provided using a glass dome over the inner courtyard space.



11. King's Building Centre, West Mains Road

Client:
University of Edinburgh
Architect:
Michael Laird & Partners

The King's Building Centre development comprises the central boilerhouse, the refectory and the social facilities building. In order to preserve site area for future phases, the buildings are located in close proximity and the material forms and finishes have been designed to facilitate interconnection and/or extension.

The existing boilerhouse provided a continuous heat supply during construction by building over and around existing plant and chimney.

12. Royal Commonwealth Pool, Dalkeith Road

Client:
Corporation of Edinburgh
Architect:
Robert Matthew, Johnson-Marshall and Partners

This swimming pool was built to satisfy the need for facilities of a high standard for recreational swimming and to be capable of handling top-class international competitions.

The main pool is 50 x 21m, providing eight swimming lanes. Adjacent is the diving pool, with diving platforms ranging from 1m to 10m in height, and a separate teaching pool for non-swimmers.

Fixed seating caters for 2000 spectators and, in order to encourage recreational swimming, a high standard of comfort has been provided in the restaurant, changing rooms, club and administration facilities.

13. Headquarters Building, Dalkeith Road

Client:
Scottish Widows' Fund & Life Assurance
Architect:
Sir Basil Spence, Glover & Ferguson

This building is situated on an impressive site on the outskirts of Edinburgh at the foot of Arthur's Seat and the Salsbury Crags.

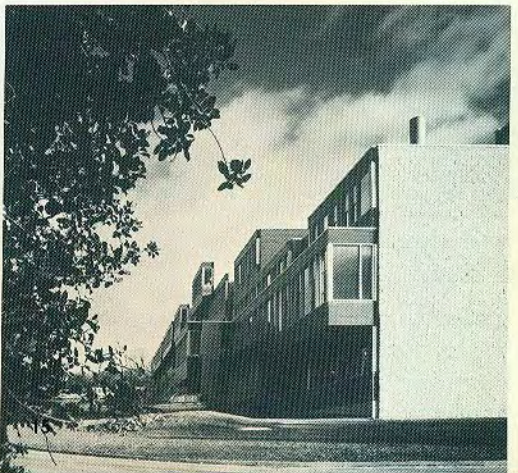
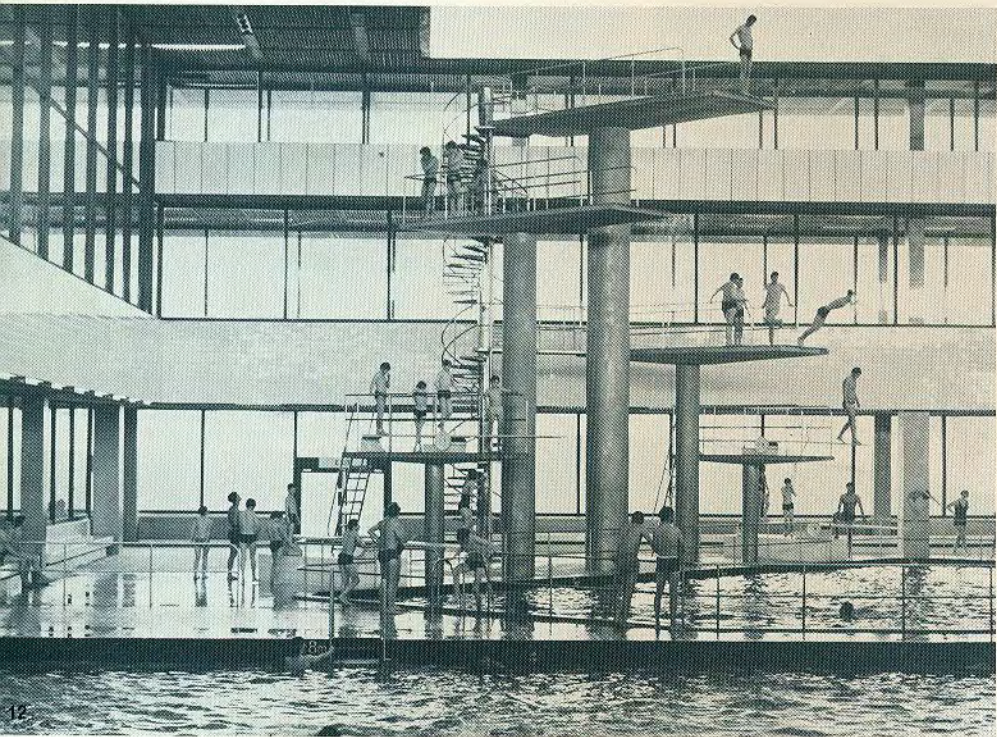
The offices consist of 12 abutting hexagonal modules, varying in height from three to six storeys. These are clad entirely in a double skin of glass, the outer layer of which is bronze-tinted.

The building is surrounded by carefully landscaped gardens. Its main entrance module rises from a pool and is approached by means of two bridges. The car park and boilerhouse structures have been concealed below a fully planted and landscaped roof complete with trees and shrubs and an automatic watering system.

14. Glen House, Greenhill Park

Client:
Mr Hamish Glen
Architect:
Michael Calthrop

This house was designed to be built in the gardens surrounding the owner's original old house. It is of timber-framed construction with a very interesting sloping roof based on the large spanning roof structure.



15. Queen Margaret College, Clermiston Road

Client:
Scottish Education Department and Board of Governors

Architect:
Andrew Renton and Simpson & Brown

This new college was a competition winning design which relocated the well-known Atholl Crescent domestic science college to its new site on the western outskirts of the city. Further extensions have recently included a social block and a new teaching wing.



16

16. Laboratories, Craigs Road

Client:
Department of the Environment

Architect:
University of Edinburgh, Architectural Research Unit

The project involved the design of scientific laboratories, animal rooms and environmental test chambers for the study of potato wart disease.

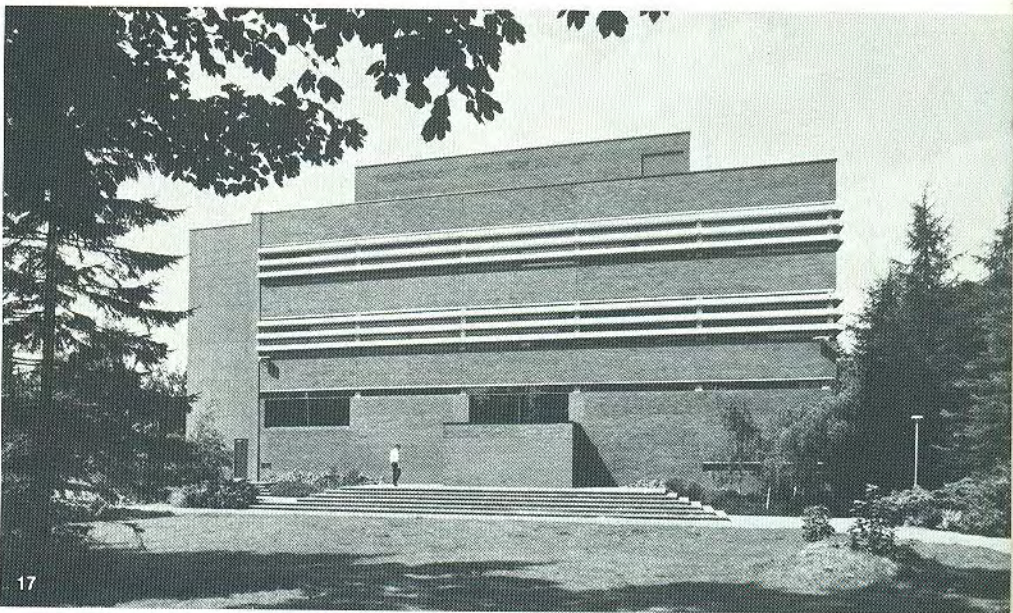
Care was taken to provide top services access for the environmental chambers from the plant room. Services access has been provided but a traditional character has been retained in the building form.

17. Heriot-Watt University Library, Riccarton

Client:
Heriot-Watt University

Architect:
Sir Basil Spence, Glover & Ferguson

This building forms part of the new university campus at Riccarton, and provides the first phase of the total library facility for the academic population of 1500.



17

18. Almondell Footbridge, Livingston

Client:
Midlothian County Council

Landscape Architect:
Morris & Steedman

Voluntary youth labour constructed most of the footpath and picnic areas of the Almond Walk Project and the Almondell Footbridge was conceived as a major link in the scheme. This bridge had to be both inexpensive and compatible with its unspoiled environment. Large prefabricated lightweight steel units with simple connections facilitated quick erection and the simple foundation requirements provided interesting work for the youth labour. The deck was welded completely on the bank and a temporary mid-river roller station erected so that it could be launched on rollers in one day.

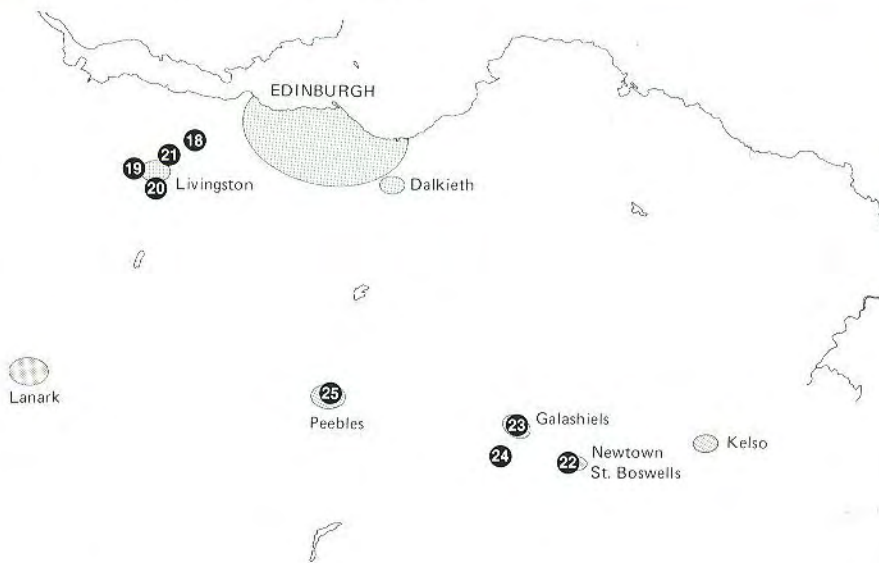
19. West Lothian District General Hospital, Livingston

Client:
Lothian Health Board

Architect:
Boswell, Mitchell & Johnston

This is the advance works stage of a 730-bed district hospital and includes access roads, laundry and boilerhouse facilities. These buildings are predominantly in structural steelwork, but further phases of the hospital are constructed in in situ reinforced concrete.

Projects in the Lothian and Borders Region



Lothian Region

- 18 Almondell Footbridge
- 19 Livingston Hospital
- 20 FP104 Factory Livingston
- 21 Gore Factory, Livingston

Borders Region

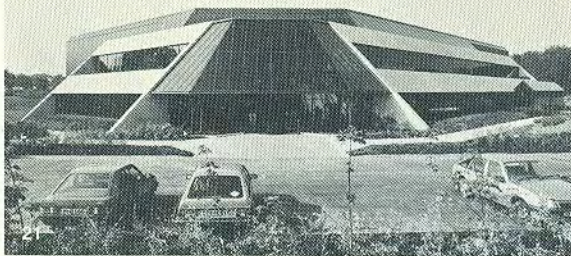
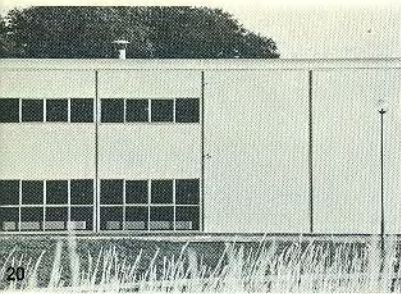
- 22 Regional Council Offices, Newton St Boswells
- 23 Fairydean Football Club, Galashiels
- 24 Bernat Klein Studio, Selkirk
- 25 New Pool, Peebles



18



19



20. FP104 Factory, Livingston

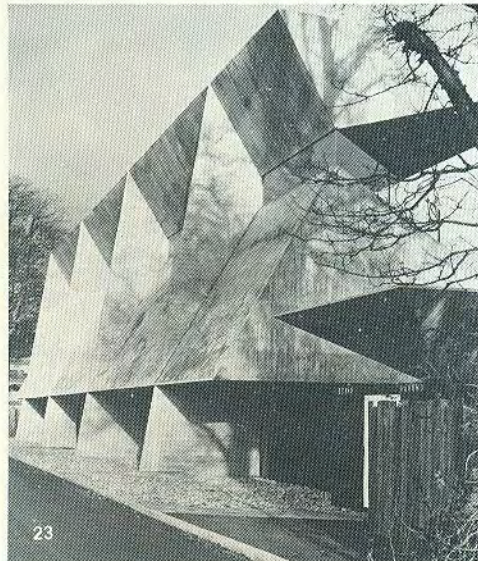
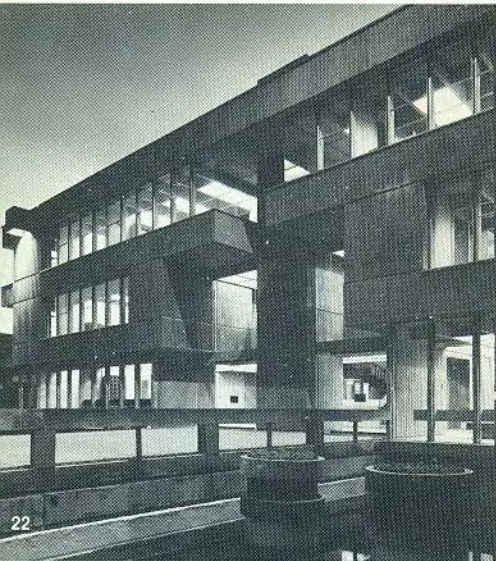
Client:
Livingston Development Corporation
Architect:
Livingston Development Corporation

A factory unit for which the building engineering design provided the initial shell and subsequently the additional requirements to accommodate the needs of Apollo Computers Inc.

21. Gore Factory, Livingston

Client:
W L Gore & Associates (UK) Ltd
Architect:
Michael Laird & Partners

This building engineering design involved maximum consideration of an energy saving solution, which dictated the siting to avoid solar heat gain. The main feature is the entrance to the office block which leads to a two-storey atrium.



22. Roxburgh County Buildings, Newtown, St. Boswells

Client:
Roxburgh County Council
Architect:
Peter Womersley

This building is the first phase of a competition winning design and now accommodates the Borders Regional Council. It is one of the few buildings with a total lightweight concrete structure, which was used to give large clearspan floors and highgrade fire-resistant thin concrete load-bearing mullions on all elevations.

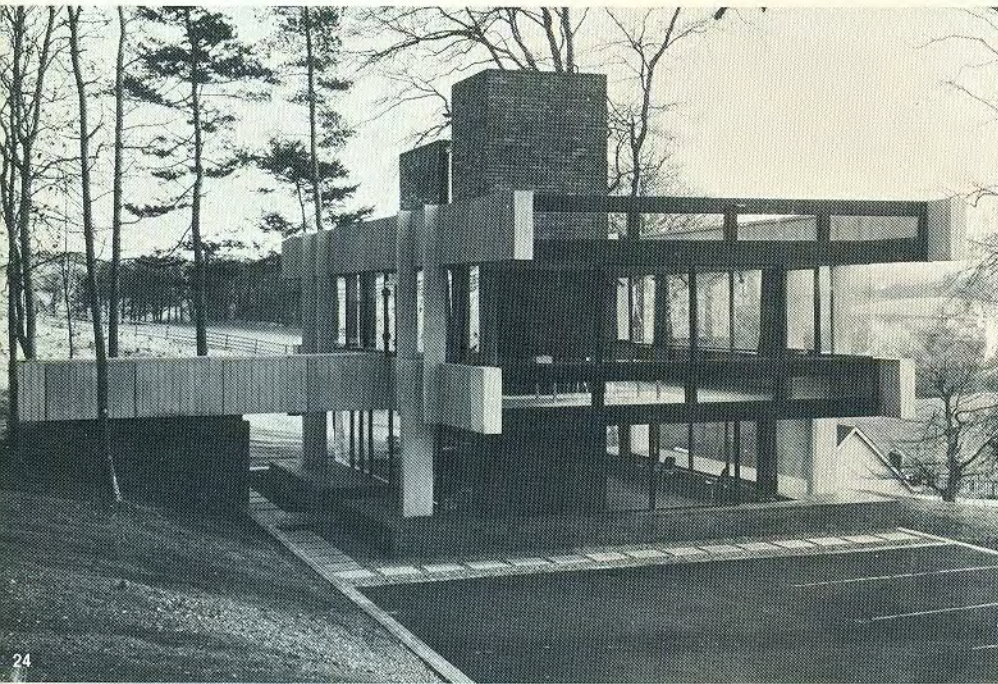
23. Fairydean Football Club Stand, Galashiels

Client:
Fairydean Football Club
Architect:
Peter Womersley

This sports stand seats 300 spectators at the Fairydean Rugby Football Club in Galashiels.

It is designed as a sculptured concrete structure, providing roof covering over the seating, by means of four triangular-shaped supporting columns.

The space beneath the seating accommodates the club room, showers and toilet facilities.



24. Bernat Klein Studio, Selkirk

Client:
Bernat Klein Studios
Architect:
Peter Womersley

The building is located in a woodland setting on the outskirts of Selkirk. It provided the studio accommodation for Bernat Klein Design Ltd. who were designers and consultants for the textile industry in Britain and abroad. The main requirements of the brief were that the studio had to provide maximum daylight for colour working and clear space to allow materials to be spread out for study. The clients also requested simplicity and neutral colours for the display of their designs. This has been achieved by using exposed structural concrete frames allowing continuous glazing on all sides, unplastered blue-black brickwork and white carpeting throughout.

25. Peebles Swimming Pool

Client:
Tweeddale District Council
Architect:
Morris & Steedman

This delightful new 25 m long swimming pool has been provided by the local authority on the bank of the River Tweed. It is a steelframed building with in-fill of brickwork and glass giving pleasant views over the newly landscaped gardens along the riverside.



The Glasgow Office

Hamish Stears

In Glasgow the choice of office location is considerably wider than in Edinburgh, reflecting the much stronger commercial activity in the city. Office buildings in the city centre have attracted high rental values, and many have been constructed in the post-war years. The size of these offices invariably means that a small organization is only a part occupier of high level floors relying on lift access.

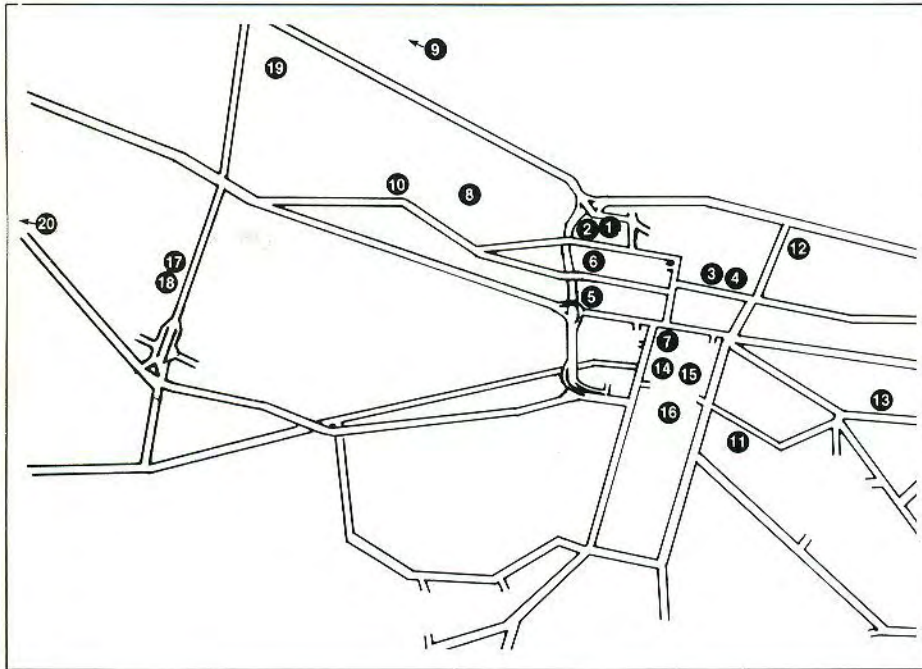
Although relatively small in size Newton Terrace, where we opened an office at No.3 in June 1967, had this type of accommodation

and it was not until 1974 that we found a location in Bergius House at Claremont Terrace that was more suitable to our way of working. By this time the size of the office had grown and we were anxious to repeat the idea of a single floor area for our office layout. Our numbers now included the Reinforced Concrete Detailing Group which serviced our detailing requirements for all the offices in Scotland.

Our project work in Glasgow has been related to civil and structural engineering for a considerable number of large-scale, public sector projects. This has highlighted the need for special procedures to programme design team working where the problem arises of dealing with the many interacting people in different office organizations. This has parti-

cularly been apparent in our major hospital projects where novel methods of project working and contractual procedures have been adopted to improve project performance.

As recently as 1984 we embarked on further expansion in Glasgow, and our offices have been completely refurbished to introduce higher standards of interior design. We have had to sacrifice our ideal of a one level office lay-out due to the restrictions in floor area available, but by creating a new internal staircase with an open well to connect two floors together we have been able to achieve a reasonable compromise. We look forward to continued growth in Glasgow to meet the demands of a greater variety in the size and type of projects currently underway.



Projects in the City of Glasgow

City Centre

- 1 Newberry Tower
- 2 Bourdon Building
- 3 Colville Building
- 4 Wolfson Building
- 5 Anderston Cross Centre
- 6 Britoil HQ Building
- 7 St. Enoch Development

North side

- 8 Rankine Building
- 9 Astronomy Building
- 10 Western Infirmary

East side

- 11 Gorbals Housing
- 12 Royal Infirmary
- 13 GEAR Footbridge

South side

- 14 New Sheriff Courts
- 15 New Mosque
- 16 College of Nautical Studies

West side

- 17 Maternity Unit
- 18 Neurosurgery Unit
- 19 Gartnavel Hospital
- 20 Abbotsinch Airport



The Glasgow Office, Bergius House at Claremont Terrace

2. Bourdon Building, College of Art, Renfrew Street

Client:

Glasgow School of Art

Architect:

Keppie, Henderson & Partners

To achieve the required accommodation on a limited site, this building had to be designed to span over Renfrew Street. Within very strict cost limits the concrete structure has been used to create the exposed floors and external walls in which are housed the schools of architecture and planning.



1. Newberry Tower, College of Art, Renfrew Street

Client:

The Board of Governors, Glasgow School of Art

Architect:

Keppie, Henderson & Partners

The strongly expressed rough-textured concrete structure gives this building a distinctive character in keeping with the original College of Art by Charles Rennie Mackintosh. Long span concrete floors give open floor areas for the various design studios.





3. Colville Building, George Street

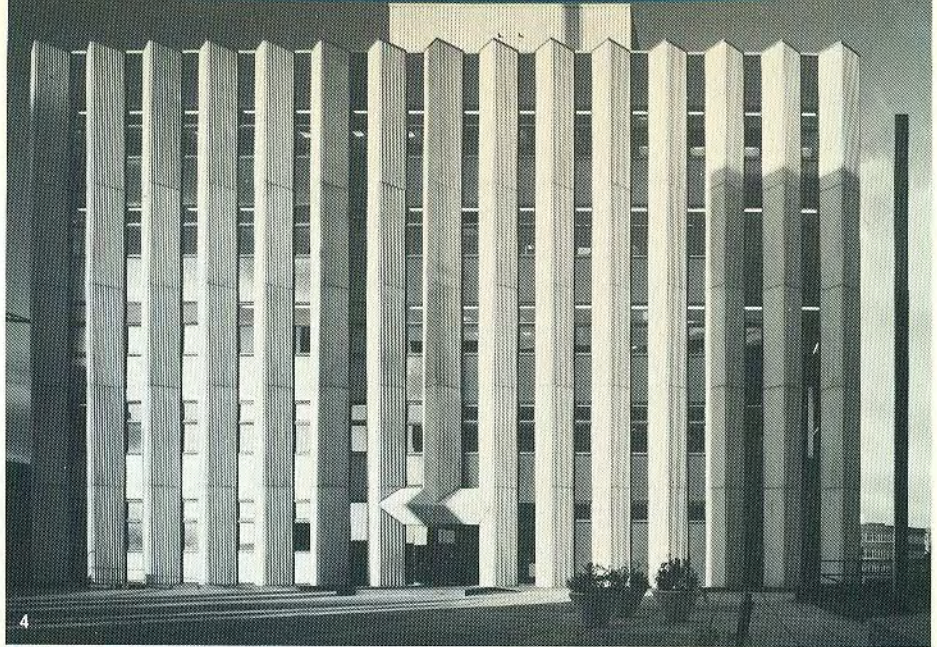
Client:
University of Strathclyde
Architect:
Robert Matthew, Johnson-Marshall and Partners

An extensive laboratory and teaching spaces for the engineering departments place this building at the heart of the University campus. The reinforced concrete structure is clad in a bright white tiling.

4. Wolfson Centre of Bio-Engineering, George Street

Client:
University of Strathclyde
Architect:
Morris & Steedman

This building was probably one of the first in the world designed specifically for bio-engineering, the science which encompasses many specialized disciplines drawn together to solve problems associated with the human body. The building, which has a total floor area of approximately 4500m², requires very special servicing, open floor spaces with controlled environments, and in-built flexibility to allow for rapidly changing requirements. The distinctive triangular shaped external columns are constructed in ribbed concrete cast in situ.



5. Anderston Cross Centre, Cadogan Street

Client:
Taylor Woodrow Group in association with Standard Life Assurance
Architect:
R Seifert Co-Partnership

This is a very large commercial development comprising offices, shops, department stores, three 20-storey housing blocks, bus station and multi-storey car parking for 1,500 cars. Construction work proved to be very complicated due to the difficult site condition and the need to complete the bus station and housing at an early stage. Extensive use is made of both precast and in situ reinforced concrete, which unifies the overall architectural treatment.

6. Britoil Headquarters Building, St. Vincent Street

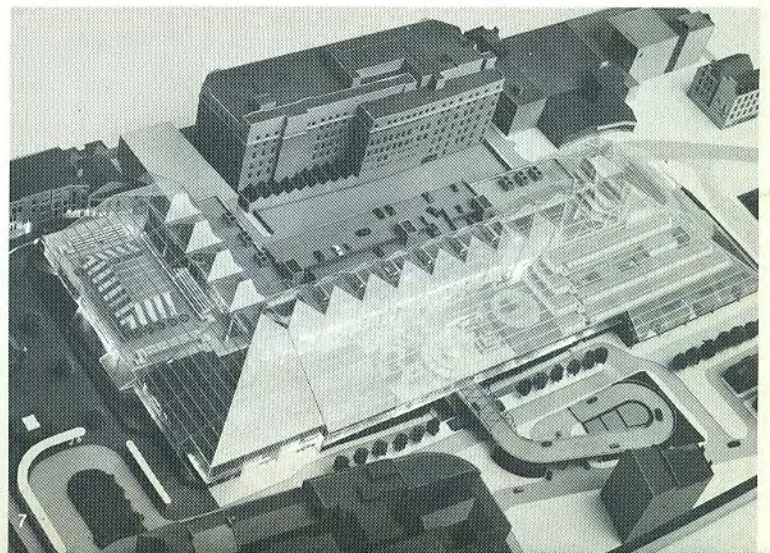
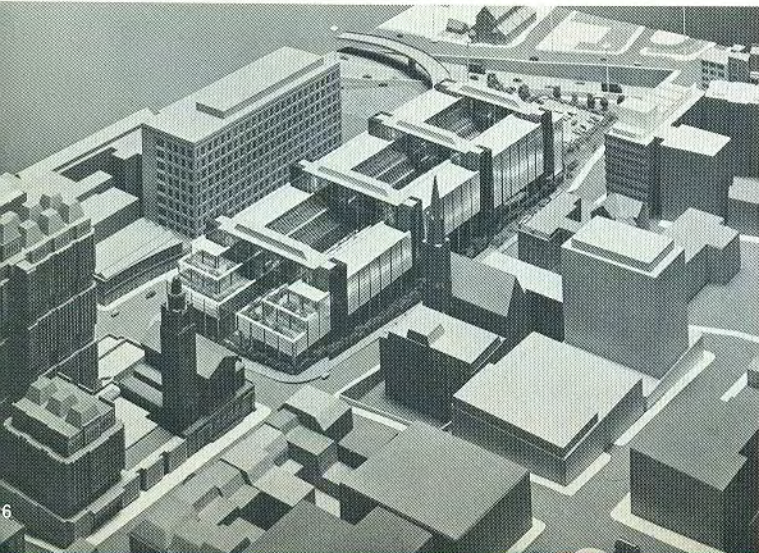
Client:
Britoil (Development) Ltd.
Architect:
Hugh Martin and Partners

When completed this will be one of the largest office buildings in Scotland, providing accommodation for over 1500 staff. The site has posed many planning problems and the design has achieved attractive internal landscaped terraces between linked open plan office areas. There are two basement areas created by using deep secant piled retaining walls along the street frontage.

7. St Enoch Development, Argyle Street

Client:
Scottish Development Agency
Architect:
Reiach & Hall/GMW Partnership

The demolition of the old St. Enoch railway station has given the opportunity to propose the development of a major new shopping complex. The design has been based on the idea of a total glass envelope structure in which the various shopping units can be located with a high degree of flexibility, together with an ice rink. Site conditions have required exhaustive geotechnical surveys due to the complex geology of the area, and site work is planned to start in 1985.



8. Rankine Building, University Avenue

Client:
University of Glasgow

Architect:
Keppie, Henderson & Partners

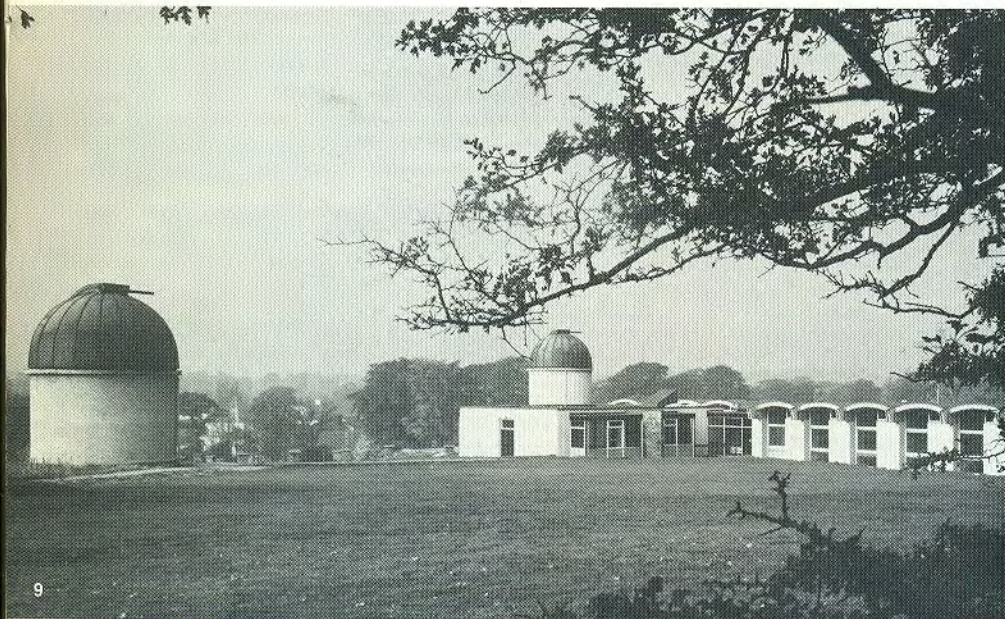
A combination of major basement accommodation, ground floor car parking and large teaching areas led to an unusual design for this building. The precast concrete superstructure was required to cater for long spans and give support to very large external precast concrete cladding panels.

9. Astronomy Building, Acre Road

Client:
University of Glasgow

Architect:
Keppie Henderson & Partners

This delightful simple building makes a distinctive impact on the open site of the university research campus. The roof structure is formed by shallow concrete arch slabs.



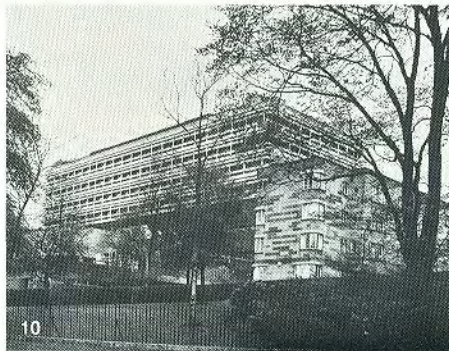
10. Western Infirmary, Glasgow

Client:
Western Regional Hospital Board

Architect:
Keppie Henderson & Partners

This project covers the first phase of the redevelopment of the Western Infirmary, one of the two principal teaching hospitals in Glasgow.

The structure is of in situ concrete, ribbed slabs with woodwool formwork being used for the 11 storey main block. Coffered floor construction for two-way spanning slab was found to be economical for part of the podium. Precast cladding units provide crisp front and rear elevations to the structure.



11. Gorbals Housing Development, Rutherglen Road

Client:
Corporation of City of Glasgow

Architect:
Sir Basil Spence, Glover & Ferguson

The bold concrete structure for these 20 storey maisonette blocks is derived from the expression of the varying vertical strength required for wind resistance. Infill precast concrete cladding panels enhanced the very expressive architectural form which owes much to the careful detailing of the external elements.

12. Glasgow Royal Infirmary Redevelopment, Alexandra Parade

Client:
Greater Glasgow Health Board and
The University of Glasgow

Architect:
Sir Basil Spence, Glover & Ferguson in association
with T.W. Astorga

The first phase of this large teaching hospital redevelopment comprises a 216 bed ward block, maternity unit, operating theatres and out patient facilities which are planned as extensions to the existing hospital. The design involved complex structural engineering problems with a novel form of composite steel and concrete columns. Cladding of the buildings is provided by strongly expressed precast concrete units.

13. Footbridge, GEAR, London Road

Client:
Scottish Development Agency

Architect:
James Cunning, Cunningham Associates

Extensive landscaping work was necessary for the large-scale GEAR rehabilitation project and this simple steel footbridge adds to the quality of the new environment being created.





14. Sheriff Courts, Nicholson Street

Client:
Property Services Agency
Architect:
Keppie Henderson & Partners

Glasgow's new Sheriff Courts are sited prominently on the south bank of the River Clyde between the Victoria Bridge and the Suspension Bridge. The main building rises from the security area and is surrounded by deep free-standing rectangular columns clad in polished granite. The horizontal entablature along the top of these columns is also clad in polished granite. Within the surrounding columns the walls are clad in natural sandstone. All the internal finishes are of a high standard and include polished limestone in the atrium area. The main building accommodates 21 courts at various levels, some of which are two storeys high and overlap courts below. A varied structural arrangement includes solid flat slab in court areas, coffered slabs, 12.6m beams with slabs spanning over courts and large floor to floor transitional beams at overlapping courts and above the atrium area.



15. Glasgow Central Mosque

Client:
Jamiat Ittihad-Ul-Muslimin (Muslim Mission)
Architect:
W M Copeland & Associates (1979/80-81)
Coleman Ballantine Partnership

This mosque is the largest in the UK. A complex steelwork roof structure is supported on brickwork walls which, together with specially coloured reinforced concrete arches, also support a mezzanine floor. The minaret is constructed of reinforced concrete.

16. Nautical College, Ballater Street

Client:
Glasgow City Corporation
Architect:
Robert Matthew, Johnson-Marshall and Partners

A multi-storey teaching block with linked recreational facilities leading to a riverside quay. The structure is in reinforced concrete coffered slabs and external cladding in bright white tiles.

17. Southern General Hospital, Maternity Unit, Govan Road

Client:
Western Regional Hospital Board
Architect:
Keppie Henderson & Partners

A piloti-type structure expresses the different types of accommodation between first floor and ground levels. The strongly expressed structural mullions give emphasis to this separate treatment of each level.

18. Southern General Hospital, Neurosurgical Unit, Govan Road

Client:
Western Regional Hospital Board
Architect:
Chief Architect — T W Astorga

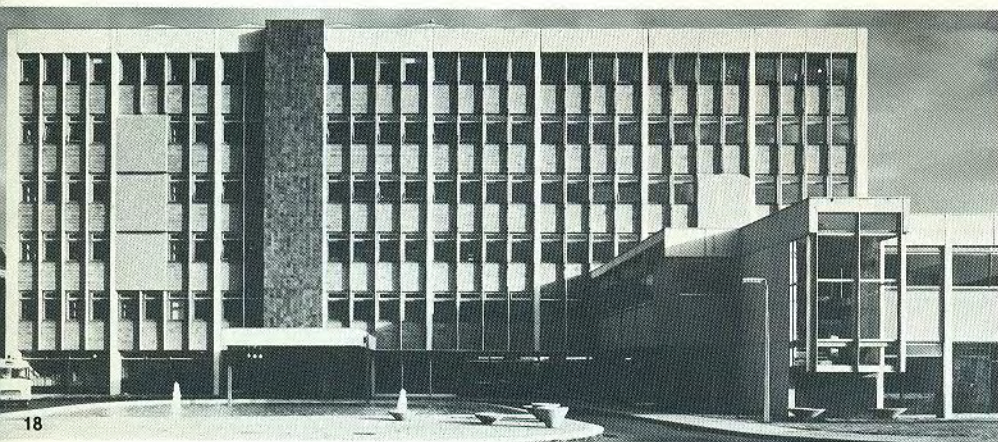
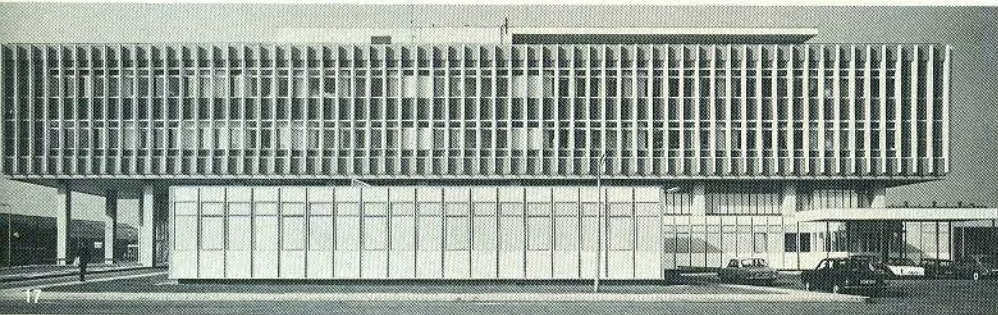
A highly serviced surgical wards and operating theatre building complex requiring minimum thickness floor slabs for ease of services distribution.

19. Gartnavel General Hospital, Great Western Road

Client:
Western Regional Hospital Board
Architect:
Keppie Henderson & Partners

This was the first of the new district general hospitals in the west of Scotland. The building consists of an 8-storey ward block of 576 beds, rising from a 3-storey podium containing outpatients, diagnostic and therapeutic facilities together with seven operating theatres, a central services department, kitchen, dining room and staff facilities.

With the exception of the lift and stair towers and spine columns, which are of in situ concrete the entire structure of the block is built of precast concrete units.



20. Abbotsinch Airport, Paisley Road

Client:

Ministry of Aviation, Board of Trade
(Main Terminal Building)
Glasgow Corporation (Airport Development)

Architect:

Sir Basil Spence, Glover & Ferguson

The main feature of the Abbotsinch Airport is a 100 x 42m terminal building in reinforced concrete, constructed to cater for two million passengers per annum. Its vaulted roof comprises precast, prestressed trusses supported across the width of the building by columns with 4.5m cantilevers at each side. The trusses support a double layer of 50mm thick concrete barrel vaults precast in 3m lengths. Other works included approach roads, car parking, mass transit depot and management offices.

Subsequent to completion of the main building, work was undertaken for major extensions to the taxiways and aprons and the development of additional passenger handling facilities.



PROJECTS IN STRATHCLYDE AND CENTRAL REGION

Strathclyde Region

- 21 Cummins Factory, Shotts
- 22 Monklands Hospital, Airdrie
- 23 Town Centre, Irvine
- 24 Bourtree School, Irvine
- 25 Roche Factory, Dalry
- 26 Ferry Terminal, Ardrossan
- 27 Brig O'Doon, Ayr

Central Region

- 28 Marine Depot, Alloa
- 29 Housing, Falkirk

21. Cummins Engine Plant, Shotts

Client:

Cummins Engine Company Ltd.

Architect:

Ahrends, Burton & Koralek

The requirement was to double engine output in such a way that existing production would not be disrupted. This was achieved by a phased development programme, which ultimately brought new facilities into commission and enabled the original production areas to be converted into final assembly and office accommodation.

The building engineering design provides for services distribution at high level in the new production areas, where a 15m structural module was adopted to relate to the optimum aisle and production line dimension. The triangular space formed by the primary delta truss and the inclined external tension supports to the secondary beams forms the main services route. Lighting in the production areas is by high pressure mercury halide high bay fittings, which provide high design illumination with acceptable colour rendering.

22. Monklands District General Hospital, Airdrie

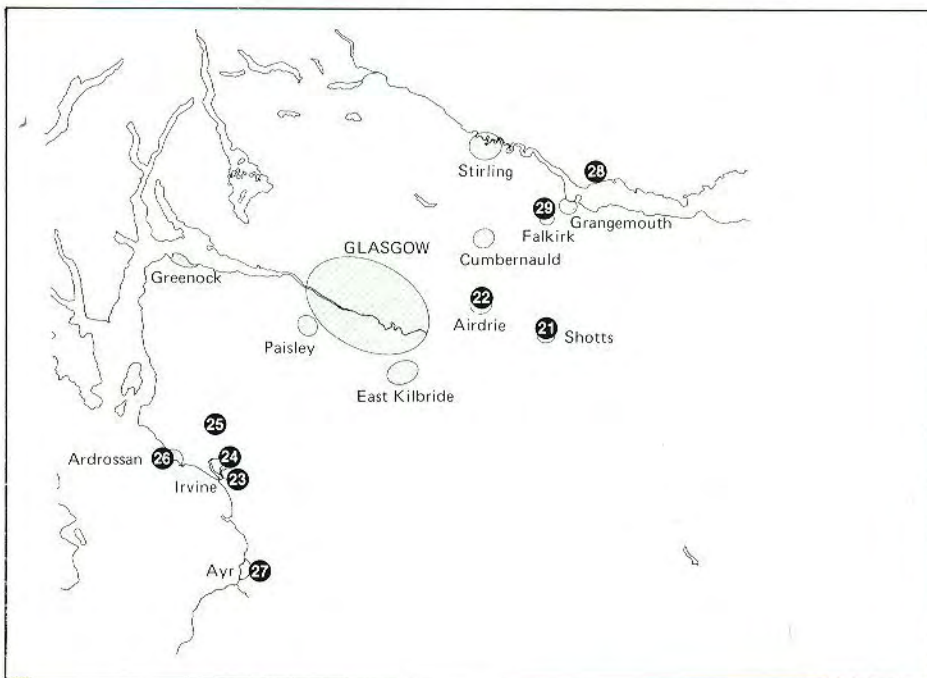
Client:

Western Regional Hospital Board

Architect:

Keppie, Henderson & Partners

The development of this major district hospital was located on a site affected by old mine workings which required special grouting treatment. A combination of high and low level buildings have been successfully integrated using a standardized concrete structural and cladding system.



23. New Town Centre, Irvine

Client:

Ravenseft & Murrayfield Scottish Developments

Architect:

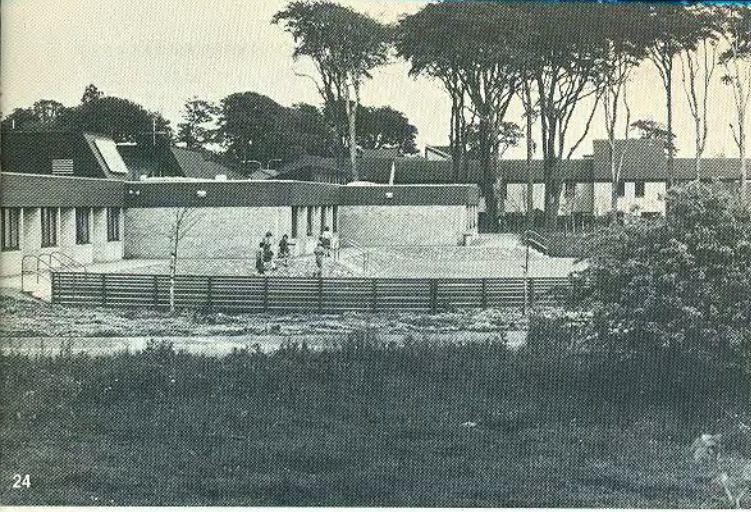
Irvine Development Corporation — David Gosling

This is an unusual project since the shopping centre is built on two bridges, one spanning a major river and the other a principal road.

The development includes an area of approximately 23,000m² for shops and storage, together with substantial office accommodation, partly in the shopping centre and partly in a separate building to the north of the site. Car parking for 1200 cars is also provided.

The basic structure is of reinforced concrete flat slab at the mall level with the bridge structures composed of steel beams.





24. Bourtree School, Irvine

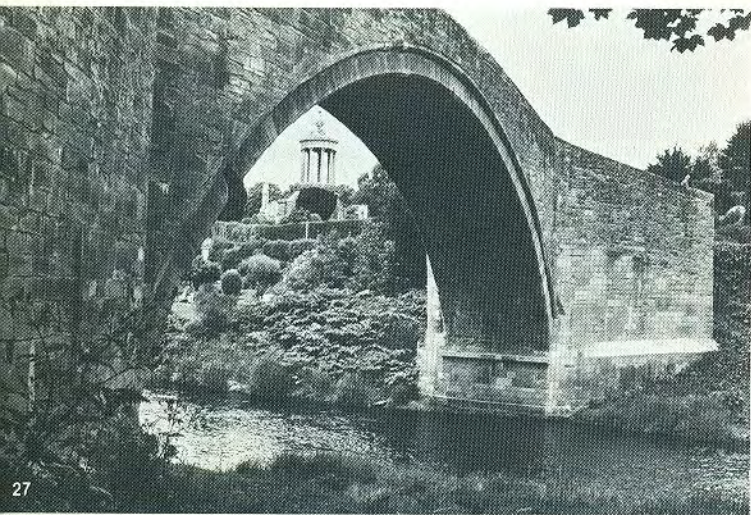
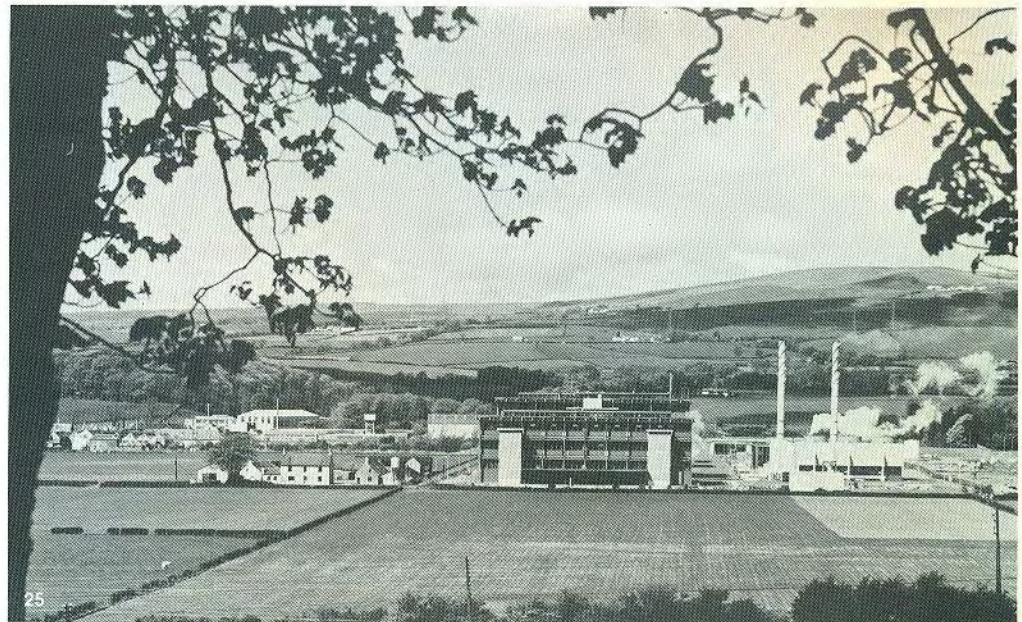
Client:
Strathclyde Regional Council
Architect:
Strathclyde Region Director of Architecture

Guidance on the future design of school building is being provided by several experimental energy-saving systems installed in this school. The single-storey brick building is heated by a ducted warm air system and three different heat recovery systems have been installed in the three main teaching areas by the Building Research Establishment in collaboration with the Scottish Development Department.

25. Roche Factory, Dalry

Client:
Roche Products Ltd, Dalry
Architect:
Fello Atkinson & Partners

Expansion of the vitamin production unit was based on four production facilities, grouped in two pairs each sharing a single storey services building. The steel frame is exposed and the simplicity of the steel detailing reflects the scale of the buildings. The dark grey colour of the frame and cladding harmonized well with the valley setting.



26. Ferry Terminal, Ardrrossan

Client:
Burns Laird Lines
Architect:
The Law & Dunbar-Nasmith Partnership

This steel footbridge with a reinforced plastic folded plate roof provides a 130m long, 3m wide walkway, giving passenger access to the Ardrrossan-Belfast ferry.

It spans a railway station with twin tracks, and has an adjustable end span controlled by hydraulic rams to cater for the variation in tide levels.

27. The Auld Brig O'Doon, Ayrshire

Client:
Kyle & Carrick District Council

Restoration of the famous stone bridge believed to have been built circa 1450. Work involved careful matching of the old stonework and repairs to the foundations.

28. Marine Engineering Depot, Alloa

Client:
Christiani & Nielsen Ltd.
Architect:
Christopher R Dinnis

A large fabrication building for the maintenance of marine construction equipment for which a building engineering design included provision of heavy crane facilities.

29. Wallace Street, Falkirk

Client:
Link Housing Association
Architect:
Wilson & Wilson

Particularly bad ground conditions in the Forth Estuary led to the use of cellular raft foundations for this three-storey housing project.



The Dundee Office

Sandy Fraser

From small attic premises in Meadowside, where we set up our office in 1969, and which served our needs for 18 months, we moved early in 1971 to the present office at 14 Long Wynd. Although in an old Victorian building, the internal space being column-free, is highly adaptable and the top two floors have sufficient area for our present and likely future needs. Together with a liberal allocation of private parking spaces in a central position the situation is very satisfactory.

The essence of our operations in Dundee is flexibility. The office is organized to tackle projects of all sizes and its motto could well

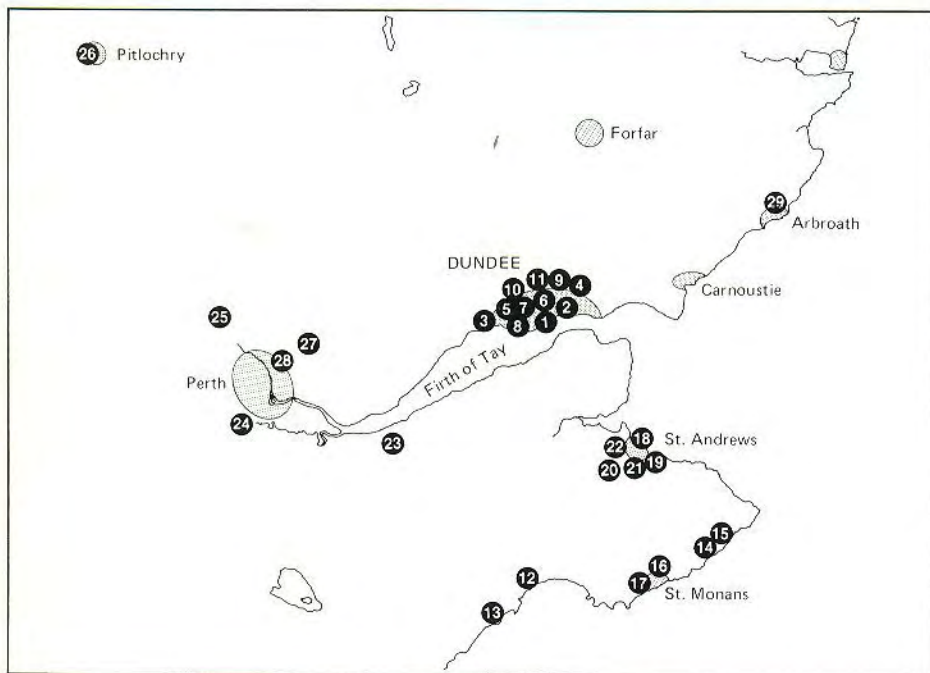
be, 'Nothing is too small'. Interspersed between the larger commissions, some of which are illustrated later, there is a plethora of small and very small works, each important in its own right and with its own particular challenge and satisfaction.

It is interesting, in retrospect, to review the changing patterns of work, reflecting political and economic change nationally, as they have affected our opportunities and small achievements. From a time of large single projects in the educational and health fields in particular, we have proceeded by way of major structural pathological problems, eg. high alumina cement concrete and its attendant problems, to the present and immediate future where individual commissions are smaller in real terms and tend also to have a lesser engineering content.

Although awards are not necessarily accepted as being of great significance, especially by those who fail to be recognized in this way, it is, nevertheless, pleasing to note that we have been associated with three Civic Trust and two Saltire Society Commendations in the last two years.

The future

Looking to the future, and despite the current problems affecting the construction industry, we see a picture brighter and more reassuring than might be expected. Given the continued patronage of our existing clients and the opportunity to develop links with others there is no reason to suppose that 25 years on we will not be looking back on a further period of successful collaboration with our colleagues in the allied design and construction disciplines.



Projects in the City of Dundee

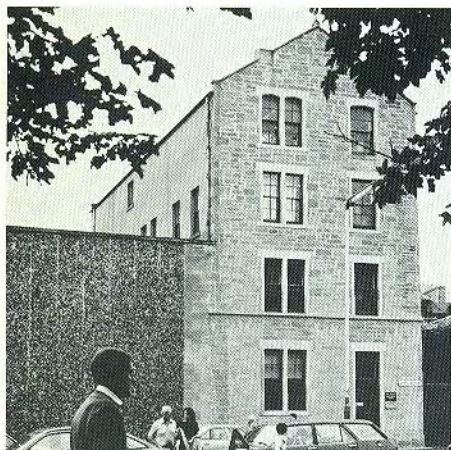
- 1 Students' Union
- 2 Maxwelltown Housing
- 3 Ninewells Hospital
- 4 College of Education
- 5 Alloway Terrace Phase 1
- 6 Bonar Hall
- 7 Alloway Terrace Phase 2
- 8 Harbour Study
- 9 Repertory Theatre
- 10 Finry Housing
- 11 GTC Turbine Overhead Shop

Projects in Fife Region

- 12 Methil Docks
- 13 Dysart Harbour
- 14 Footbridges, Anstruther
- 15 Harbour Lea, Anstruther
- 16 The Maltings, St Monans
- 17 Braid Court, St Monans
- 18 University Library, St Andrews
- 19 David Russell Hall, St Andrews
- 20 Old Course Golf & Country Club, St Andrews
- 21 Botany Building, St Andrews
- 22 Health Centre, St Andrews
- 23 Towerwell, Newburgh

Projects in Tayside Region

- 24 GAFLAC, Perth
- 25 Countryside Commission, Battleby
- 26 Festival Theatre, Pitlochry
- 27 Flood Prevention, Perth
- 28 Scone Airfield, Perth
- 29 Advance Factory, Arbroath



Left: The Dundee Office, 14 Long Wynd.

1. Students' Union Phase 1, Dundee

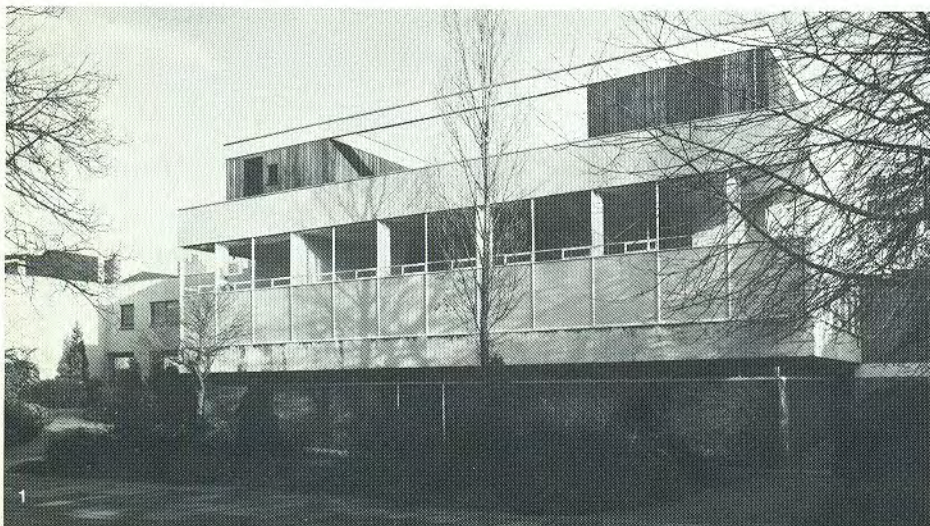
Client:
University of Dundee
Architect:
Ian Burke, Martin & Partners

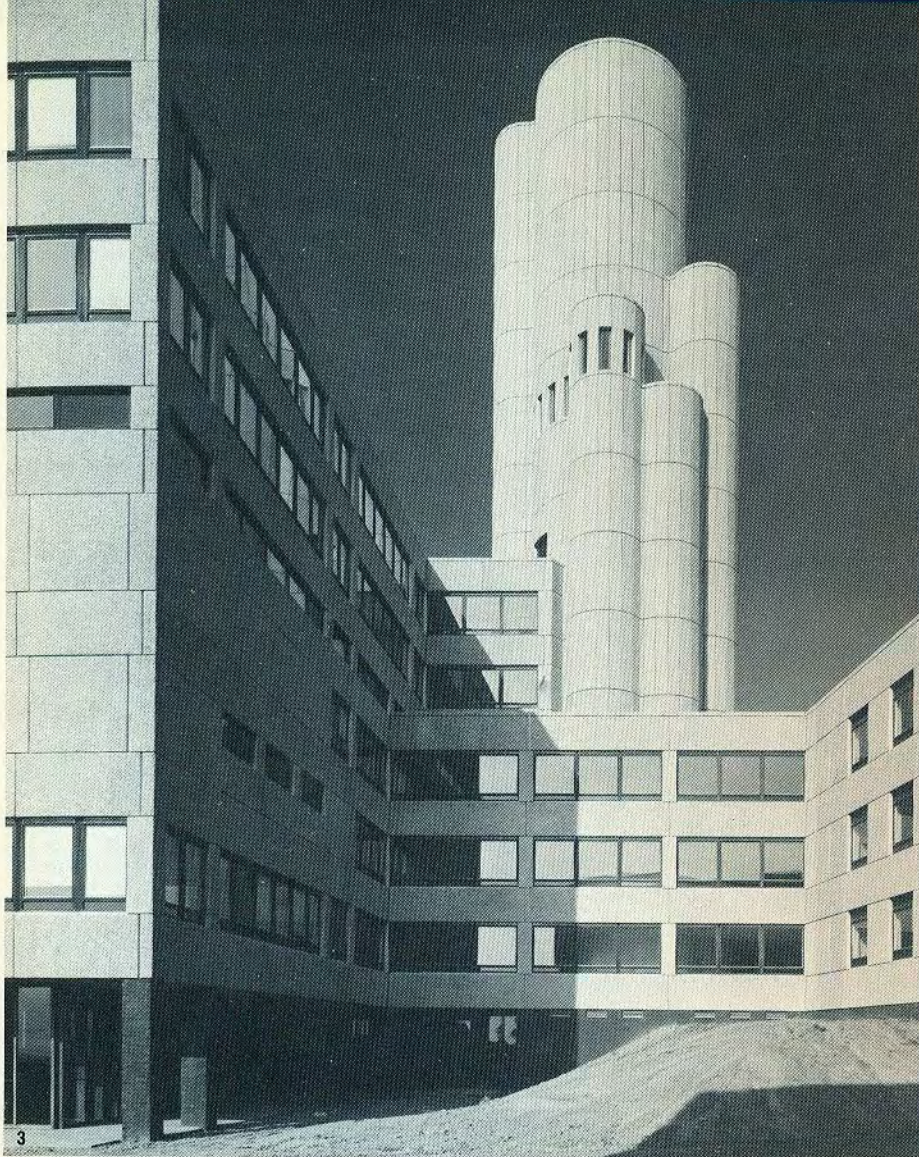
Structural engineering design of union building including a refectory and small library. This small building combines the use of exposed structural concrete in profiled roof beams which also contain the main heating and ventilation ducting.

2. Maxwelltown Housing, Dundee

Client:
City of Dundee
Architect:
Ian Burke, Martin & Partners

Four 22-storey blocks of maisonettes using in situ reinforced concrete with brick cladding.





3. Ninewells Teaching Hospital and Medical School, Dundee

Client:
Eastern Regional Hospital Board
Architect:
Robert Matthew, Johnson-Marshall and Partners

This was the first completely new teaching hospital to be built in Britain this century. It occupies a site of some 80ha on the outskirts of Dundee, overlooking the Firth of Tay.

There are three separate but linked groups of buildings covering an area of 142,000m² comprising the central complex of hospital and medical school, the engineering group of laundry, boiler house and workshop plus the residences which include the nurses' training school. The structure is of in situ reinforced concrete and cladding is provided with large precast concrete panels.

4. College of Education, Dundee

Client:
The Board of Governors
Architect:
Thoms Wilkie Partnership

A new college on a greenfield site providing complete education training facilities including a theatre complex which is also available for local community use. The structure is of in situ reinforced concrete and extensive use is made of exposed load-bearing blockwork.

5. Alloway Terrace, Phase 1, Dundee

Client:
Servite Houses Ltd.
Architect:
Robbie & Wellwood

The project is built on a north-sloping site of approximately 0.45ha to the west of St. Vincent's Church and Servite Priory. The building is two storeys high at the south end and four storeys at the north.

A total of 35 sheltered flats for elderly people are provided in the scheme. The building is constructed of load-bearing blockwalls, in situ reinforced concrete suspended slabs and timber roof trusses.

6. Bonar Hall, Dundee

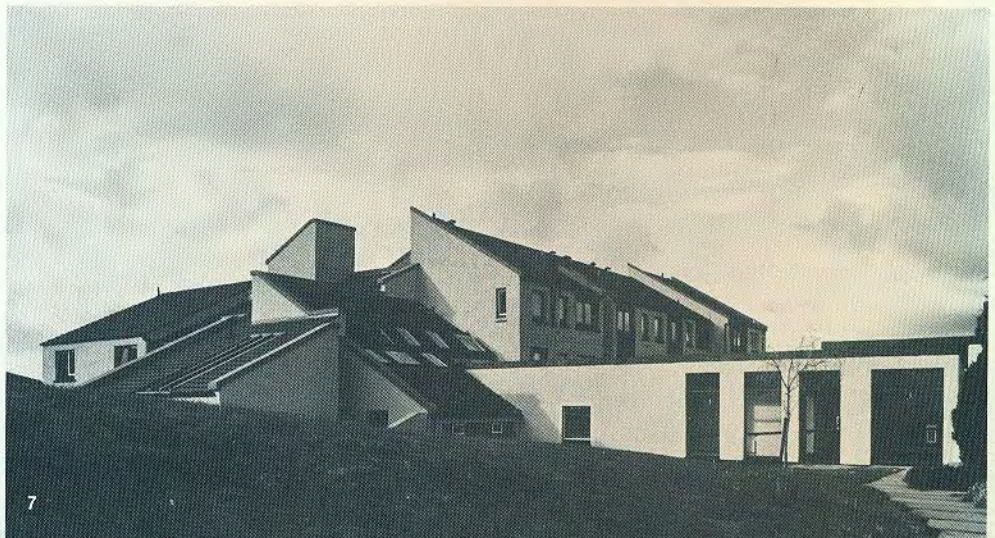
Client:
University of Dundee
Architect:
Gillespie, Kidd & Coia

A building, constructed in load-bearing brick and blockwork, reinforced concrete and structural steel, on a site requiring 'vibro-compaction' prior to constructing foundations. It provides a 450 seat capacity hall, display galleries and the Ustinov Room for University Senate meetings.

7. Alloway Terrace, Phase 2, Dundee

Client:
Servite Houses Ltd.
Architect:
Robbie & Wellwood

Phase 2 of the Servite Houses development of Alloway Terrace is built immediately west of the first phase development. The principal building reaches a maximum of four storeys in height and contains 32 sheltered flats for the elderly. A covered link with a central sitting area connects the communal facilities to those in the first phase building. Walls are loadbearing concrete block masonry, supporting precast and in situ reinforced concrete slabs and timber trussed rafter roofs.



8. Harbour Study, Dundee

Client:
Tayside Regional Council

A detailed study of the Tay Estuary and Port of Dundee to assess the potential for development related to North Sea offshore engineering services. Participation in the study included an appraisal of the facility to provide maintenance work on floating drilling rigs.

9. Repertory Theatre, Dundee

Client:
Dundee Repertory Theatre Company Ltd.
Architect:
Nicoll Russell Design Studio

A new 450-seat capacity theatre which incorporates a fly tower to provide maximum flexibility in handling scenery. Other facilities include a workshop, offices, two bars and a restaurant. The main auditorium and surrounding offices are of in situ reinforced concrete construction. The stepped upper surface of the auditorium floor is echoed on the soffit as an architectural feature. The fly tower is a steel-framed structure, with blockwork infill, supporting the roof over the stage and the grid floor for the flies. Steelwork is again the structural medium for the auditorium roof, with deep radial girders spanning between circular hollow section columns at the back of the auditorium and the deep lattice girder over the proscenium opening.

10. Fintry Housing, Dundee

Client:
Servite Houses Ltd.
Architect:
Robbie & Wellwood

A sheltered housing development on a gap site located in a housing estate. The design has adopted a strong vernacular style to link with the surrounding buildings.

11. GTC Turbine Overhead Shop, Dundee

Client:
GTC Gas Turbine Ltd.

A factory to provide a bespoke gas turbine engine overhaul and testing facility predominantly servicing offshore oil production platforms.



12. Industrial Estate Development, Methil Docks, Fife

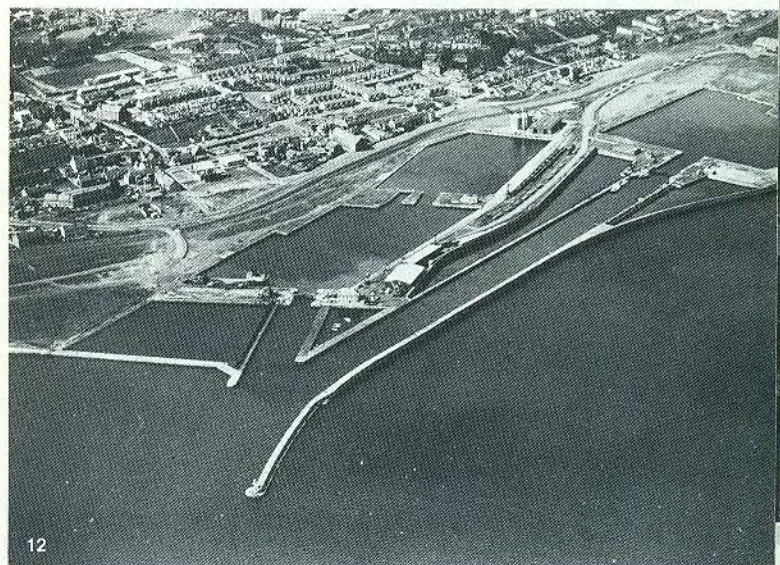
Client:
Scottish Development Agency

The rehabilitation of the derelict No. 3 dock involving study of the sea wall and dock gates for essential repair work. Part of the dock has been refilled to provide a site for factory development and new road entrances to the Nos. 1 and 2 dock areas.

13. Dysart Harbour, Fife

Client:
Kirkcaldy District Council

Extensive repair work to the sea wall at the entrance to Dysart Harbour became necessary after it had suffered storm damage, and this work was combined with the construction of the nearby visitors' car park.





14. Footbridges, Anstruther, Fife

Client:
Scottish Development Agency
Architect:
Baxter, Clark & Paul

A landscaping project for industrial land renewal work involved the provision of a number of simple footbridges in timber and steelwork.

15. Sheltered Housing, Harbour Lea, Anstruther, Fife

Client:
North East Fife District Council
Architect:
Baxter, Clark & Paul

A delightful local authority housing project on the site of the former gasworks in which the blend of new buildings amongst the old surroundings has been widely commended.

16. Sheltered Housing, The Maltings, St Monans, Fife

Client:
North East Fife District Council
Architect:
Cunningham Jack Fisher Purdom

The conversion of the old Maltings building into flats for elderly people involved some interesting structural engineering problems in restoration of floors and walls.

17. Braid Court Housing, St Monans, Fife

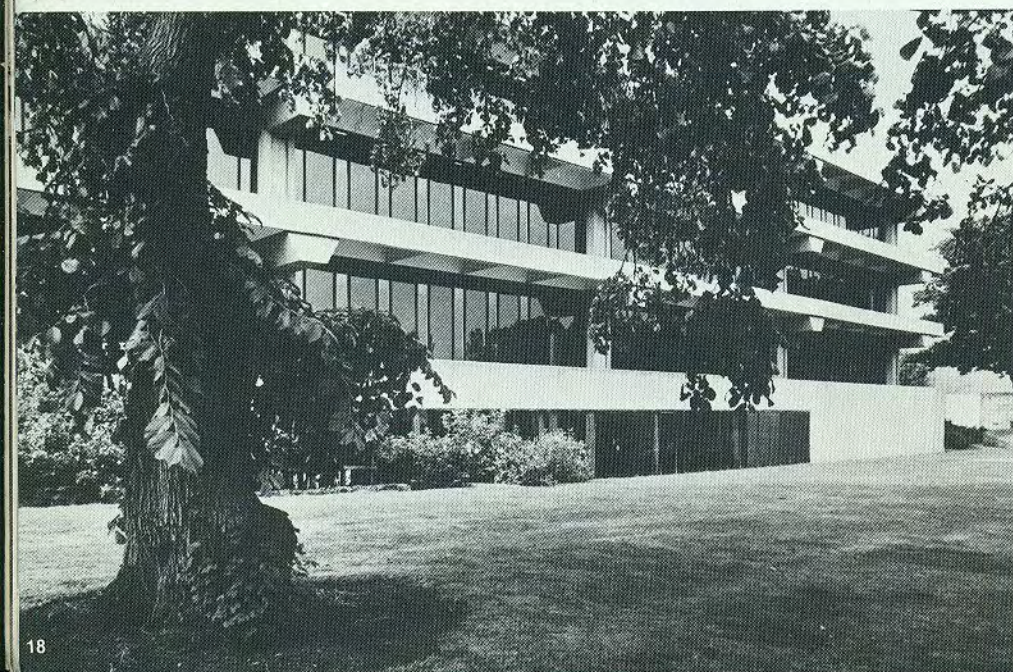
Client:
North East Fife District Council
Architect:
France Smoor

An urban renewal project in a traditional East Neuk fishing village. The massing and choice of materials carefully respect the local vernacular style.

18. University Library, St Andrews, Fife

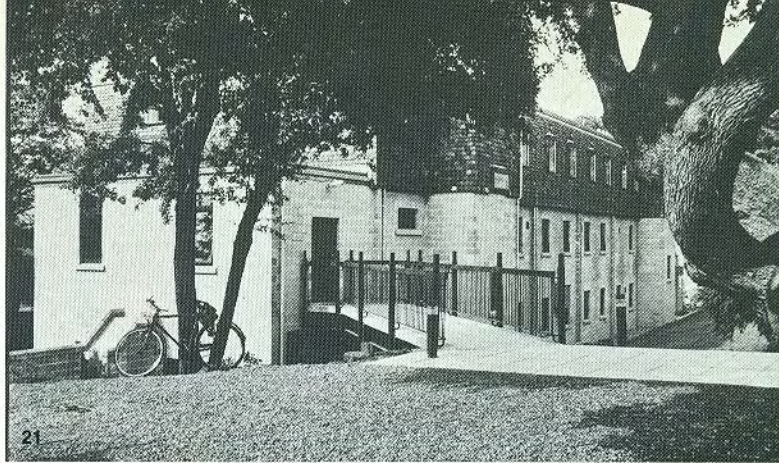
Client:
University of St Andrews
Architect:
Faulkner-Brown, Hendy, Watkinson, Stonor

A boldly designed building consisting of three storeys of long span precast concrete construction over a semi-basement.





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19. David Russell Hall, St Andrews, Fife

Client:
University of St Andrews
Architect:
Cunningham Jack Fisher Purdom

A series of four-storey student residence blocks with a large amenity building in which the chimney is concealed by a vertical feature.

20. Old Course Golf and Country Club, St Andrews, Fife

Client:
The Old Course Golf & Country Club Ltd.
Architect:
Cunningham Glass Partnership

The recent extensions to the old British Transport Hotel have provided extra bedrooms, leisure centre and golf club members' rooms overlooking the 17th fairway of the Old Course.

21. Botany Building, St Andrews, Fife

Client:
University of St Andrews
Architect:
University Architect — John Ferrier

A building engineering design for a three-storey laboratory building with high quality insulation and energy use efficiency.

22. Health Centre, St Andrews, Fife

Client:
Fife Health Board
Architect:
Robbie & Wellwood

Four local general practices are now located in this building which serves the whole of the town. It is predominantly a single-storey load bearing masonry building with staff accommodation and dental clinic in part of the dominant roof structure.

23. Towerwell, Newburgh, Fife

Client:
North East Fife District Council
Architect:
L A Rolland & Partners

An interesting housing development in a conservation area of older buildings. The careful treatment of the design has been highly commended.



23



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24. General Accident Fire & Life Assurance Corporation plc

Client:
General Accident Fire & Life Assurance Corporation plc
Architect:
James Parr & Partners

The exposed-aggregate precast concrete-clad building is terraced into a hillside overlooking Perth. The rooftop landscaping allows this very large building to blend well with the landscape in which it is set. The air-conditioned, highly-serviced and finished interior houses open plan offices, meeting rooms, management areas, board room and executive suite, kitchen and dining room and computer suite. A comprehensive sports complex and residential hostel share the same site.



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25. Training and Display Centre, Battleby, Tayside

Client: Countryside Commission for Scotland
Architect: Morris & Steedman

The Centre was developed from the alteration and adaptation of some existing farm buildings which were grouped in the traditional manner with farm house and outbuildings surrounding a farmyard. The building engineering design of this scheme involved roofing over the farmyard to form a central auditorium and modifying the adjacent buildings to provide a foyer, display area, lecture rooms, plant-room and ancillary accommodation.

22

26. Festival Theatre, Pitlochry, Tayside

Client: Pitlochry Festival Society Ltd.
Architect: The Law & Dunbar-Nasmith Partnership

A new 540-seat theatre, situated on the banks of the River Tummel close to the famous hydro-electric dam and fishladder. Ancillary facilities include dressing rooms, foyer, restaurant and bars. The structure consists of a combination of load-bearing brick walls and steel columns supporting steel roof structures and reinforced concrete floors.

27. Scone Airfield, Perth, Tayside

Client: Airwork Services Ltd.
Architect: J F Stephen

This small airfield has been provided with a coherent group of buildings for a new control tower, visitors' lounge and offices for the engineering department.

28. Advance Factories, Arbroath, Tayside

Client: Scottish Development Agency
Architect: Robbie & Wellwood

The development of small advance factory buildings to attract new industries to the area is well illustrated by this example on the Elliot Industrial Estate.

29. Flood Prevention, Perth, Tayside

Client: Tayside Regional Council

Extensive flooding of the North Muirton area of Perth made necessary the construction of a large bund wall along the banks of the Rivers Tay and Almond.

The Aberdeen Office

Sandy Fraser

In August 1979, we opened for business in a small office formerly occupied by C.G. Doris. After 2½ years we were beginning to run out of space and on 28 March 1983 we moved into our present office on the top floor of a new city centre development within easy walking distance of trains, taxis, shops, etc. We find it suits us well and we expect it to meet our needs for some years to come.

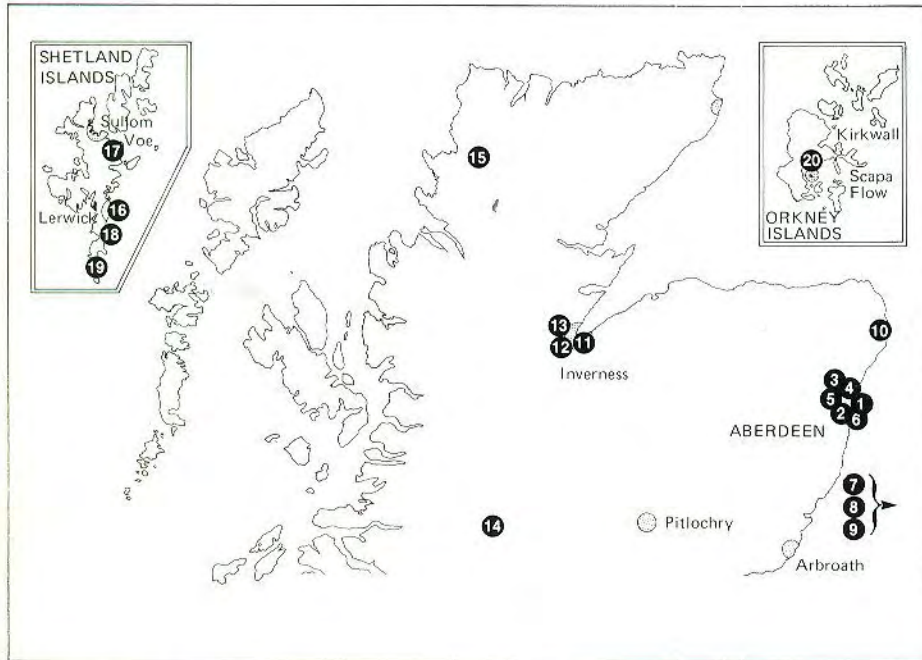
The effects of North Sea oil on the economy of Aberdeen and environs are overwhelming

and inescapable and, whilst we might have hoped for a larger proportion of our work to be directly oil-related, much of the apparently non-oil work we have done would not have happened other than as infrastructure development following North Sea-inspired growth in the area. We arrived at a time of severe national recession and Aberdeen is experiencing some of the same difficulties.

However we have managed to sustain steady growth and believe this will continue for the foreseeable future. We have been involved in projects ranging from fish to oil, both now 'traditional' Aberdeen industries, from schools and timber-framed housing to mountain railways and ferry terminals and,

geographically, from Unst in the far north of Shetland to Wester Ross and south to Montrose.

We see our future including a significant amount of prime agency civil engineering work, work for oil companies in onshore civil and structural engineering and some off-shore activities related to platforms in service, such as structural auditing and checking. We expect to continue our investigation and report activities in support of the increasing tendency in our industry for disagreements to reach court action and for insurance companies to resist claims. We also look forward to a growing share of traditional structural engineering work with local architects.



Projects in the City of Aberdeen

- 1 Union Street, Aberdeen
- 2 Joint Agriculture, University of Aberdeen
- 3 Johnston Halls of Residence, University of Aberdeen
- 4 Westburn Pavilion
- 5 Jute Street Housing
- 6 Scotia

Projects 'Offshore' Aberdeen

- 7 Brent C Flare Tower
- 8 Hutton Platform
- 9 Maureen Articulated Loading Column

Project in Grampian Region

- 10 Marathon Base, Peterhead

Projects in Highland Region

- 11 Bridge Street, Inverness
- 12 Council Buildings, Inverness
- 13 Kessock Bridge, Inverness
- 14 Glencoe Bridges
- 15 Kylesku Bridge

Projects in Orkney and Shetland Islands

- 16 Anderston High School, Lerwick
- 17 Brae Junior School
- 18 Cunnisburgh Primary School
- 19 Dunrossness Primary School
- 20 Ferry Terminals, Orkney Islands

Below: The Aberdeen Office

1. Union Street, Aberdeen

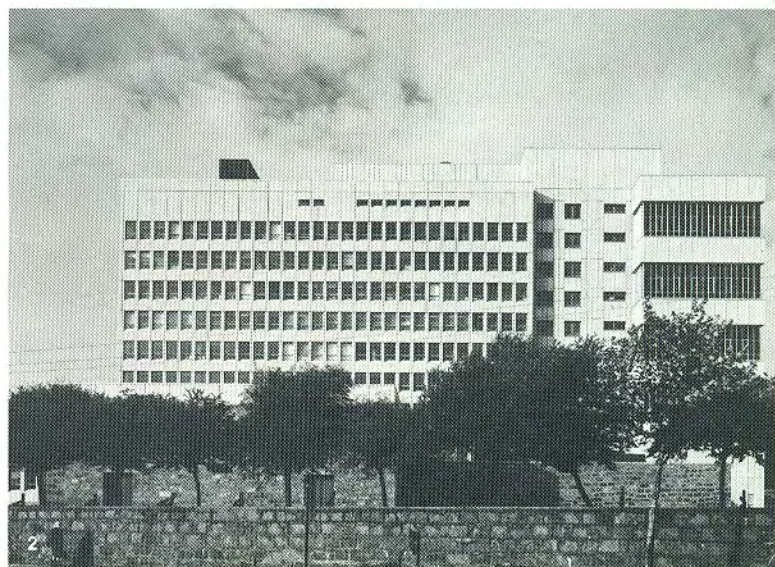
Client:
Murrayfield Real Estate Development Company
Architect:
Ian Burke, Martin & Partners

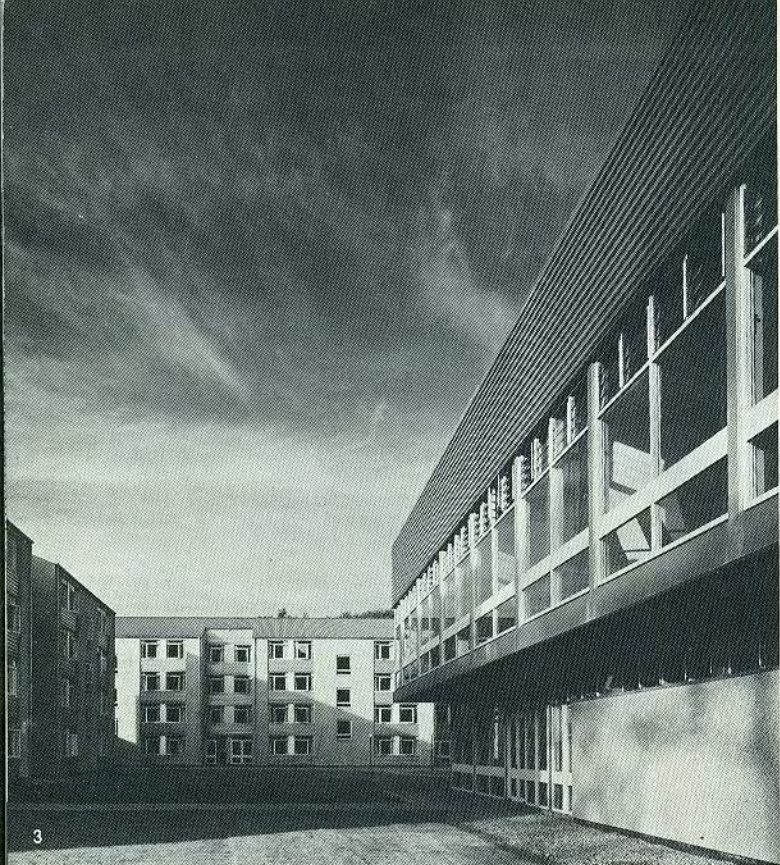
This is one of the earliest shopping developments in Aberdeen and restored an important corner site with street level units and rear servicing. Also included in the development are new premises for the Aberdeen branch of the YMCA.

2. Joint Agriculture Building, Aberdeen

Client:
University of Aberdeen
Architect:
Robert Matthew, Johnson-Marshall and Partners

This is an elegant building located in the playing fields surrounding the university buildings in Old Aberdeen. It used a form of precast concrete loadbearing external walling which gives an attractive elevational treatment.





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3. Johnston Hall of Residence, Aberdeen

Client:
University of Aberdeen
Architect:
Robert Matthew, Johnson-Marshall and Partners

This is the second hall for both male and female students, and is located in Old Aberdeen in close proximity to the university buildings. It contains study bedrooms and a large central refectory with exposed cantilever concrete first floor slabs.

4. Westburn Pavilion, Aberdeen

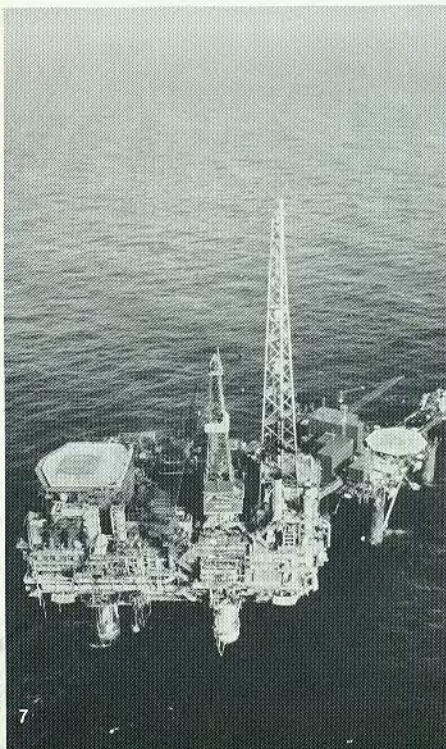
Client:
Aberdeen District Council
Architect:
City Architect: Ian A Ferguson

This building provides attractive social and recreational accommodation at the municipal bowling greens. It was the venue of the World Bowling Championships in 1984.

5. Jute Street, Aberdeen

Client:
Alexander Hall & Son (Builders) Ltd.
Architect:
Mackie Ramsay & Taylor

Private sector housing provided in the traditional style suited to the local materials of the area.



7

6. Scotra, Altens, Aberdeen

Client:
Scottish Offshore Training Association
Architect:
Bruce and Patience

This organization provides training facilities for offshore drilling and platform operations. Due to the success of their courses considerable extension of existing buildings became necessary with new lecture theatres and seminar spaces.

7. Brent C Flare Tower, North Sea

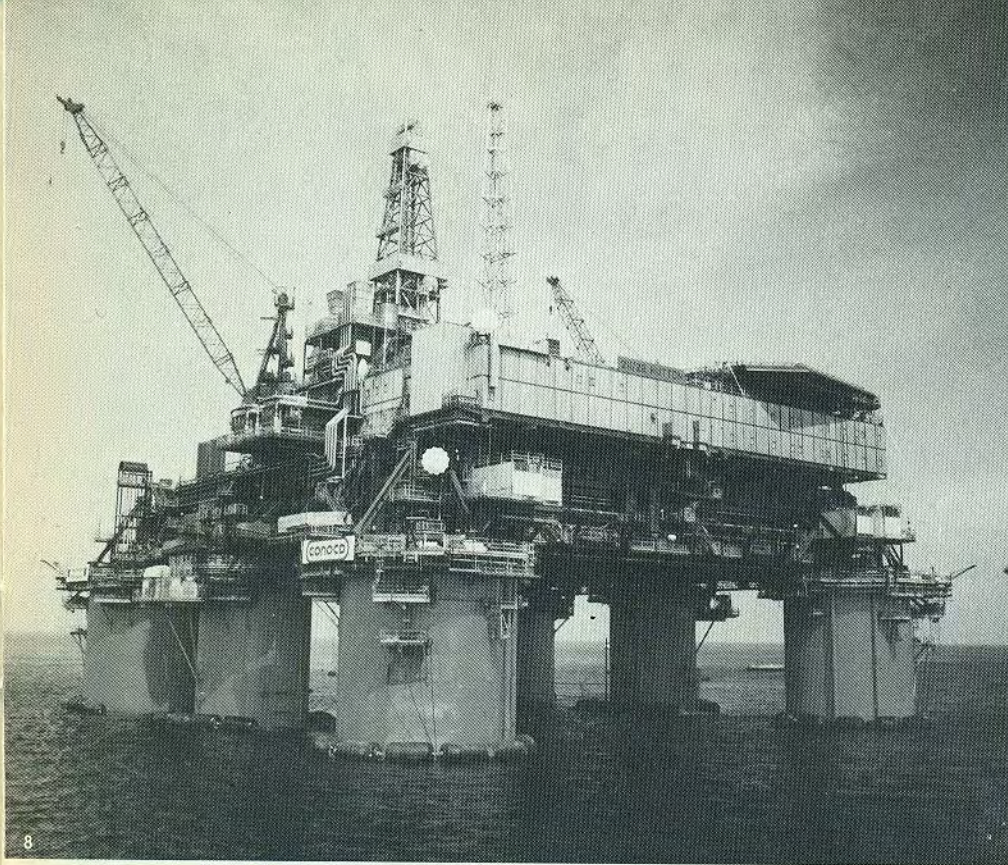
Client:
Shell UK Exploration and Production

The flare towers are used to burn off the gas from offshore oil production and this example is 100 m in height. The design and construction involves complex structural analysis for dynamic behaviour.

8. Hutton Platform, North Sea

Client:
Conoco (UK) Ltd.

This is the world's first tension leg oil production platform involving the design and construction of deck and hull structures before joining and floating out to location. The structural engineering work in which we assisted was concerned with the specialist problems of stress analysis, steelwork design, supervision of fabrication and temporary works design.



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9. Maureen Articulated Loading Column, North Sea

Client: Phillips Petroleum Company

This is a novel form of loading device to bring oil away from the production platform. It consists of a 100 m underwater concrete column supporting a 31 m steel superstructure. We assisted with the concrete design and supervision of construction.

10. Oilfield Support Base, Peterhead, Grampian Region

Client: Marathon International Petroleum (GB) Ltd.

Architect: Baxter, Clark & Paul

This land base provides a storage facility to support North Sea Brae Field operations. Phase 1 of the development, on an 8 ha site, includes a 4000m² warehouse of 43m clear span with a 17m span portal crane. Storage is provided for palletted materials and there are fully enclosed dust-free areas. The west end of the building incorporates 800m² of offices and training rooms.

Curved eaves and concealed gutters help reduce the apparent bulk of the building. Lighting, via the double-skin roof structure, combines with the white sheet steel inner face of the double-skin interior. The facade to the office entrance is of glass reinforced plastic. Insulated doors on the south and east facades are remote-controlled by radio to minimize open time and so conserve energy within the building, which is fully heated.

11. Bridge Street, Inverness

Client: Murrayfield Real Estate Development Company

Architect: Ian Burke, Martin & Partners

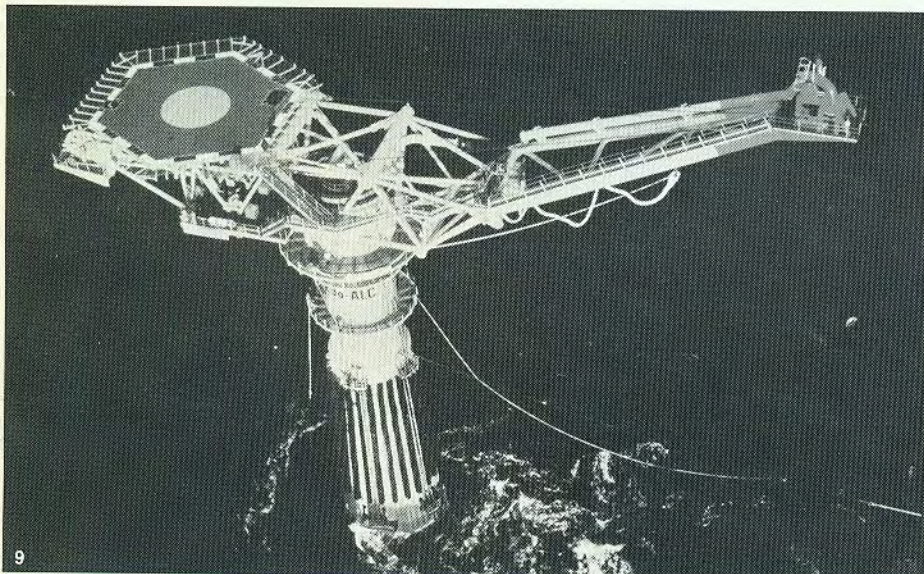
This commercial development is located adjacent to Inverness Castle and has to provide for both a public library and offices together with shopping facilities. The structure used was formed of mushroom slabs to cater for the large cantilever floors needed to satisfy the unusual planning solution adopted to superimpose the different types of accommodation.

12. County Buildings, Inverness

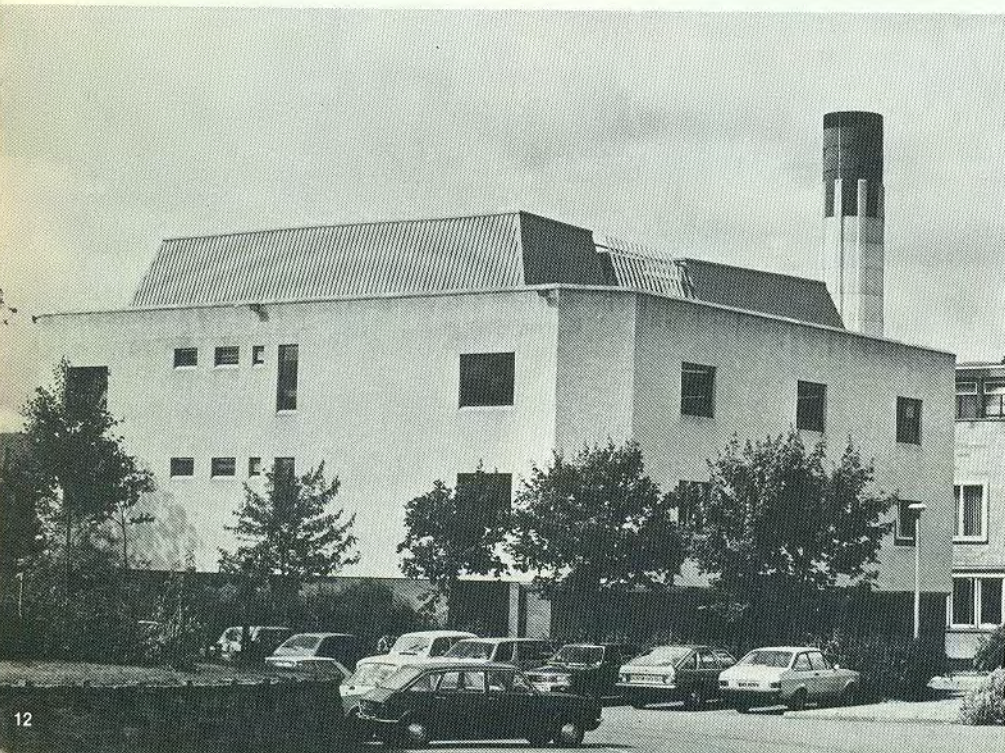
Client: Highland Regional Council

Architect: Dorward, Matheson & Gleave

This is the first phase of the new Regional headquarters building and our building engineering design provided a fully air-conditioned open plan office arrangement.



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13. Kessock Bridge, Inverness

Client:
Scottish Development Department

This major 240m main span cable-stayed bridge is located near Inverness on the main A90 route to the north. The design was adopted as the result of a competition between selected contractors, and executed under our supervision as Joint Engineers with Crouch and Hogg.

14. Glencoe Bridges, Highland Region

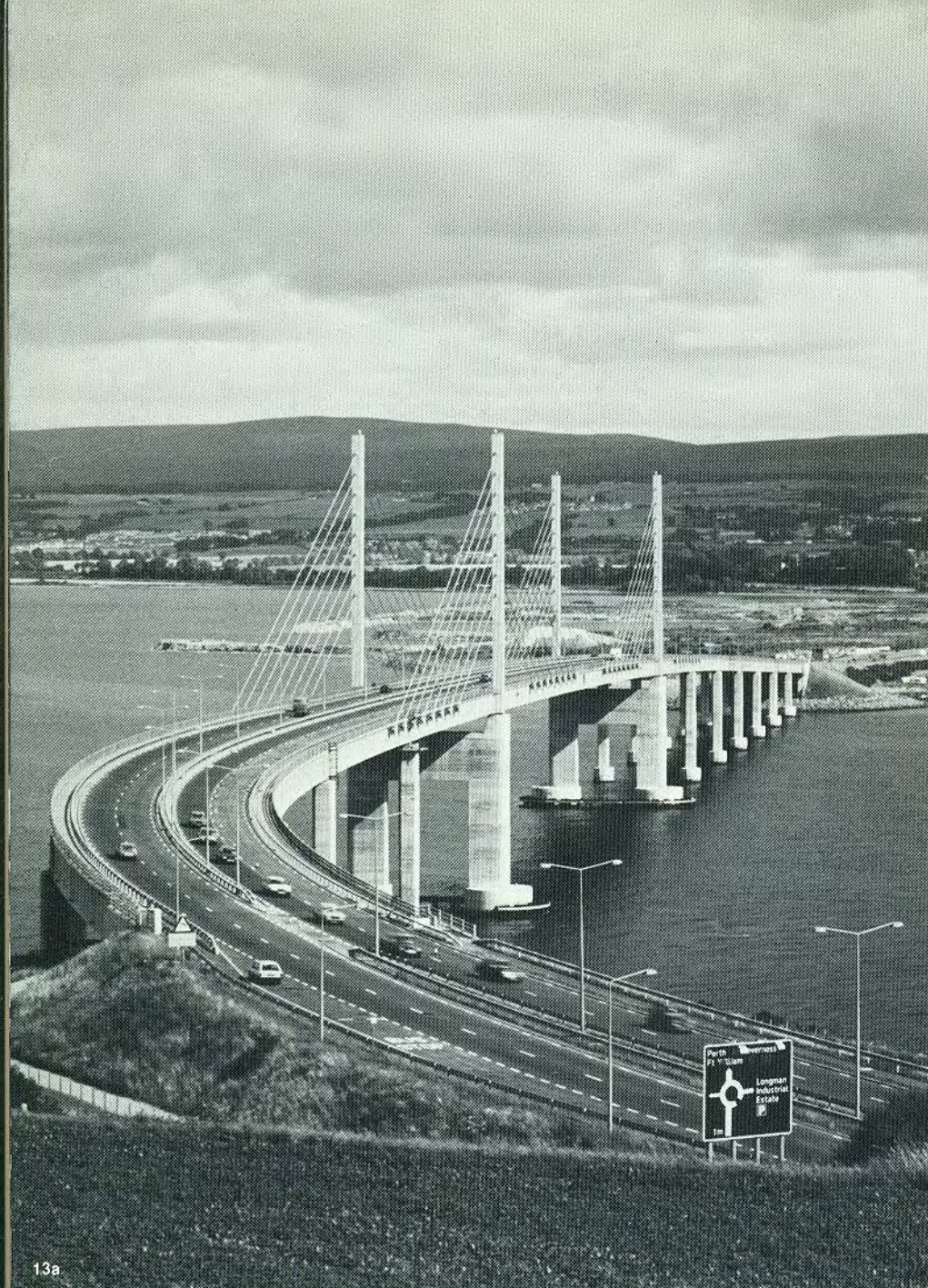
Client:
Scottish Development Department

Many of the country's early concrete bridges are suffering serious deterioration and a large programme of remedial work has become necessary. A carefully researched series of repairs contracts has been embarked upon, and we have become involved in some of the early work in this programme. The Etive Bridge illustrated is one of three bridges on the A82 south of Glencoe which were constructed in the 1930s.

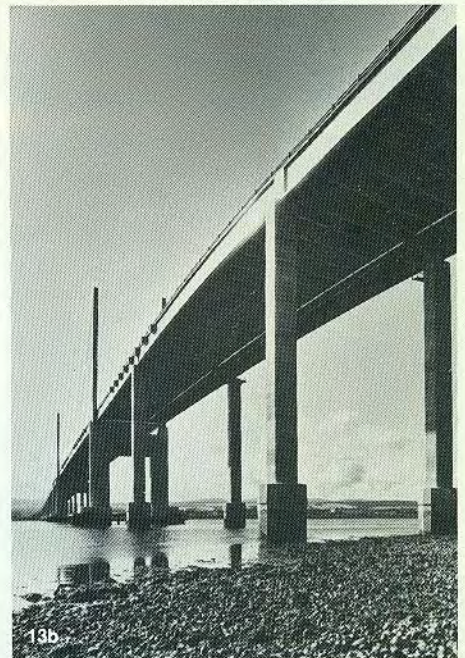
15. Kylesku Bridge, Highland Region

Client:
Highland Regional Council

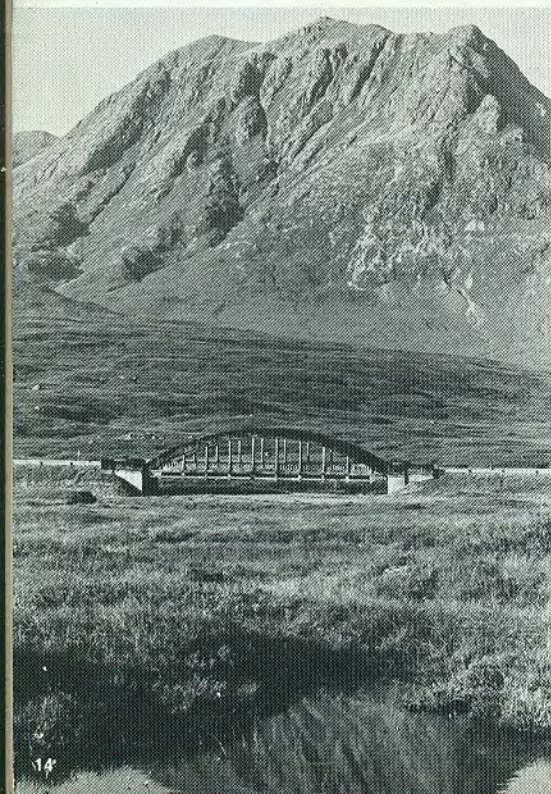
This bridge, which spans over a deep sea loch, completes the road link to Cape Wrath. It is a curved prestressed concrete box girder structure 276m in length, together with approach roads which involved major rock cutting and peat excavation.



13a



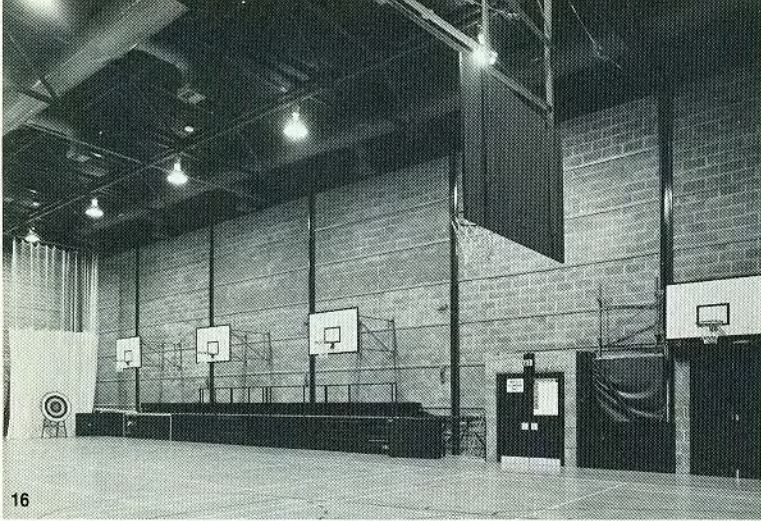
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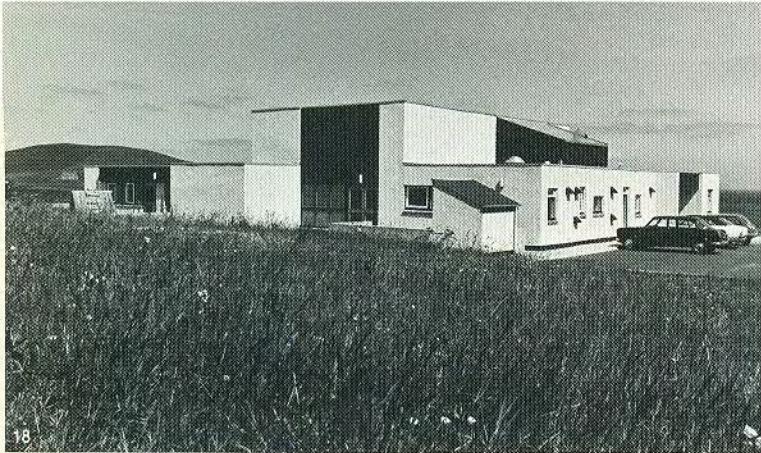
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16. Anderson High School, Shetland Islands

Client:
Shetland Islands Council
Architect:
The National Building Agency; Charles Robertson

One of our first building engineering design projects involving the extension of an existing school with gymnasium facilities.

17. Brae Junior High School, Shetland Islands

Client:
Shetland Islands Council
Architect:
Baxter, Clark & Paul

This is a new secondary department for 250 pupils with elegantly simple low level buildings.

18. Cunningsburgh Primary School

Client:
Shetland Islands Council
Architect:
Baxter, Clark & Paul

Cunningsburgh school is situated alongside the main road from Sumburgh to Lerwick. The school provides accommodation for 120 pupils and has four classrooms and a multi-purpose hall.

19. Dunrossness Primary School

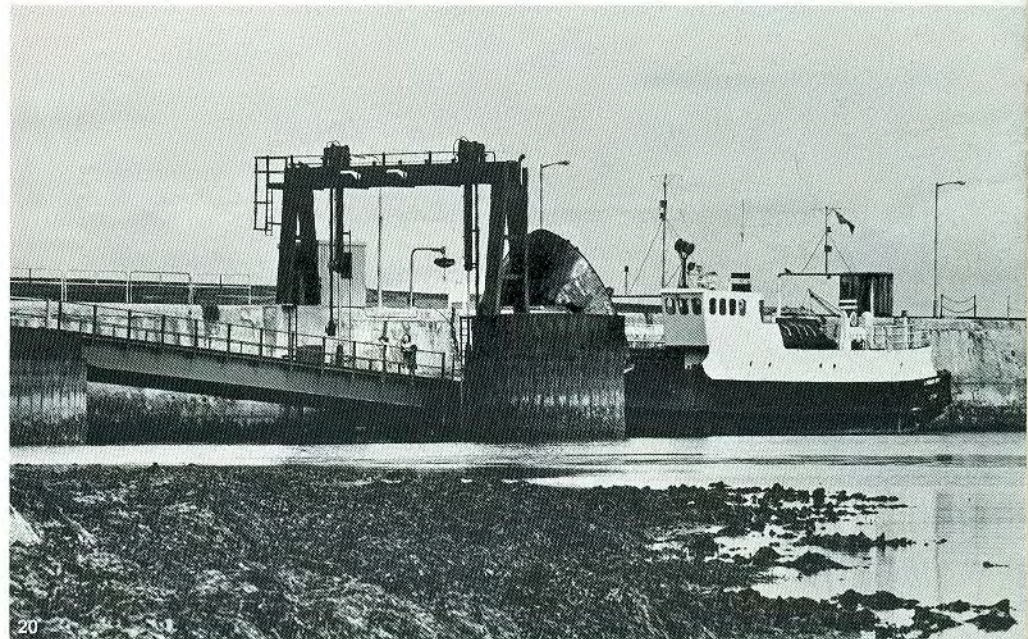
Client:
Shetland Islands Council
Architect:
Baxter, Clark & Paul

This is a 240 pupil school with eight classrooms and multi-purpose areas including a small swimming pool. The school serves a scattered rural population and is of sturdy construction to resist very high wind speeds.

20. Ferry Terminals, Orkney Islands

Client:
Orkney Islands Council

The islands of Flotta and Hoy at Scapa Flow rely on sea transport for their basic supplies and communications from the mainland at Houton. New terminals for the RO-RO ferry have been provided at each location and consist of shore works with adjustable link bridges. The hinged bridges are steel girder structures and operate on hydraulic cylinders supported from steel frames. Remote controlled devices have been provided to allow control from ferry vessel of the adjustments for docking.



20

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