

*REPORT OF  
THE SUMMERLAND  
FIRE COMMISSION*

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GOVERNMENT OFFICE,  
ISLE OF MAN.

## REPORT OF THE SUMMERLAND FIRE COMMISSION

To His Excellency Sir John Warburton Paul, G.C.M.G., O.B.E., M.C.,  
Lieutenant-Governor of the Isle of Man

### INTRODUCTION

1. Summerland was part of a leisure complex, comprising Summerland itself and the adjacent Aquadrome, an indoor swimming pool. Summerland was a large building containing a considerable area of open space and several upper floors, arranged as open-fronted terraces. Except for two basement floors, it was enclosed in a steel framework, clad partly in a coated steel sheet material, but mostly in an acrylic sheeting known as Oroglas. The building had capacity for about 5,000 people and offered a wide variety of entertainment including music, singing, dancing, eating and drinking, sun-bathing, bingo, pin table games and table tennis.

2. On the evening of 2nd August, 1973, a fire started outside the building close to one of the walls and spread into the interior. The building became engulfed in fire in an extremely short time and all the floors at and above entrance level were completely destroyed. Of an estimated 3,000 people in the building at the time, the vast majority escaped amidst scenes of panic, but 50 persons — men, women and children — perished, and a similar number were treated in hospital. In terms of loss of life, this was the worst peacetime fire disaster in the British Isles since 1929.

3. On 3rd September, 1973, His Excellency Sir Peter Hyla Gawne Stallard, K.C.M.G., C.V.O., M.B.E., Lieutenant Governor of the Isle of Man, appointed this Commission by Warrant in the following terms: —  
"I, the said Lieutenant-Governor DO HEREBY APPOINT —

The Hon. Mr. Justice Cantley, O.B.E.,  
P. S. Wilson-Dickson, Esq., O.B.E. and  
Professor Denis Harper, B.Arch, Ph.D., M.Sc.Tech.,  
F.R.I.B.A., M.R.T.P.I., F.I.O.B.,

to be a Commission to be styled 'The Summerland Fire Commission' to inquire into, and report on, all the circumstances of, and leading up to, the fire at the Summerland Leisure Centre, Douglas, on Thursday, 2nd August, 1973, and to make recommendations AND I DO FURTHER APPOINT The Hon. Mr. Justice Cantley, O.B.E., to be Chairman of the Commission and G. Carter, Esq., F.C.I.S., of Government Office, Isle of Man, to be Secretary."

4. We, the Commission, held a preliminary public meeting at the Villa Marina, Douglas, on Tuesday, 9th October, 1973. At this meeting, we gave our interpretation of the lines of inquiry, gave directions on matters of administration and procedure and granted applications by interested parties for representation at the public hearing. The public hearing began on 19th November, 1973, and ended on 13th February, 1974, during which period we sat on 49 days and also made several inspections at the site of the fire.



5. We were assisted in the presentation of the evidence and the ascertainment of the facts by Mr John Newey, Q.C., Mr. M. Burke-Gaffney and Mr. T. W. Cain, advocates acting for the Commission instructed by the Treasury Solicitor. We are greatly indebted to them and to the Treasury Solicitor and his skilled and conscientious staff, as well as to the other Advocates who appeared before us for their help in the Inquiry. We wish to acknowledge valuable technical assistance in the course of the Inquiry given by Mr. Norman C. Crook, F.R.I.B.A., of the firm of Taylor, Young and Partners and Assistant Chief Fire Officer F. C. Best, M.I.Fire.E., of Kent Fire Brigade and the willing and very efficient help we have received throughout from our Secretary, Mr. George Carter, F.C.I.S.

6. We also wish to record our gratitude to the University of Manchester Institute of Science and Technology for very generously providing us with all the accommodation and facilities we needed during our preparation of this Report.

7. Having concluded the Inquiry, and considered the evidence which we heard and the submissions which were made to us, we now present this Report which we have drawn up to embody our findings and recommendations. For convenience, it is divided into 12 parts as follows:—

- I. The Concept.
- II. The Architectural Management
- III. The Structure in Detail.
- IV. The Bye-law Submissions
- V. The Tenancy and Fitting-out
- VI. The Theatre Regulations, 1923
- VII. Fire Protection and Precautions
- VIII. Origin and Development of the Fire
- IX. Factors in the Spread of the Fire.
- X. Factors in the Loss of Life
- XI. Conclusions
- XII. Recommendations

## CONTENTS

	Paragraphs
INTRODUCTION	1 - 7
PART I — THE CONCEPT	
1. The original use of the site .....	8
2. The development of the idea .....	9 - 10
3. Diagram of concept .....	11
4. Appointment of Principal and Associate Architects	12
5. The phases of the concept .....	13 - 14
6. Letting to Trust Houses Forte Leisure Ltd. ....	15
7. Time-table of development .....	16
8. Design considerations in relation to Byelaws .....	17 - 18
9. Floors, areas and levels (Table I) .....	19
10. Fitting out by Trust Houses Forte Leisure Ltd. ....	20
PART II — THE ARCHITECTURAL MANAGEMENT	
1. Appointment of Principal and Associate Architects	21 - 23
2. Chart of architectural management (Table II) .....	24 - 26
PART III — THE STRUCTURE IN DETAIL	
1. The site .....	27 - 28
2. Building access and details (Table III) .....	29 - 33
3. The Aquadrome .....	34 - 35
4. Construction of Summerland .....	36
5. Lower floors (below level 5) .....	37 - 38
6. Upper Floors (levels 5 to 8) .....	39
7. Use of steel 'V' sections and concrete .....	40
8. Use of acrylic in south wall and roof .....	41 - 42
9. Use of Galbestos in eastern elevation .....	43 - 44
10. Construction of Floors 6, 7 and 8 .....	45
11. Partitioning and roofing .....	46
12. Construction of staircases .....	47 - 48
13. Main contractors and sub-contractors (basic structure) .....	49
14. Appointment of Architects and contractor for fitting out .....	50
15. First design report to Douglas Corporation (in 1965)	51

## CONTENTS (continued)

	Paragraphs
<b>PART IV — THE BYELAW SUBMISSIONS</b>	
1. First Byelaw submission (11th October 1967) .....	52 - 53
2. Second Byelaw submission (9th July 1968) .....	54
3. Third Byelaw submission (15th February 1971) ...	55
4. Summary of relevant Byelaws .....	56 - 59
5. Waiver of Byelaw 39 (in respect of acrylic) .....	60 - 63
6. Use of Galbestos in relation to Byelaw 39 .....	64
7. Approval of Local Government Board to waiver of Byelaw 39 .....	65 - 66
8. Authority of Local Government Board to approve Byelaw waivers .....	67
<b>PART V — THE FITTING OUT OF SUMMERLAND</b>	
1. Design and construction (December 1970-May 1971)	68 - 69
2. Third Byelaw submission (15th February 1971) ...	70
3. Changes and alterations to earlier plans .....	71 - 72
4. Alterations not presented for approval .....	73
5. Contents (furnishings, equipment, partitioning, etc.)	74 - 77
<b>PART VI — THE THEATRE REGULATIONS</b>	
1. The 1923 Regulations .....	78 - 79
2. Regulations applicable to Summerland .....	80
3. Enforcement of Regulations .....	81
4. Procedure followed in the case of Summerland .....	82 - 84
<b>PART VII — FIRE PROTECTION AND PRECAUTIONS</b>	
1. Structural protection and fire precautions .....	85
2. Means of Escape (Table IV) .....	86 - 87
3. Enclosed staircases (Nos. 2 and 6) .....	88 - 90
4. Alternative exits from floors (Table V) .....	91 - 92
5. The "Fire-Fighting Party" .....	93
6. The Fire Alarm System .....	94
7. The emergency electricity supply .....	95
8. Directional signs and notices .....	96
9. The public address system .....	97



## CONTENTS (continued)

	Paragraphs
10. The "walkie-talkie" sets .....	98
11. Hose reels and extinguishers .....	99
12. Water supplies and hydrants .....	100
13. Access for appliances .....	101
14. Staff instruction and training .....	102

### PART VIII — ORIGIN AND DEVELOPMENT OF THE FIRE

1. The fibreglass kiosk .....	103
2. Burning of kiosk .....	104
3. Attempts to extinguish and the spread of the fire...	105 - 107
4. Involvement of Oroglas .....	108 - 109
5. Further spread and control of the fire .....	110
6. Times relevant to start and development of the fire	111 - 117

### PART IX — FACTORS IN THE SPREAD OF THE FIRE

1. Parts played by design, construction and staff .....	118
2. Failure by staff .....	119 - 122
3. Properties of external (Galbestos) wall .....	123 - 124
4. Relevance of Byelaw 39 to external wall .....	125 - 126
5. Properties of inner (Decalín) wall .....	127
6. Contribution to fire of concealed void .....	128
7. Decision on use of Decalín fibreboard .....	129
8. Possible effects of using plasterboard instead of fibreboard .....	130
9. Fire stopping .....	131 - 132
10. Exposure of upper floors .....	133 - 136
11. Flammability of contents (partitions, floors, etc.) ...	137 - 138
12. Fire load classifications .....	139 - 140
13. Provision of sprinkler system .....	141
14. The part played by Oroglas .....	142 - 149
15. The part played by Galbestos.....	150 - 155

## CONTENTS (continued)

Paragraphs

### PART X — FACTORS IN THE LOSS OF LIFE

1. The attributable causes .....	156
2. Organisation of evacuation procedures .....	157 - 162
3. Action taken by members of Summerland staff .....	163 - 164
4. Availability and use made of fire alarm system .....	165 - 169
5. Defects in means of escape .....	170 - 172
6. Principles of means of escape .....	173 - 174
7. Escape distances and units of exit width .....	175 - 178
8. Separation of children from parents .....	179
9. Exit from Solarium floor (level 5) .....	180
10. Obstruction of exits .....	181 - 183
11. Inadequacy of exit and directional signs .....	184
12. North-east service stairway — lack of proper protection .....	185 - 189
13. Failure of emergency lighting system .....	190 - 191

PART XI — CONCLUSIONS .....	192 - 246
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### PART XII — RECOMMENDATIONS

#### TABLES

I. — Floor areas and levels .....	19
II. — Chart of organisation of the project .....	24
III. — Schedule of Plans S1 to S9 .....	29
IV. — Schedule of stairs .....	87
V. — Schedule of exits .....	91

#### ILLUSTRATIONS

1. Diagram of concept .....	11
2. Relationship of Galbestos to terrace floors .....	107

#### PHOTOGRAPHS

1. Photograph of south face
2. Photograph of interior
3. Photograph of the fire

CONTENTS (continued)

APPENDICES

- A. Plans S1 to S9.
- B. Parties and their legal representatives.
- C. Witnesses.



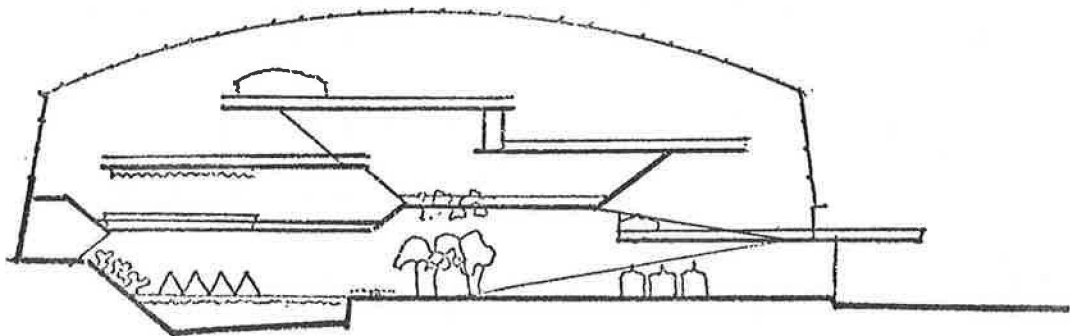
## PART I. THE CONCEPT

8. The site on which Summerland stood was previously occupied by the Derby Castle, an entertainment centre of the early 20th Century, very much part of Victorian and Edwardian Douglas. There was clearly a desire to replace this old complex of buildings by buildings which would be thoroughly up-to-date, and provide some tourist attractions which would bring back visitors to the Island. It was to be an attempt to counter the obvious attractions of the Mediterranean.

9. There is little doubt that ideas simmered in the minds of responsible people, both individually and in the Committees of the Douglas Corporation which owned the site. It would seem that some substantial credit must go to Mr. J. Philipps Lomas for the more specific ideas behind the Summerland concept which began to develop in the early 1960's. The basic idea, as referred to in evidence, was to create something of a Cornish village atmosphere and activity in an artificial Mediterranean climate, thus allowing for seaside shopping, a hillside, lounging, sunbathing, swimming and listening to the minstrels "at the end of the pier" — in fact all the fun of the fair; and all this was to be available even in the worst days of the Island's summer. It was to be a far call from the 19th Century Winter Gardens, but the concept had something of the same base.

10. Essentially the concept required a considerable enclosed volume and a great deal of transparency so that the internal spaces, shapes and movements always had the primary role, while the enclosing structure and external skin remained in the fairly remote background. The constructional world of building and architecture during the late 50's and early 60's was alive with daring new structural concepts. The famous Italian Engineer, Nervi, had produced some splendid and very advanced glass and concrete structures for Sports Stadia and Swimming Pools; the largest enclosed Stadium in the world was built at Houston, U.S.A., and the International Exhibition 1967 at Montreal had been the scene of some very exciting new structures and particularly the huge geodesic dome designed by Buckmaster Fuller for the U.S. Pavilion. There is very little doubt that techniques, materials and skills would be available to provide the kind of concept that was being envisaged.

11. Diagrammatically the concept could be portrayed like this:



### THE CONCEPT :

A simplified diagram but not representing any part of Summerland as built.

A transparent building containing a seaside "village" with terrace levels suggesting the slopes of a village street giving access to shops, kiosks, pub and amusements, and with a bathing pool, sand, trees and shrubs.

Though it had some affinity with the kind of activities expected in Exhibition buildings, the concept was very new and likely to be unique—certainly in Europe at the time of the late 1960's when it was hoped that the complex would be built and ready for occupation.

12. The firm of J. Philipps Lomas (later J. Philipps Lomas and Partners) were appointed Architects to the project in 1965 by the Corporation of Douglas. They were given the overall responsibility for the development of the design and the management of the project to the agreement and satisfaction of the Corporation. Being a resident of the Island with his architectural practice in Douglas, Mr. Lomas would have ready access to the members of the Corporation and its offices and have considerable knowledge of local criteria, problems and expectations. Mr. Lomas, as will be referred to in more detail, obtained his client's agreement to the appointment of Gillinson, Barnett and Partners of Leeds as Associate Architects. Together they produced diagrams and reports in order to solidify the ideas of the early concepts to the Corporation's satisfaction.

13. The programme for the scheme was on the basis of the Corporation developing its own site with financial assistance from the Government of the Isle of Man and on completion continuing to run and maintain the premises. Three phases were planned: (1) a swimming pool with attendant dressing rooms and bathing facilities (this will be referred to subsequently as the Aquadrome); (2) the Solarium (this being the Summerland concept already described and which will be so named hereafter); and (3) a multi-storey car park (which at the time of this report has not been built). The Aquadrome was studied, developed and built first and was opened in 1969. Its design and construction will be briefly referred to later but in the event, though some material damage resulted from the fire, it was largely saved and is expected to be in commission for the 1974 season.

14. During the construction of the Aquadrome, the concept of Summerland (Phase 2) was developing into detailed design. The original idealised concept of the village gradually changed into something more realistic into which the "rock and roll" bands, the entertainer, bingo, amusement arcades and a number of licensed bars could more easily be incorporated. The actual capital finance became an anxiety as did the possible future uncertainties of management. There were considerable delays in the finalisation of the Summerland plans while negotiations took place on finance between the Douglas Corporation and the Isle of Man Government.

15. A decision was also taken after considerable negotiation to let Summerland in the form of a constructed shell, to Trust Houses Forte Leisure Ltd., who were given the authority and the sponsibility for designing the more decorative part of the interior of the building to meet their requirements of a Leisure Centre. As a result there was an important gap in the continuity of the project between the completion of the constructional "shell" (Stage 1) by one team under the original ownership of the Corporation (which still owns the site and asic fabric) and the subsequent furnishing, equipping, servicing, decorating and manning of the building undertaken by the Lessees and carried out, in its design aspects, by another, though related, team (Stage 2).



16. The essential time-table of the development of the Summerland part of the project was as follows: —

- |  |                     |
|--|---------------------|
| 1. Appointment of J. Philipps Lomas as Architects .....  | 14th April, 1965    |
| 2. Agreement to the appointment of Gillinson Barnett and Partners of Leeds as Associate Architects ..... | 24th May, 1965      |
| 3. The first design report presented to the Douglas Corporation .....                                    | July, 1965          |
| 4. First Byelaw and Town Planning submission .....   | 11th October, 1967  |
| 5. Visits to Expo. '67 Montreal .....  | May, 1967           |
| 6. Second Byelaw and Town Planning submission .....  | 9th July, 1968      |
| 7. Work on site began .....  | 25th October, 1968  |
| 8. Sub-contract tender for steelwork by Wright Anderson accepted .....                                   | 20th November, 1968 |
| 9. Sub-contract tender for Oroglass by Lennig Chemicals through William Cox Ltd. accepted .....          | 14th July, 1969     |
| 10. Sub-contract tender for Galbestos by H. H. Robertson (U.K.) Ltd. accepted ...                        | 3rd February, 1970  |
| 11. Completion of structural and shell work  | December, 1970      |
| 12. Design and tenders for shop fittings .....   | early months 1971   |
| 13. Submission of third Byelaw plans .....   | 15th February, 1971 |
| 14. Opening of Summerland .....  | 25th May, 1971      |
| 15. Completion of shop fittings .....  | March, 1972         |

17. The above time-table of events exposes some of the complexities in the general organisation and control of the overall project. It would seem that the first project, concerned with the Aquadrome (phase 1) both in the design and construction, moved along without much incident. The Aquadrome was a fairly orthodox design of a modern type solidly built in reinforced concrete. The Phase 2 project for Summerland needed a lighter more exotic structure in which there were likely to be more technical and financial unknowns. The designers very soon recognised that a waiver of the particular Byelaws concerned with the external walls would be necessary if their wish to achieve considerable transparency was to be fulfilled and both the 1967 and the 1968 Byelaw submissions were made in the understanding of such a waiver being granted for the use of the acrylic glazed walls. The most important difference, which was of some consequence, was that whereas the main east wall of the building in the 1967 Byelaw submission was shown as concrete, this wall was changed in the 1968 application to coated corrugated steel in the interests of economy. Byelaw approval was granted on both occasions, as will be referred to later.



18. At the stage of the completion of the structural contract (stage 1) and essentially built in the form shown in the 1968 Byelaw application drawings, the Summerland Phase 2 was in the diagrammatic form shown on Section S1.

19. The overall volume of Summerland was approximately 2,564,000 cubic feet and the available floor areas were as in Table I.

TABLE I

<i>Floor No.</i>	<i>Name</i>	<i>Level</i>	<i>Gross Area (sq. feet)</i>
2.	Discotheque .....	13.00	8,894
3.	Lower Downstairs .....	24.00	25,488
4.	Upper Downstairs .....	38.00	10,080
5.	Entrance Level .....	50.75 (53.65)	32,112
6.	Marquee Showbar and Terrace .....	69.00	16,900
7.	Leisure Floor .....	84.00	13,116
8.	Cruise Deck .....	96.00	9,432

These floor areas and the necessary doors, entrances and exits and the stairs had been designed in the expectation of a complement of from 3,000 to 5,000 visitors present at any one time.

20. The fitting out by Trust Houses Forte with the assistance of their Architects required some care in the provision of additional facilities for the declared usage of the accommodation including supplementary storage, many separating partitions, staff rooms and the considerable study of the movement of crowds of people. By the nature of the project the visitors were going to be of all ages, sometimes single and sometimes in family groups. Once agreement between the owners and lessees had been reached, work on the fitting out proceeded very rapidly after a further (third) set of Byelaw plans had been submitted to the authorities. A considerable number of shop fitting specialists and equipment manufacturers were involved.

## PART II. THE ARCHITECTURAL MANAGEMENT

21. Messrs. J. Philipps Lomas and Brian Gelling accepted the appointment as principal Architects to the Aquadrome and Summerland project in 1965 and the specific terms of their appointment are set down in an Agreement dated 1st September 1965 received from the Town Clerk of the Douglas Corporation. Excerpts from this read as follows: —

“2. The Council under and by virtue of the powers contained in the Local Government Acts 1916/63 has decided to demolish all the buildings on the site and to erect thereon a covered swimming pool sports and entertainment centre remedial and other baths licensed restaurant and other amenities and to use the same as a place of public resort and entertainment (hereinafter called “the works”).

### NOW IT IS HEREBY AGREED AS FOLLOWS:

1. The Council hereby appoints the Architects as architects for the object of carrying the Council's above recited purposes into effect and the said Architects hereby accept such appointment subject to the Conditions hereinafter set forth.

2. The Architects shall examine and survey the land and premises comprised in the parcels above recited and shall forthwith prepare drawings to the requirements of the Council sufficient to gain the approbation of the Governor's Executive Council and the Local Government Board and shall submit to the Council approximate estimates of the cost of the Works based on cubic measurements.
  3. The Architects shall if and when such preliminary drawings are finally approved prepare with reasonable dispatch working drawings and a specification fully illustrating the entire project whereby to enable the Council to instruct fully an independent Quantity Surveyor to take out quantities in accordance with the standard method of measurement for an entire and lump sum contract in accordance with the standard practice laid down by the Royal Institution of Chartered Surveyors.
  7. The Architects shall give such periodical superintendence and inspection to the Works as may be necessary to ensure that they are being executed in accordance with the working drawings and specifications aforesaid. The Council will employ a Clerk of Works for daily superintendence and who will be instructed to report to the Architects".
22. Mr. Lomas recommended that the firm of Gillinson Barnett and Partners of Leeds should act as Associate Architects for the projects because of their established expertise on leisure buildings and enclosed shopping precincts and this recommendation was accepted. It was understood however that Mr. Lomas remained totally responsible to his client. Correspondence followed between J. Philipps Lomas and Gillinson Barnett and Partners concerning these distinctive roles in the project and the following excerpts are taken from a letter dated 24th May 1965 of their intended relationship: —

- "1. J. Philipps Lomas is the Architect employed by and is directly responsible to the Douglas Corporation.
2. Gillinson, Barnett and Partners will act in association with and will be responsible to J. Philipps Lomas.
4. *Division of Work.* It is presumed that Gillinson, Barnett and Partners will be generally responsible for the preparation of all drawings and details and J. Philipps Lomas will be generally responsible for site supervision. The preparation of contract documents to be the responsibility of J. Philipps Lomas. Generally, all correspondence and discussions with specialists and any appointed consultants will be the responsibility of Gillinson, Barnett and Partners, after prior agreement with J. Philipps Lomas".

Mr. Lomas's firm on the Isle of Man is small and has rarely involved more than six technical people of whom Mr. Lomas and his partner Mr. Gelling were the only two qualified as architects. The firm had undertaken no work outside the Island at the date of this project.

23. The firm of Gillinson, Barnett and Partners of Leeds is a fairly young firm, with the two named principals still in their middle forties. The firm was formed about 1954 and has rapidly grown until it is well over 100 strong and had by 1973 four offices in various centres in Britain. Mr. Barnett told the Commission that the office works within the general organisation recommended by the R.I.B.A. Manual of Practice and that all jobs have a job architect allocated, who is responsible to one of the partners. The partner concerns himself with more than one job, but remains res-



possible for the assembly of the brief and its interpretation for financial aspects of the project and for overseeing the general concept. He would wish to be kept informed about any changes in planning accommodation and quality which the job architect — dealing with the development of the design and the day to day negotiations with sub-contractors, specialists and merchants — might find it expedient to make.

24. Significant change occurred in the general control of the project when Trust Houses Forte took over as clients for the design and fitting out work of Stage 2. The chart Table II gives some indication of those changes. (See end of Section).

25. During the developments from the structural work of Stage 1 to the fitting out of Stage 2, Messrs. Gillinson, Barnett and Partners, with a new partner, Mr. Green, in control, proceeded with all the detailed work required to put specific accommodation (and therefore usage) into effect. At no time in the general organisation of the project through both phases and stages were any independent specialist consultants appointed and much specialised design was undertaken through the design offices of sub-contractors and specialist merchants.

26. The considerable correspondence concerned with the design of Summerland brings to light some of the communication problems which can result from divided responsibility, particularly in the relationships between clients and the associated architectural firms and between architectural firms and the sub-contractors who are providing some of the expertise for them. The design control at the job level went through three hands during the long progress of the design and Mr. Lomas settled all matters of the supervision of the construction in the hands of his recently-appointed partner Mr. Gelling. It was Mr. Gelling's association with the firm of Gillinson, Barnett and Partners — where he was an assistant for about six years — which brought the Leeds firm into association with Mr. Lomas.



TABLE II

SUMMERLAND PROJECT MANAGEMENT STRUCTURE

1965

1970

1972

ISLE OF MAN L. G. BOARD

Planning Committee  
Chairman, P. Radcliffe  
Chief Inspector, P. H. Newbold  
Planning Officer, J. M. Watson

Fire Services Committee  
Fire Officer, C. Pearson

DOUGLAS CORPORATION

Clients & Byelaw Authority

Finance Committee

Derby Castle Sub-Committee  
Chairman W. B. Kaneen

Works Committee  
Chairman J. J. Bell 1967  
Chairman S. G. H. Quirk 1969

Borough Surveyor L. I. Powell

PRINCIPAL  
ARCHITECTS

← J. Philipps Lomas →

← B. Gelling  
Job Supervisor →

Main Structure  
Stage I

ASSOCIATE  
ARCHITECTS

Gillinson Barnett & Partners

C. Barnett  
partner

A. Theaker  
job architect

Lennig (Rohm & Haas)  
Wm. Cox  
Robertson  
Wright  
Anderson

Parkinsons  
General Contractors

Quantity Surveyors  
Wakeman Trower & Co.

Fitting out and furnishing  
Stage II

Later  
PRINCIPAL  
ARCHITECTS to TRUST HOUSES FORTE

A. Green G. A. Owen  
partners

D. R. Byrom  
job architect

assistant  
J. Frank

Sulzer  
Woolman  
Fox  
Wardle  
Stott  
& others

Wm. Eaves  
Gen. Contractors

← K. Paxton  
Div. Director

← J. W. Dixon  
Fire Officer

Beefles  
Bertorelli  
De Lorka

Quantity Surveyors  
D. S. Leslie & Partners



### PART III. THE STRUCTURE IN DETAIL

#### *The Site*

27. The Site of the combined Aquadrome and Summerland is at the northern end of the long sweep of the Douglas Promenade about one mile from the harbour and in the Onchan district. Any building project proposal for this site has certain important constraints. The available land is limited north-south by the presence of a considerable rock cliff on the north and by the railway line of the Manx Electric Railway running alongside the main road on the south. The east-west dimension is longer and is bounded by the electric railway depot on the east and the terminus of the railway on the west. The total available site area was about two acres.

28. The ground rose from west to east along the road, though the cliff top on the north side was approximately level and had a mean height from the centre of the site of about 90 feet. The weather of the Island is very changeable and gale force winds can develop quickly and strong gusts of up to 120 m.p.h. have to be allowed for in any building calculations. The temperature at sea level rarely reaches extremes but rain showers can be strong and prolonged. Fine and warm weather can be enjoyed for long periods in a normal summer and the whole climate is clean and bracing. The site is well protected from the prevailing westerly winds but not from the less frequent southerly and south-easterly gales. Electrical, sewerage and water services were available for the site but water supply had to be augmented when final needs became known.

#### *Site and Building Access*

29. The illustrations appearing at the end of the Report show the following details of Summerland:

TABLE III

Section S1	Longitudinal Section	
Plan S2	Discotheque .....	Level 13.00
Plan S3	Downstairs .....	Level 24.00
Plan S4	Upper Downstairs .....	Level 38.00
Plan S5	Entrance (Solarium) Floor) .....	Level 50.75 (53.65)
Plan S6	Marquee Showbar .....	Level 69.00
Plan S7	Leisure Floor .....	Level 84.00
Plan S8	Cruise Deck .....	Level 96.00
Plan S9	Site and Block Plan	

30. The site clearly presented a number of problems to any designer contemplating the design of Summerland. The site lacked real freedom of access from any of its four sides. The obvious point of approach was along the Promenade from the west and this provided the easiest access of all four sides, being reasonably clear of the railway terminal. The road and the electric railway lines and wires on the south boundary and the presence of the railway are clearly inhibiting factors. To the north lie the electrical railway rolling stock sheds with lines feeding into them just beyond the south-east corner of the site. The most significant feature of the site is of course the cliff face on the north boundary, rising at an angle of about 50 degrees.



31. The evidence showed that this face was not very stable and presented a number of structural difficulties. The problem of access in these circumstances was crucial, particularly as entrances and exits for up to 5,000 visitors at any one time had to be planned for, in such a way as to overcome the obvious boundary barriers referred to above. Because all these visitors were paying, there would be immediate problems of supervision which would much influence the provision and siting of exits where these had to be separated from the main entrance. Two other access problems had to be faced. One would be the considerable requirement for staff and service entrances. The staff might number as many as 300, and service deliveries and storage would be required for all the bars, restaurants and a number of stalls and kiosks. The other would be a concern for rapid approach and services in the event of fire fighting being necessary. The solution adopted in the Summerland plans involved providing an entrance floor 'platform' at the second floor (solarium) level to which level all patrons except the visitors to the lower ground floor Discotheque had to climb. There was obviously an immediate decision to be taken about the siting of the Aquadrome which was to be the first phase of the construction and this was planned at the west end of the site and nearest to the town. This decision essentially placed the Summerland complex behind the Aquadrome, which further complicated problems of access to Summerland. The terraces at the 50.75 level (Entrance Floor) were approached either from a small dog-leg stair from the road level car park at the west end, or from a rather similar stair attached to a pedestrian ramp which was on the sea side of the Promenade and crossed the road by a pedestrian bridge. The bridge connected with the pedestrian terrace at the narrow end of the site where the terrace width was fairly restricted.

32. A joint service area for both Aquadrome and Summerland was available at road level approached across the railway lines into a re-entrant bay in the Aquadrome area but the major service area thought to be required by Summerland was planned within a service yard at the east end adjoining the railway depot. A service stair and lift were provided at the north end and later a goods receiving office was added. This stair descended from the Leisure Floor as an enclosed stair and provided an alternative exit from the public areas. It was the only staircase in the scheme that opened, within its enclosure, directly into the open air. This staircase will be the subject of later analysis.

33. It is important to note that this stair (No. 2) on both the 1967 and 1968 byelaw submission drawings referred to later, opened into an enclosed and covered yard which could have been closed by a sliding shutter and gate at its southern end. As built this yard was no longer enclosed, as the enclosing wall and gates were not constructed, but the original intention is of some significance.

### *The Aquadrome*

34. The Aquadrome part of the Derby Castle complex was designed and constructed first. Once the decision about its siting and detailed planning on the site had been taken, these factors formed considerable restraints on the later design of Summerland itself, in particular the influence that its presence had on problems of access to Summerland and the relationship



involved in the details of the party wall between the two. It is of some consequence to record that the Aquadrome remained under the direct control of the Douglas Corporation whilst Summerland was eventually leased to Trust Houses Forte Leisure Ltd. It is possible that some of the plan arrangements might have been different if this form of dual control had been foreseen at the outset. The major service control areas were planned in the Aquadrome and the main boiler house, heating plant, electrical switchgear and emergency lighting control were all located in the ground floor of the Aquadrome at the time of the fire. The staircase No. 6 was essentially an administrative stair giving access to all this plant, and as revised later in the second stage of the contract the Summerland administration offices were also approached (4 - 38.00) from this stair, which seemingly remained within the Corporation's control and was not part of the tenants' lease.

35. The construction of the Aquadrome was characteristically of re-inforced concrete, including walls and floors. There were few windows and at the swimming bath level most of the natural light was obtained from a west wall and a large acrylic roof light. Whilst the Commission has not studied the design of the Aquadrome in great detail, because it was only marginally damaged by the fire, no evidence was offered that the Aquadrome infringed in any way the local building and safety regulations.

#### *Summerland Construction*

36. The diagrammatic section of the Summerland building is shown on plan No. S1. (See end of Report). As already referred to in paragraph 19 above, there were seven main different floor levels, the plans of which are shown on illustrations Nos. S2 to S8. During the Inquiry these floors were referred to by numbers 2 - 8 and this pattern is followed in the plans now illustrated. The key floor is No. 5, the Solarium floor at 50.75 level, with a small rise to 53.65 at the east end where all the main terraces are arranged. This floor No. 5 is constructed in re-inforced concrete and the floor itself survived the fire, though practically everything above the actual floor was consumed.

#### *Lower Floors*

37. There is one main floor below No. 5. This is known as Lower Downstairs level (3 - 24.00) and is approached from Floor 5 via staircases (3 and 7) and a large balcony (4 - 38.00) which houses the administration offices, a small bar and a children's cinema; this cinema until a late stage was planned at the Solarium level.

38. Below No. 3 level, and again planned at a late stage, is level 13.00 which housed the Discotheque though this activity only occupied part of the total basement (No. 2 level) space. Illustrations Nos. S2 and S3 show the plans of these floors. They are noteworthy because they are of orthodox re-inforced concrete construction and having no windows are nearly entirely lit with electric light. Together they form a complete contrast to the construction above level 50.75. Emergency exits from these floors were rendered a little difficult because of the separate functions and control of Summerland and Aquadrome. Level 3 fortunately had direct access prac-

tically on the level to the east service area by doors Nos. 8 and 9. Floors 2, 3 and 4 were constructed within the Building Regulations but when details of the Discotheque were considered, means of escape were specifically considered and a maximum of 350 people only were to be present at any one time. All these floors, and those above, were furnished and equipped after the main contract (Stage 1) was essentially completed.

### *Upper Floors*

39. These floors include the Solarium level 5 and the three terraces — plans 6, 7 and 8 — in the eastern half of Summerland. At plan level 6 there is an additional bar at the west end called the Pool Bar, overlooking the swimming pool, originally planned as part of the Aquadrome but thereafter included in the Summerland designs. It was approached either from the spectators' terrace at level 6 or from the Solarium floor (5) up a small spiral stair. The Solarium (plan 5) provided the main "assembly" floor, approached directly from the main entrance at its west end. This entrance, the only public access to Summerland (with the exception of the Discotheque which had a separate entrance at the road level across the Electric Railway) was controlled by two pay boxes with turnstiles. Passing through these, the visitor entered a large volume rising to a glazed roof 67 feet high above the Solarium floor. Immediately to the right, adjoining the completely glazed south front, was an escalator rising to a first floor terrace providing the most usual access to the upper levels. Across the main full height Solarium floor and up short flights of stairs rising about 3 feet was the first terrace, accommodating at the north end a terrace bar and restaurant and at the south end an Amusement Arcade (all shown on plan 5). Various service rooms were planned on the eastern side of this level.

40. An essential feature of the building was the continuity of the rock face which, nearly totally, formed the north wall of both Summerland and Aquadrome. The basic structure of Summerland was formed of large steel V sections rising from the reinforced concrete structure of floor 5 and the floors below. This steelwork formed a strong V pattern grid, dominating the structure on the south face, and echoed by a similar pattern near the rock face. The steel pattern is less simply planned where the multi-storey terraces (levels 6, 7 and 8) intervene and a mixture of V frames and more orthodox stanchion and beam construction was designed to support these floors. Earlier some of the terrace structure was designed as reinforced concrete but the final structure was steel, supporting wood floors.

41. The main south face of Summerland was formed of acrylic dome panels 6ft. x 6ft. with a "diamond" profile patented as Coxdomes and supplied by William J. Cox Ltd. from the acrylic material known as Oroglas marketed by Lennig Chemicals in Britain under the authority of Rohm and Haas of U.S.A. This wall surface involved a continuous pattern of 252 domes below the gutter giving an uninterrupted wall of 212ft. x 42ft. The domes were supported on aluminium frames supported on light steel angles in turn fixed to the main V frames. Acrylic has a high coefficient of thermal expansion — of approximately .00004 per °F. at 60°F. — and some care had to be taken to allow freedom of movement inside the aluminium frames. At the high level the domes abutted a large horizontal gutter of fibreglass above which was the essential light steel framework supporting the glazed roof.



42. The roof was entirely glazed with Oroglas similarly supplied by the above firms, but this time in the form of shallow domes planned to run into fibreglass gutters running from north to south. The extent of this roof, which covered all but the eastmost bay of the building, covered both the public terraces and the whole of the large volume of the Solarium. It had the same horizontal length as the acrylic glazing of the south wall below.

43. By contrast the eastmost bay of the south face was solid without any glazing at all, as was the whole of the eastern elevation. Externally, in the first Byelaw plans of 1967, this construction was planned as reinforced concrete, ostensibly similar to the construction below entrance level, and at that time acrylic clerestory lighting was shown.

44. In the later Byelaw plans of 1968 (and as actually built) this construction was much simplified, in the interest of cost according to the evidence, and a coated corrugated steel sheet was supplied by H. H. Robertson (U.K.) Ltd. under the patent name of Galbestos. This is a material much used for external faces in industrial work and can be obtained with various contours and finishes. Galbestos was specified as Colour Galbestos, coated both sides, because at the time of the order it was not known how the eastern end of the building was going to be furnished and finished, and it was expected that some of the Galbestos walls inside would be left as a single sheet and uncovered. The Galbestos sheets were supported on steel angle rails supported in turn on the main steelwork. (See detail showing relationship of external Galbestos to Terrace floors following paragraph 106).

45. The terrace floors at 6, 7 and 8 levels were all constructed of timber supported on intermediate and main steelwork. This involved softwood joists supporting one inch softwood floors. This construction was unusual for a building of this kind, but in the evidence it was explained that the construction permitted a great flexibility in the later planning of subdividing partitions and that it was lighter and cheaper. In order to provide sufficient resistance to fire, the underside of these floors and all the steel supporting them were required to be sprayed with Limpet asbestos to provide as required two hours fire resistance. There is no doubt that this sprayed asbestos was actually applied and there are many remains of it to be seen. The actual relationship of corrugated steel, steel stanchions and beams and infill wood floors presents a great problem in filling completely with a sprayed material. The floors move due to changing loads and the walling due to thermal expansion. The dimensions across the infilling of the voids vary considerably and much of the continued support of sprayed material depends upon adhesion between surfaces which may suffer differential movement. In any case, the nature of spraying involves nearly complete reliance upon the operators on the site. This is explained here, because there is ample evidence that the fire stopping both horizontally and vertically as required by the Byelaws was certainly not complete in the months before the fire, though it may have been originally.

46. At the Stage 2 of fitting out, a considerable amount of partitioning was carried out, some of which was parallel to the inner face of the Galbestos and presented a number of hazards which will be referred to later. The roof immediately over the Galbestos walling on the eastern end, and at a



slightly lower level than the Oroglas roof, was covered with three-ply bituminous felt on boarding. A similar roof was constructed between the northern edge of the Oroglas roof and the cliff face supported again on timber joists on steel beams. This roof was pierced at intervals by acrylic dome lights. The west face of the Solarium where it joined the Aquadrome, and above the roof level of the Aquadrome, was constructed of transparent Oroglas exactly similar to that of the south face. Where this wall, below, was shared with the actual swimming pool, it was of glass to allow a clear view of the pool. Six doors could be opened in this glazed wall, but were usually locked because of the separate tenancies. This wall was not designed as a fire resisting party wall, although the Aquadrome and Summerland were under different management control.

47. All the staircases leading from the Solarium level downstairs to the Upper Downstairs level (4 - 38.00) were constructed in reinforced concrete. Two of these stairs, the north-east service stair (No. 2) and the administration stair came from above and were enclosed. The north-east service stair (No. 2) descended from the Leisure level (7 - 84.00) down to the east service yard, therefore serving all floors, but excluding the topmost floor — the Cruise Deck (8 - 96.00). The administration stair descended from the Pool Bar level, served three levels and opened into the service accommodation of the Aquadrome.

48. The other two stairs which had open access from the Solarium — the north (Carousel) stair and the west (Cinema) stair — were also constructed in reinforced concrete. Both these stairs descended only to the Upper Downstairs (4 - 38.00). The main "flying" stair (No. 1) rose from the Solarium to the Marquee Showbar floor (6 - 69.00) and onto the Leisure floor (7 - 84.00). This stair was a completely open stair constructed of hardwood open treads on steel bearers. Two similar stairs led from the Leisure floor (7 - 84.00) up to the Cruise deck (8 - 96.00). There was no enclosed stair at this level. One further stair was added at a very late stage of the fitting out of Summerland. This was a (so-called) rustic stair approached by a wooden gangway from the Garden Bar at level 6 which ran westwards parallel to the cliff face and the stair, which was also made of timber, descended to the Solarium floor (level 5) just west of the north stair (St. 3). It was built at the request of the Chief Fire Staff Officer and is not to be found on any of the three Bye-law submissions. All the stairs referred to above are further scheduled on Table IV in Part VII.

49. With the exception of this rustic stair, all the structural work described in this chapter was practically completed under the control of J. Philipps Lomas as a result of a negotiated contract with Parkinson's Ltd. of Douglas. This company was already on the site building the Aquadrome under Phase 1. This structural contract was started in late 1968 and included the sub-contracts for the steelwork by Wright Anderson, the Cox-dome acrylic panels by William Cox and the Galbestos cladding by H. H. Robertson. Some of the final work under Parkinson's contract was delayed because of lack of information about details of furnishings and fitting out and the contract was terminated in December 1970 after omissions had been measured. This curtailment and early completion of the contract were attributed to the long drawn out negotiations between the owners, Douglas Corporation, and the prospective lessees for Summerland, Trust Houses Forte Leisure Limited.

50. At the time of completion of the first (structural) stage of Summerland, therefore, practically all the furnishing and fitting out work had still to be done. Within the Trust Houses Forte agreement with the Douglas Corporation, all this was to be done under the authority of Trust Houses Forte and to their requirements. With the exception of plumbing and drainage work, the further design and construction had to include all electrical, heating, hot water and ventilation services. For this work, Trust Houses Forte appointed Messrs. Gillinson, Barnett and Partners as their Architects and Wm. Eaves as their Building Contractors, and in due time the third Bye-law application plans to cover this work were submitted in February 1971 to the Douglas Corporation and to the Isle of Man Local Government Board.

51. The first design report prepared jointly by J. Philipps Lomas and Gillinson, Barnett was presented to the Douglas Corporation in July 1965. It included both the Aquadrome and Summerland (as it later became known). Thereafter nearly all the early design work and negotiations were concerned with the Aquadrome with which this report is only marginally concerned. However, the actual sequence of events which was conditioned by the early building of the Aquadrome had some influence on the later development of the designs for Summerland itself. This early report of July 1965 shows that the Architects had at this stage practically decided that acrylic "glazing" was a fundamental choice for the south wall and the roof of the Solarium if the basic concept was to be satisfactorily developed.



#### PART IV. THE BYE-LAW SUBMISSIONS

52. In October 1967 Messrs. J. Philipps Lomas submitted the first of three applications for Bye-law approval, in respect of the design of Summerland.

53. The application of 1967 was illustrated by plans Nos. 655/177A - 185A which had some important differences from the description already given of the building. Orogas was specified for both the south wall and the roof. The last bay (east end) of the south wall and the whole of the east wall, however, was shown as reinforced concrete with clerestory windows at the high level of each of the terrace decks. The floors of the terrace decks at 6, 7 and 8 levels were of hardwood joists supported on reinforced concrete main beams. The drawings were not very clear; there was a rather serious error in that the plan 181B showed the 6 level floor as being solid six inches reinforced concrete slabs whereas the section 183A showed this floor (correctly) as skeleton R.C. framing with wood floors. There were no dimensions and only minimal detail on the drawings.

54. The second Bye-law application was dated the 9th July, 1968, and was accompanied by revised drawings. During the design period between these two Bye-law submissions there had obviously been a number of considered design changes, most of which had been adopted in order to simplify the design and make economies because of rising costs. The most important of these revisions were as follows: —

- (a) The reinforced concrete walling planned for the west end of the building and forming the external wall to the Solarium and terrace levels 5 - 8 was replaced by a single skin wall of Colour Galbestos. The clerestory windows in this wall in the earlier submission were omitted and the Galbestos wall was entirely windowless, though there were seven ventilators at each floor level. The wall below level 5 (50.75) remained as reinforced concrete.
- (b) A similar revision was made to the last (eastmost) bay of the south elevation which had previously been reinforced concrete.
- (c) The roof height was lowered as a result of protests from residents of Strathallan Road.
- (d) The complicated geometry of the earlier acrylic roof design was changed and simplified. This roof now became a series of continuous acrylic dome lights running north to south on a low pitched light steel framework.
- (e) The original reinforced concrete columns and beams designed to support the timber floors of the terraces 6, 7 and 8 were changed to steel duly covered with Limpet asbestos.
- (f) The original provision of double escalators serving the terraces from level 5 to 6 and from 6 to 7 were omitted and replaced by the "flying staircase." Only one escalator from level 5 up to the spectators' terrace remained.



- (g) The solar dome was included at the level 7 (84.00).
- (h) The terrace outlines on plan, particularly those associated with the 50.75 (5 level) were much simplified and one terrace at 53.65 level was substituted.

There is no indication in the formal correspondence that the above considerable alterations had occasioned any particular discussion or anxiety.

55. There was to be in 1971 a further application which dealt with some of the fitting out by Trust Houses Forte and this will be referred to later. The essential structure of Summerland was, however, eventually completed in accordance with the 1968 plans.

56. The relevant Building Bye-laws in the Isle of Man are the "Bye-laws with respect to buildings and new streets" made in 1963 by the Isle of Man Local Government Board under the authority of the Local Government (Building Bye-laws) Act, 1950. Section 3 of that Act confers on Douglas Corporation as local bye-law authority, power in any particular case to "suspend, alter or relax the requirements of the building bye-laws or dispense with compliance therewith." This power of waiver, as it has been called, is exercisable only with the consent of the Local Government Board. Section 3 further provides for the giving by the local authority of notice of the proposed waiver in such manner and to such persons, if any, as the Local Government Board may direct and that the Board shall not give their consent to the waiver before the expiration of one month from the giving of the notice.

57. Bye-law 39 requires (omitting what is irrelevant to Summerland) that the external walls of any building shall be non-combustible throughout and have a fire resistance of two hours. The use of either Oroglas or Colour Galbestos for the external walls of Summerland would contravene this Bye-law. Neither of these materials complies with the requirement as to non-combustibility or the requirement as to fire resistance.

58. Bye-law 50(1) requires that in every public building the roof shall be "so covered as to afford adequate protection against the spread of fire into the building or to adjoining buildings." The extensive and unprotected use of Oroglas in the roof of Summerland would contravene this Bye-law. It was suggested in the course of the Inquiry that the provisions of Bye-law 50(1) would be complied with if a building was so isolated from other buildings as to provide adequate protection against the spread of fire into the building or to other buildings. Having regard to the special and separate provisions of Bye-law 50(2) and 50(4), which do not apply to public building, we consider this proposition to be untenable.

59. Bye-law 47 provides that in any cavity wall built wholly or partly of combustible material, the cavity between any leaves formed of or containing combustible material shall be fire stopped at the junction of the wall with any other wall or with any floor, ceiling or roof and at intervals of not more than 15 feet. As Summerland was ultimately fitted out, there were voids or cavities formed between the Colour Galbestos and interior

partitioning constructed of fibreboard or plasterboard; but we agree with the view expressed by Mr Powell, the Borough Engineer and Surveyor of Douglas Corporation, that this feature did not constitute a "cavity wall" within the meaning of the Bye-law. However, it was a very similar feature to a cavity wall from the point of view of fire danger and the principle of the Bye-law applied equally strongly as a matter of ordinary prudence and good practice.

60. When the 1967 plans were submitted to Douglas Corporation for Bye-law approval, it was appreciated that the use of Oroglas in the walls of Summerland would not comply with Bye-law 39, but the Borough Engineer advised the Works Committee of Douglas Corporation that it was a proper case for waiver of the Bye-law with the consent of the Local Government Board. Unfortunately, at this stage, and for a long time afterwards, the Borough Engineer and the Works Committee were imperfectly informed about the properties of Oroglas. According to the Borough Engineer, he had been orally informed by Mr. Lomas the Architect of the Corporation that Oroglas was non-combustible and that it was not fire resistant because it would soften, melt and fall out if exposed to the heat of fire. If Mr. Lomas gave Mr. Powell the impression that Oroglas was non-combustible, it is difficult to understand how he permitted himself to do so, for Mr Lomas was well aware that Oroglas is combustible. However, Douglas Corporation proposed to waive Bye-law 39 on the basis that Oroglas was non-combustible but not fire resistant and applied to the Local Government Board for consent accordingly, as appears from the Borough Engineer's letter to the Local Government Board dated 7th November, 1967. With this letter was enclosed a copy of a supporting letter dated 3rd November from Mr Lomas to the Borough Engineer, paragraph 5 of which states 'the enveloping structure is in fact an acrylic glazed space frame, no part of which is combustible, but both the acrylic sheets and the alloy framing cannot be regarded as fire resistant.' We found Mr. Lomas's explanation of this letter unconvincing and we prefer the evidence of Mr. Powell.

61. There was no proposed waiver or application for consent in respect of the Oroglas roof. Mr. Powell erroneously formed the opinion that there was no contravention of Bye-law 50 by the use of Oroglas, but he based this opinion, at least partly, on his belief that Oroglas was non-combustible.

62. The application for waiver was duly considered by the Planning Committee of the Local Government Board to which the Board had delegated its functions in relation to applications for consent to waiver of bye-laws. The Planning Committee obtained the views of the Chief Fire Staff Officer on the proposal. By a letter to the Committee dated 15th November 1967, the Chief Fire Staff Officer made it clear that Oroglas afforded no fire resistance and was also combustible, but he concluded: "Since the complex does not present an exposure hazard to any other building and since there is unlikely to be any interference with the means of escape, I raise no objection to the suggested construction." The Committee did not further consult the Chief Fire Staff Officer or communicate with Douglas Corporation but on 17th November consented to waiver of Bye-law 39. Their decision was incorporated, in accordance with their normal procedure, in a standard document which notified their decision as Planning



Committee to permit building development. The document refers to the application made and the plans submitted on behalf of Douglas Corporation and concludes: "this approval shall have the effect of suspending Bye-law 39 of the Building Bye-laws made under the Local Government (Building Bye-laws) Act 1950 to the extent necessary to give effect to this approval."

63. It should be observed that the application and plans referred to complied with Bye-law 39 in all respects other than in the use of Oroglas in external walls. To that extent nothing more was agreed than Douglas Corporation had asked; but Douglas Corporation had asked for consent to waiver of one requirement of the Bye-law (fire resistance) and the Local Government Board, by its Committee, had intentionally consented to waiver of both requirements without intimating in any way to Douglas Corporation that consent had been given on a wider basis than that of their application. Mr. Bell, who was Chairman of the Works Committee of Douglas Corporation in 1967, told us that he believes that if they had been informed that Oroglas was combustible, the Works Committee would not have agreed to a waiver of Bye-law 39. If he is correct in this belief, it is the more unfortunate that there was such lack of inter-communication between the two Authorities.

64. The 1968 plans showed Colour Galbestos in place of reinforced concrete in the external walls of the Solarium and terrace at the east end of the building. Mr. Powell was aware that Galbestos would not comply with the requirements of Bye-law 39 both as to fire resistance and non-combustibility, but he considered it an adequate material in all the circumstances. We accept that he advised the Works Committee that it would be appropriate to waive the requirements of Bye-law 39 in relation to the Galbestos, although the Chairman, Mr. Kaneen, does not now recall it. We accept that the intention of Douglas Corporation was to ask the Local Government Board for consent to such a waiver but it never did so. What happened was that Mr. Gelling, on behalf of Douglas Corporation, had already submitted a planning application to the Planning Committee and the Local Government Board in respect of the new plans. This application was accompanied by plans and particulars which clearly showed that it was proposed to use Galbestos in the construction of the east wall and this fact was appreciated by the Planning Committee. However, there had been no specific request for consent to any waiver of Bye-law 39 in respect of Galbestos and the Committee considered the application exclusively from the general planning point of view, which included the appearance, but not the fire resistance or combustibility, of Galbestos. On this occasion no advice was sought from the Chief Fire Staff Officer, who did not see the new plans or proposals.

65. On 16th August 1968, without any intervening communication with Douglas Corporation, the Planning Committee approved the proposals in the new plans and application and on 20th August issued a notification of its approval in a document in the same form as that of 1967, referring to the new application and plans and incorporating as before the statement "this approval shall have the effect of suspending Bye-law 39 of the Building Bye-laws made under the Local Government (Building Bye-laws) Act



1950 to the extent necessary to give effect to this approval." We accept the evidence of Mr. Radcliffe, the Chairman of the Local Government Board and Chairman also of the Planning Committee, that it was not in fact intended to give consent to a waiver of Bye-law 39 in relation to Galbestos. All that was intended was to confirm the consent formerly given in relation to the use of Oroglas. However, there was no such restriction stated in the document and it was understood by Douglas Corporation and the Architects as referring both to the Oroglas and the Galbestos which were shown in the plans and particulars.

66. Thus in 1967 Douglas Corporation were given more than they intended to receive and in 1968 they received more than it was intended to give them. They acted on their own belief and on 29th August 1968 issued a notice of Bye-law approval of the new plans, waiving the application of Bye-law 39 by reference to the decision of the Planning Committee.

67. The origin of the exercise by the Planning Committee of the functions of the Local Government Board under Section 3 of the Act of 1950, though no doubt lawful, is obscure. The situation is further clouded by Article 8 of the Town and Country Planning (General Interim Development) Order of 1936 which provides:

"The Board may approve of any application for development notwithstanding that the proposals are not in conformity with any . . . . . Bye-law . . . . . of any local or other authority and such approval shall have the effect of suspending such . . . . . Bye-law . . . . . to the extent necessary to give effect to such approval, but before giving their approval in such cases the Board shall confer with such local or other authority."

We were invited, on substantial grounds, to determine that Article 8 is ultra vires the Statute under which it purports to have been made. We think that such a determination would go far beyond the competence of this Inquiry and happily it is not necessary for the Commission to express any view about it. It was made plain to us by the evidence of Mr. Radcliffe that the Committee was not on either of the occasions with which we are concerned acting under Article 8 and they certainly did not confer with Douglas Corporation before giving their approval.

## PART V. THE FITTING OUT OF THE BUILDING AND ITS COMPLETION FOR OCCUPATION

68. The evidence suggested that there was a considerable delay between the work on the design of the structure and carcass of Summerland and the real start of the work of the designing of the interior. This was evidently occasioned by protracted negotiations which were taking place between the owners, Douglas Corporation, and the prospective lessees, Trust Houses Forte Leisure Ltd. It is probably of some significance that this large company was undergoing a major reorganisation change at that time, with all the disturbance this causes to management. It is necessary to recall also that at this stage Messrs Gillinson Barnett, until this time associate Architects, became principal Architects for Trust Houses Forte and Messrs. J. Philipps Lomas and Partners were no longer responsible and it would seem, had no further formal agreement with Gillinson Barnett. Mr. Gelling however appears to have given some later ad hoc supervisory help.

69. The structure of Summerland was practically completed before the Lease for the Tenancy was duly agreed and signed on 14th December 1970. It required Trust Houses Forte to so furnish and complete the premises to provide suitable facilities for holiday makers and conferences, etc. The building in December 1970 was only a weatherproof "skeleton," with practically no subdivided spaces other than lavatories and the north-east staircase. There were no services except plumbing and drainage. It was obvious therefore that a very considerable design and construction task remained to be done. Understandably too, Trust Houses Forte were keen to open for business during the forthcoming summer season of 1971. In a matter of a few months therefore the Architects were required to design all the interiors and to negotiate for considerable service sub-contracts. Among these last were sub-contracts for the following:—

Heating and Ventilating	— Sulzer
Electrical Installation	— Woolman
Interior Decoration	— Hughes
— ditto —	— Fox Bros.
— ditto —	— Stotts
Sound Equipment	— Pye
Shop Fitting	— Wardle
Glass	— Pilkington

and many others, under contract to Messrs. Wm. Eaves, general contractors.

70. Nearly all this work of designing, initiated by the Architects and approved by the clients, was telescoped into a very short period between December 1970 and the opening date of 5th May 1971. It involved work in excess of £400,000, nearly all of which came as very special units from the Mainland. There is no doubt that it stretched the limits of resources of all concerned and many decisions must have been taken with insufficient care and investigation. On 15th February 1971, the third Bye-law plans were submitted on behalf of Trust Houses Forte Leisure Ltd. to the Isle



of Man Local Government Board. These were new plans, Nos. 1038/35-41, and essentially they were concerned with the fitting out of the premises including the necessary subdivisions for particular activities. Thus, the necessary partitions required to create the Restaurant and the Amusement Arcade on the Solarium (5) floor were indicated and the necessary enclosure of the Beer Hall (floor 6) which became known as the Marquee Showbar were also indicated.

71. Other matters of some consequence in the later discussions about the fire were also to be seen on these 1971 plans, though there was little reference to these changes during the evidence except that concerned with the north-east stair. This change was in the elimination of the original east end wall which was inside the external Galbestos wall, and at right angles to the flight of steps. Instead, the stair was planned to use the splayed line of the Galbestos wall itself as an external end wall.

72. Other changes were the omission of the original closed yard at the east end of the building and the placing of the Administration Offices downstairs at level 4, approached from the administration stair (No. 6). A small administration office had previously been shown close to the main entrance. A new entrance to the Discotheque from King Edward Road was designed. At the time of this 1971 submission the level 8 (which became the Cruise Deck) was shown to be used for Television. The plans gave no particulars of the proposed wall linings nor the actual details of the many partitions. There were no references either to false ceilings which were later erected.

73. A number of later alterations were made to the premises whilst in occupation which were never presented for approval. Among them were the building of the Rustic Walk and the stairway leading from the Garden Bar (level 6) down to the north-west corner of the Solarium (level 5). The elimination of the outside steps from the Mini Golf Terrace to the lower public terrace, and the cutting of a new doorway in the enclosed north-east stairway just behind the Marquee Showbar, were also not brought to the attention of the authorities.

74. The Commission asked, in vain, for an inventory of all the furniture, equipment, curtains, carpets and all the incidental decor that might have been seen at Summerland before the fire. In these circumstances, we have had to rely upon specific evidence when referring to particular accommodation, as exemplified by the Amusement Arcade and Marquee Showbar, and on the considerable number of coloured photographs of the interior made available to us. Later reference will be made to the fire loads resulting from the considerable accumulation of combustible material, but this was probably not excessive when related to the highly colourful and flamboyant atmosphere that the designers were trying to produce — fairly cheaply. Thus there was a considerable use of plasterboard partitions on softwood studding and exposed timber and plywood. In the case of the Amusement Arcade (level 5) the exposed lining of the walls was Decalin, and the room housed a number of slot machines and a long bench for bingo. There were evidently many prizes on display.



75. In the adjoining Restaurant (level 5) there was a highly decorative ceiling involving hanging units and light fittings and this restaurant could be partitioned off by a sliding partition largely constructed of hardwood and perspex. The Solarium itself was largely an open space normally filled with deck chairs roughly facing a (removable) stage. The Marquee Showbar was enclosed from the Solarium by a very decorative painted partition of a double sandwich construction which was 10" thick and involved — from inside to outside — a plaster skim, plasterboard, glass fibre insulation, 4" x 2" studs, plasterboard, 4" x 2" studs, glass fibre insulation, plasterboard and skim. This design provided a sound resisting partition so that the noise from the Solarium and Amusement Arcade did not interfere with the quite separate noise within the Marquee Showbar itself. It would seem that this was not entirely effective because of the gap which existed between the edge of the floor and the continuous Oroglass wall. Later, a polythene curtain was installed to try to reduce the Amusement Arcade noise. The Marquee Showbar had a series of red material marquees hanging from the ceiling, and the intruding steel stanchion was cleverly camouflaged by a ciment fondu "tree", part of which — significantly — survived the fire.

76. On the Leisure floor (level 7) there was a series of partitions to form rooms for changing for the Sundome, which was an entirely enclosed space with a fibreglass convex "roof" in which the sun lights were fixed. Devotees evidently lay on polystyrene filled cushions. We understood that many of the partitions were of painted plywood on timber studding. The whole unit with its paybox control and its changing rooms was secluded, remote, and from a fire point of view, very suspect. Above, at Cruise Deck level 8, there was no use specified at the time of opening and only later was the terrace planned for deck games and table tennis.

77. A considerable amount of apparatus and equipment could have been seen on the floors below the concrete floor of the Solarium — Upper and Lower Downstairs and the Discotheque (levels 4, 3 and 2) — but these were not affected by the fire and we have not sought any detailed particulars. Much of the contents was damaged by water and was not of course available for our inspection. In making this comment, however, it should not necessarily be assumed that we believe these levels, in different circumstances, to be free from fire risk.

## PART VI. THE THEATRE REGULATIONS

78. The only general fire safety regulations applicable to Summerland were the Theatre Regulations of 1923 made by the Local Government Board under the authority of the Local Government Consolidation Act 1916 and the Local Government Amendment Act 1922. The regulations applied to Summerland because the definition of "theatre" in the Act of 1916 includes "any music room or other place of public resort containing a superficial area of not less than 500 sq. ft. to be kept open for public dancing, music or public entertainment of the like kind".

79. A comparatively recent statute, the Local Government Act, 1963, extends the definition of "theatre" to include "every building . . . not being or being part of a private house, to which the public are admitted for any entertainment whether for payment or otherwise," but no further and more general regulations have yet been made. This is regrettable because it is very obvious, even on a casual reading of the current Regulations, that they are primarily designed to apply to the ordinary conventional type of theatre, and that many of their provisions are entirely inappropriate to a building such as Summerland and to many other buildings within the definition of "theatre." By virtue of Section 241 of the Act of 1916 the Board is empowered to alter, vary and amend their existing regulations as they may think expedient and from time to time in any special case to dispense with or modify the regulations or "annex thereto conditions if they think it necessary or expedient so to do." This right of the Board to deal specially with any particular case is expressly reasserted in the Regulations of 1923. Thus in any case where the Regulations are inappropriate to a particular building, the Board has full power to deal adequately with the situation by making appropriate special stipulations as to safety. However, it can only do so effectively if careful, cautious and expert consideration is given to the fire risks of the particular building. This situation could create something of a trap for the Board or its officers if special precautions have to be improvised without the guidance of a prescribed and appropriate code.

80. Among others, the following provisions of the Regulations of 1923 were applicable to Summerland unless modified or dispensed with on the authority of the Board:—

REGULATION 1 deals with application for a Certificate without which, under Section 242 of the Act of 1916, the operation of a theatre is unlawful. The Regulation provides that the applicant shall give the Board notice in writing of his application, accompanied by plans of every part of the proposed "theatre." At the same time the applicant must supply a detailed statement of the respective number of persons proposed to be accommodated in the various portions of the building. This is a very useful provision because it directs the minds of all concerned to the adequacy of the means of escape in case of fire.

REGULATION 2 provides that the building shall be constructed of such material and of such strength as may be approved by the Board.



REGULATION 8 provides that the staircases and the floors of the passages, lobby, corridors and landings shall be of fire resisting materials. Every staircase for the use of the audience shall be supported and enclosed by walls built of brick, stone or other approved incombustible material. No staircase or internal corridor for the use of the audience shall be of less than five feet and every staircase or corridor for the use of the audience which communicates with any portion of the house intended for the accommodation of a larger number than 400 shall be increased in width by six inches for every additional 100 persons until at least a width of 7 feet 6 inches has been obtained. Every staircase must have strong handrails securely fixed on each side.

REGULATION 9 provides that where a portion of the audience is to be accommodated over or at a higher level than others of the audience, a separate means of exit of the width previously described for staircases and connecting directly with the street or other open space shall be provided from each floor or level.

REGULATION 10 provides that all doors specified by the Board shall open outwards and shall only be fastened by means of an automatic bolt of a pattern approved by the Board's Inspector. The method of opening such doors must be approved by the Inspector and the method of opening must be clearly indicated upon the doors.

REGULATION 24 provides that the regulations as to fire shall be kept always posted in some conspicuous place so that persons belonging to the theatre may be acquainted with their contents.

REGULATION 25 gives the Board power to require the appointment of attendants to act as firemen. These firemen shall examine the exits, staircases and fire extinguishing apparatus before every performance.

REGULATION 31 provides that all exits shall be plainly indicated by a sign and kept always conspicuous and in good condition.

REGULATION 32 gives the Board's officers the right of admission at all times to all parts of the building during the time of any performance or at any other time upon reasonable notice being given to the Manager.

81. For many years the Local Government Board, through its Fire Services Committee, has delegated the enforcement of the Theatre Regulations to its Technical Officers. As the Chairman Mr. Radcliffe pointed out in evidence, fire precautions are a technical matter and the individual members of the Board have no specialist qualifications for this type of work. However, delegation went rather far. In June 1966 the Board accepted the recommendation of the Fire Services Committee that inspection for the purpose of issuing Certificates under the Theatre Regulations should be carried out by the Chief Fire Staff Officer. In practice the Chief Fire Staff Officer has been given the full responsibility not merely of inspection, but also of deciding whether or not a certificate should be issued. Mr. Radcliffe agreed that in and after 1967 no preliminary reports were made by the Chief Fire Staff Officer to the Fire Services Committee.



If, after inspection, the Chief Fire Staff Officer thought it right for a certificate to be issued, he recommended accordingly, and a certificate was issued. Certificates are issued annually.

82. The procedure which was followed is well illustrated by the case of Summerland. Application for what was called a "Theatre Licence" was made in a letter dated 4th June, 1971, to the Local Government Board from a firm of Advocates in Douglas and the Board sent a copy of the letter to the Chief Fire Staff Officer for appropriate action. In at least two important aspects this application did not follow the procedure laid down by Regulation 1. (a) No plans were submitted with this application and, as has already been mentioned in this Report, the Chief Fire Staff Officer had not seen the plans of 1968. He had, however, made several inspections of the building after completion of the shell at the end of 1970. He had also had consultations and correspondence with the architects for Trust Houses Forte Leisure Limited, and had required certain additional work to be done for the purpose of fire precautions. (b) A statement of the number of persons to be accommodated in the various portions of the building was not supplied with the application. No such statement ever was supplied and the Commission has heard various differing estimates of the number of persons for whom this building was designed.

83. On 8th July, 1971, the Chief Fire Staff Officer wrote to the Administrator and Secretary of the Local Government Board as follows:—

"There is a good deal of work still to be done before it can be said that all safety requirements have been met. However, urgent steps are being taken to ensure completion and in order that the opening of the Complex should be legalised, I recommend that the certificate of fitness be issued now.

I recommend that this be accompanied by a letter making it clear that its issue is conditional upon all safety requirements being completed without delay."

On 9th July, 1971, the Administrator and Secretary issued a Certificate with a covering letter in the terms suggested by the Chief Fire Staff Officer. The Certificate itself stated, contrary to the facts, that the building, known as Summerland, complied with the Regulations of 1923. So far as the document was concerned, none of the regulations was modified or dispensed with for Summerland nor were any special conditions imposed as to fire precautions. The same applies to subsequent certificates.

84. In making up his mind whether or not to authorise a Certificate in respect of Summerland, the Chief Fire Staff Officer did not really apply the Theatre Regulations at all. He said in evidence that he does not know how these regulations can be applied to a building which is not strictly a theatre, and it must be conceded that his difficulty is understandable. What he did was to apply to Summerland what he considered to be the appropriate practical commonsense standards of safety. He satisfied himself that such standards of safety were provided and accordingly he authorised the issue of a Theatre Certificate, without perhaps realising the inappropriate terms in which this certificate would be expressed.

## PART VII. FIRE PROTECTION AND PRECAUTIONS

85. We should make it clear that when we deal in this Report with the protection of buildings against fire and its effects, we are concerning ourselves only with those measures which are designed to ensure the personal safety of the public. As we understand, the requirements imposed by law for public safety against the risk of fire in buildings are of two main kinds, as follows:—

### 1. *Structural Fire Protection*

This has the general objective of public health and safety and is usually imposed at the plan stage by means of byelaws or building regulations, so framed as to ensure:

- (a) the prevention or retardation of fire spread within the building so that a fire will not become uncontrollable and thus lead to the collapse of the building, and
- (b) the prevention of fire spread from one building to another so that a general conflagration in the locality is avoided.

The main systems used for achieving these two aims include: compartmentation within buildings, i.e. the division of the building into compartments with fire resisting separation between them; other requirements for fire resisting construction, including fire resisting external walls; separation between buildings, either by separating walls or by adequate distance; specified forms of construction for roofs, so that the ingress of fire is resisted; and the choice of materials and structures with specified performance characteristics in fire.

### 2. *Fire Precautions*

These are designed to protect the occupants of a building in the course of its everyday use by ensuring that in the event of fire they will be able to make their way to a place of safety by their own unaided efforts, and that they will be protected against the effects of fire and smoke until they have done so.

These requirements may in turn be placed under three main headings, viz: —

- (a) structural precautions such as means of escape, i.e. passages, corridors, stairways and exits, so arranged, and if necessary protected, that safe escape will be assured;
- (b) physical precautions, such as fire alarm systems, fire-fighting equipment, directional signs and emergency lighting;
- (c) organisational precautions such as fire routines, evacuation procedures, the training of staff and the holding of drills and practices.

Some of these precautions, particularly those having a structural nature such as means of escape, may be imposed in combination with structural fire protection requirements at the plan stage (as in the Scottish Building Regulations and, in part, in the Building Regulations for England and Wales). In addition, however, most public buildings operate under legislation laying down conditions which must be complied with if the public are to be admitted, and various fire precautions are imposed by such legislation. The Theatre Regulations of the Isle of Man are an example.

In this Report, the requirements in the Isle of Man for structural fire protection and the Theatre Regulations have been dealt with in Parts IV and VI. The following paragraphs describe the fire precautions existing at Summerland before the fire.

#### *Means of Escape in Case of Fire*

86. No schedule of the means of escape ever existed in respect of Summerland. If such a schedule had been prepared at any early stage in the design it would have focused attention on some of the problems of placing the required staircases and the routes and access to them.

87. The following table gives a schedule of all the staircases available in Summerland at the time of the fire. The widths of staircases and exits relevant to escape from the fire are indicated in terms of "units of exit width" that each contains — a unit may be taken at 1 foot 9 inches or 525 mm. The stair numbers can also be found on the plans listed in Table III (paragraph 29).



TABLE IV

<i>Stair Number</i>	<i>Name</i>	<i>From Level to Level</i>		<i>Descriptions</i>	<i>Units of Escape</i>
1	Cinema	5	7	Open tread timber and steel stair near south wall with open half landings	Less than 3
—	Control Room	5	6	Open with stop and reverse switches at top end	2 persons abreast
2	Spectators' Terrace	3	7	The enclosed concrete stair at N.E. corner provided an emergency exit	3 (nominal)
3	Cruise Deck	4	5	In concrete, from downstairs and on to Solarium level at N. side	3
4	Cruise Deck	5	6	Constructed in logs and timber — an afterthought	2
5	Funfair	5	6	Small access stair to Pool Bar	1
6	Discotheque	4	6	The enclosed stair in concrete at Entrance (west) end, marked Private	3
7	North Exit	4	5	In concrete, from downstairs and on to Solarium level at S. side	3
8	Discotheque Exit	6	7	Small access stair (timber and steel)	—
9	Main (Flying) Stair	Q	5	(See Note below)	
10	Escalator	7	8	Open tread stair (as 1) near to top of Service Stair at level 7	3
11	Service & Exit Stair	7	8	— ditto — but near to south wall.	3
12	Carousel	3	4	Open stair from main L. Downstairs on to balcony of Upper	
13	Rustic	2	4	Downstairs	—
14	Spiral	2	3	In concrete, leads into Funfair area and so to east exit	—
15	Administration	2	road	This stair in concrete leads from landing on stair to Discotheque entrance.	—

Q — stairway between Aquadrome and Spectators' Terrace (doors to Aquadrome normally locked).

88. A reference should be made to the two enclosed stairs Nos. 2 and 6:

(A) *The Service and Emergency Stair (No. 2).* This was the most continuous stair in the project, rising from its external door in the east service yard at level 3 through levels 4, 5, 6 and 7 to the Leisure Floor. Double doors from all these floor levels opened into the main landings of the stair and these doors were designed to be self-closing. The stair well was essentially enclosed but it had features which prevented it from being described as a protected stair up to the standards of an emergency stairway. It had Galbestos sheet cladding with a combustible surface on two walls, and the seal between the Galbestos and the brick wall on the south side of the stairway was of doubtful effectiveness. The landings in addition to the essential exit doors from the main floors gave access directly to doors to kitchens, toilets, offices, a duct and stores. The stair enclosure also contained a goods lift and a vertical refuse chute. This last opened into the open air. Some of these openings on to the stair landings were not fire-resisting or self-closing.

89. Very unfortunately too, some time after the building had been operating a doorway was cut directly into the stairs enclosure at Marquee Bar level (6). This was to provide direct access to the bar stores behind the Showbar space, to avoid carrying stores through the Showbar itself. No door was ever provided. The making of this doorway emphasises that the stair was primarily regarded as a service stair.

90. The stairway enclosure had no windows and no ventilation. At Leisure floor level (7) a horizontal ventilation duct with combustible jointing units crossed over the landing from the outside wall to the lavatory block. The ceiling over this landing on the Leisure floor (7) which was the top landing of this staircase was not fire-resisting on top as it was an extension of the wood floors of the Cruise Deck. The stairway varied from three units in width to rather less than two units on some half-landings. It had a hand-rail on one side all the way down, but on the other side there was no hand-rail on the Galbestos wall at any level. At the foot of this stairway a double door with panic bolt fittings gave access to the east service yard. A door immediately beyond provided an entrance to the Lower Downstairs (Fun-fair) level 3, from which there was a direct exit doorway with panic bolts, also into the yard.

(B) *The Administration Stair (No. 6).* This stair was designed primarily for staff use. The level 4 (Upper Downstairs) floor from which it rose was subject to a number of plan alterations, and only at a late stage became the site of Summerland's administrative offices. This gave access to the Main Entrance, close to the main doors at level 5, but the access door was one unit wide only and was marked "Private." The stair went up further to the Pool Bar at level 6 where it had an access door behind the bar counter. At the foot of this stair at level 4, the stair gave access to the south service yard enclosed from the street by a roller shutter. This stair was represented during the Inquiry as being an alternative means of escape, a matter referred to later.

91. The stairs scheduled in Table IV provided the means by which the various floors of Summerland could be vacated. Table V schedules the various exits possible, making no evaluation of them at this stage as means of escape in case of fire.

TABLE V.  
EXITS FROM THE FLOORS

Level	Floor	No. of Exits	Stair Nos.	Units	Door Nos.	Units	Notes
8	Cruise Deck	2	10 11	3 3			
7	Leisure	2	1 2	3* 3*			
6	Marquee Showbar	4	1 2 4 9	3* 3* 2 —	14  12	3  9	Via the Rustic Walk via Spectators' Gallery
5	Solarium	8	2 3 7 6	3* 3 3 3	1 3 2 4	6 3 6 9	Main Entrance to Mini Golf Course Emergency Doors to Terrace through to Aquadrome
4	Upper Downstairs (Carousel Bar)		3 6 7 13	3	10	1	
3	Lower Downstairs (Funfair)		2 12	3*	7 8	3 3	to Disco Stair Exit door with panic bars into service area
2	Discotheque		15		5		to King Edward Road into Funfair and to service yard

\* Nominal



92. From Table V it will be seen that a number of alternative exits were available from the various floors. Later these will be evaluated as related to the Summerland fire. Escape from the floors Nos. 2, 3 and 4 below the Solarium (5) was not critical in the fire, but this does not mean that the exits were entirely satisfactory if fire had broken out at one of these levels. The fire however was on and above level 5 and the escape routes from these levels can be identified. They were three, as follows:—

- A. The route north-east, down the service stairway (St.2) and out into the service area. This route led from Leisure (7), Marquee (6) and Solarium (5) levels. From Cruise level (8) one of two open stairways (Sts. 10 and 11) could be used.
- B. The route north and west, from Marquee level (6) (and above via open staircases) along the rustic walk, down the rustic stairway (St. 4) on to Solarium floor level and thence into the Aquadrome, out by the main entrance or down through the Solarium floor.
- C. The route south and west, from all levels down the flying staircase (St. 1) and out on to the mini-golf course, or at the main entrance, or off the Spectators' Terrace by the escalator or the spiral staircase. This route could also be taken through the Solarium floor and out via downstairs.

The qualities of these routes on subjects of length, protection or safety of destination will be referred to later.

#### *The "Fire-Fighting Party"*

93. There was evidence that five members of the Trust Houses Forte Leisure staff were constituted as a team for the purpose of "first aid" fire-fighting. Certainly Mr. Harding considered himself as in charge of the party, but the only other person referred to as being a member who gave evidence in the Inquiry was not aware of his membership. There was no satisfactory evidence that training and instruction were undertaken by any members of the fire-fighting party.

#### *The Fire Alarm System*

94. This was a "two-stage" system. An alarm transmitted by means of a manual call point was not immediately sounded as a public warning, but could be investigated by the management before giving the alarm. The Summerland system had some other features including a direct link to the Douglas Fire Station. There was an indicator board installed in the Control Room. The system had two parts as follows:

##### *(i) The Public System.*

This comprised 20 break-glass manual call points, 7 bell sounders and 6 siren sounders. As installed the arrangement was that, on any call point being actuated, a light came on and a buzzer sounded on the indicator board in the control room. At the same time a call was sent to Douglas Fire Station by direct line and a time clock was started. The func-

tion of the latter was to permit of a delay, of a predetermined length, before the bells and sirens in Summerland sounded. However, at the time of the fire the mechanism had been adjusted without the approval of the Chief Fire Staff Officer so that the call to the Fire Station was also on the delay. The length of the delay was set by turning a knob on a dial on the indicator board. By pressing a button on the indicator board in the Control Room the public alarm could at any time be sounded immediately.

(ii) The Staff System.

This comprised 7 call points, similar to those included in the public system but generally situated in places frequented by staff only, and identified by a painted ring round the box. These call points also showed a light and sounded a buzzer on the indicator board, but they were not linked to the delay clock and called Douglas Fire Station and sounded the public alarm at once.

Both systems had certain additional safeguards — fuses, indication of power loss, facilities for testing ,etc. — common to such systems. No outside maintenance contract had been placed.

*The Emergency Electricity Supply*

95. Unlike some buildings in which secondary electricity supplies for standby purposes are provided by batteries, Summerland possessed a standby generator. This stood in the plant rooms adjacent to the south service area and, having been primarily intended for the Aquadrome, was owned and operated by Douglas Corporation for both the Aquadrome and Summerland. It consisted of an alternator driven by a diesel engine, so arranged as to start up on the failure of the mains supply. Twelve-volt batteries were used for starting the engine. The set had sufficient capacity to supply a limited amount of lighting, including lights on the service stairway (No. 2) and to keep the fire alarm system working. The set could be manually disconnected by means of a toggle switch on a fuseboard in the plant room, but the switching-in of the generator could only be done by the mains failure. To test it, therefore, mains failure was simulated by operating the main switch.

*Directional Signs and Notices*

96. There was no systematic indication of exits or escape routes. No directional signs or arrows ("TO FIRE EXIT," etc.) were provided, and only a limited number of exit doors were so identified. These included the door from the Marquee Bar into the service staircase (No. 2), the exits from the Sundome area on the Leisure floor, the door from the Solarium floor on to the mini golf course, and the foot of the Carousel stairway (No. 3) on Upper Downstairs level (4).

*The Public Address System*

97. This was potentially suitable for making announcements in case of a fire emergency. A number of loudspeakers were arranged on a "vertical feature" not far from the main entrance. This was a structure of tubular

steel members extending from the Solarium floor the full height of the building and carrying informative signs. The loudspeakers could be heard in all parts except those (such as the Marquee Bar) which were enclosed. Announcements could be made from microphones in the Control Room and on the stage. The operator in the Control Room could over-ride any other use of the system where necessary.

#### *The "Walkie-talkie" Sets*

98. About six of these were in the hands of departmental managers, who could speak to each other as they circulated in the building. The sets were not a fire precaution but would be useful in an emergency. An additional set was intended for the Control Room but had not been provided at the time of the fire.

#### *Hose Reels and Extinguishers*

99. Fourteen hose reels were installed in the building. These were disposed as follows:—

Level 8.	Cruise Deck	...	...	1
„ 7.	Leisure Deck	...	...	2
„ 6.	Marquee Showbar	...	...	2
„ 5.	Solarium	...	...	3
„ 4.	Upper Downstairs	...	...	2
„ 3.	Lower Downstairs	...	...	3
„ 2.	Discotheque	...	...	1

They were fitted to 1-inch piping in turn fed by a 3" downpipe originating at the incoming water main on the north side of the roof. Each reel was equipped with its own stop valve, which had to be turned before water was available at the nozzle; the latter was of the hand-controlled spray-jet type. The hose was 3/4-inch in diameter (internal) and lengths were either 75 feet or 100 feet. Sectional valves were fitted on the piping at various points. Hand extinguishers were provided on the usual scale.

#### *Water Supplies and Hydrants for Fire-Fighting*

100. There was a 3" wet falling main in the service stairway for the use of the Fire Brigade, with one outlet for 2 3/4" hose on each occupied level. Outside the building there were six street hydrants within 150 yards of the building. The supply and pressure at these hydrants was barely adequate for fire-fighting as they stood, but an improved supply was made available by the Water Board on request from the Fire Brigade after fire-fighting operations had begun.

#### *Access for Fire Appliances*

101. There were only three points at which the Fire Brigade could obtain access for appliances to within 60 feet of the building and on the same level. One of these was the Discotheque entrance on the south side, and the others were the two service areas. Access was at street level in all cases. The mini-golf terrace was 25 feet above this level and the cruise deck was some 55 feet above the mini-golf terrace.



*Staff Instruction and Training*

102. No organised system of staff training existed and, apart from the "fire-fighting party", no member of the staff was given any duty or any instruction whatever as to his or her actions in the event of fire. There was a notice about fire procedure in the Control Room, though Miss Hardy, the operator in the Control Room, was unaware of its contents.

## PART VIII. ORIGIN AND DEVELOPMENT OF THE FIRE

103. A fibreglass kiosk had been used during the early summer as a ticket office in connection with the Mini Golf Course on the outside terrace which extends along the seaward side of Summerland. About two months before the date of the fire this kiosk had been damaged by storm and was dismantled. Most of the dismantled kiosk had been taken away and stored in the basement of Summerland but for some reason, about which we received no positive information, one section was left lying on its side at the eastern end of the terrace close to the Galbestos wall. It contained a roll of wire netting covered in some combustible plastic and it may also have contained some paper and similar litter which tended to be blown into and accumulate in that area of the terrace.

104. On the evening of August 2nd, 1973, three Liverpool schoolboys on holiday caused the section of kiosk and its contents to catch fire. The story told by the boys to the police was that the kiosk caught fire accidentally from a discarded lighted cigarette end; but before us Counsel for the three boys formally admitted on their behalf that ignition was in fact caused by a lighted match. Although we were not asked to hear any further evidence on this matter, we considered whether to do so. We decided that it was highly unlikely that further investigation by evidence would enable us to determine with any confidence whether or not the kiosk section was set on fire intentionally. Accordingly we do not make any finding on this point. In any event there is no suggestion and no cause to suspect that the boys intended to cause a major fire or to endanger the structure of Summerland.

105. Within a matter of minutes the kiosk section was burning fiercely and the flames were impinging on the Galbestos wall. Unsuccessful attempts were made by the members of the staff of Summerland to extinguish the fire by means of fire extinguishers and by means of a hose which was brought through a window of the Amusement Arcade. Attempts were also made to move the burning section away from the building, but it collapsed, still burning, against the Galbestos wall. By this time the combustible coating on the outside face of the Galbestos opposite to the burning kiosk section had ignited. Because of the high conductivity of the sheet metal in the Galbestos, fuel vapours were quickly evolved from the coating on the inside face of the Galbestos and became ignited so that there was fire within the void between the Galbestos sheeting and the fibreboard lining of the Amusement Arcade. In the opinion of Professor Rasbash, which is consistent with the evidence of the eye-witnesses, burning on the inside coating of the Galbestos would begin within about one minute after ignition of the outside coating, either spontaneously by the vapours reaching ignition temperature or from a pilot flame coming through a gap in the Galbestos sheeting caused by differential thermal expansion of the metal.

106. The fire spread within the void, igniting the fibreboard lining and its 4" x 2" wooden supports and thereby increasing the fire and the combustible gases within the void. The Decalin lining gave way by reason of becoming charred or burnt and fire massively invaded the Amusement Arcade. In Professor Rasbash's opinion, this happened within about ten

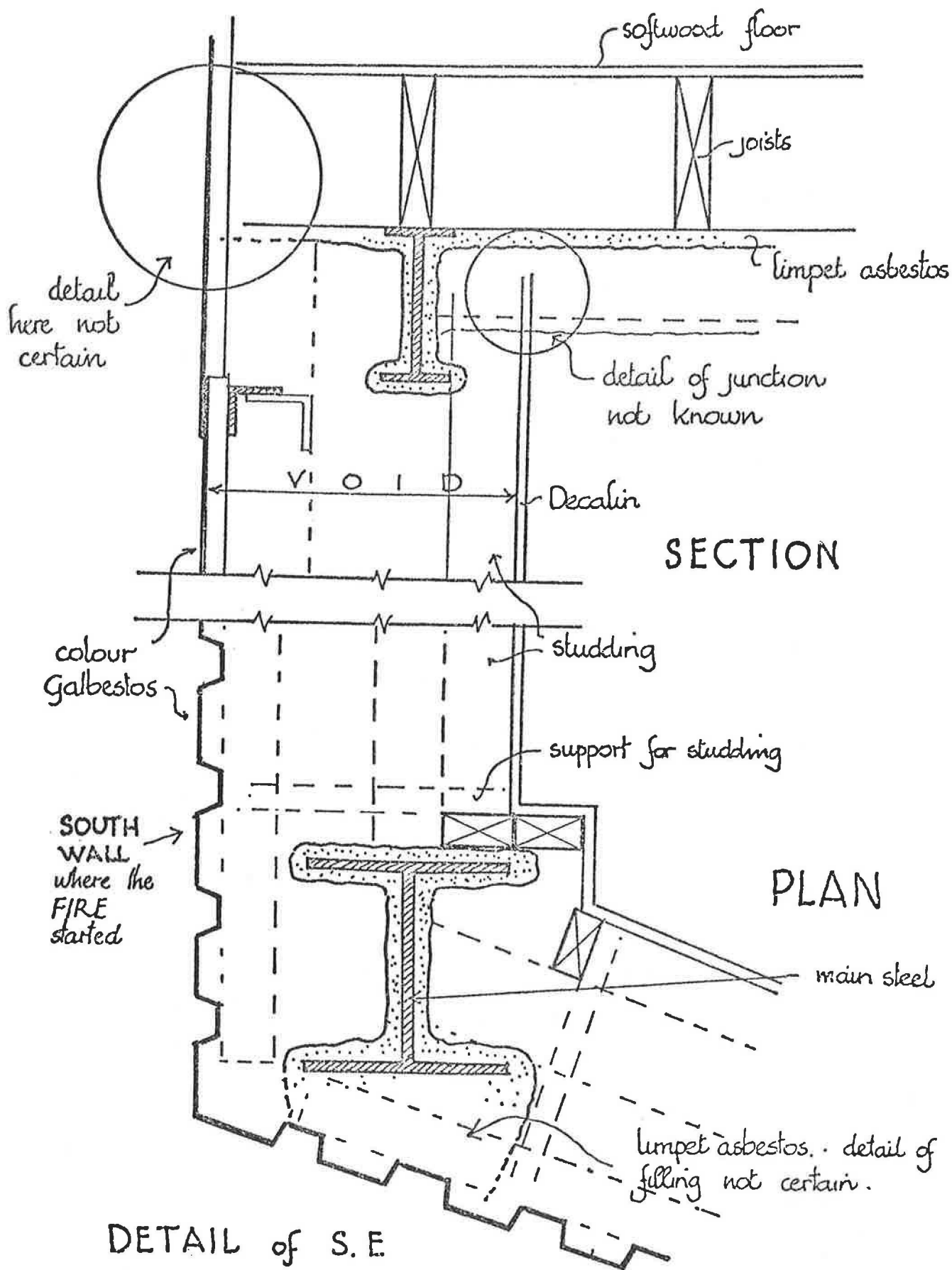
minutes of fire starting within the void and resulted in the ejection of a substantial accumulation of flaming vapours from the void into the Amusement Arcade. A number of eye-witnesses confirm the sudden eruption of fire into the Amusement Arcade and its rapid spread northwards within the whole of the Amusement Arcade area and involving the terrace Restaurant.

107. The fire subsequently spread to the Marquee Showbar and terrace, the Leisure floor and the Cruise Deck; but its course and progress at this stage cannot be traced as clearly from the evidence of the various eye-witnesses as in the case of the fire in the Amusement Arcade. There is evidence that flames spread upwards over the front edge of the terraces successively. There is evidence suggesting that at an early stage smoke and inflammable vapours, but not fire, were finding their way up to the Marquee Showbar level and to the Leisure floor level or above from within a nest of voids formed between the Galbestos wall and interior partitioning. (See following page) There is also evidence, convincingly supported by expert evidence from Professor Rasbash, that flame from the Amusement Arcade went up what was referred to as "the chimney," being a gap running between the Oroglas wall and the edges of the ceiling and floor at each terrace level on the south or seaward side.

108. The stage at which Oroglas became involved in the fire deserved and received special attention, particularly as there was at one time a widespread public impression that Oroglas played the primary role in the development and spread of fire within the building. This is contrary to the evidence. We are satisfied by clear and positive evidence of eye-witnesses that the Oroglas was ignited from fire within the building and was not ignited until there was a very substantial fire in the Amusement Arcade. We also accept Professor Rasbash's deduction from photographs which were taken at an early stage of the fire and from other evidence that the Oroglas on the south wall was almost certainly ignited from flames spilled over the ceiling of the Amusement Arcade into "the chimney" already referred to.

109. Within a matter of a few minutes the Oroglas was burning both in the south wall and in the roof at the east end. It is Professor Rasbash's opinion that the roof caught fire from flames which first travelled vertically up the Oroglas wall and we think this is likely. It is necessarily a matter of deduction or conjecture, because eye-witnesses involved at that time in a very alarming drama cannot reasonably be expected to record reliable impressions of the precise sequence of events which crowded upon one another. What is clear is that a very considerable conflagration rapidly developed on the whole height of the building at the east end and within a few minutes of the flames sweeping up the front of the terraces the roof burned open or blew open at the east end. The fire moved much more rapidly westwards along the roof than it did along the south wall. This progress of the fire is recorded vividly in photographs and cine films taken at the time.





DETAIL of S.E.

CORNER. an approx diagram only

no detail was prepared during building:

this sketch has been made from the evidence

110. The fire spread westwards along the building until almost everything combustible in the fabric and furniture of Summerland at and above Solarium level was destroyed. That there was only slight damage to the Aquadrome was due to the realistic appreciation of the situation by the Chief Fire Staff Officer, who ordered a concentrated effort to stop the fire at the western boundary of Summerland as soon as it became obvious to him that no fire brigade could hope to save Summerland from destruction. The Fire Brigade "stop" message reporting that the fire was under control was sent at 9.10 p.m.

111. We have endeavoured to ascertain some relevant times in the development of the fire. The accounts given by various witnesses cannot all be reconciled. Witnesses who were present at the fire understandably differed in their estimates and impressions of time.

112. Of first importance is the time when the fire began on the Mini Golf Terrace. We fix that time at shortly before 7.40 p.m. A witness, Miss S. Appleton, was working in a kiosk shop on the Solarium floor when she saw smoke from outside the building drifting into the Amusement Arcade through an open window. It happened that she had occasion to look at her watch at that time and she is able to fix the time at 7.40 p.m. We have no reason to doubt the accuracy of this evidence nor do we doubt that the smoke which she saw was coming from the burning kiosk section, particularly as Miss Appleton was told by someone soon afterwards that some boys had lit a fire, but it was under control.

113. The next time which we consider to be established to within a few minutes either way is the time when the fire first entered the Amusement Arcade from the void in the wall. We put this time at about 8 p.m. The automatic fire alarm from Summerland sounded in the Fire Station at five minutes past eight. A somewhat difficult problem is to resolve how the alarm could operate on the direct line to the Fire Station, but not operate to sound any alarm in Summerland, but we accept Dr. Guban's proffered explanation as the most likely — that the alarm was activated from a staff push which energised the link to the Fire Brigade, but did not sound the alarm system in Summerland because of a short circuit due to the action of the fire on a conduit. So far as we can discover, there were only two persons who might have operated this staff push, Mrs Bisson in the Discotheque or Mr. Harding in the Service area of the Marquee Showbar. According to their respective accounts, Mrs. Bisson's action was taken after she had been told that there was a fire upstairs and the building was being evacuated, and Mr. Harding's action was taken at about the time when fire was first seen by him in the Marquee Showbar.

114. It is of course possible that the alarm heard in the Fire Station was not activated by either Mrs. Bisson or Mr. Harding and that other evidence as to the time when fire first entered the building should be given more weight. For example, Mr Mannion, the organist, was due to finish his stint at 8 p.m. and was about to do so when, most unfortunately, he was asked by the Compere to continue playing because there was a small fire and the

Compere did not want anybody to panic. Mr. Mannion estimates that it was about two minutes after that that he looked round and saw fire at the back of the Amusement Arcade. The evidence of Sub-Officer Quayle is that the first fire appliance arrived at Summerland at six or seven minutes past 8 p.m. He cleared the Downstairs and Upper Downstairs levels and then tried to go up to the Solarium by a staircase from Upper Downstairs, but was unable to do so because of the severe heat conditions and burning debris in the Solarium. This state of affairs had arisen before 8.11 p.m. when the electricity was switched off at the main.

115. Professor Rasbash gave the following estimated timing of the course of the fire: —

- 0 — 3 minutes: Fire being established in kiosk section.
- 4 — 6 minutes: Ignition in void.
- 14 — 16 minutes: Fire breaks out of void.
- 16 — 18 minutes: Rapid ejection of vapour takes place involving the whole of the Amusement Arcade floor.

Professor Rasbash proffered these times only as approximate and as a rough guide but it seems to us that they tend to support the times which are more positively derived from the evidence of the witnesses already referred to.

116. We conclude therefore that there was a period of at least 20 minutes between the appearance of obvious fire on the Mini Golf Terrace and the entry of fire into the Amusement Arcade.

117. At 8.11 p.m. Mr. Shaffer, the House Manager, switched off the main electricity supply. This time is reliably established by the stopping of an electric clock and this time can be clearly related with the evidence of witnesses who were put in darkness by this regrettable act of misguided zeal. We know that by 8.11 p.m. there was extensive fire on all three terraces above the Amusement Arcade and that Sub-Officer Quayle had found himself unable to enter the Solarium from the floor below.



## PART IX. FACTORS IN THE SPREAD OF THE FIRE

118. The rapid spread of the fire was due in part to the design and construction of the building and in part to failure by staff of Summerland to take prompt and appropriate action.

### *Failure by Staff of Summerland*

119. As already stated, the kiosk section on the Mini Golf Terrace was on fire by 7.40 p.m. Efforts to deal with it were made by members of the staff at Summerland for at least 20 minutes and were wholly ineffective. This was at least partly due to the severity and tenacity of the fire in the kiosk section and the speed with which fire spread into the Galbestos wall and the void behind it. Attempts were made to extinguish the fire by means of portable fire extinguishers and by means of a hose reel passed through a window from the Amusement Arcade. Portable extinguishers could not be expected to have much effect in the circumstances and the hose was also ineffective. We have been told that the water pressure was less than it should have been. The evidence on this point was not conclusive but it is possible that the pressure was reduced because the hose had become trapped or kinked or for some other reason unknown. It may be that a fire-fighting party, well organised and led and well-trained by actual practice with equipment could have disposed of the preliminary fire before it invaded the building, but we do not put the matter higher than that.

120. Of cardinal importance was the failure to call the fire brigade until 21 minutes after discovery of the fire. The great danger inherent in a fire-fighting party is that all concerned may so preoccupy themselves with fighting the fire, which is or becomes beyond their capacity to control, that no-one remembers to call the fire brigade in time. This is one of the things which happened at Summerland. The members of the staff who tried to extinguish the fire were individually zealous but their efforts were useless and no-one thought of calling the fire brigade in time. There was no lack of means available for the purpose. There was an elaborate automatic fire alarm system with staff pushes which would at once have signalled direct to the brigade. There was a control room which similarly had a direct alarm link with the brigade, and it would have been very useful if only the young lady in charge of it had been properly instructed and could have been communicated with. There were G.P.O. telephones.

121. The first call from Summerland to the brigade was at 8.01 p.m. when Mr. Shaffer, the House Manager, having been urgently told by Mr Harding to call the brigade, overlooked the entire automatic alarm system and telephoned to the brigade from a public telephone box near the Administration staircase. The automatic alarm was not used until 8.05 p.m. Ironically at about 8 p.m. the brigade had already received two reports of the fire from sources outside Summerland, one of which was a ship at sea, and appliances were on their way before any message or signal was received from Summerland. This delay in calling the fire brigade and the failure to use the automatic alarm for the purpose are symptomatic of the general unawareness of the management of Summerland at this time of

the importance of making proper provision for a possible fire emergency by practical organisation and training of staff.

122. It is necessary, of course, to consider at what stage a reasonably prudent and responsible person would have called on the fire brigade. If the fire brigade had been summoned when the fire on the Mini Golf Terrace was first seen, the building would certainly have been saved, but to say that was the appropriate time to call the brigade to this fire is to apply hindsight to all the facts now known. We consider that, whether the properties of the external wall were appreciated or not, the time for calling the brigade had arrived as soon as it became evident that the fire in the kiosk section was not going to be quickly and positively extinguished. On our assessment of the evidence, that time arrived about one minute after water was first applied to the fire. A minute is long enough to appreciate whether the action being taken is effective. If the brigade had been summoned then, it is our view that the building might have been saved.

#### *Lack of Fire Resistance in the External Wall*

123. As related in Part IV, the original intention in 1967 was to construct the eastern end of the wall in reinforced concrete. In 1968 Galbestos was substituted for reinforced concrete in this place and compliance with Byelaw 39 was waived. Had the wall possessed the two hours fire resistance required by Byelaw 39 the disaster would not of course have occurred but it does not necessarily follow that the granting of the waiver and the use of Galbestos were wrong decisions. It was suggested that an external fire threatening this building was such an unlikely possibility that it was not imprudent to disregard it and that Byelaw 39 was intended only to protect a building against exposure to fire from neighbouring buildings and vice versa. The Manx Electric Railway depot was about 26 feet away from the building at a lower level and houses in Strathallan Road were about 195 feet away at roof level and the boundaries of their gardens at the nearest point were about 60 feet away. It was urged that this was a degree of isolation sufficient to justify waiver of Byelaw 39. We do not accept this view. A fully developed fire in the railway depot could constitute an exposure hazard to Summerland and there was evidence in the Inquiry that the heat from the fire in Summerland was very strongly felt in a house in Strathallan Road. In any event, this was an urban environment and it is very rarely that a total absence of exposure hazard can be expected in perpetuity in such surroundings.

124. There is a further aspect of the risk of exposure of a building to accidental fire to be considered. The designers and the Local Authority did not accept that an accidental fire against an external wall, or an act of vandalism, which might in these days occur anywhere and of which intentional ignition of an object such as the kiosk would be an example, was something to be taken into account. It is no doubt true that one cannot guard against everything and if account has to be taken of every possibility of fortuitous external fire, every building however isolated would have to be constructed as a fortress. However, we have formed the view that the use of Galbestos in the wall of this building was an error of judgment although it would be harsh not to concede that it was an understandable



one. This building was not isolated from accidental or intentional interference by irresponsible persons and to have no fire resistance in its external wall, whether the wall was masking a void or not, was in our view to take an unnecessary risk.

125. It is convenient in this context to point out that Byelaw 39 imposed two requirements; fire resistance and non-combustibility. It is no doubt true, as was said in evidence, that even without the combustible components of Galbestos, this external fire would have penetrated the building. However, the contribution of the combustible components of Galbestos accelerated the growth of fire in the early stages. Both requirements of the Byelaw are important.

126. The waiver of a safety provision imposed by a Byelaw is always a responsible decision. In our view a current Byelaw should be regarded as setting a calculated normal standard of safety and it is a dangerous approach to waiver simply to consider whether the standard set in the Byelaw is necessary in the circumstances. Assuming the existence of the Byelaw to be justifiable general on grounds of safety for persons, waiver can only be granted without risk where the standard of safety will be maintained by some other means than the application of the Byelaw. In other words, the design should incorporate some compensating measure to restore the standard of safety to that which would have existed had the Byelaw not been relaxed. There were various opportunities in the case of Summerland to require such compensating provision in the design; as by requiring a sprinkler system within the building and by imposing a specially generous provision of means of escape from all parts of the building.

#### *The Combustible Inner Wall*

127. When the shell of the building was completed at the end of 1970 and J. Philipps Lomas and Partners ceased to be the Principal Architects, the wall at the eastern end was a single skin Galbestos wall with no lining or partitioning in the interior. Messrs. Gillinson Barnett and Partners thereafter became Principal Architects, responsible for the completion and fitting out. Their original intention was to erect an interior wall of plasterboard in the Amusement Arcade but Trust Houses Forte Leisure Ltd. required a more sound-absorbent finish. Mr. Frank, an interior designer employed by Messrs. Gillinson Barnett, suggested the use of Decalin, a form of fibreboard, and it was agreed between him and representatives of Trust Houses Forte Leisure Ltd. to substitute Decalin for plasterboard. Mr. Frank amended the drawings accordingly and the Decalin lining was erected by the Shop Fitter Sub-Contractors in conformity with the amended drawings. This had the effect of creating a concealed void with a combustible inner surface on both sides (i.e. fibreboard and Galbestos). Such a void is a dangerous fire hazard and a serious breach of good building practice. Combustible voids are much more hazardous than other combustible surfaces because fire can develop in them to a great intensity without being readily detected and when once detected can be exceedingly difficult to fight. Even if fire on the outside of the building is not to be anticipated, fire can find its way into a void by other mechanisms. There



were electrical machines in Summerland adjacent to the Decalin wall, there may have been electrical wiring and conduit within the void and the public, of all ages and degrees of responsibility and intelligence, were in and out of the building all the time.

128. This error, which may well have been the biggest single structural contribution to the disaster of the fire, arose from an unfortunate combination of circumstances at a time of intense activity. Mr Frank did not know the properties of Decalin and did not know that it was combustible. He had in fact seen Decalin for the first time the previous day when a trade representative produced a sample to him. When the decision was made to use Decalin he did not discuss it with Mr Owen, who although an industrial designer and not an architect, was a partner in Messrs. Gillinson Barnett and was immediately in charge at this stage. Although Mr. Owen noticed the Decalin in the drawing, he did not think about its fire properties. Mr. Green, Mr. Owen's architect partner, was not aware of the substitution of Decalin at the time it was made, and although in June 1971 he included it in a long list of alterations carried out on clients' instructions which he compiled and sent to Trust Houses Forte Leisure Ltd., the significance of the item did not register in his mind.

129. A faint attempt was made to place some of the blame for this blunder on Trust Houses Forte Leisure Ltd. because they were parties to the decision to use Decalin. However, their representative was not and was not purporting to be an expert or knowledgeable in this field and we think, as Mr. Owen and Mr. Green candidly admitted, that the clients were entitled to rely on their architects to tell them if a material was not safe to be incorporated in the building.

130. It was suggested by Dr. Guban that even had the inner wall been of plasterboard, which is virtually a non-combustible material, the fire would have broken into the Amusement Arcade nearly as quickly. He based this on two facts: (1) plasterboard has fire resistance hardly longer than that of fibreboard of the same thickness — 18 minutes as against 15 minutes for fibreboard at 12.7 mm. thickness, and (2) the studding holding up the plasterboard would have burned and failed fairly quickly. We are not persuaded that this suggestion is wholly right. The amount of fuel involved would have been much less in the absence of fibreboard. Full scale tests later conducted by H. H. Robertson (U.K.) Ltd. and described by Mr. Benson, showed this quite dramatically. The threat in the case of plasterboard would have been much less.

#### *Absence of Effective Fire Stopping*

131. There are ways of reducing the hazards from combustible surfaces within voids. One is by fire stopping — the provision of barriers within the space to divide it into small compartments. These barriers are not so much intended to prevent the spread of fire within the void (it would be unrealistic to require fire resisting barriers in a void whose walls are not themselves fire resisting) as to arrest or to retard the spread of air, hot gases and smoke and thus delay the development of a serious fire within the whole of the void. As already stated in Part IV, although Byelaw 47 did not technically apply, good practice required fire stopping in the void. It would have

delayed, though not prevented, the ingress of fire into the Amusement Arcade and would probably have greatly reduced the severity of the invasion. Those responsible for the creation of the void did not seek to provide fire stopping at the intervals specified in Byelaw 47. Evidence was given that fire stopping was achieved at the vertical stanchions but we are unable to accept that this was successful in all cases. The construction was not effective as regards the Decalin wall and we accept evidence that smoke found its way round the corner.

132. Another matter related to fire stopping occupied a good deal of time in the Inquiry. The Byelaw requirement was that floors should have a fire resistance of two hours. This meant of course that the whole area of the floors should have this character and it was rightly assumed that by implication from the Byelaw there must be no gap between the edge of floor and the inside face of the Galbestos through which fire could pass. Provision for stopping gaps between the edge of the floors and the inside face of the Galbestos was not shown on drawings but appropriate instructions were given on the site to the sub-contractors who were employed to spray asbestos on the underside of the floors. The sub-contractors worked the asbestos into the corrugations of the cladding and no doubt when the shell of the building was handed over this stopping was in place. However, it was by no means completely effective by the time of the fire. The evidence of eye-witnesses established that smoke rose to the upper parts of the building on the inside. We believe that in places at least the asbestos had either fallen away or had been removed in the course of fitting services into the building.

#### *Exposure of Upper Floors to Fire from Below*

133. There were several reasons why the fire would progress rapidly once it had broken out of the void. Characteristics of the building as constructed were (1) that one half was a multi-storey building in the sense that people and contents were distributed at different levels accessible only by means of stairs; (2) all the upper floors were open on one side so that they were exposed to invasion by fire occurring below; (3) part of another side (the area between the western end of the Galbestos wall and the western edge of the upper floors on the seaward side) was exposed to a narrow chimney-like opening between the edge of the floor and the external wall; (4) the remainder of the sides, at least on one floor, were exposed to holes in a void enclosed by combustible surfaces; the other half of the building was completely exposed to the effects of a fire in any part of it, and (6) the roof was made of a material which would fail at once and fully vent a fire taking place below. It may be said that the fire which occurred entered from outside in a way not readily to be foreseen. However, fire can occur internally from a variety of common causes where there are voids and false ceilings. The result could be the same from other causes although the fire would perhaps not be so well concealed in the early stages. The building provided three paths for fire to reach the upper floors from an outbreak at Solarium level; one path up through the voids in the north-east corner; one path out of the side of the Amusement Arcade and up through "the chimney" between the floors and the Oroglas cladding; and one path up under the front edges of the open terraces of the upper floors. The provision of two



hours fire resistance on the underside of the floors was no safeguard against any of these features, except perhaps to some extent the first, and only served to ensure that the steelwork was still in place after the building had been completely devastated.

134. It is easy, particularly with hindsight, to point to features in the building which offered unnecessary risks of fire spread and this is unhelpful without consideration at the same time of the principles from which the danger stems, so that the errors need not be repeated. The basic fact is that Summerland, as built, was a multi-storey building with almost no compartmentation. A study of any modern fire regulating system shows that compartmentation is the feature on which reliance is placed for the defence of the building against fire spread. This principle is discernible in the Isle of Man Byelaws and the Theatre Regulations as well as in other regulations to which we were referred. For the protection of property in an unoccupied building its function is to divide up the risk so that the fire growth will be limited to one compartment. In an occupied building the object is to separate people from the fire risk. Hence there are requirements in the Theatre Regulations for a proscenium wall and protected exits; in a theatre the fire risk is on the stage and this must be separated from the auditorium. In Summerland the "audience" and the fire risk were mixed up together on the Solarium and upper terraces, each of which had no separation from any other part of the building. The only protection for the "audience" on their way out of the building was in the somewhat unsatisfactory covered stairway in the north-east corner or in the stairways below the Solarium floor.

135. An interesting comparison might be made with a departmental store with an open central well. Here shoppers and goods are mixed up together and each "shelf" is open to attack from fire on the level below. There have been many very serious fires in such buildings, some with heavy loss of life. However, there are vital differences; a departmental store is required to have much better provision for separation of staircases than Summerland had and — learning lessons from fires which have occurred — sprinklers are almost always provided.

136. Assuming that the concept of Summerland had to be pursued as conceived, we recognise that direct compartmentation would present difficulties. Other measures were needed. If (1) a fire-resisting, non-combustible wall had surrounded three sides of the upper terraces, (2) each floor had been effectively sealed off to this wall, (3) each terrace had been set back well from the one below, (4) the front railing of each terrace had been replaced by a fire resisting wall of the same height and extended a foot or so below floor level, (5) any front partition on a terrace had been of non-combustible construction and (6) a sprinkler system had been fitted in the east end of the building on all floors, the risk of the building being quickly overtaken by fire would have been greatly reduced.

#### *Flammability of the Contents (Solarium floor and above)*

137. The contents of the floors, so far as ascertainable from the evidence in the Inquiry were as follows:—

- (i) Floor surfaces.



Above the Solarium floor, which was concrete, the floor surfaces were soft wood. They would have flame spread rating of Class 3 or 4. Mr. Milstone, a Consultant Architect, estimated that adding joists and flooring together there were about 30 tons of timber in the floors. The Cruise Deck was bare but other areas were carpeted except for about 15% by area, which was tiled, and the Solarium floor itself which was largely bare. Carpets were of good quality, 80% wool, which is not readily ignitable and has low flammability. The tiles in the tiled area were plastic and would have surfaces of Class 3 or 4.

(ii) Partitions and Ceilings.

There was a considerable area of partitions. They lined the south and east end walls, though not consistently; they enclosed the Marquee Showbar; they divided the Amusement Arcade from the Restaurant; they formed various offices, stores and bars, and they enclosed some leisure facilities such as the Television Viewing Area on the Leisure floor. It is not easy now to decide what proportion of these partitions was of plasterboard, fibreboard or plywood respectively. The plasterboard would have a negligible combustible content but fibreboard or plywood would be entirely combustible with a rapid flame spread. Mr. Milstone's estimate of the quantity of timber in the partitions and ceilings was about 5 tons. The partitions, whether of plasterboard or other material, were supported by softwood studdings. Mr Milstone estimated these at about an additional 2½ tons. The walls of the Sauna changing rooms were said to be of polystyrene, a readily flammable substance.

(iii) Hard furniture and fittings.

These mostly comprised tables, chairs and bar counters. Tables were mostly of timber, faced with plastic laminates, as were also the bar counters and Bingo counter in the Amusement Arcade. Some, however, were of pine faced plywood. The commonest types of chairs (other than deck chairs) were of steel tube with moulded plastic seats. Deck chairs were of the common variety made of hardwood and canvas, the latter not treated against flammability.

(iv) Soft furnishings and drapes.

Except perhaps for the deck chairs, there seem to have been no soft chairs. All drapes, except one, were chosen from a range of proprietary materials all of which were inherently flame-resistant. This means that they would be consumed while flame was applied to them but would not continue to burn when the flame was removed. The one identifiable exception was the polythene curtain hung on the south side of the Marquee Showbar. This would be readily flammable.

138. No criticism can be made of the selection of materials for drapes and carpets. So far as timber for partitions, etc., is concerned, it was not suggested that this was treated for flame resistance. Such treatment is available but in practice is not commonly used. Whilst many materials on these upper floors would resist small sources of ignition, most of them would contribute readily to a substantial fire if one should start. Hence,

although the contents of the terraces had not been chosen irresponsibly, a huge, violent fire could burn them all out in a short time.

139. We were referred on behalf of Messrs. Gillinson Barnett and Partners to the system of classification of fire load described in a Stationery Office Publication "Post-War Building Studies No. 20, the Fire Grading of Buildings". By this system buildings or compartments of buildings are classified into three grades of fire load as follows:—

LOW FIRE LOAD: those averaging not more than 100,000 B.Th.U. per sq. ft. (equivalent of 12 lbs. timber/sq. ft.)

MODERATE FIRE LOAD: over 100,000 but not more than 200,000 B.Th.U. per sq. ft. (equivalent to 25 lbs. timber/sq. ft.)

HIGH FIRE LOAD: over 200,000 but not more than 400,000 B.Th.U. per sq. ft. (equivalent to 50 lbs. timber/sq. ft.)

140. We accept the evidence of Mr. Milstone that applying this system, the floors of Summerland had on average a fire load within the Low Fire Load category although about threequarters of the maximum in that category. However, the practical significance of these gradings must not be misunderstood. The publication referred to above makes it clear on page 18, para. 48, that the division into low, moderate and high fire loads is of significance in determining the required fire resistance of structures. This must be so, since the amount of fuel carried per unit of area will determine how long a fire is likely to last as a minimum. A low fire load will require enclosure therefore only by perhaps half-hour fire-resisting construction, while a high fire load may need, say, four hours. It does not follow that a low fire load will not produce a fire of great violence, though of short duration. So in the case of Summerland, the fire load was low and the fire lasted a relatively short time but it was a violent fire while it lasted. The violence of the fire was partly due to the generally light, slender form of much of the combustible material, but also largely due to the very great amount of oxygen available for combustion after the roof had vented so quickly.

141. In a building design of this kind, where the contents must inevitably pose a degree of threat to the occupants in the event of fire, there is a limit to what can be done by restricting the choice of materials. One way of dealing with this difficulty is provision of a sprinkler system. Little objection to this idea was advanced during the Inquiry although Messrs. Gillinson Barnett and Partners, the Public Authorities and Trust Houses Forte Leisure Ltd., had all considered a sprinkler system to be unnecessary. The expert evidence was generally in favour of it, though with some reservation. Since sprinklers do not operate until a relatively high-temperature is reached, they are not primarily regarded as a device for saving life. For this there can be no substitute in most buildings for generous means of escape. However, in a public assembly building of such a kind that compartmentation cannot be effectively achieved, the growth of fire in one part



must be checked to allow good time for the occupants of another part to escape. The limitations on checking the growth of fire by the choice of materials being what they are, the sprinkler system seems to us to be indispensable in the circumstances of such a design as Summerland.

#### *The Part Played by Oroglas*

142. The eastern edge of the Oroglas wall on the south face of Summerland was about 20 feet from the initial fire in the burning hut. More than 20 minutes elapsed before the wall of Oroglas at that edge caught fire. All the evidence suggests that it first caught fire inside from flames passing up from the burning Amusement Arcade. Very soon after that, the fire penetrated through the first Coxdomes to the outside and from there, progressively faster, moved upwards and westwards. The photographs showed that it "paused" at the vertical line formed by the terrace edges. At that time, as shown by the illustration (Photograph 3) the roof was on fire for about two-thirds of its length.

143. The evidence could not establish definitely whether the roof caught fire before the Oroglas wall. Once the roof caught fire it burned out in an astonishingly short time — it may be as little as ten minutes. By the time the fire brigade arrived there was nothing they could do to put out the Oroglas fire which spread along the wall to the clerestory lighting in the west end of Summerland. They therefore concentrated their attention on saving the roof of the Aquadrome.

144. Oroglas is a form of acrylic plastics material known as polymethylmethacrylate. It is organic and combustible. It has a surface spread of flame rating of Class 3, an ignition temperature of 300° C., and begins to soften before that at a temperature of 90° C. At a simple demonstration given before the Commission, the side of a small sample was ignited by the direct flames of a bunsen burner in about 70 seconds. After ignition, the sheet burnt steadily rather than fiercely, though at an increasing speed as the burning area increased. When ignited on one side, it burned on that side only for about five minutes, the unburned side remaining relatively cool. When a hole appeared after that time, burning continued on both sides. When the burned area became substantial, the whole sheet became soft and lost its shape. Flaming drops began to fall at this time. There was almost no smoke. Application of a flame to the edge of the sheet ignited the sheet in about 18 seconds, and gave substance to the requirement of edge protection particularly advocated by manufacturers and producers.

145. The behaviour of a small burning sample gives little indication of the holocaust which was produced by the burning of the external faces of Summerland. It is obvious that the rate of burning of Oroglas increases rapidly as it is heated by other burning material near to it. The speed and intensity of this fire exceeded the expectations of the experts giving evidence to the Commission, and must cause surprise in the minds of the manufacturers.

146. In view of a strong recommendation that all exposed edges of Oroglas should be protected from direct contact with flames, it is difficult to



explain why the designers, architects and dome fabricators alike, permitted the long edges of all the roof domes to be exposed and unprotected. The fire must have accelerated because of this weakness, but it is not possible to say whether this was formidable or not, nor whether it made material difference to the evacuation of the building.

147. We heard much of the 'fall-out' principle during the evidence. This principle sees the softening of the acrylic before ignition as permitting panels to 'fall-out' and thus allowing venting of an internal fire, with a useful removal of lethal smoke. There is little doubt that the rapid consumption of the roof domes permitted venting very quickly and that this released great heat and certainly a lot of smoke. There was no suggestion however that any domelights from the roof or Coxdomes from the south wall fell before igniting. The theory of fall-out was referred to in a report of some tests carried out by the Fire Brigade in Boston, Mass., using acrylic window glazing. The tests had no relevance to the Summerland design however and we remain unconvinced about the probability of fall-out without ignition. Neither Rohm & Haas nor William Cox promised that fall-out would occur and they always emphasised that the behaviour of Oroglas in fire was unpredictable. It would depend upon complex factors — the thickness, rate of heating, ignition source and methods of fixing would all play a part.

148. Venting cannot be unequivocally beneficial, as it will enormously increase the speed and ferocity of the fire in the building's contents. In a very large building like Summerland, in which there is ample volume for the accumulation of smoke and hot gases, the benefits of venting are even less evident.

149. There remain a number of questions which have to be investigated if acrylic panels are going to be used in considerable and continuous expanses. The foremost requirement is to know much more than is known now about the performance of large surfaces under conditions of fire. The standard tests, the results of which are the only information available to designers, could clearly lull them into complacency, particularly if characteristics of fall-out and venting are given undue importance. It is, we believe, quite possible to clad a building in acrylic safely, but the way it was used and the extent of its use made Summerland a vulnerable building. There is still the lack of what Dr. Guban called a sound philosophy of the effects of scaling up in size the results of fire test experience.

#### *The Part played by Galbestos*

150. The Galbestos supplied and fixed by H. H. Robertson (U.K.) Ltd. at the eastern end of Summerland provided the path by which the fire spread to the interior. The architects had previously changed the design from reinforced concrete to steel cladding in order to simplify and cheapen the construction. The first enquiry to Robertsons was for a quotation for supplying and fixing their material and included a separate price for an integral plasterboard lining, and a reply stating their price was dated the 6th June 1968. This integral specification was however not accepted on grounds of cost, and Colour Galbestos coated both sides only was substituted and eventually ordered by Parkinsons on the 3rd February 1970.

151. We gained the impression that in making these changes, neither the architects nor Robertsons gave much thought to the fire risk. The evidence of the architects was confused and they seemed to hold the view that the material was virtually non-combustible. In this opinion they quoted the EXT.SAA rating referred to in the Robertson advertising literature, headed "Robertson Colour Galbestos Wall Cladding" included in Specification 1965. This literature was not in itself clear, as Robertsons conceded. Under the heading of "Fire Performance" it stated:

"Exhaustive tests on Colour Galbestos have been carried out by the Fire Research Organisations at Boreham Wood.

These include—

- (a) External Fire Exposure Roof Test BSS 476:  
part 3—EXT.SAA.
- (b) Internal Spread of Flame BSS 476:  
part 1 Class I or II.
- (c) Fire Propagation — the results indicate that the contribution which Colour Galbestos is likely to make to fire is negligible".

We consider that this kind of information could be misinterpreted during a rather superficial and not well-informed examination. We came to the conclusion that the architects who made the decision were not sufficiently knowledgeable about the character of Colour Galbestos to ask the right questions. It would have been helpful if Robertsons had realised this, and had volunteered their assessment of the risk situation. They had the plans and they worked on the site.

152. The Colour Galbestos used at Summerland was BR4.736 composed of 15'0 (app) x 2' 5" (736 mm.) x 13/8" thick over the corrugations. The steel core is zinc coated, covered with asbestos felt saturated with bitumen and then faced with a polyester resin coating.

153. It is believed that this material had not been used for the external cladding of a multi-storey public assembly building before. There is no doubt that Robertsons have been involved in considerable investigations since the fire, and it is much to their credit that they were so candid and helpful at the Inquiry. We were particularly impressed with the full scale fire research experiment carried out by Mr Benson for the Company. This was very helpful in emphasising particular characteristics of the materials which perhaps previously have not been so clearly stated. It is of course the plastic coating of polyester resin and the bitumen saturate of the material which are combustible. For ignition, a strong independent fire source is required. On ignition there is a rapid flame spread up the surface of the sheeting (and less rapid horizontally) until the flame source is remote from the coating when the heat lessens and the flames die out. In the meanwhile, near the heat source Colour Galbestos will deform and hot gases and flames can penetrate inside both to an inner lining and to any combustible material near at hand.

154. The above conditions applied at Summerland and, as already described, considerable combustible material behind and inside the external colour Galbestos cladding caught fire and burned fiercely. It thereby continued also to feed fire to the inner skin of the Colour Galbestos upwards.

155. Beyond the Amusement Arcade (level 5) and the back of the Marquee Showbar (level 6) the Colour Galbestos sheeting itself probably did not contribute much to the extension of the fire which was predominantly fed from the many combustibles on the wood floors. It was the combination of Colour Galbestos, combustible fibreboard linings and the floor-ceiling relationships which was lethal. It must be emphasised however that these relationships were the results of decisions taken by the designers, who had the prime responsibility of assessing the future performance of the individual components.



## PART X. FACTORS IN THE LOSS OF LIFE

156. The high number of casualties can be attributed to two causes. One is the very rapid development of the fire. The other is that evacuation of the building, which, on account of the rapid development of the fire needed to be particularly prompt, orderly and easy, was delayed, unorganised and difficult. The rapid development of the fire and its causes have already been dealt with in Parts VIII and IX. It remains to deal here with the causes and effects of the defective evacuation which was due to faults in management and faults in design or construction.

### *Absence of Proper Organisation for Evacuation*

157. In a public assembly building such as Summerland it is an essential duty of management to establish and maintain a practical procedure for quick and orderly evacuation of the building in a fire emergency. It is not easy to do this and the requisite procedure can certainly not be improvised during an emergency. Proper evacuation procedure requires the integration of the actions of a number of members of the staff, carried out against a background of sudden emergency and the risk of panic which is always present when a large number of persons are gathered together and become apprehensive. The requisite organisation has to be worked out well in advance. This involves consideration of such matters as: who is the authority to decide on evacuation, who is to tell the public, by what means are the public to be told, how are the staff themselves to be told, what members of the staff will be required to control and direct orderly evacuation, and when and how are the staff themselves to leave the building? In addition, at Summerland the maintenance of a proper system of evacuation was rendered more difficult because there was a rapid turnover of staff throughout the season. This situation necessitated constant vigilance to ensure that any system instituted was properly maintained.

158. Mr De Lorka was General Manager. He had joined Summerland in May 1973 and after a period during which he was taking over from the former General Manager, Mr Bertorelli, he assumed control in June 1973. Trust Houses Forte Leisure Ltd. had in existence an excellent document compiled for the guidance of General Managers, to assist them in safeguarding the public and property under their control. This document stated, among other things, (a) that all means of escape from a building to which the public may resort must be kept available and unobstructed while the public are present and responsible persons must be given this duty to perform, and (b) that all employees must be conversant with the procedure laid down in the fire routine and take part in evacuation drills. A record must be kept of such drills. Mr De Lorka told us he had never seen this document. We think it may have been in one of the files handed over to him but perhaps it was not. Certainly he had never read it.

159. In 1971, the then General Manager, Mr Beetles, drew up two sets of good and practical instructions, one for operations control staff and one for departmental heads. The former document stated that if the "Duty Manager" decided that the building should be evacuated, an announcement would be made through all areas. There followed a prescribed form

of announcement designed to start evacuation at once without causing panic. Both the documents stated that on the announcement for evacuation being made the staff would ensure that they were positioned at the nearest available exit and emergency exit to direct patrons out, controlling them quickly and calmly. The escalator should be switched off. Full lighting should be switched on.

160. Mr Harding, the Technical Services Manager, had seen the former document and he told us that a copy of it was pinned up in the Control Room. No other witness we heard seems to have read it.

161. In fact, whatever may have been put on paper, or under a former General Manager into practice, there was no evacuation procedure in existence in the summer of 1973. There were no evacuation drills. Mr De Lorka thought it was for Mr Harding to organise an evacuation procedure, but he never discussed it with him. He told us in explanation that it was the height of the season and they were very busy. No doubt this was true but it follows that large numbers of the public were inside Summerland at this time. Mr Harding thought it was for the heads of departments to organise their own evacuation procedure but he gave them no instructions about it. Mr Paxton, the Deputy Managing Director of Trust Houses Forte Leisure Ltd., thought it was for Mr Harding to organise an evacuation procedure and for Mr De Lorka to make sure that he did it. Mr Dixon, the supervising Fire and Safety Officer of Trust Houses Forte Ltd. for the entire United Kingdom, who inspected Summerland and also had interviewed Mr De Lorka before his appointment, thought it was Mr De Lorka's duty to organise an evacuation procedure and no part of Mr Harding's duty. Mr De Lorka in evidence accepted that if a fire occurred, he relied on members of the staff using their own initiative as to what to do to get people out safely. He did not think there was much of a fire risk at Summerland.

162. In this thoroughly unsatisfactory state of affairs it is not surprising that the fire found the entire staff completely unprepared and at a loss. In the emergency there were errors of judgment, errors of action and errors of inaction. They were all human errors and failings and are not to be derided by us who were not involved at the time. In the absence of prior thought and organisation and training, all this was to be expected.

163. Some lost their heads and some behaved with coolness and courage and even self-sacrifice. Mr McEachern, the Bars Manager, lost his life in the fire. Mrs Wynne Smythe, the Manageress of the Marquee Showbar, directed patrons into the emergency staircase and did not leave until she believed all others to have left and when the building was in darkness and she was in danger of being overcome by smoke. She had had fire brigade training. No one exerted overall control or authority. Mr Harding was fully occupied in trying to fight the fire until it was obviously beyond control. It was he who told Mrs Wynne Smythe to evacuate the Showbar. He personally attended to many details. He helped to get people out of the building. It was he who stopped the escalator which had been left moving upwards while people were trying to escape down it and he also succeeded in unlocking one of the emergency doors which had been left locked — both these being examples of tasks which under a proper system would



have been performed at the beginning and by subordinates. Mr Shaffer, the House Manager, as already related, turned off the main electricity supply, thinking that this was the right thing to do and being ignorant of the written instruction to the contrary to which reference has already been made. When the main supply was turned off, an emergency generator adjacent to the switch room should automatically have started and provided emergency lighting. Mr Shaffer did not notice that the generator had failed to start although on our inspection we found that this generator makes a loud and unmistakable noise clearly audible in the switch room. His misguided action put the covered escape staircase in the north-east corner in darkness at the height of the crisis.

164. With the exception of Mrs Wynne Smythe, no member of the staff who gave evidence before us recollected ever receiving any instructions about what to do about evacuating the building in the event of fire. There was a special notice in the office of the Showbar and Mrs Wynne Smythe had read it. There probably were, or had been, notices related to the alarm system in other parts of the building, but they do not seem to have made any impression. A proper evacuation system is not established or maintained merely by putting up notices.

165. So far as equipment is concerned, Summerland had the means of promptly notifying the public in the building of any fire emergency and of instituting orderly evacuation. There was the elaborate fire alarm system which has already been described in Part VII of this report. The actuation of the system at any public call point would immediately signal to the control room and, after a delay, notify the fire brigade and the public within the building. The actuation of the system at any staff call point would immediately signal the fire brigade and control room and also sound the alarm bells and sirens in the building. The control room was so situated as to give a view of almost every part of the building. It was linked by telephone to various parts of the building. There was a fire panel on which was a button which would immediately activate the alarm system, warning the fire brigade and sounding the bells and sirens. By means of a microphone and sound equipment in the control room, a public announcement could be made which would be heard in all parts of the building except enclosed areas such as the Marquee Showbar and the Sundome. Anyone using the microphone in the control room could over-ride any other microphone being used anywhere else in the building. The making of a suitable public announcement and the control and guidance of the members of the public by staff who knew what to do would be of great importance in a general evacuation of the building. The mere sounding of bells and sirens without explanation and guidance might not be understood or might cause panic and dangerous disorder.

166. No effective use was made of any of this equipment, either to inform the occupants of the building or to sound an alarm. Although, as already related in Part VIII of this report, a signal reached the fire brigade on the alarm system at 8-05 p.m., no alarm sounded within the building and it would have been too late if it had. The probable explanation of this is that fire had attacked the wiring in the building so that a short circuit was caused.



167. Although the control room was obviously designed as a control centre with an important function in a fire emergency, that function seems to have been wholly lost sight of by the summer of 1973. The young lady who was in charge in the control room at the time told us that she had no idea of anything to do with the fire alarm system. She said she had seen a small notice on the wall in the control room. Mr Harding said in evidence that he told her to read this notice; but whether she was told to read the notice or not, it was quite clear that she was unaware of its contents. When the fire occurred, she saw it spread in the Amusement Arcade and saw people in panic making for the exits. She then prudently ran out of the control room. There was nothing more she could do at that stage.

168. There were many other things to do in the control room. The young lady controlled the sound and lighting equipment for the stage, made public announcements about entertainments in the building and operated equipment for playing recorded music within the building. Mr De Lorka told us that these various activities were a full-time job and we accept that the young lady was not aware of any other responsibilities.

169. The only public announcement to evacuate the building was given when flames were sweeping across the Amusement Arcade and people were already running towards the exits. At this stage, Mr De Lorka, hurrying to break open the locked emergency doors leading to the Aquadrome, passed some stage artistes and told them to make an announcement. Mr Mannion, the organist, accordingly shouted "everybody out".

#### *Defects in the Means of Escape*

170. There were shortcomings in the means of escape viewed against the background of the building's susceptibilities to fire spread and we believe these shortcomings were responsible for some of the deaths and injuries and could possibly have led to casualties even if there had been a reasonably prompt alarm. Deaths occurred on the Leisure Floor, on the Marquee Showbar floor, on the service staircase in the north-east corner of the building, on the Solarium floor and on the flying staircase. As regards the deaths on the upper floors and three at the back of the Amusement Arcade, we think that at least some of them were not due to defects in the means of escape; it seems more likely that these victims were simply overwhelmed where they were. None of them was unreasonably far from the means of access to an escape route of some sort.

171. There was a bad bottleneck created between the foot of the escalator and the main entrance, which resulted in a pile-up of living bodies and other persons walking over them. Fortunately no deaths resulted from this. The three main areas where means of escape were defective were the flying staircase, the north-east service staircase and the main entrance.

172. The flying staircase was the location of at least 13 deaths. In our view this staircase did not constitute a satisfactory means of escape. For such a purpose it was wrong in type, position and dimensions. During the Inquiry there was argument as to what standards of means of escape should

be considered for purposes of comparison between Summerland and accepted good practice elsewhere. We were referred to the Scottish Building Regulations, to a Code published in 1945 by the Building Industries National Council and, in passing, to other Codes. In addition, of course, there were the Theatre Regulations of the Isle of Man which directly applied by law to Summerland, but were not in fact applied to it when the decision as to whether or not to issue a Theatre Certificate was made.

173. We do not propose to attempt a detailed comparison of the escape system in Summerland with those of other codes. All codes and regulations presuppose adherence to specified structural requirements as a background to means of escape and it would be necessary also to consider the respective structural requirements. We prefer to apply principles which we believe underlie every system of means of escape irrespective of its origin. One principle is that if a person cannot go safely in one direction because of fire, he must be able to go in another direction and reach safety unharmed. It follows that in going away from the fire, the escaper must not have to travel for such a length of time (i.e. for such a distance) that he may be overtaken by the fire before he reaches a place of safety.

174. Escape routes may be "protected" (protected against fire and the effects of fire) or "open" (unprotected against fire or the effects of fire). Open escape routes need to be limited in length while protected ones do not.

175. The service staircase in the north-east was, at least to some extent, a protected staircase. The route to it was across the floor at each level, except on the Cruise deck, to which this staircase did not extend. However, no-one can be identified as having failed to escape from the Cruise deck although persons who were overcome below may have started from there. Where the service staircase served a floor, the distance along the open route across the floor was as a rule not more than an average of 85 feet. This distance is reasonably acceptable. The acceptable distance according to the Scottish Regulations is 100 feet and according to the Code of the Building Industries National Council, 75 feet. However, a person prevented from reaching the service staircase might be obliged to travel up to 200 feet to reach the nearest exit. The nearest exit was the door to the Mini-Golf course and this was of relatively small capacity. The distance a person might have to travel to reach the main entrance could be up to 350 feet, exposed all the time to the effects of fire within the building. Such distances along open escape routes are in our view grossly excessive.

176. We consider that the flying staircase was unsuitable for escape purposes and that a second protected staircase was essential to meet proper safety standards in this building. The flying staircase had other defects which we refer to below but on the ground of travel distance and situation alone, it created a wholly unnecessary hazard.

177. An escape route must be wide enough, or there must be enough escape routes containing a sufficient aggregate width, to accommodate the full number of persons who may need to escape. The flying staircase had a width of 4 feet 2 inches and the service staircase had a nominal width of 5 feet, although it was less than this in several places. These two routes



were alternatives and as such should each have been capable of allowing the escape of the full number of occupants of the Cruise deck, Leisure floor and also the Marquee Showbar floor, taking into account that there was an additional route from the Marquee Showbar level, by the rustic walkway in the north-west corner by the Garden Bar. The established basis for assessing the capacity of escape routes is referred to in Part VII, Table V and is by the use of "units of exit width". It is assumed that one unit of exit width can accommodate the passage of 100 persons in  $2\frac{1}{2}$  minutes.  $2\frac{1}{2}$  minutes is commonly accepted as the maximum allowable time in a place of public entertainment for a person to travel by an open escape route to an exit door or to a door leading into a protected escape route. On this basis the service stairway would accommodate 300 people if it had its full nominal width of 5 feet, and the alternative, the flying staircase, was short of the capacity of 300 people. If one credits the flying staircase with a capacity of 250 and adds 200 for the 2 units provided by the rustic walkway, the total for the alternative routes is 450. The actual number for whom capacity had to be provided was difficult to determine. Various formulae were relied upon in the calculations made by witnesses and these produced widely differing figures. For present purposes we take one of the lower sets of figures — that claimed by Messrs Gillinson Barnett and Partners as representing the design occupancy — which totals 800. This is about  $2\frac{1}{2}$  times the capacity of the service stairway and not far short of double the capacity of the combined open alternatives. In our view, this ought to have been appreciated at the design stage as well as by the Chief Fire Staff Officer when he was called upon to consider the adequacy of the safety precautions before issuing a Theatre Certificate.

178. We do not know whether there was serious overcrowding on the service stairway. Nearly all the occupants of the Marquee Showbar went that way but we do not think that many others did, nor do we think that inadequate capacity is likely to have led to any of the deaths there. There was undoubtedly grave overcrowding on the flying staircase and this, combined with exposure to the worst of the fire, accounted for the deaths which occurred on or near this staircase.

179. The building and its use in occupancy as a leisure centre were novel and unusual and involved one factor which has not so far as we know figured in any previous fire disaster. Parents tended to be separated from their children, since pursuits for each were located in different places—in some cases separated by as much as three floors. When the fire was evident in the building, parents did not go directly to the exits, as occupants of buildings on fire would normally be expected to do; they naturally tried to find their children. On the flying staircase, narrow and congested as it was, people were trying to go in opposite directions while exposed to the effects of a raging fire. This unusual factor was overlooked by the designers, by the Chief Fire Staff Officer and by the occupiers. It is easy to say that it should have been appreciated and provided for. It seems very obvious now. However, it was an unusual feature and it is much more understandable for it to have been overlooked by those who were concerned with fire precautions before the building went into operation than for Trust Houses Forte Leisure Ltd. to have overlooked it once the various facilities were set out and the building was in actual operation. It is a feature which calls for lavish means of escape and in any event for reliable marshalling organisation in fire emergency.



### *Exit from Solarium Floor*

180. There were a number of unsatisfactory features in the arrangements for exit from the Solarium floor.

- (i) The bottleneck at the main entrance has already been referred to. This was largely but not entirely due to the locking of doors which should have been open in an emergency. However, the main entrance was not, in our view, well designed as an escape route. Although it provided 12 units of exit between the south wall and the wall of the administrative staircase, access was narrowed to 6½ units by intervening pay-boxes and moveable barriers. Further exit width was available by glass doors in the south wall near the main entrance but they were at a right angle to the main entrance.
- (ii) None of the doors on the Solarium floor were secured by "panic bolts". All were secured with mortice locks. The system, which was accepted by the Chief Fire Staff Officer, was for keys to be kept available at the doors in glass-fronted boxes for use in an emergency. In the Inquiry we heard no evidence that this system is not generally regarded as acceptable for emergency exits for places of public assembly and entertainment. We do not find this system acceptable, and the actual experience of Mr De Lorka during the fire is a sufficient illustration. He said that when he arrived at the doors leading to the Aquadrome, he broke them open with a trestle because he did not have time to open them with the key which was in the glass fronted box. He was asked whether the key was very far away from him and he replied that it was not "but the heat was intense and I wanted to get the people out as fast as possible". This was not the only instance during the fire where the key to a door was either not found or not used. It is in any event difficult to obtain and use a key when numbers of people are pressing against the doors.
- (iii) The glass doors leading to the Aquadrome were at the end of a long open escape route and did not give access to a place of safety, but into another building which was not fire-separated from the Solarium. We do not regard this as a satisfactory means of escape from fire.
- (iv) The pair of doors leading on to the Mini-Golf course did not lead to a place of safety. The Mini-Golf course was adjacent to the Orogas south wall and exit was blocked at the west end by a drop in level of 3 feet 6 inches, surmounted by a railing. This was not a feature of the original design, which had provided for steps at this point, but at the request of Trust Houses Forte Leisure Ltd. the steps were omitted from the construction and the fence was erected, but in the plans which had been submitted to Mr Pearson, the Chief Fire Staff Officer, and which he had examined, the steps were included. He had not been given any notice of the change.
- (v) There were three staircases leading downwards from the Solarium floor. One was the administrative staircase (6). Access to this staircase measured little more than one unit, the doorway in the Sola-

rium was marked "Private", and the point of discharge at the end of the staircase was into an encloseable yard. We do not accept this as an escape stair. The other two staircases, the Cinema stairway (7) and the Carousel stairway (3), are acceptable as providing an aggregate 6 units, but means of escape leading down into a basement are far from ideal.

- (vi) It was contended that the construction at Solarium level provided a total of 36 units of exit width which would give ample escape for 2000/2500 persons, estimated as a maximum likely occupation of the Solarium. This addition of all units of escape takes no account of the very real possibility that in a fire a number of the exits might not be available. If the exits from the Solarium level are considered from the point of view of alternative routes of escape, it emerges that most of the exits are at one end of the building. There is however no evidence from which it would be right to suppose that any deaths were caused by congestion at the exits out of the Solarium.

### *Obstruction of Exits*

181. It is an unfortunate and very regrettable fact that at the time of the fire a number of the doors intended for use as emergency exits were locked. The doors leading into the Aquadrome were locked as has already been stated. The two glass doors in the south wall near the main entrance were also locked. Mr Harding was able to open one of them and was then pushed away by the emerging press of people. Of the two pairs of main entrance doors, one was locked. Mr Shaffer ran to the Manager's office to obtain duplicate keys for these doors and by the time he returned with what he called "a handful of keys" the doors had been broken open.

182. There was a conflict of evidence as to whether all the keys which it was intended should be available in glass-fronted boxes were in fact available at the time of the fire. We do not find ourselves able satisfactorily to resolve this conflict but it is not very important since, as already indicated, the evidence showed that in practice, even where keys are available, there is not time or opportunity to obtain and use them. Mr Pearson told us that in accepting this system for locking doors, he had assumed that in a fire emergency staff would attend at the various doors to unlock them. No doubt a proper evacuation procedure would have provided for this, among other things, but there was no such procedure established at Summerland.

183. The doors at the foot of the covered stairway in the north-east corner were fitted with panic bolts. However, at the time of the fire, one pair of these doors was padlocked and also obstructed by a parked motor car. The car was driven away and the padlock taken off, but not before people escaping down the stairs had found themselves unable to open these doors. This was a particularly grave disregard of safety precautions, because on two occasions previously, the Fire Service had complained to the Management of Summerland on finding exit doors padlocked and assurance had been given that there would be no repetition.



### *Inadequacy of Exit Signs and Directional Signs*

184. It seems to us, from the evidence of persons present at the fire and also from examination of plans and photographs, that Summerland was not a building in which it was easy to find one's way about and that exits would not easily be noticed. This, of course, does not apply to exit by the entrance doors. Persons instinctively tend to leave a building by the way by which they came in. Accordingly the ordinary access routes were not marked except for exit signs on the main doors. The glass doors adjacent to the main entrance were marked "Emergency Exit" as also were the doors on to the Mini-Golf course. The Aquadrome doors on the Solarium level were not so marked, nor were the staircases leading down from the Solarium floor. The doors from the Spectators' terrace to the Aquadrome were marked "Emergency Exit". The door from the Marquee Showbar into the covered stairway at the north-east corner was marked "Emergency Exit" and we understand that doors leading out of the male and female changing areas of the Sundome on the Leisure floor were similarly marked. The exit door from the Funfair area (below the Solarium level) into the north-east service yard was also so marked. We have no specific evidence of any other doors being marked as exits and more important, no evidence that there were any directional signs guiding the public towards exits. We think it possible that some people on the upper floors were not aware that there was any way down other than by the flying staircase by which they had come up.

### *Lack of proper protection on the North-East Service Stairway*

185. Although this was a service stairway, it also purported to be a protected emergency escape route. The architects (other than Mr Lomas) were positive that it was at all times designed and intended as a protected emergency escape route. Mr Lomas in evidence and referring to the original design stage, made the rather startling observation that this staircase was "a notional fire escape at the time . . . an earnest of intention".

186. As originally constructed, it had a number of defects. These have been described in Part VII. We received the impression that it was primarily designed and intended as a service staircase for the use of the staff and for the movement of goods and this was certainly one of its functions. Some of its inadequacies arose from its dual role. For example, at the time of the fire one landing was partly obstructed by a deep freezer. We consider it undesirable to combine the functions of a service stairway and an emergency staircase in a building of this type.

187. A number of doors leading from accommodation opened on to the stairway. Not all these doors were self-closing or fire-resistant. The worst feature, however, was the presence of the open doorway in the wall separating the Marquee Showbar from a lobby which formed part of the stairway landing. This doorway was made by the staff of Summerland, under the direction of Mr Harding, for the purpose of facilitating the movement of goods into and out of the bar. It was made without permission, as was required, from higher authority in Trust Houses Forte Leisure Ltd., and without informing the Byelaw Authority. The danger of creating this permanent opening into the stairway does not seem to have been appreciated by anyone who knew of it.



188. This unprotected opening must have been responsible for a considerable amount of smoke entering the staircase. If, in addition, doors which were not self-closing were used and left open by people escaping from the fire, further quantities of smoke would enter the stairway. Although the first people to escape from the Marquee Showbar found cool air on the stairway, after descending a few steps, the upper part of the stairway soon became filled with smoke. Soot and signs of burning, which were still visible at the time of the Inquiry, show that as soon as the fire reached the north side of the Marquee Showbar, which must have occurred by about 8-12 p.m., the conditions on the stairway at that level would be lethal.

189. Twelve bodies were found on the stairs, some only about 8 feet from the exit. Death was probably due to asphyxia or carbon monoxide poisoning in all cases. It is possible that in some cases, due to late appreciation of the need to escape, the victims may have been severely incapacitated by carbon monoxide by the time they reached the stairway. It is a matter of speculation to what extent persons who were overwhelmed on the stairway had been hampered or delayed in escaping by the darkness after the lighting was switched off, by the uneven width of the stairway, by the absence of a handrail on one side and by the padlocking of the first set of exit doors.

#### *Failure of the Emergency Lighting*

190. When Mr Shaffer switched off the main electricity supply, the emergency lighting system referred to in Part VII should automatically have come into operation. We have considered three possible explanations for its failure:

- (i) That the starter batteries were not adequately maintained by Douglas Corporation. On August 4th they were found to be in poor condition, deficient in electrolyte and not capable of starting the motor for the generator. However, we heard evidence that they were regularly maintained by Douglas Corporation and Mr Worsley, an electrician employed by Trust Houses Forte Leisure Ltd., corroborated Mr Harding's evidence that on the day after the fire the batteries were capable of starting the motor when tested.
- (ii) That the toggle switch for isolating the generator had been for some reason switched off prior to the fire and had been left in the 'Off' position. Mr Worsley says that he found it in that position the day after the fire. It is, however, possible that some employee of the Electricity Board who was on the premises at 8 a.m. on August 3rd turned the switch off. If the switch had been turned and left off before the fire, the person responsible was an employee either of Douglas Corporation or of Trust Houses Forte Leisure Ltd. Mr Cowley, Q.C. on behalf of Douglas Corporation suggested reasons, which we found very persuasive, for concluding that if the switch had been interfered with before the fire, it was more likely to have been done by an employee of Trust Houses Forte Leisure Ltd. than by an employee of Douglas Corporation. There would be no oc-

casation for an employee of Douglas Corporation to switch off the isolating switch in the course of maintenance, but Trust Houses Forte Leisure Ltd. might have occasion to do so if electrical repairs were being carried on in Summerland. During the week before the fire there had been some trouble with the electrical system in Summerland.

- (iii) That the fire had attacked the wiring of the emergency lighting circuit by 8-11 p.m. If this happened, it might result in a short circuit and tripping of the circuit breakers after the generator started. This theory would fit in with the evidence of Mr Gibson who said that when he was in the covered stairway the lights went out, came on again briefly and then went out finally. No other witness whom we heard spoke of the lighting behaving in this way, although there was a statement somewhat to the same effect by a witness not called in the Inquiry. Against this theory is the evidence of Mr Worsley that the wiring, which was in conduit, all survived the fire.

191. If we had to choose between the three possibilities, we would be inclined to favour (ii) above; but we do not consider that we are in a position to determine satisfactorily which was the cause of the failure.



## PART XI. CONCLUSIONS

192. There was great enthusiasm for the Derby Castle project in the early days and the Douglas Corporation received much encouragement from the Isle of Man Local Government Board. This encouragement included a large financial grant. The project was to be the biggest Island building of the century, and a very considerable undertaking for a small community.

193. Thereafter, when the project was put into the hands of Mr J. Philipps Lomas, it would seem that both the Local Government Board and the Corporation concluded that he had also taken over nearly total responsibility for the design development, its management and eventually its success in performance. Too often the Commission were told that "we relied upon the architects" for correct decisions and solutions on many issues.

194. There are some responsibilities which seemingly were delegated—which cannot be taken by the design consultants however efficient and experienced they may be. These are the public authority and client responsibilities. In the first, Douglas Corporation and the Local Government Board share. It was their duty to see that, in the public interest, the best of solutions was found, that the Byelaws and regulations were adhered to, and that the officially deposited plans were properly understood, and if approved, duly carried out without alteration.

195. The Commission considers that the plans offered for Planning and Byelaw approvals were indifferent, and in the light of the importance of the project, they should have been sent back for clarification and better information. Certainly, in any case, they demanded a detailed scrutiny by all the officials and committees concerned. It may be that this scrutiny did not take place, each party perhaps believing that the other had already inspected the proposals properly.

196. Various matters contributed to the misunderstandings referred to in Part IV between Douglas Corporation and the Local Government Board.

- (a) The lack of inter-communication between the two parties.
- (b) The carrying on concurrently by the Planning Committee of two quite different functions, viz. the consideration of planning applications and the exercise of the Local Government Board's functions under section 3 of the Local Government (Building Byelaws) Act 1950.
- (c) The absence of any clear and prescribed procedure for applications to the Local Government Board for consent under Section 3 of the Act.
- (d) The long established failure to observe the procedure visualised by the proviso of Section 3 of the Act of 1950 under which Douglas Corporation would have had to give notice of the waiver which it was proposed to make and the Local Government Board would not have consented to it until a month had elapsed from the giving of the notice.

- (e) The practice of incorporating in a planning permission the waiver of a byelaw which might have nothing to do with planning considerations.

197. Within the clients' responsibilities, particularly as guardians of public spending, was the primary one of making the best choice of the design consultant and manager of the project. This should be done with full knowledge of the responsibilities which must be accepted and the resources required to sustain the consultant in his duties. A carefully selected list assembled from consultants in Britain and even Europe would not have been inappropriate to be considered for a project of the magnitude of Derby Castle.

198. The choice of Mr J. Philipps Lomas presumably was made without recognising that he had controlled only a small local architectural office all his life, and that his experience was limited only to modest building designs.

199. It did not, in the Commission's view, materially improve this choice that a firm in Leeds with a large organisation and more resources was appointed to act as associate architects. Mr Lomas was regarded as being entirely responsible to the clients in respect of all design decisions in spite of the fact that it was understood that Gillinson Barnett and Partners would provide both the design and the research expertise.

200. Even with the best possible choice of architect, the clients must continue to examine critically the conceptual ideas as they develop, and test them against a practical background of proposed usage and management of the completed building. They must remain in control of capital expenditure, costs-in-use and the likely budget appropriate to the intended use of the building. The Commission obtained no evidence, though it was sought, to show that these particular controls were ever applied. If they had been it is considered that some serious design mistakes might have been brought to light.

201. The Commission was asked to accept that no serious mistakes were made in the design of the building, on the grounds that the completed building was well praised by official and professional visitors. Such visitors are not particularly on the lookout for defects and this kind of argument is not very impressive. A critical analysis at the time of the scrutiny of the plans and completed building would, it is believed, have revealed the following important elements which should have been the subject of further consideration:—

- (a) The rather inaccessible position of the main entrance on its high terrace, as reached from the road.
- (b) The lack of good and quick access for fire fighting.
- (c) The extreme expanses of acrylic on walls and roof, beyond the needs of transparency. This seems particularly pertinent where the acrylic walls and roof are adjacent to the upper (internal) terraces.
- (d) The use of softwood structural floors for the upper terraces.



- (e) The haphazard arrangement of stairs and exits, and particularly the remote position of the only enclosed exit stair which also acted as a general service stair.
- (f) The marked lack of any compartmentation in the volume above the entrance floor, which involved a considerable extent of multi-storey space.

202. No efficient design management was applied to this unique project of Summerland. It is a design team's particular responsibility to consider carefully the functions of a building, particularly from the point of view of its efficient usage, comfort, maintenance and safety. Elsewhere the Commission has been critical, not so much of the particular choice of certain materials, but of the way they were used, with little understanding of their limitations.

203. Summerland required a first class architect and manager continuously working on the project during its design, erection and completion. The two senior partners in the two architectural practices involved, Mr J. P. Lomas and Mr C. Barnett, once the original brochure had been presented, did not thereafter put design pencil to paper. The significant skills of designing and the decisions thus taken were passed successively to two job architects, neither of whom had been associated with this kind and magnitude of project before.

204. No one — clients, authorities nor architects — ever stood back and looked at the project as a whole. Each could have done so within the terms of their responsibilities. Here the architects, because they were making design decisions based on expected usage, had the primary duty. Neither principal, Mr Lomas nor Mr Barnett, did so, and Mr Lomas with his duty towards his client was even willing to admit in evidence that he acted as a "post box or conduit" between Gillinson Barnett and the participants on the Island. Mr Barnett was surprised at this admission and denied it. He believed he had the subordinate role until the end of Stage 1. It became clear in the Inquiry that neither principal properly fulfilled the role of project manager or director and far too many important decisions were taken 'down the line' at job architect (or lower) level without ever being reviewed by the senior partners. Mr Theaker often made reference in his evidence to conversations with Mr Lomas but Mr Lomas denied most of these, or could not remember them.

205. It became clear that communications, particularly those of a decisive character, were indifferent between the two. This does not mean that there was any lack of cordiality. Many letters passed between the two architectural firms, and from either one of them to commercial firms or local authorities but some of them were unhappily expressed.

206. Quotations from letters which were written during the design period establish the kind of attitudes which sometimes arose. Examples are "we might get away with it", "curbing his (the Fire Officer's) impetuosity", treating the Theatre Regulations "with a pinch of salt", "steering the mind of the Chief Fire Staff Officer along the lines of the lowest estimate" in fire-fighting equipment; and "I do not think we need worry unduly on this business of fire resistance. The Town Council will have to apply a waiver and I do not think for one moment that they will refuse

it". We found one description of the project as "not a building but a weatherproof enveloping structure", both confusing and misleading to a client. In these circumstances Mr Barnett agreed to a suggestion in cross-examination that it was necessary to watch Mr Lomas "like a hawk".

207. Acrylic as a walling and roofing material was decided upon for the transparent building before the presentation of the brochure in 1965. Mr Barnett took the primary decision that this, in the form of Oroglas, was the essential material for this purpose. He was clearly committed to it and did not make sufficient enquiries about using it in extensive areas. This material had (as seen at the time of 1966-67) many advantages for the twin purposes of transparency and comfort, but being entirely committed, the architects never thoroughly investigated other people's knowledge and experience of the material, which had never been used so extensively in Europe before. The visit to Expo '67 at Montreal gave its architect visitors from Gillinson Barnett — it seemed to the Commission — little help in the use of the material, and no supplementary information was received from Rohm & Haas, or other American sources, which might have been helpful. It is possible that, on the contrary, the view of the U.S.A. pavilion lulled inexperienced designers into a false sense of security, for the conditions for which Summerland was being designed were quite different, and required a quite different solution.

208. The Commission believe that the objectives of Summerland could if necessary have been achieved by the use of other materials. Though the use of acrylic might have been subsequently confirmed, the analysis of other alternatives was certainly a prime responsibility before the decision was taken. Mr Barnett, in spite of the repeated assertion during the Inquiry that Summerland could only be built in acrylic, reluctantly confirmed that the architects could have designed Summerland without its use.

209. On many occasions during the hearing of the architects' evidence, they showed little simple scientific knowledge about materials and about standard performance requirements of buildings in general. The study of performance as part of design and construction should include safety, efficient usage, comfort and maintenance. An assessment of safety, particularly fire safety, appears so far to have been generally neglected in architectural education. We accept Mr Milstone's comment that architects in general practice cannot be expected to have a very specialised and scientific knowledge of the chemical and physical attributes of materials, and we would not expect understanding of all the minutiae of research results. We would, however, expect that architects would understand the precise requirements of building byelaws and the known and advertised information resulting from British Standard Tests. If they did not, then they would be expected to seek guidance.

210. All new buildings, particularly where both a new geometry and relatively untried new constructions are involved, present a complex series of physical and chemical forces. Architects are unwise to accept research responsibilities for such influences upon performance of buildings in use, unless they can turn to members of their staff who have research experience. The design of Summerland, vulnerable to the spread of fire and



without protection to guard against it, indicates lack of such experience. The alternatives were either to design within the firm's limited and traditional knowledge of the behaviour of buildings, or to seek specialised scientific knowledge from outside.

211. For knowledge of particular materials and structural systems, the Commission would expect that the designers would seek help and advice from any research establishment. We find the suggestion that the Research Establishments concerned with the performance and further use of building materials would be unlikely to say anything of real use, quite unacceptable. Even if this view were held, however, there is no excuse for not trying. In the particular cases of both Galbestos and acrylic, we believe that the Building Research Establishment and the Fire Research Station could have said something useful.

212. Tests for judging the behaviour in fire of building materials and structures, published by the British Standards Institution and by other organisations, were mentioned frequently during the Inquiry. Most commonly, the tests referred to were those of BS 476 in its various parts, but there was also reference to methods of testing plastic materials, some published by BSI and some originating in America. It was suggested that these tests failed in their objective of telling architects and others what they needed to know. It seemed that some at least of those engaged in designing were relying on these standard tests to tell them how a material or structure would behave in a fire, and thought that, if the prediction derived from the test was not borne out in practice, the test was in some way at fault.

213. The difficulty at the root of this matter is the difference in scale between the standard test and the use of the material or structure in full scale. The difference arises in two main ways: the specimen being tested may be relatively small, and the source of heating or ignition may also be quite small. Both these features arise, evidently, from the need to keep the tests fairly simple, inexpensive and rapid to perform. The specimen to be tested will be representative in general terms of the material or structure itself, however large it may be when in actual use; on the other hand, the performance of a material when used as a single roof-light may well be quite different from its behaviour when used for cladding in sheets of large area.

214. Much more striking is the difference in result between a material tested against a small ignition source and its behaviour in a fully developed fire. The Summerland fire itself was the cause of some surprise, even consternation, in its behaviour compared with what standard tests of materials might lead one to expect, chiefly, we believed, due to the very great element of heating to which its constituent materials were subjected. There may thus be a big difference between the expectation of performance and the actual event, and it is in the failure of the one to predict the other that the questioning of the validity of the tests arises.

215. The Commission believes that this difference is inevitable in the nature of things. The standard tests, as we have said, are obviously chosen as a sensible compromise between the need to know as much as possible

and the fear of making the tests too cumbersome and expensive to be performed as often as they are needed. They will give a general indication of characteristics in the conditions of the test, but they will not necessarily predict the behaviour of a material in the particular application for which its user intends it: they could not do this without being far too numerous, cumbersome and costly to be practicable. Their limitations need to be understood and kept in mind. Where the performance of a material in a particular application cannot safely be predicted from the standard test then specific *ad hoc* investigation and testing will need to be carried out by the manufacturer, the designer or the user.

216. The Commission was told that, during the long process of designing Summerland, the details of escape in case of fire could not be considered because the kind of occupancy, usage and activities were not decided, as no tenant had been nominated. The Commission cannot accept this. As early as the brochure of 1965, the concept was sufficiently portrayed and activities described for owners and architects to agree a formula by which the design could, with confidence, develop. A formula does exist within the neglected Theatre Regulations. It might have been found to be inapplicable and out of date (both were subsequently suggested at the Inquiry) but this formula could have been a starting point.

217. There was no evidence offered to confirm that matters of occupancy and fire precautions and escape were discussed at any length among the architects during the critical periods of design development. A number of occupancy figures were given to the Commission from which the Commission has extracted the following:—

#### CALCULATIONS OF OCCUPANCY

	Architects (Mr Green)	*Commission	Fire Staff Officer
8. Cruise Deck .....	40	340	80
7. Leisure Deck .....	160	550	200
6. Marquee Bar .....	680	400	500
5. Solarium .....	1,150	1,250	2,000
	2,030	2,540	2,780

\* The Commission's figures were based on a Model Code of the Building Industries National Council used by Gillinson Barnett. This code was never officially issued.

A consensus agreed a figure of approximately 3,000. It should be noted that these figures exclude any occupancy below the Solarium level. The Commission came to the conclusion that occupancy figures had not been considered in proper detail before the fire.

218. No one seems to have recognised the great responsibility attached to designing a public building without establishing and confirming usage.



Some consensus of view, at the early stages, could without doubt have been established between clients, authorities and architects, if someone had taken the initiative. There were some factors expressed at the Inquiry which could clearly have been envisaged very early in the project:—

- (a) There could be high densities of people congregated in particular areas.
- (b) The building would be unfamiliar to casual (once only) visitors.
- (c) A combination of the above could lead to panic in the event of fire.
- (d) There could be some relatively immobile people, very young, very old and the disabled.
- (e) Some children would be unaccompanied.
- (f) The possibility of vandalism is always present.
- (g) There would be much combustible material and some potential sources of fire outbreaks in such a building.

219. The architects in their evidence recognised the existence of these factors, and it is difficult to explain why matters of escape and evacuation were hardly referred to in any documents until after the fire. Many explanations were given about the inadequate design of the enclosed north-east stair (No. 2) which was presented by the architects and authorities as an emergency (fire) exit. The Commission is not convinced that this stair was from the outset designed for this purpose. In fact it was a service stair designed to serve the upper levels with stores received in an enclosed yard. This yard was left open finally, but its existence on the early Byelaw plans 1967 and 1968 leave the firm impression that this stair together with its service lift was not designed primarily for emergency exit. The architects could have designed it very satisfactorily (from known precedents) if they had so regarded it, and they cannot shift design responsibility on to local authorities and fire officers.

220. The Commission was not impressed by repeated attempts by the designers to suggest that other people should have told them of any mistakes or inadequacy in the plans. Authorities may not always have the resources and expertise to offer such detailed scrutiny and advice, and qualified designers should not rely upon it.

221. The nature and character of official inspections of work in progress were not clearly understood. No official inspection of Summerland during the fitting-out stage was recorded or carried out by the building inspectorate of the Douglas Corporation. The object of such inspections throughout the progress of a job is to ensure that the building in all its detail is carried out in accordance with the plans approved by the Corporation, and to the standards required by the Byelaws, Regulations and codes of practice in force. Safety for the general public is the primary requirement.

222. Clerks of Works and Architects are also supervisors but their motivation is different in that it is client-orientated, checking standards relating to the signed Contract and subject to the later interests of the clients. At Summerland, the Corporation believed that at the late stages the presence

of a Clerk of Works and the periodic supervision of the architect were sufficient to cover the traditional inspections of their own building inspector. If the architects and the Clerk of Works, during the time of fitting-out, had been Douglas Corporation's own appointments there could possibly have been some formal delegation, though this would not have been wise. In the circumstances, however, both architects and Clerk of Works at that late stage were the appointments of Trust Houses Forte Leisure Ltd., with no-one taking the responsibility for the Douglas Corporation.

223. Confusion of roles and some lack of attention and understanding by the Lessees resulted in no formal inspection by anyone being undertaken before the building was released for occupation, and no completion certificate was requested by the Contractors nor issued by the Local Authority.

224. When the Lessees accepted the structure of Summerland (Stage 1) as the enclosure for the proposed leisure facilities for which they were to provide all the fittings, equipment, furniture and decoration, they made no technical inspection or assessment of the structure. This structure was obviously unusual and they had entered into a full repairing lease and were going to complete the building with material in excess of £400,000 in value. If such an inspection had been carried out by the Lessee's technical experts, appreciation of some of the items already referred to in paragraph 218 would surely have given warning of possible additional safeguards which ought to have been provided. Maintenance problems associated with reaching the remote external surfaces of Orogas and of keeping the Coxdomes weatherproof would no doubt also have been raised.

225. The Lessees, as occupiers, seem never to have been aware of how vulnerable Summerland was, or might become, and yet its protection was their responsibility. This is the more remarkable since in 1971 their experienced Insurers had offered a very substantial reduction in premium if a sprinkler system was installed.

226. There is an abiding need in the spending of capital for fitting-out of the magnitude referred to in Part V to be sure of the essential priorities. The whole activity involved in the work required by Trust Houses Forte Leisure Ltd. was telescoped into five short months. The motive was the earliest opening date, but the procedures verged on the irresponsible, with too little attention to wise expenditure. Given time and wise counsel, money could have been found for safe standards, sprinkler systems and proper detailing particularly of associated materials.

227. The application for a waiver of Byelaw 39 in respect of Orogas walls and its subsequent granting by Douglas Corporation and its authorisation by the Local Government Board should only have followed exhaustive enquiries and some scientific investigation. A question raised as to how to keep such walls out of harm's way would have imposed some very prudent restraints. Even after such enquiry and investigation the waiver of a byelaw is only justifiable when no reduction in the standard of personal safety is likely to result. (See para. 126).



228. Particular characteristics of the chosen external walls — Oroglas and Galbestos — in respect of fire, waterproofing and heat insulation were sufficiently known to permit a detailed study of safeguards against fire risks, including fire stopping and fire barriers, and differential temperature movements. No really serious and positive attention was at the time given to these factors. It could have been given by designers, inspecting authorities, manufacturers and fabricators.

229. It is in the interest of manufacturers to know more about the performance of their products before they acquiesce in their use being extended or changed. Though they cannot usually take responsibility for design decisions associated with their products, they must recognise the need for special investigation when use outside their own experience is proposed, if the reputation and particular qualities of their products are to be safeguarded.

230. At Summerland, the manufacturers and fabricators emphasised at the outset that they regarded the possible unignited fall-out of acrylic panels under great heat to be unpredictable. Investigation should have been undertaken to provide against this uncertainty before the walls and roof were constructed of Oroglas. It was also stated that exposed edges of acrylic were relatively easily ignited, but this characteristic was not taken into account in the design of the roof.

231. Fire protection and precautions are referred to in Part VII of the Report and the requirements are set down in some detail. Fire protection is concerned with choice of structural systems and materials of construction and furnishings. Precautions are concerned with escape, efficient evacuation, and with fire-fighting. On this last, the Fire Officer's decision must be regarded as obligatory and conclusive. On matters of material and structural selection and of the safety of occupants, his knowledge will in some measure depend upon his experience and this knowledge will be in the balance with other design and planning criteria. In the one he must state the requirements and in the other he must be properly consulted.

232. The Chief Fire Staff Officer received the plans for the 1967 submission. He should have considered the problems of fire-fighting at that time in order to improve the conditions which he agreed, in the event, were very difficult. On matters of materials and escape, however, he was not consulted formally either by his Committee or by the architects and was not even sent the changed Byelaw plans of 1968 and 1971. There is no doubt that he should have been, and that his opinion should have been sought on all these matters at the time of deposit of plans. He recognised that a great number of changes had been introduced, most of them for the worse from the point of view of occupant safety. However, as he said:

“This building was approved by the Local Government Board, by the Byelaw Authority, who are also the clients. They had accepted floors which were not incombustible. They had done so without any reference to me”.

He went on to say that there was a limit to the extent to which he could exercise his powers, and he was not sure enough of his ground to withhold

a Theatre Certificate. He was thus placed in a very difficult position. By hindsight he wished he had insisted on considerable modifications, but being fully involved with other responsibilities and with limited time devoted to fire protection matters, he made no representations.

233. The Chief Fire Staff Officer did, however, require the construction of the rustic stair after the building had been otherwise completed. If at the right time he had carefully reviewed the problems of escape, he now believes he would have strongly urged that a further enclosed stair in the south-east corner should serve the upper terraces.

234. The inspections referred to in paragraphs 221 and 222 were concerned with work in progress. There was no evidence that continuing inspections of public buildings after occupation authorised by the Regulations were ever made at all, though there may have been the occasional visit. These inspections should be in respect of usage and preparedness in case of fire, both the duty of the Fire Officer.

235. Regular inspections on behalf of the fire service while the public were on the premises would have brought to light some of the problems of the building as occupied and the lack of proper staff organisation. They would have focused more attention on problems of doors with locks and even padlocks and on the preparedness of the alarm system. Inspections must, of course, precede the granting of the yearly Theatre Certificate, which must not be just a licence, but must impose real and continued responsibility upon the Management.

236. The Commission considers that it is wrong to vest the responsibility for the issuing of a Theatre licence totally in the hands of the Chief Fire Staff Officer. He could certainly make the inspections at any intervals he deems sensible, but after his inspection for the purpose of a Theatre Certificate being issued, he should make a detailed report, supported by his presence at an officially established committee which, after consideration, take the appropriate action and issue the certificate under the authority of the Government.

237. It was alleged that the Theatre Regulations of 1932 were no longer workable and if an attempt was made to apply them to entertainment premises in general in the Isle of Man then many such premises would be obliged to close down. The Commission views this assertion with much dismay, because if the Regulations are considered to be obsolete, then this makes the certificate the regulations required a mere formality and not the serious control it is required to maintain.

238. As already discussed in detail in Part VI, the Regulations are clearly concerned with the design and use of a traditional theatre building. Entertainment and leisure buildings do not easily fit into this traditional activity. The Summerland disaster serves to emphasise the need for the Regulations and the certificate they require to be carefully reviewed and the procedures brought up to date. The certificates need to be more stringent and more exact and the inspection associated with them must be rigorous.



239. The Fire Service should have seen these inspections and those of the building in occupation as a vital duty. It is reassuring to hear that a new appointment of Fire Prevention Officer has now in 1974 been made.

240. Higher Management of Trust Houses Forte Leisure Ltd. could with great advantage have encouraged the necessary official inspections, and by so doing have received some reassurance that the local control and management of Summerland was of appropriate standard.

241. Architects in designing buildings must not rely upon efficient management to make the building efficient and safe in time of emergency or failure, but neither must the occupiers accept the building as safe without knowing something of its vulnerability of fabric and contents and without a considerable study of the problems that arise due to the usage and occupancy of the kind of clientele which they are encouraging. Young boys were admitted unaccompanied and for adults there were the temptations of six licensed bars.

242. It is an important responsibility of the occupiers of a public entertainment building to establish and maintain a proper system of fire precautions, including not merely the checking of the condition of emergency exits and the testing of the alarms and fire-fighting equipment but also most particularly the provision of a practical and well understood procedure for evacuation of the building in a fire emergency. In the case of an organisation such as Trust Houses Forte Leisure Ltd. this responsibility has to be delegated to individuals but it does not lie entirely at local management level; it is the responsibility of higher authority to take such action as is reasonably practicable to ensure that the local management is aware of its duties and is performing them.

243. As already stated in Part X, there is reason to believe that under a former General Manager, Mr Beetles, a proper system was worked out. Directives which he issued dealt with the fire alarm system and the notification of the fire brigade and referred to a "Duty Manager" in the building. If the Duty Manager decided that the building should be evacuated a prescribed announcement was to be made over the public address system and the staff were to station themselves at the exits and emergency exits to direct and control patrons. It is also evident from his directives that the control room in his time was regarded as a control centre in emergencies whatever other functions it may have had. Of course, the establishment of a proper system is not enough; it must be maintained by training and practice.

244. In the summer of 1973, there was no proper system at all, and no one assumed overall control when the fire broke out. Whatever his administrative skill in other directions, Mr De Lorka lacked appreciation of what he should have realised was among his duties as General Manager, to make proper provision for dealing with a fire emergency. There was no evidence that he was ever specifically informed that he had any duties of this nature. Mr Dixon, the supervising Fire and Safety Officer, assumed that Mr De Lorka would know that such matters were within his responsibility.

245. In many cases a man appointed as a General Manager would appreciate that he would have this responsibility, but his superiors ought not to leave such an important matter to chance. Trust Houses Forte Leisure Ltd. had a duty of supervision and they had the means of performing it. Supervision of a General Manager does not, of course, involve daily supervision. Mr Dixon made periodic visits to the various establishments of Trust Houses Forte Leisure Ltd. and he had visited Summerland. Unfortunately he did not consider that his duties extended to checking that an evacuation procedure had been established. On his inspections he concerned himself with such matters as the state of the emergency exits and fire-fighting equipment. It may be that in his turn Mr Dixon was not properly instructed in the scope of his duties.

246. In all the above inadequacies and failings, it seems to the Commission that there were no villains. Within a certain climate of euphoria at the development of this interesting concept, there were many human errors and failures and it was the accumulation of these, too much reliance upon an "old boy" network and some very ill-defined and poor communications which led to the disaster. It would be unjust not to acknowledge that not every failure which is obvious now would be obvious before the disaster put structure and people to the test.



## PART XII. RECOMMENDATIONS.

1. In the designing of a building a named person should be in charge from the outset and take and be known to be taking the major design decisions.

2. If manufacturers, fabricators and other participants in a project are expected to take responsibility for some part of the performance of the building these responsibilities should be clearly agreed in writing and the client should be informed.

3. Architects and clients together should carefully consider the requirements and performance of a building-in-use at the stage when conceptual designs are proposed and before proceeding with the details of the design and the later submission of plans to the authorities. "Performance" embraces efficient and comfortable occupancy and usage and safety, including safety in case of fire.

4. Early in the design stage designers should consult the authorities concerned with byelaws, town planning and fire regulations. Given this collaboration and advice, the designers must take responsibility for agreed decisions.

5. Architectural training should include a much extended study of fire protection and precautions.

6. Building inspections during construction should be conducted formally and precisely, both by architects and local authority inspectors. They should be duly recorded to confirm that the building is being built in accordance with the approved plans and the relevant byelaws and regulations.

7. On the completion of the works, after a satisfactory official inspection, a completion certificate should be issued. No public building should be occupied until after this has been done.

8. A set of detailed and up-to-date plans of the premises, showing the essential structure and services, should be available in all occupied public buildings.

9. The Building Byelaws should be revised by reference to more recent building legislation elsewhere which takes account of the use of new materials and building techniques and embodies the results of present day fire research.

10. As a matter of urgency, the Theatre Regulations should be revised and extended so that they include a complete code of safety regulations plainly applicable to a public entertainment building which is not a theatre in the ordinary sense. Some of the existing Regulations, such as Regulations 8 and 9, need revision for this purpose, applying the principles referred to in paragraphs 173 to 177. Some, such as Regulations 1, 2 and 10, are of general application. On the other hand, some of the existing Regulations are wholly inappropriate to a building which is not a theatre in the ordinary sense.

The revised Regulations should be so worded, headed and arranged that on reading them it is clear which Regulations are intended to be of general application, which are intended to apply only to theatres in the ordinary sense and which are intended to apply to other buildings. An Inspecting Officer can then conveniently ascertain and report whether a building complies with the relevant Regulations and whether there is a case for exemption from compliance with a particular Regulation or for the imposition of special conditions.

11. An Officer responsible for recommending the issue of licences or certificates relating to safety in public buildings should report to a properly constituted committee which will authorise the issue of the licence or certificate. Certificates under the Theatre Regulations should specify any exemption granted and any special conditions imposed.

12. Before granting an application for a waiver of a byelaw or regulation an authority should satisfy itself that the standard of safety for occupants which is set by the byelaw or regulation will be maintained by some other means. (See para. 126).

13. Both architects and regulating authorities should ensure that full provision of means of escape and protection against fire spread, with due regard to maximum foreseeable occupancy, is incorporated in the design of a building from the beginning.

14. When a large public assembly or entertainment building will contain by virtue of its proposed occupancy any substantial quantity of flammable materials (notwithstanding any proposal for flame retardant treatment) the design should include the installation of a sprinkler system unless special reasons apply. A typical special reason would be the risk of water damage to exceptionally valuable contents, as in a museum, when alternative provision should be made.

15. Voids with combustible interior surfaces should not be unnecessarily incorporated into a building intended for public assembly. If they are functionally essential they should be provided with permanent and reliable fire stopping or with sprinklers.

16. Manufacturers and suppliers should provide the fullest possible information about the fire properties of building materials to intending users.

17. In applying the results of British Standard and other standard fire tests on building materials and structures, architects and designers should bear in mind the difference in scale between the standard test and the conditions of use in full size. If necessary, special investigation should be made on a suitable scale to supplement the standard test.

18. Designers who consider using sheet steel cladding materials for multi-storey public buildings should have careful regard to the instability which may result from thermal and vibratory movements and thus affect junctions with other materials.



19. Until more information is available about the behaviour of acrylic sheeting for cladding purposes its use for such purposes should be confined to situations in which the hazard it might present is minimal, as follows:—

- (a) Acrylic roofing or cladding of an occupied building should not be placed within 3.5 metres of any point which would normally be within reach of persons inside or outside the building.
- (b) It should not be placed within 6 metres of any combustible material or any point where there is a risk of combustible material being put.
- (c) In any occupied multi-storey building or envelope containing an occupied multi-storey structure it should only be used in limited areas for roofing or cladding. These areas should be sufficiently separated by non-combustible material.
- (d) External exposure hazard to any occupied building roofed or clad with acrylic sheeting should be avoided by the provision of adequate separation distances between the building and its site boundaries as laid down by modern regulations or codes of practice.
- (e) In any case where the recommendation in (d) above is not followed, the roof and/or cladding should be protected by a reliable and effective water-spray system.
- (f) Any building roofed or clad with extensive areas of acrylic sheeting and intended for occupation by a substantial density of population (say in excess of one person to every 3 square metres of the net area) should have a higher standard of means of escape than the normal provision for the same number of persons. For example, aggregate exit width, properly distributed, might be increased by half and travel distances reduced by a third.

20. When acrylic sheets are used for roofing or cladding the edges should always be protected against the risk of ignition unless this risk is otherwise obviated.

21. The proprietors and managers of places of public assembly and entertainment should review their fire routines, including evacuation procedures, to ensure that they are satisfactory. Advice should be obtained, if necessary, from the fire authority for the area. Fire routines and evacuation procedures, once established, should be regularly checked and practised.

22. The staff of public assembly and entertainment buildings should be instructed and trained in fire routines, including evacuation procedures. Advice should be sought on this also, if necessary, from the fire authority.

23. Buildings used for public assembly and entertainment should be regularly inspected while the public are on the premises by the authority responsible for imposing requirements for public safety so as to ensure that the appropriate regulations, conditions of licence or certificate and codes of good practice are being complied with.

24. The staffs of public buildings, or a proportion of them, should be instructed in the use of fire-fighting equipment provided in the building. If a special fire-fighting party is maintained it should have a high standard of efficiency and engage in drills and practices. If this cannot be assured to the satisfaction of the fire brigade for the area it is better to dispense with the special fire-fighting party. The fire brigade should be called to every alarm of fire.

25. The managements of public buildings should assure themselves, in consultation with the fire authority for the area, that access to their buildings for fire-fighting purposes is satisfactory.

26. Fire alarm systems should be regularly tested and a record kept of the tests.

27. The possibility of designing a fire alarm system in such a way that the effect of fire on the wiring is always to sound the alarm and not to render the system inoperative deserves investigation.

28. Emergency lighting equipment should be regularly tested and a record kept of the tests.

29. There should be investigation into the design of emergency generator sets so as to ensure that any set fitted with a cut-out switch is also provided with either an interlock or a buzzer or warning light to prevent the set being inadvertently left inoperative when unattended.

30. Where a fire alarm system incorporates a mechanism whereby either the public warning signal or a call to the fire brigade can be placed on delay the mechanism for this purpose should, if possible, be so designed that the period of delay cannot readily be altered without reference to the fire authority.

31. Planning for the erection of a public building should include the preparation of a schedule of the means of escape. Means of escape should conform to modern regulations and codes of practice, including suitable provision for alternative escape routes, limited travel distances on unprotected routes, adequate width in escape routes and exit doors and the correct design of protected escape routes and stairways.

32. Public buildings in which the disposition of facilities involves separation of parents from their children should if possible be so arranged that the separate facilities are confined to one floor level. Where parents and their children are likely to use different floors the building should be provided with generous means of escape and the arrangements for marshalling during an evacuation of the building should be designed to give special confidence both to parents and children during the emergency.

33. Diagrammatic plans showing escape routes should be publicly displayed in assembly and entertainment buildings. They should be supplemented by prominently displayed directional signs showing the routes to be taken to emergency exits.



34. In places of public assembly and entertainment doors intended for use in an emergency should never be locked while the public are on the premises, even if keys for the locks are provided in adjacent boxes. All exit doors should be readily openable from within at all such times. Advice as to suitable fastening should be sought, if necessary, from the fire authority.

This terrible fire, one of the most rapidly developing fires ever to occur in a public building, has not only left a temporary ruin on the Island but a permanent scar in the minds of Manxmen. It was tragedy enough, but the Commission believes it could have been even worse if Summerland had been occupied by 5,000 people later in the evening after dark and the fire had started then. It is with this in mind that the Commission concludes by making the foregoing recommendations.

(Signed) J. D. CANTLEY

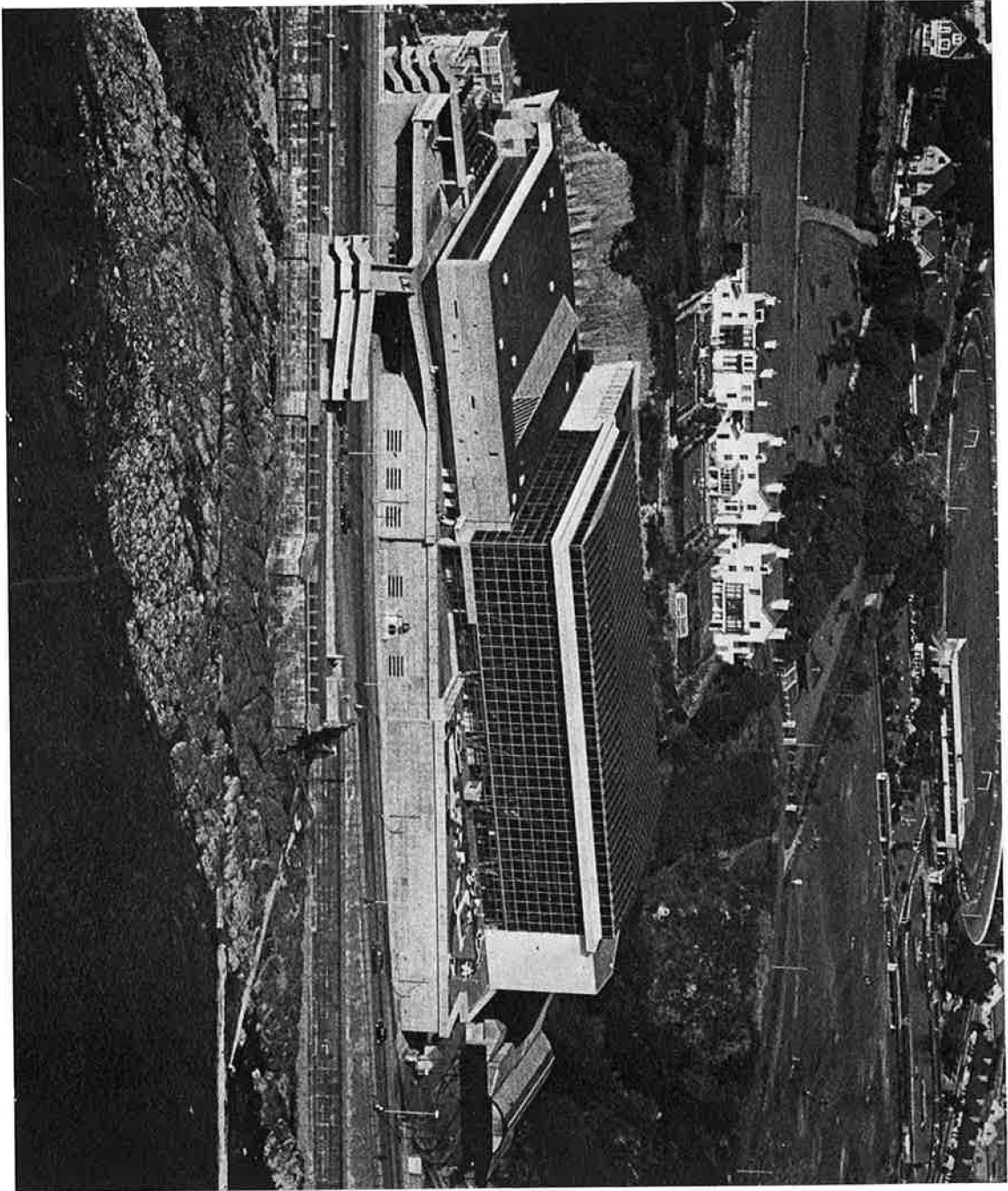
P. S. WILSON-DICKSON

DENIS HARPER

G. CARTER

Secretary

May 1974.











# Douglas Isle of Man



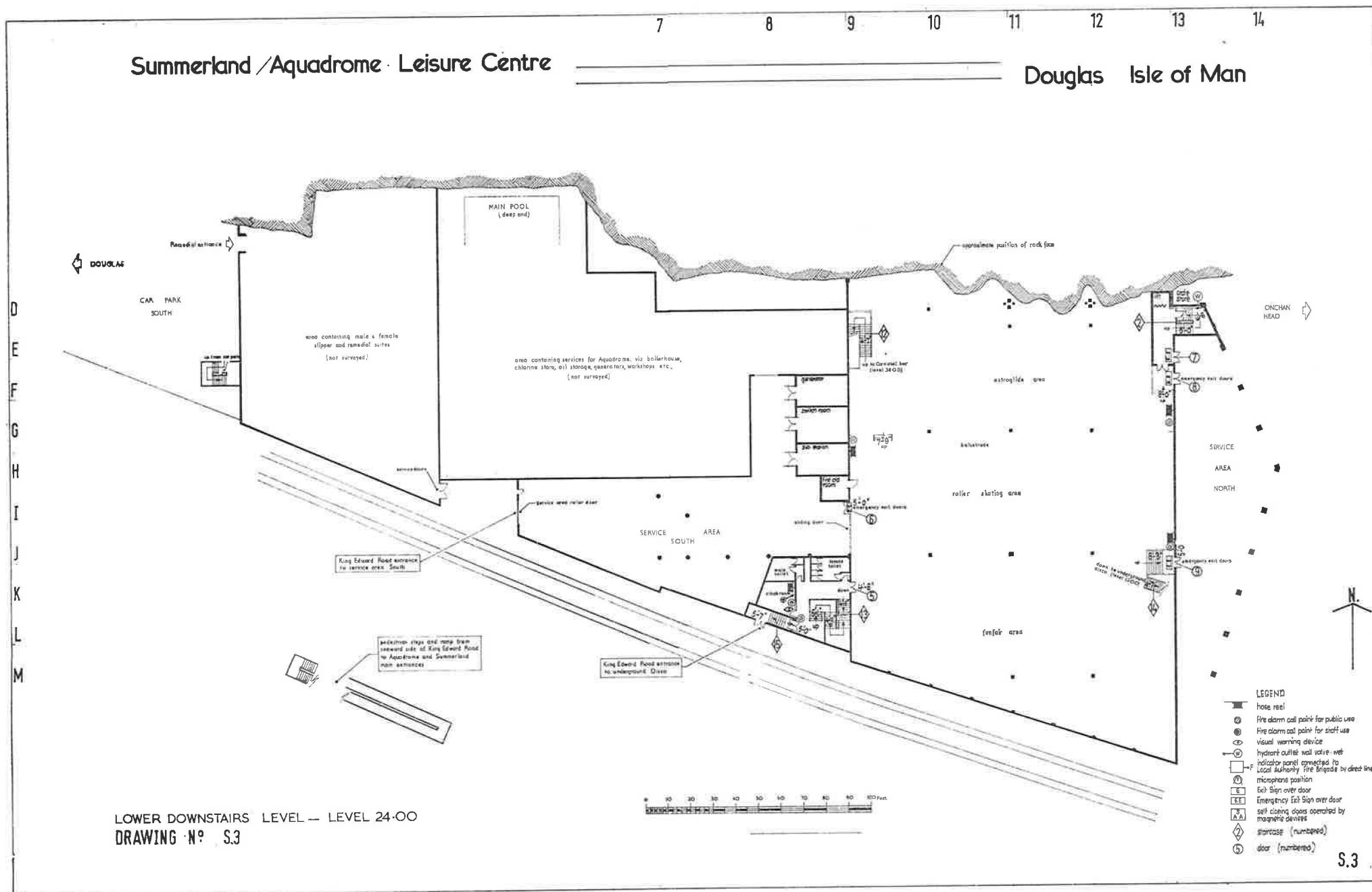
# Douglas Isle of Man





# Summerland / Aquadrome Leisure Centre

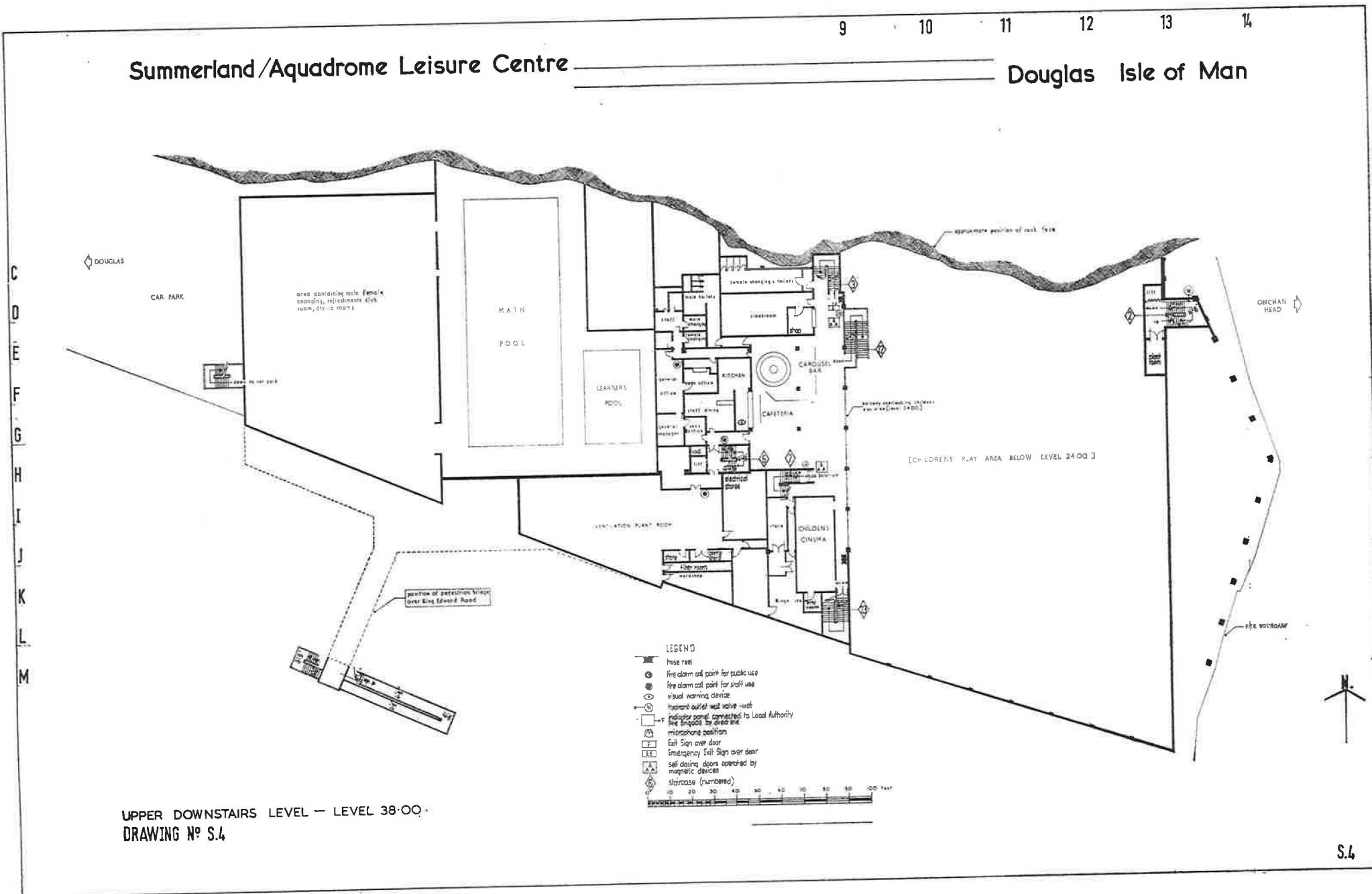
Douglas Isle of Man



S.3

# Summerland/Aquadrome Leisure Centre

Douglas Isle of Man





# Summerland/Aquadrome Leisure Centre

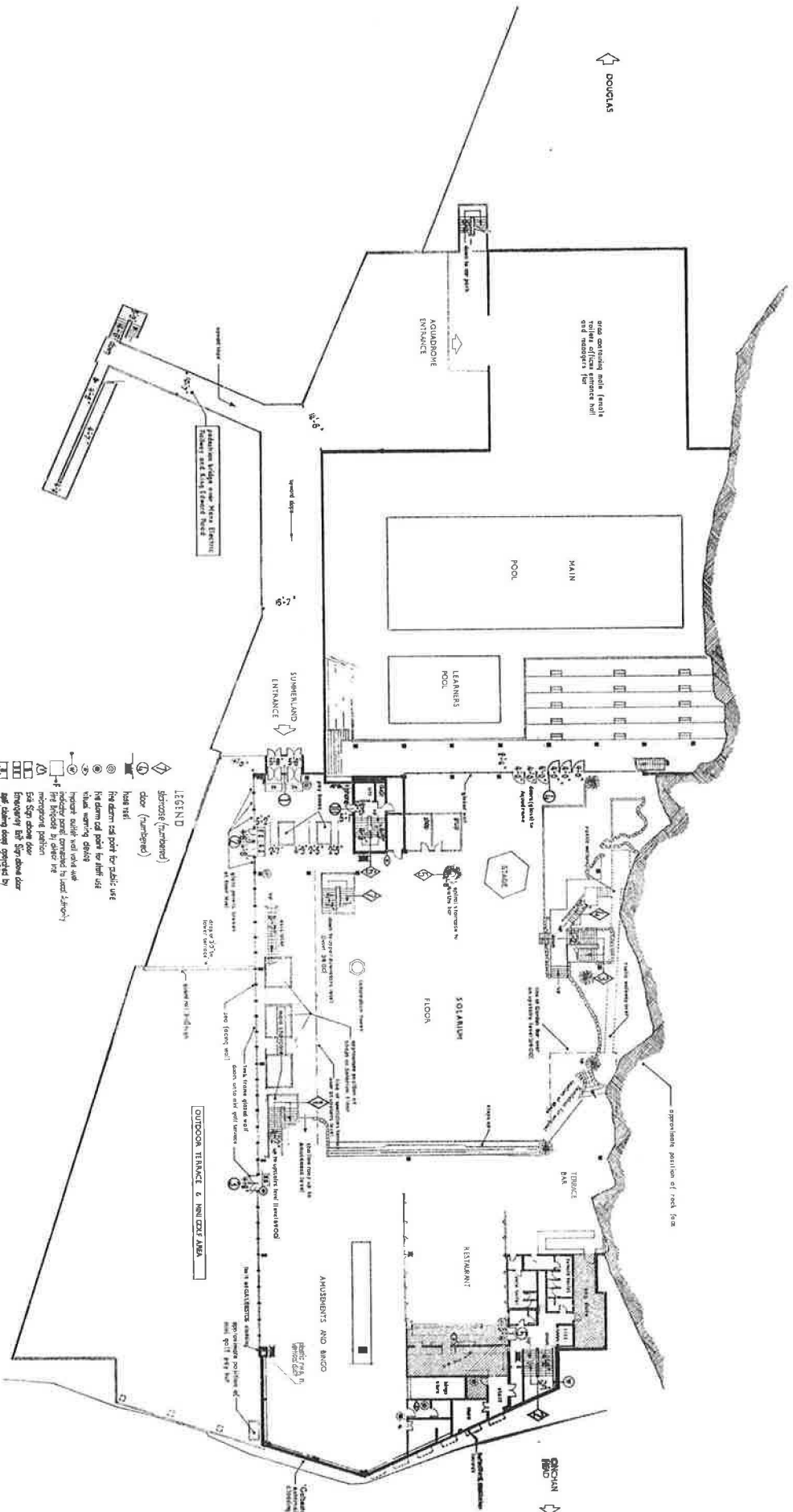
Douglas Isle of Man

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ENTRANCE LEVEL — LEVEL 50-75  
DRAWING N° S.5



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  - ② door (hatched)
  - ③ door (hatched)
  - ④ door (hatched)
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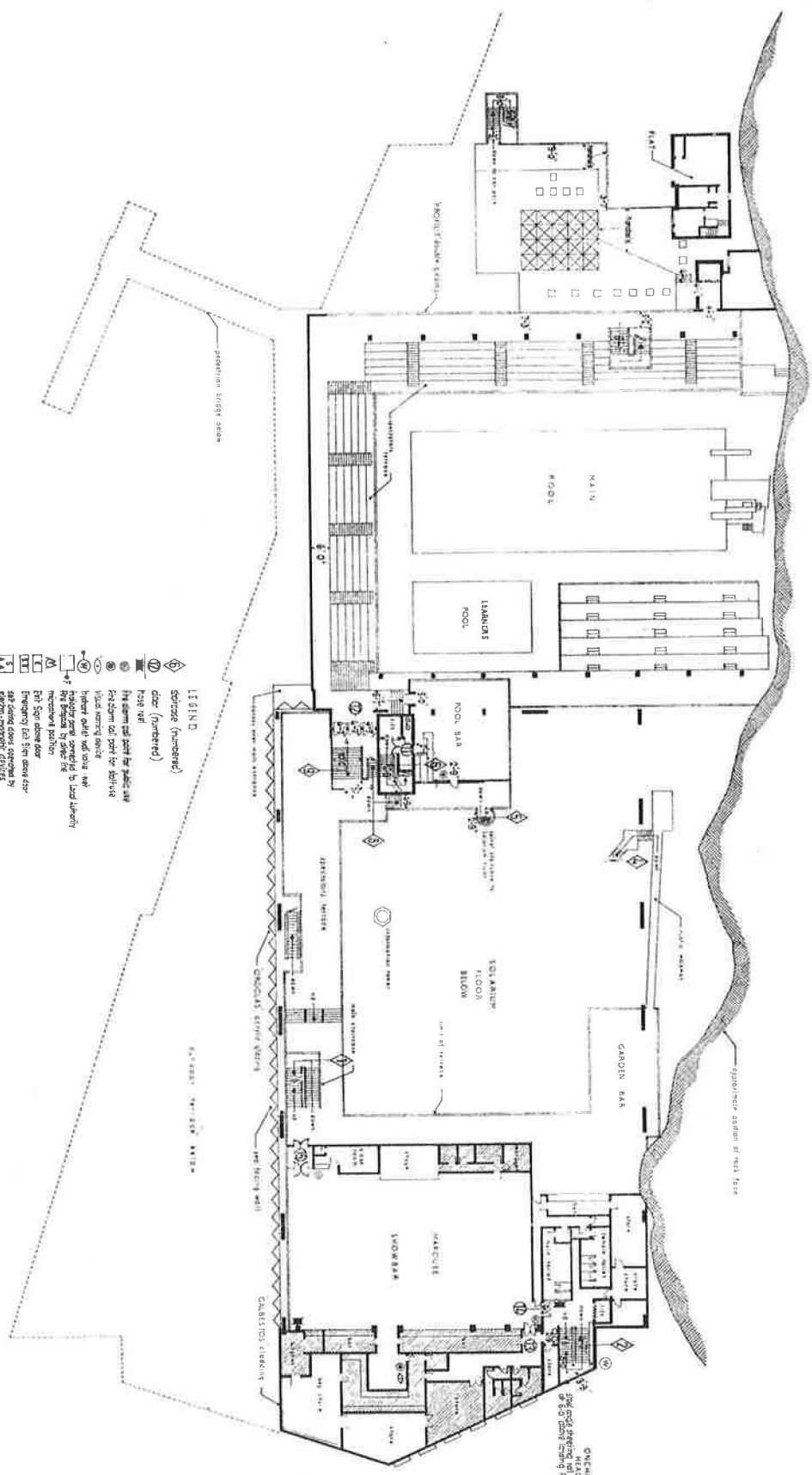


# Summerland/Aquadrome Leisure Centre

Douglas Isle of Man

6 7 8 9 10 11 12 13 14

DOUGLAS



## LEGEND

- ① SCISSOR (luminaire)
- ② door (interior)
- ③ door (exterior)
- ④ fire alarm call point for public use
- ⑤ fire alarm call point for staff use
- ⑥ visual warning device
- ⑦ handrail (stairs)
- ⑧ fire blanket
- ⑨ fire blanket by door fire
- ⑩ fire blanket by door fire
- ⑪ fire blanket by door fire
- ⑫ fire blanket by door fire
- ⑬ fire blanket by door fire
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UPSTAIRS LEVEL - LEVEL 69.00  
DRAWING Nº S.6

S.6

Douglas Isle of Man

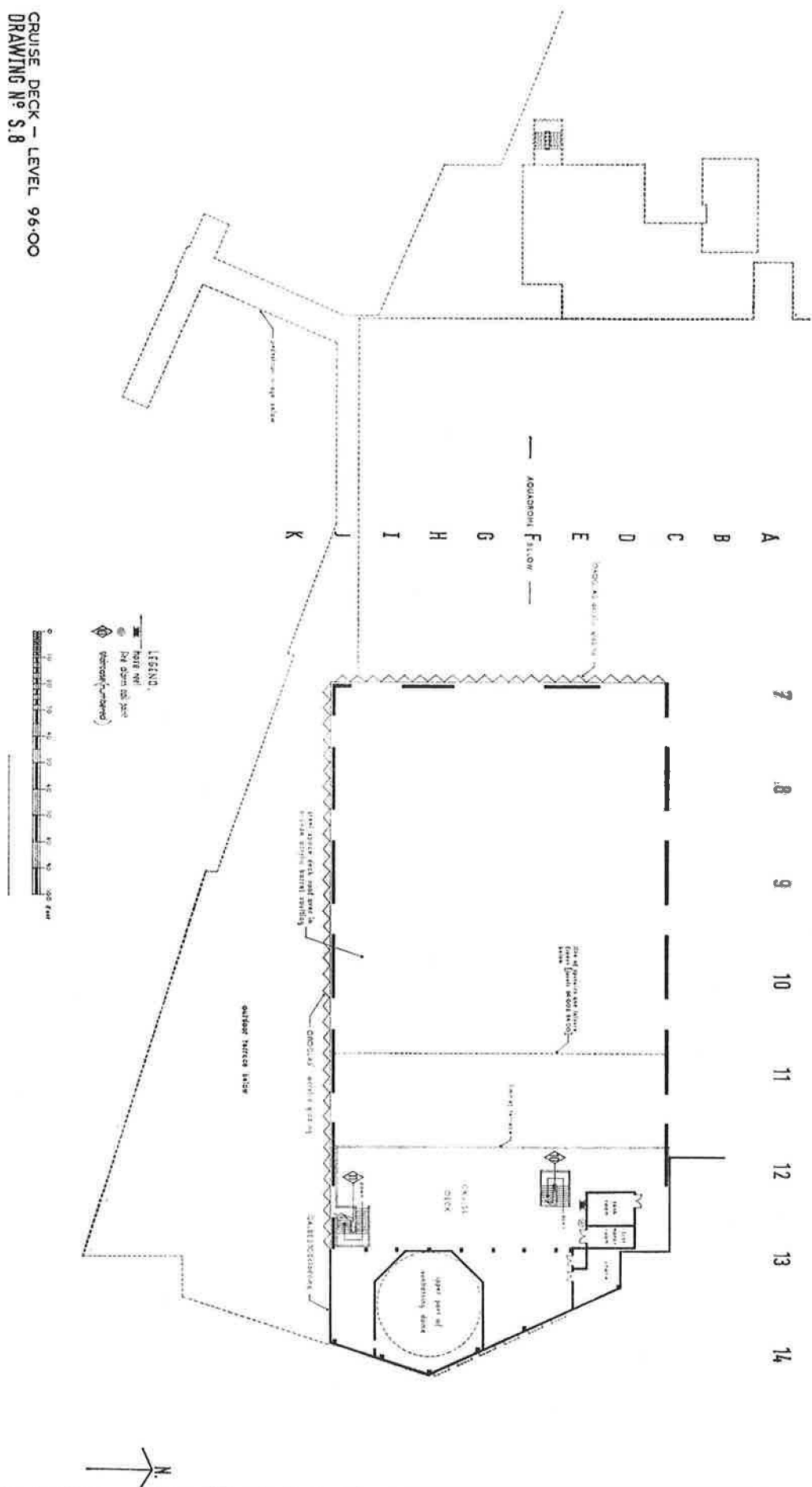


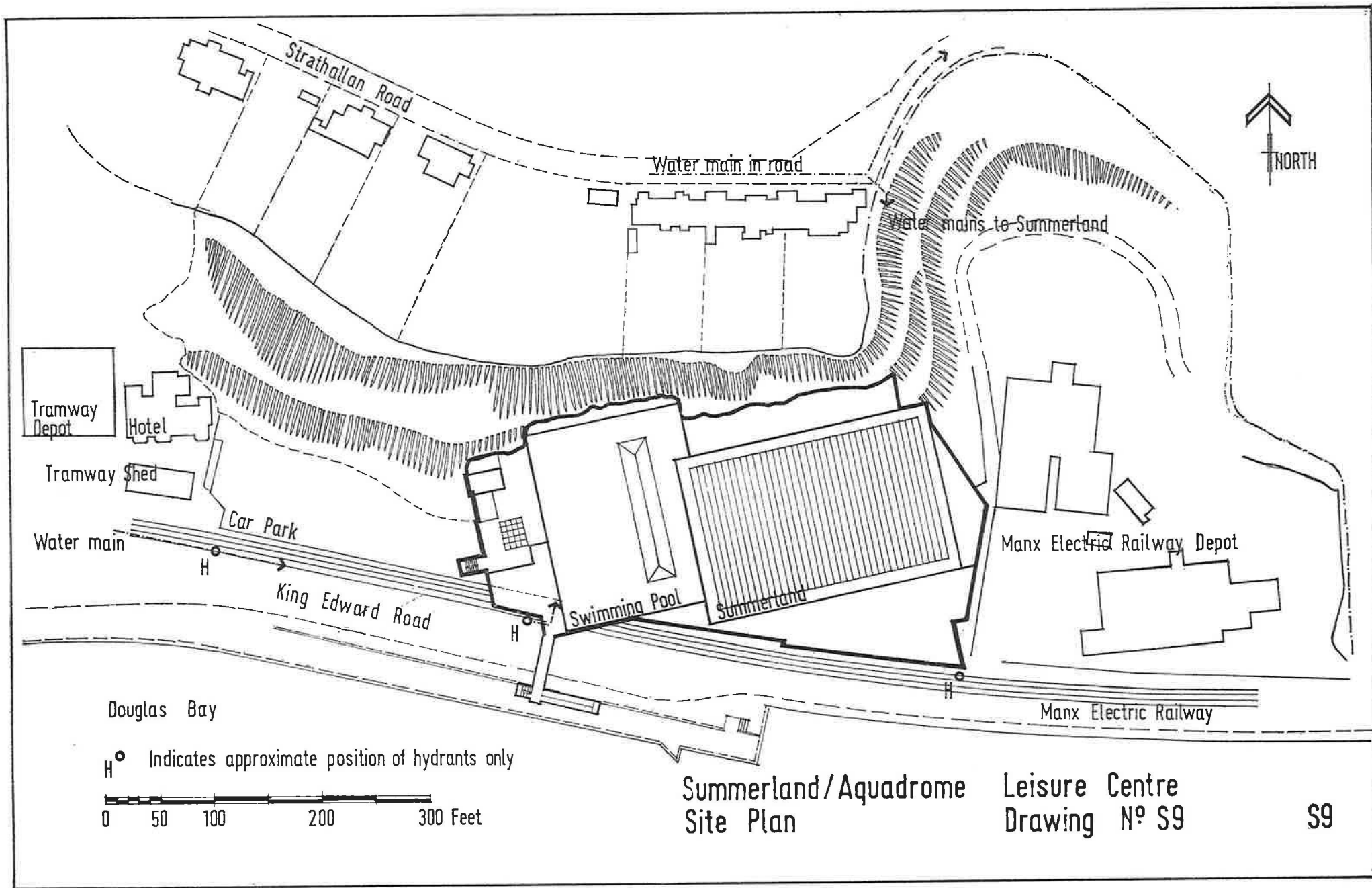
LEISURE FLOOR — LEVEL 84.00  
DRAWING N° S.7

**S.7**



# Douglas Isle of Man





H<sup>o</sup> Indicates approximate position of hydrants only

0 50 100 200 300 Feet

Summerland/Aquadrome  
Site Plan

Leisure Centre  
Drawing N<sup>o</sup> S9

S9

APPENDIX B.

PARTIES AND THEIR LEGAL REPRESENTATIVES

<i>Party</i>	<i>Advocates</i>
The Commission	Mr J. H. R. Newey, Q.C., Mr M. A. Burke-Gaffney and Mr T. W. Cain, instructed by the Treasury Solicitor.
The Isle of Man Local Government Board	Mr R. I. Kidwell, Q.C., Mr D. S. Perrett and Mr J. K. Green, instructed by Messrs Weightmans, Liverpool.
The Corporation of Douglas	Mr D. M. Cowley, Q.C., Mr R. J. D. Livesey and Mr E. W. Fargher, instructed by Messrs Davis, Campbell & Company, Liverpool.
Trust Houses Forte Leisure Ltd.	Mr E. M. Ogden, Q.C., Mr G. Hamilton, and Mr B. T. Stanley, instructed by Messrs Herbert Smith & Company, London.
Rohm & Haas (UK) Ltd.	Mr R. S. Alexander, Q.C., and Mr K. S. Rokison, instructed by Messrs Linklaters & Paines, London.
J. Philipps Lomas & Partners	Mr E. J. Teare, Douglas.
Gillinson, Barnett & Partners	Mr J. C. Griffiths, Q.C., Mr A. T. K. May and Mr F. B. Johnson, instructed by Messrs Ince & Company, London.
Williaam J. Cox Ltd.	Mr C. S. C. S. Clarke, instructed by Messrs Allen & Overy, London.
H. H. Robertson (UK) Ltd.	Mr A. P. Leggatt, Q.C., Mr M. Howard, Mr C. J. M. Symons and Mr E. W. Fargher, instructed by Messrs Clifford-Turner & Company, London.
Relatives and Personal Representatives of deceased and injured persons	Mr D. B. McNeill, Q.C., Mr R. E. I. Pickering, Mr D. M. Evans and Mr H. D. N. Hanson, instructed by Messrs Oliver & Company, Ellesmere Port.
The Three Boys	Mr M. H. Feeney, instructed by Messrs Behn Twyford & Company, Liverpool.



APPENDIX C.

*The following is a list of the witnesses who gave oral evidence in the Inquiry--*

Mr Lawrence Adam  
Mr Alan Anderson  
Miss Susan Appleton  
Mr Philip John Quarles Back, DFC  
Mr Clifford Harry Barnett, MA, ARIBA  
Mr Antony Baker  
Mr Ian Michael Edward Bancroft  
Mr John James Bell  
Mr Denis George Benson, B.Sc.(Eng.)  
Mrs Patricia Bisson  
Mr John Derek Bradwell  
Mr William James Bridson  
Mr Derrick Richard Byrom, ARIBA  
Pol. Sergt. John Davidson Cain  
Mr Henry Cannell  
Mr John Cannell  
Mr Victor Nigel Cherry  
Mr Paul Robert Chinn  
Mr Thomas Wilfred Clague  
Mr Douglas Fletcher Clucas  
Mr Harry Cole  
Mr David Cowell  
Mr Anthony David De Lorka  
Mr Joseph William Dixon  
Mr Paul Gerald Dowling  
Mr Norman George Foster  
Mr John Frank  
Mr Ronald Henry Fyles  
Mr Brian Gelling, ARIBA  
Mr George Raymond Gibson  
Mr Malcolm Selby Gibson  
Mr Anthony Denis Goddard  
Mr Alan Green, ARIBA  
Dr. Keith Gugan, Ph.D., B.Sc., F.I.Chem.E., M.I.F., A.I.Gas.E.  
Dr. Richard Ernest Dunbar Hamm  
Mr Joseph Allen Hannay  
Mr John Kenneth Harding  
Miss Angela Mary Hardy  
Mr Arthur Dennis Houghton  
Mr Noel John Quayle Howarth  
Mr Fred Jenkinson  
Mr William Bowman Kaneen  
Mr Robert Charles Kelly  
Mr William Lang  
Mr Carl Larsen  
Mr John Julian Leach  
Mr James Philipps Lomas, FRIBA

Mr Dennis Machen  
 Mr Christopher John Mannion  
 Mr Ronald Milstone, LIB., FRIBA., FIA  
 Mr Raymond George Morris  
 Mr Peter Howarth Newbold  
 Mr Francis Newton  
 Mr Joseph Hartley Norman  
 Mr Maurice Francis O'Hara  
 Mr Geoffrey Alan Owen, FSIAD  
 Mr Frederick Charles Stuart Palmer  
 Mr Christopher Alan Parkes  
 Mr George Partington  
 Mr Kenneth Paxton  
 Mr Cyril Pearson M.I.Fire.E.  
 Mr Leslie Irvine Powell, MIME, ARICS  
 Mrs Winifred Agnes Prince  
 Sub-Officer Leslie Douglas Quayle  
 Mr William Howard Quayle  
 Mr Stephen George Henry Quirk  
 Mr Percy Radcliffe  
 Mr Dennis Alfred Ranscombe  
 Prof. David Jacob Rashbash, Ph.D., B.Sc., F.I.Chem.E., F.I.Fire.E., ARCS  
 Mr William Kevin Roberts  
 Mr Terence Sandiford  
 Mr Lawrence Anthony Shaffer  
 Miss Marion Sheehan  
 Mrs Olwyn Shimmin  
 Dr. Frank Skuse, Ph.D., B.Sc.  
 Mr Colin Smith  
 Mr Edward Smith  
 Mr Gordon Smith  
 Mrs Pauline Wynne Smythe  
 Mr David Richard Stimson  
 Mr Terence Swanton  
 Mr William George Taggart  
 Mr Ian Munro Tasker  
 Mr Alan Theaker, ARIBA  
 Mr Michael Hubert Treasure  
 Mr Gerard Vernon  
 Station Officer Mario Michael Ventre  
 Mr Alan Norman Watson, B.Sc.  
 Mr John Malcolm Watson, B.A., ARIBA, MRTPI  
 Mr John Edward Wilson  
 Mr Roger Arthur Worsley