URBAN STREETS AS AN ARMATURE OF THE PUBLIC OPEN SPACE

A Thesis presented for a
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to the Mackintosh School of Architecture, Glasgow

by

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I dedicate this dissertation to the memory of my father.

CONTENTS

ILLUSTRATION LIST

CHAPTER I

CHAPTER II

1. Martina, France: Apulia, Italy
   From E.A.Gutkind "Urban Development in Southern Europe"
   Italy and Greece, New York, Free Press, 1969
2. Cumbernauld New Town
   From Survey Map
3. Algier's Development, Algeria
   From Oref-Gam "Casbah Architecture et Urganisme"
   Office Riadh El Feth, Alger, September, 1984
4. Diagram of street cross-section
5. Rome- Area of the Pantheon
   From the map of Giambathista Nolli 1748 in Stanford Anderson's
   "On Streets" 1978
6. Ville Contemporaire, 1922
   From Le Corbusier and Jeanmeret, Pierre "Oeuvre Complete"
   Les Editions d'Architecture, Zurich, 1937
7. Algiers Proposal, Le Corbusier
   From Technique et Architecture, No. 329 "Special Algerie"
   1980
8. View of the proposal. Algiers
   ibid
9. La Ville Verte 1930 - Le Corbusier the Radiant City
   From Stanford Anderson "On Streets" 1978
10. Diagram of building/street
11. Cumbernauld - Area of the Town Centre
    From Survey Map
12. Plan voisin 1930. Le Corbusier
    From "Oeuvre Complete" les Editions d'Architecture Zurich, 1937
13. Blocks of dwellings on the Cellular system
    From Le Corbusier "The City of Tomorrow"
    London - J. Rodker, 1929
14. Dwellings with "Setbacks"
    ibid
15. Antwerp project
    From Le Corbusier, Wayne Copper, 1933

16. Diagram of street into three elemental forms
17. Diagram of proportions between width and distance of street
From Ashihara, Yashinobu "The Aesthetic Townscape"
The Mit Press, 1983
18 a.b. Proportion of streets
From McCluskey, Im "Road and Townscape"
The Architecture Press, London, 1979
19. Proportion of streets
ibid
20. Street enclosure - function of cross-section
21. Street enclosure - function of built-form
22. Street enclosure - function of length
23. Street enclosure - function of visual termination
24. Street enclosure - function of bits

CHAPTER III

1. James Craig's plan, Edinburgh New Town, 1767
From Youngson, A.J. "The Making of Classical Edinburgh"
Edinburgh University Press, 1966
2. Plan of the New Town of Edinburgh 1776 showing the progress in developing Craig's plan
ibid
3. Plan of Edinburgh New Town
From Survey Map
4. Diagram of Edinburgh New Town
5. Diagrams showing the formal composition
6. George Street looking toward Charlotte Square
From Youngson, op cit
7. George Street looking toward Saint Andrew Square
ibid
8. Plan of Nancy, France
From Bacon, Edmund "Design of Cities" 1982
9. Aronomatic of Edinburgh New Town showing the composition of the block

29. Hanover Street looking south: Royal Scottish Academy
    Photograph 1986 by author
30. Frederick Street looking south: Sculpture
    Photograph 1986 by author
31. Castle Street looking south: Sculpture and the Castle
    Photograph 1986 by author
32. Charlotte Street looking south: Church
    Photograph 1986 by author

33. MacArthur map, Glasgow 1773
    From Garcia de Venuesa Angel "Glasgow and the Time Machine"
    An illustrated history of the urban forms, Glasgow
    University, M. Litt Thesis 1982
34. Street opened in 1750
    ibid
35. Map showing the mansions sites 1775
    From Gibb, A. Glasgow. "The Making of a City"
    Biddles Ltd. Guilford and King's Lynn 1983
36. Barry's map 1750
    From Garcia D.V. op cit
37. Diagram of Glasgow Merchant City
38. George Square, 1986
39. The New Town,
    From Garcia D.V. op cit
40. Trongate looking east
    ibid
41. Plan of Central Glasgow
    Survey Map
42. Built form of the Merchant City
43. Diagram of the Merchant City grid
44. Ingram Street
45. George Street
46. Hutcheson Street

47. Candleriggs Street

48. Virginia Street

49. Different type of block

50. George Square, City Chambers
Photograph 1986 by author

51. View nodel showing the dense and compact character of the Merchant City
Model of the planning department, Glasgow

52. View of model showing the variety of Glasgow Merchant City character

53. Corner as an element of orientation

54. Type of corners in the Merchant City
Photography 1986 by author

55. Buchanan Street, Pedestrian precinct
Photograph 1986 by author

56. Argyle Street
Photography 1986 by author

57. The lane: canyon effect

58. The lane: canyon effect
Photograph 1986 by author

59. Plan of the Merchant City

60. Plan of the main longitudinal streets

61. George Street looking west
Photograph 1986 by author

62. Ingram Street looking west
Photograph 1986 by author

63. Trongate looking east
Photograph 1986 by author

64 Argyle Street looking west
Photograph 1986 by author

65. Plans of the crossing streets

66. High Street
Photograph 1986 by author

67. Candleriggs Street
Photography 1986 by author

CHAPTER IV

CHAPTER V

APPENDIX

SUMMARY

There has already been much written about the streets in many different ways, such as in planning, sociology, traffic engineering and in architecture, which refers at some point to an aspect of the street. The range of material is therefore very wide, but much of this deals with a particular field of comment, such as streetscape, social experience and social behaviour.

I want to discuss the streets from an urban design point of view and then see how this might relate to social experience, for a better understanding of our urban environment. Broadly speaking the thesis is divided into 5 chapters. The first chapter deals with the concept of the street; I will be defining the street, explaining its complexity, referring to the "bits" which have to function such as doors providing entry and windows, daylight, but which also combined with other "bits" such as decorations to form the facade and therefore the character of the streetscape. Modern technology has surely added other function to the street, I will be describing the impact of it on the appearance of the street of the built environment.

The second chapter is an analysis of the physical relationship between building and space which could be reduced to a basic state of solids and voids. I will discuss the streets as a system of differentiated open spaces which corresponds to the image of the traditional city, and the streets as a system of undifferentiated open spaces which corresponds to any of Le Corbusier's urban proposals. I will then look at those elements which act as the enclosing element of the street.

The third chapter is an analysis of the form and spatial composition of two different urban environments, with emphasis on the aspect of the streets and how they determine the townscape. The two examples are, Edinburgh New Town and Glasgow

Merchant City. The first example which has a formal composition has been chosen for a better understanding of the second one which had an incremental development over different periods. This chapter will end by a summary of General Characteristics between the two urban settlements.

The fourth chapter deals with the conflict and failure in terms of design and legibility of Glasgow Merchant City and shows why the components of the townscape do not subscribe to a clear and legible structure. By using a request survey on this area, I will analyse how people understand and use this area.

The fifth chapter is an attempt to bring a New Order to Glasgow Merchant City, because its townscape and layout seem to be confused in terms of legibility. The New Order is to provide an "ARMATURE" upon which all the main component of the townscape will be connected so as to form a coherent and harmonic townscape where legibility will be understood. A proposed armature for Glasgow Merchant City will be discussed.

In the final chapter, conclusions are drawn and the two underlying ideas of the general concept of the armature are explained.

INTRODUCTION

In many cities something like a quarter of the land area is used for streets, the percentage varying with the nature of the street layout. In an old city centre area with a grid of relatively short blocks the percentages is likely to be higher; in a residential area with relatively low density and narrow streets the percentage will probably be lower. By any measurement, however, streets make up a significant portion of our urban surroundings.

In a settlement of any size urban streets are a system of linear spaces on which the geometry of the city is built, therefore we have to recognize them as the framework of public open space. If a city is to be designed, the design of the streets, and the streetscape, are both going to have a significant effect. Because of their prime function as a connector between different spaces, they provide movement in the city; but they are more than that. Streets are part of our outdoor recreation and working spaces and they reveal much of the essential character of the city which enables one to comprehend its structure and spatial organisation.

Le Corbusier regarded the typical pattern of streets and pavements which we see today in the city as a confused system of passages filled with uproar and the stink of cars, buses and lorries. It was not always so, and the main objective of this thesis is to show that, by a better understanding of the principles of Urban Design, the street can be restored as an attractive, enjoyable and memorable element of city design. In the words of Camillo Sitte, the Viennese Urban Designer:

> "We should be looking at ways for maintaining our capacity to move in the city, without destroying our place of arrival". (1)

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CHAPTER I : CONCEPT OF STREET

1. Definition of the Street

The word "street" is derived from the latin "sternere" to pave, and so related to all latin derived words with the "str root" that are connected with building, with construction is some physical or at least notional way. It recurs in many European languages. The Italian "strada", for instance or the German "strasse" suggest an area apart for public use and can include spaces with simple, limited demarcations without necessary connections to other streets. It does not necessarily lead anywhere in particular therefore, but may finish in a Plaza or in a Blind Alley. According to Chamber's English dictionary, a street is...

"a paved road, a road lined with houses" and later...

"those who live in a street or are on the street".

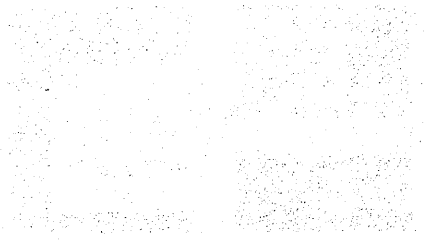
It would appear to imply something more than a route or a right of way, but a route on which people live and work. Thus it is more than a mere transport solution such as the road system in Cumbernauld New Town or in the concept of the Radiant city (Ville Radieuse) of Le Corbusier where the roads run through open landscape and the urban street has disappeared. In terms of this thesis therefore, the street is essentially an element of the urban form, in which there is a strong sense of enclosure at ground level and of organised external space with a variety of functions, shapes and proportions.

Taken to a literal conclusion, the street is the people and the people are the street. Italians in particular make the street an integral part of their daily life. For then it exists not simply to carry traffic but as an important arena of the community.

In simple terms, a street is that which separates the buildings and yet includes them and allows for people a free

passage between them. Obviously there is a great deal more to the street than this, which makes each one unique but it is the how and why of this relationship which is of particular interest in an assessment of the physical characteristics.

Streets or paths as they are called by Kevin Lynch, are the channels along which the observer moves. For many people they are the predominant elements in their image. People observe the city while moving through it, and along these streets the other environmental elements are arranged and related to form a structured urban environment. (2) This environment can be then conceived as a system of places connected by routes. This way of experiencing our surroundings can be related to the concept of static and dynamic space. A static space is one which, by its form, carries a sense of rest and completeness, whereas a dynamic space which tends to be linear and associated with "route", implies movement and change. A static space tends to be circular or square and associated with "Place". (Fig. 1,2). Streets, which are routes therefore perform movement from one place to another, also have characteristics of places to a greater or less degree and townscape aligninent; in my opinion the result of both dynamic and static space is concerned with increasing the sense of place. (Fig. 3).



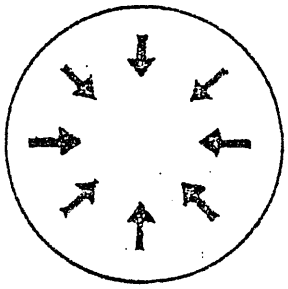


Figure I. Diagram of static space.

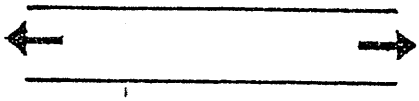


Figure 2. Diagram of dynamic space.

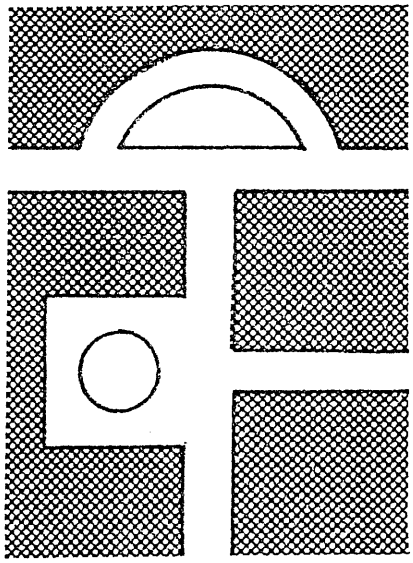


Figure 3. Composite space. Combination of a static and dynamic space.

Figure 4. Trongate, Glasgow I850.

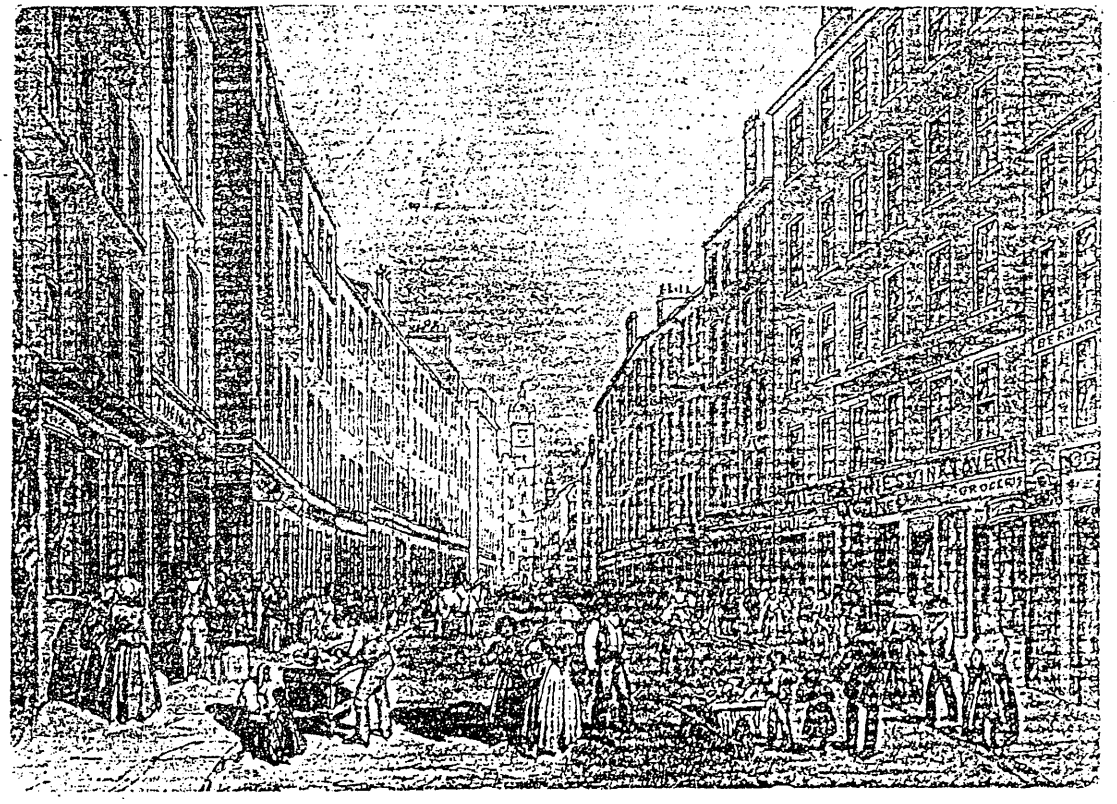


Figure 5. Saltmarket, Glasgow I850.

2. Complexity

If we want to go further, we find that a street - and perhaps one should say a successful street - is the one which supports different activities at the same time and, more important, it performs a variety of roles according to our changing set of circumstances. The street gathers people and allows them to enjoy various activities from simple observation or conversation to a wide range of activities in for example, the market place. The potential for performing different roles can only be ascribed to the individual elements of the streets and their way in which they are performing object; it is a very complex organism.

Stanford Anderson describes the street as

> "integral parts of our movement and communications networks; they are the places where many of our conflicts or resolutions between public and private claims are accessed or actually played out"

and finally

> "they are the arenas where the boundaries of conventional and aberrant behaviour are frequently redrawn. (2)

In other words, the street with its interactive conditions is complex and ambiguous phenomena: its function is not just to allow servicing and movement through it, but to perform more activities than that. Leon Krier notes that: "the street is used not only as a space of economic but of social exchange". He then adds

> "There is a strict relationship between building type, form of property and the form of the public space, The Street". (3)

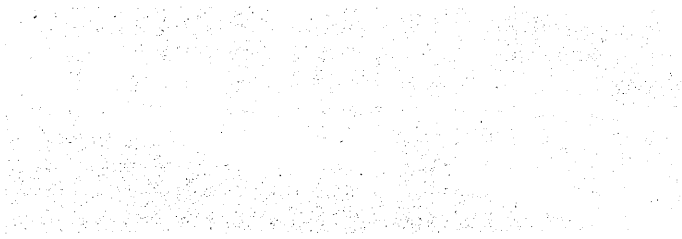
In Glasgow for instance, the street was the arena where activities

might focus, and because of the overcrowding conditions of the tenement, meeting took place on the street for a cheerful every day life. (Fig. 4, 5).

There is also an architectural complexity in the form of the street. At its simples the street is formed by continuous buildings on one or both sides which form a linear enclosed space. It may be straight or segmental in plan and it may be widened and extended into the form of squares which act as focal points of the street system.

The form of the street can respond to climate to create shade or shelter. For example by placing the pavement below the buildings along the street and thus creating continuous arcades or porticos, the street takes on an extra dimension and pedestrian activity is enhanced. A good example of this form of the street is Bologna, (Fig. 5, 7) where, as Bernard Rudofsky notes that

> "the porticos of Bologna provide much more than shelter from the elements, they are the site of a time honoured custom" (4)



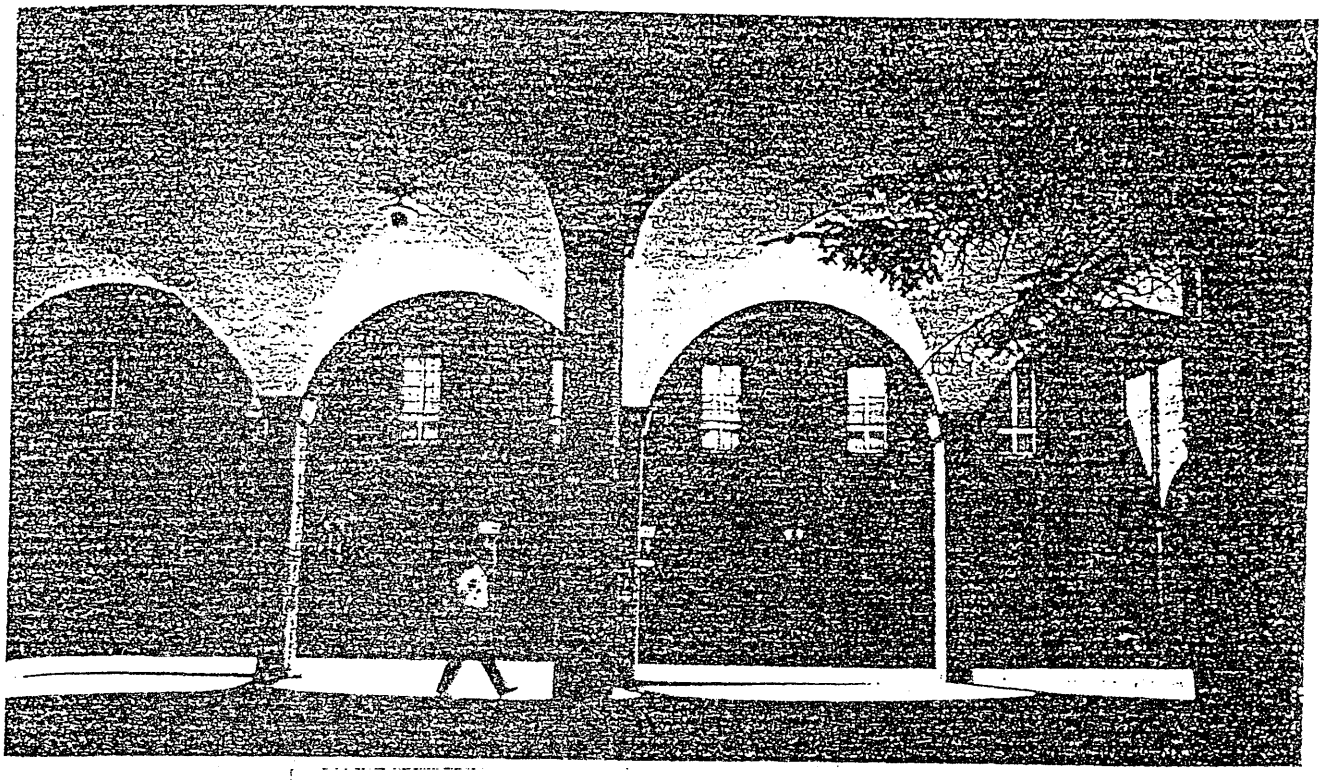


Figure 6. The porticoes of Bologna.

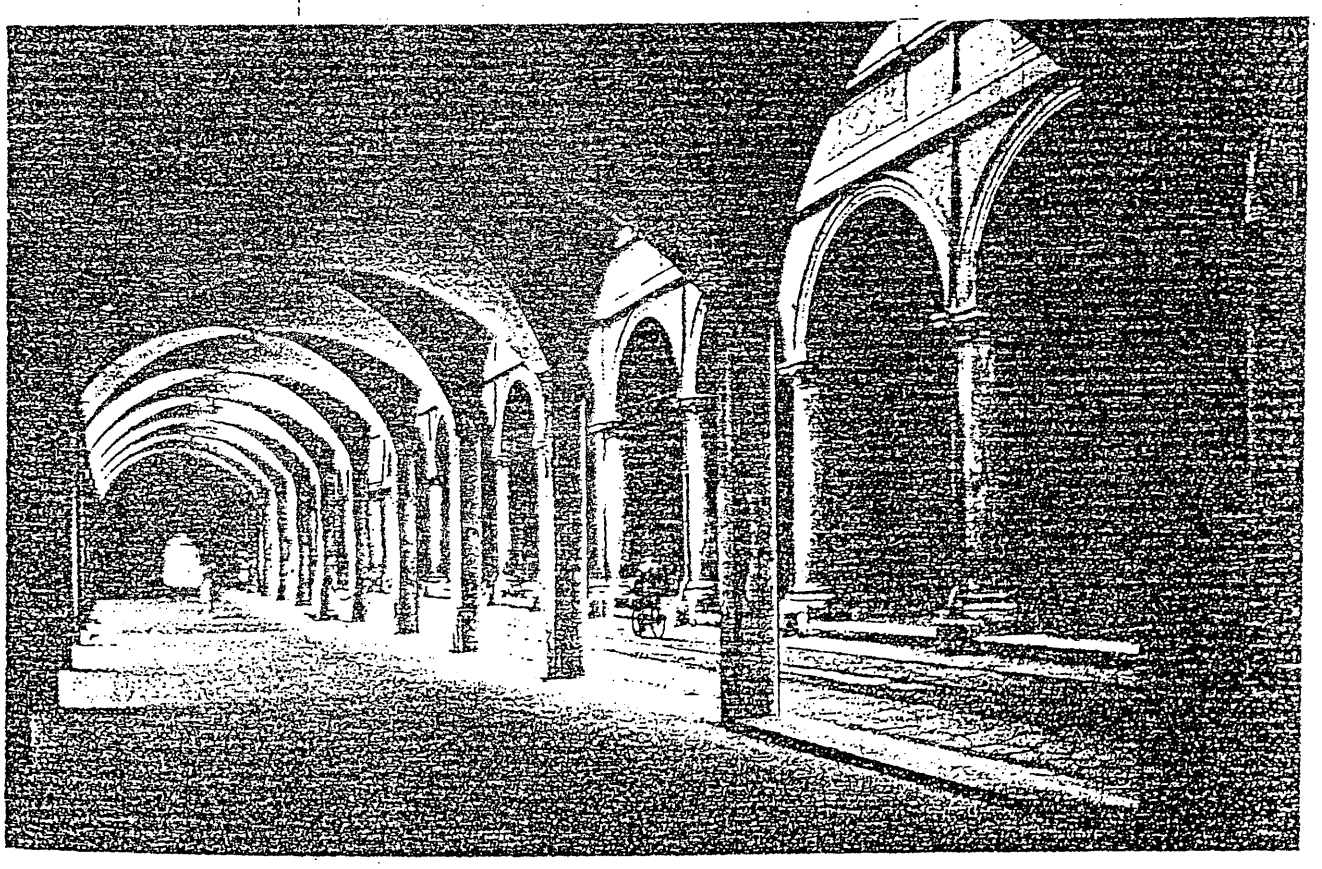


Figure 7. Balogna's porticoes street.

3. The "Bits"

This study requires a new word to describe all the elements, I have borrowed the term "Bits" as used in computer technology. The bits in general are the openings such as doors and windows, those voids which are combined with a solid wall and yet make the building to which they subscribe. These bits have to provide a function (such as door providing means of entry, exit, security etc.) but which also combined with other bits (such as steps, pavement, railings and so on) to allow certain activities to take place. (Fig. 8, 9)

The experience of the street is provided in this way by the collection of all the bits into a cohesive working system. Looking to the figure (10), the street seems to be in very simple terms and has little to tell; but it is still a street - perhaps an indefined street. However, by adding the bits to those meaningful vertical walls on both sides of the street. (Fig. 11) It would appear that, it becomes characterised by those rhythmic openings. Thus this image of this particular street is more defined when the bits take place and allow it to be a unique urban street in a contextual environment.

Historically the bits were purpose made or purpose designed to fulfill a number of functions; they were useful and instantly meaningful often in a symbolic way. But they illustrate the character of any street, their actions and interactions, make the street what it is. The common form of fenestration in the upper floors of street frontage give to the street an established rhythm. (Fig. 12)

The window is a very good example of a bit of the street which should work for itself as well as contribution to the richness and usefulness of the street. From a point of view of the passerby, each window told a story. Its physical presence indicated the

type of room behind and possibly the type, or at least wealth, of the person occupying it. It's detailing, proportions and quality of material helped to give some visual clues as to the position of the building in the hierarchy of street buildings.

Figure 8. The bits of old Glasgow.

(a) David Hamilton (?), 151–7 Queen Street. Giant pilastrade with subsidiary first-floor pilastrade. Orthodox fenestration at second.
(b) c. 1849(?) Warehouse, north-east corner, Glasgow Cross (largely destroyed). Superimposed pilastrades on first and second floors. Original ground floor not known.
(c) Alexander Thomson, 1849. Dunlop Street Building. Giant pilastrade with subsidiary pilastrade, area between pilasters at second floor fully glazed. Top-floor design subsequently adopted for tenements.
(d) Alexander Thomson, 1858 or later, Washington Hotel, Sauchiehall Street (destroyed). Giant pilastrade with subsidiary pilastrade at first floor, dwarf pilastrade at third.

Figure 9. The bits of old Glasgow.

(e) Alexander Thomson, 1859. Grosvenor Building. Giant pilastrade with aedicules at first floor, consoles at third.
(f) Alexander Thomson, 1865. Grecian Building, Sauchiehall Street. Egyptianizing architraval openings replace aedicules; 'piers' between become dwarf columns at second floor.
(g) Alexander Thomson, 1871-3. Egyptian Halls, 84-100 Union Street. Highly developed synthesis of all previous designs. Dwarf colonnade at third floor; complex pilastrade scheme at first and second; superimposed coupled anta pilastrades with additional bracketed pilastrade slotted into the interstices at first floor. Note that end pilasters (not shown) run through from first to second floor without entablature, and resemblance of bracket capitals to cast-iron ones in (h).
(h) Alexander Thomson, c.1863. Buck's Head Building, 63 Argyle Street. Continuation of the 1849 Dunlop Street Building. Double stanchion iron frame, innermost stanchions wood-clad, outermost treated as giant order; masonry third floor. Tapered capitals occur also in end bays of (f) (not shown). Original ground floor not known.
(i) Alexander Thomson, 1860. Cairney Building, 42 Bath Street (destroyed). As executed; differs slightly from elevation published in 1872. Enriched version of tenement designs at first and second floors. Third-floor piers free of glazing for the first time in commercial designs. Note similarity of aedicules and piers to those of (e).

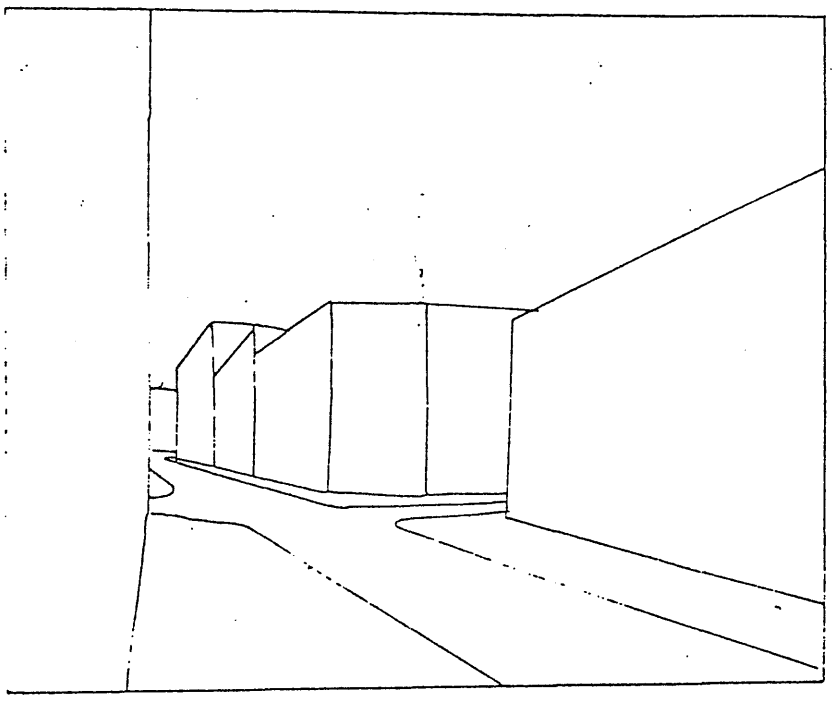


Figure IO. Diagram of a street without the bits

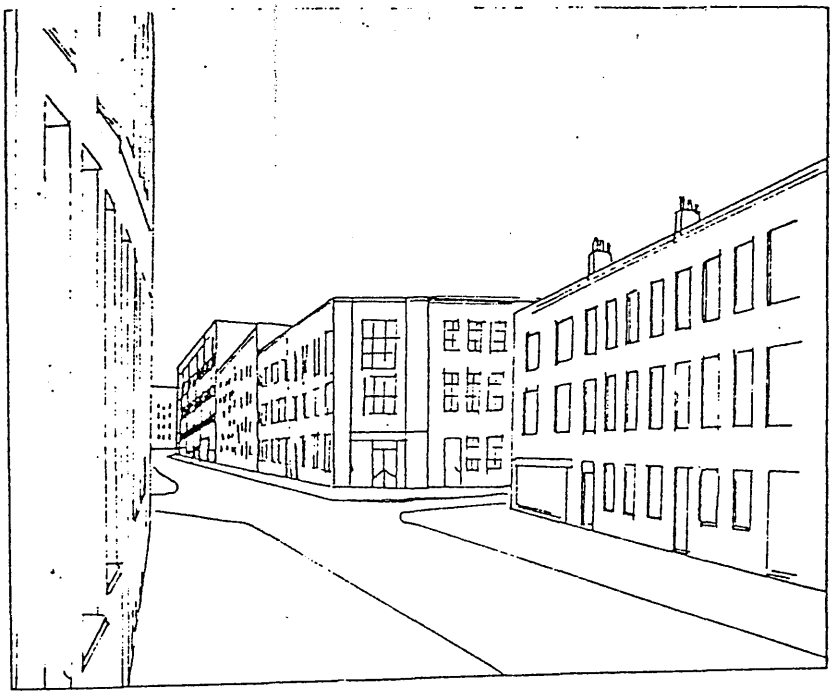


Figure II. Diagram of a street with the bits.

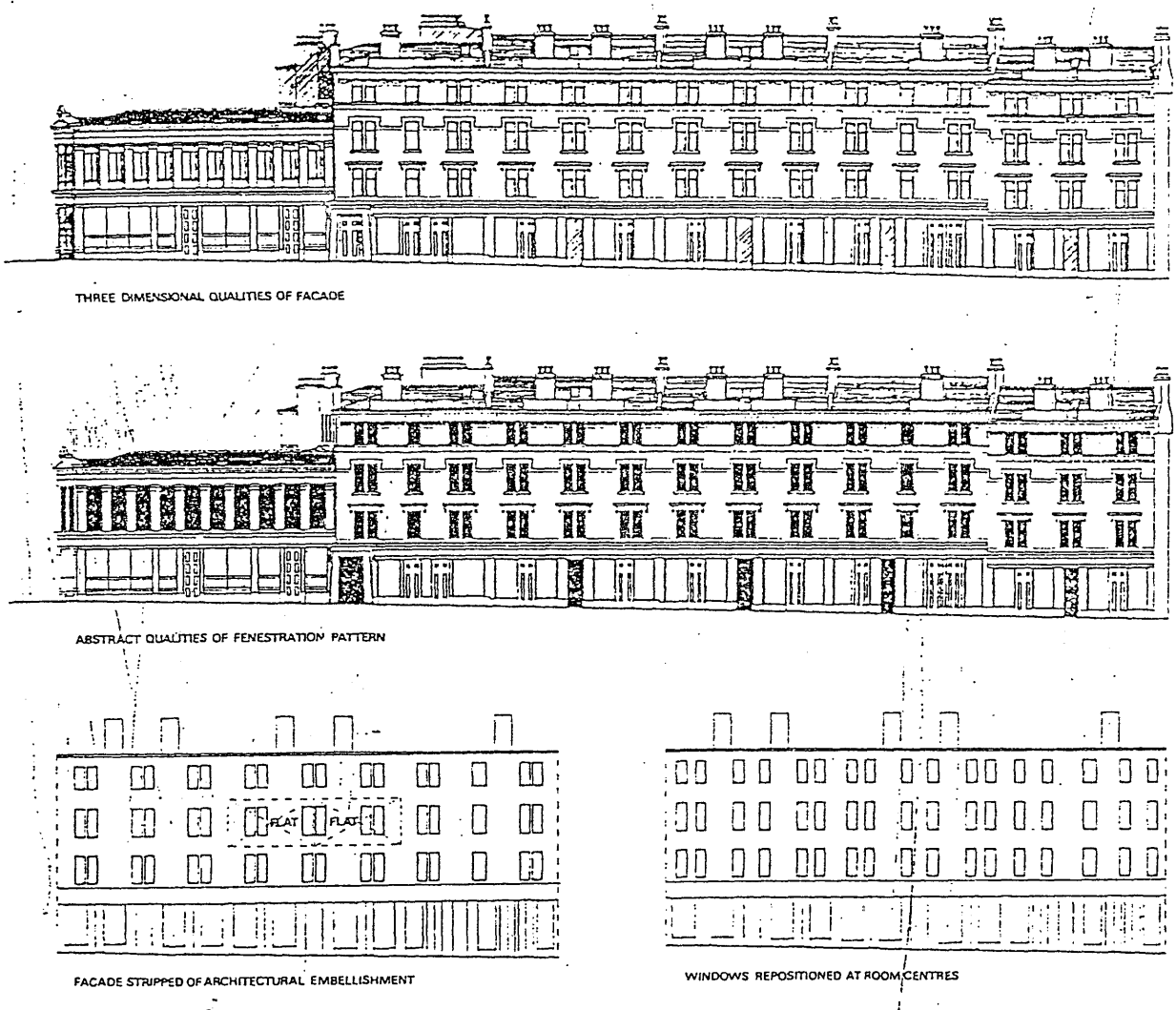


Figure I2. The bits contributing to the richness of the street frontage.

4. Impact of Modern Technology

For nearly a century, the urban street has been under persistent attack from several directions: the designer of Garden Cities, the CIAM modern masters, and local government and welfare architects of Anglo - Saxon / Scandinavian countries have all attempted to postulate forms of urban settlement in which the street was deprived of its past function or analysed out of existence.

By the beginning of the 20th Century, the pressures of commercial expansion, together with the growth of population and wealth affected the urban environment, the larger and more elaborate buildings demanded by these influences made possible by advances in technology, the more important being the development of New Materials for structures and the introduction of Electricity. These factors produced profound changes in the shape and size of new buildings which affected the streetscape and therefore, the City as a whole.

These pressures and advances brought about by technology change not only the width, direction and contours of the street, but the characters of the external walls which flanks the street. Modern buildings owe their rectilinear shapes to modern structural techniques: steel and concrete lend themselves to slab, post and beam construction. The new structural materials allowed large spans and slender supports and thus a freedom in planning hitherto unknown. The large spans made possible by steel and concrete have not only freed the interior of the building from the large piers necessary in medieval and classical buildings, but have also made possible the elimination of the external wall as a structural element, so that the wall can be in front of or behind the supporting columns; it can be made entirely of glass or other light material and may assume the function purely of a weatherproof envelope of variable shape independent of the structure. (Fig. 13, 14)

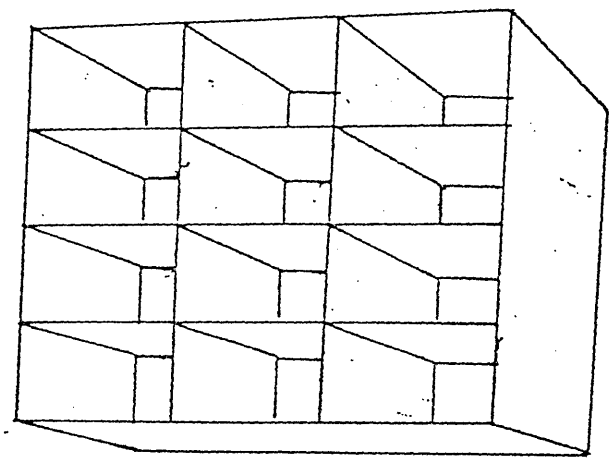


Figure I3. The elimination of the external wall.

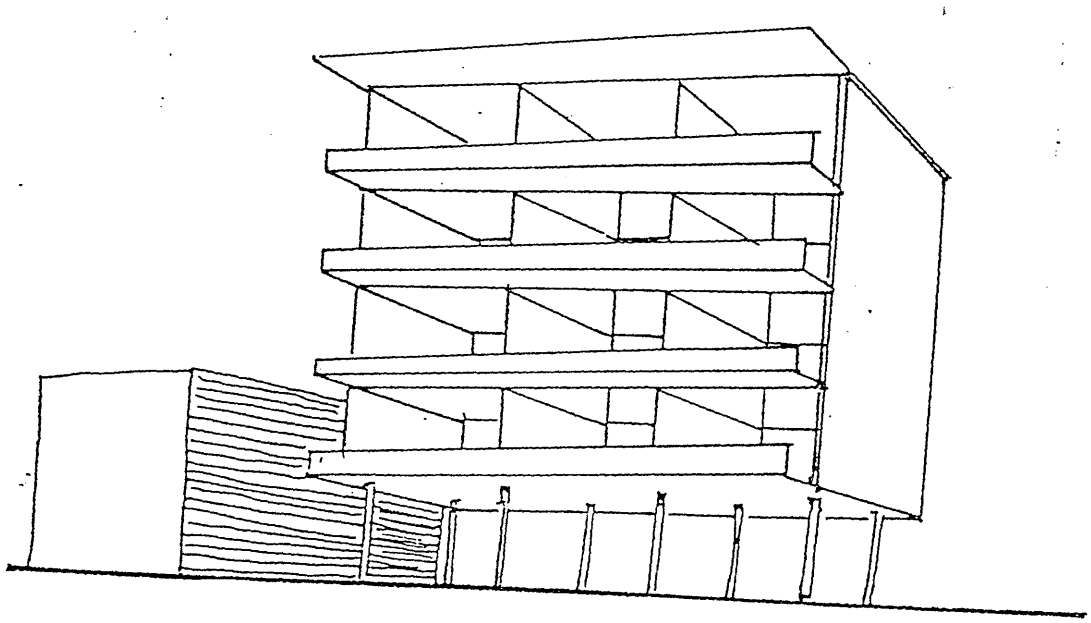


Figure I4. Building with new structural element.

The rhythm is one of the essential constituent in the character of streets, but once the quality of the external wall has changed, this rhythm became non-existent or disrupted. The disruptions that are breaking the rhythm of so many streets in our towns operate in two ways;

1. they break the rhythm of short-unit frontages by introducing long-frontage buildings among them.

2. by changes in detailed design to forms which are at odds with existing forms.

This disruption on a far greater scale is caused when the rebuilding of a whole block of small frontages creates a few large-unit frontages in its place, this is mainly brought about through the new type of building required for chain - stores, supermarkets, department stores, office-blocks with ground floor shops, and so on. (Fig. 15, 16) The main change of design which affects rhythm is the form of the bits and particularly the window openings. Until now the common form of these has been square or vertically rectangular, the repetition of this pattern of window down a street is one of the strongest elements in establishing the street's rhythm.

The introduction of cheap electricity, by making possible fast passenger lifts and good safe artificial lighting, enabled buildings to be designed that were far taller and deeper in plan than had been possible before. The lift then, permits multilevels constructions; for example in Glasgow, from 3 or 4 stories, this number doubled to 7 or 8 stories. This new type of tall buildings affected the streets - the scale is no more respected and in addition to that they create a great concentration of activities and traffic because they were build on street pattern created before the invention of the electric lift.

Figure I5. Abalanced rhythm of the street frontage.

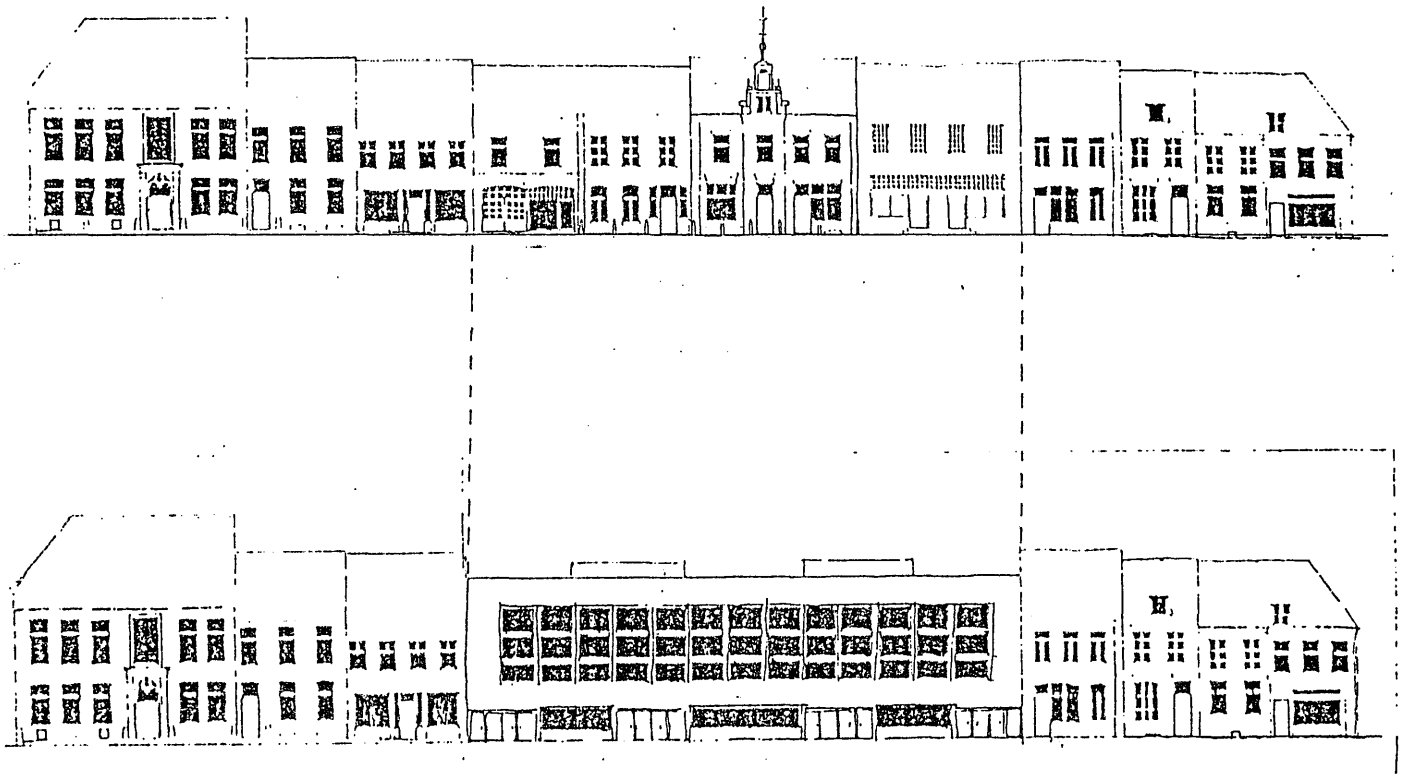


Figure I6. Large frontage building breaking the rhythm of the street.

Street - lighting first appeared with the invention of the gas-lamp, subsequently the improvement of the external lighting came about by the invention of the electricity. Street lighting has changed then, from gas street-lamps where the amount of light was very limited, to a better incandescent lighting and with more illumination. This improvement of lighting has changed the appearance of the streets, in particular at night where social life was at one time limited to day time. Derive from this growth of technology and complexity we find today a growth of services in the street and an increasing variety of street furniture - eg.; telephoneboxes, traffic signs, electricity boxes, lamps, litter boxes, railings, parking meter etc., which produce a kind of visual chaos; there has been little or no attempt co-ordinated design and layout, and they are not conceived as a coherent system to create an orderly street environment.

The final and by far the most important element in this drama was the motorcar, which became a symbol of the modern life, and stimulated the decline of the traditional street environment. Streets were not originally designed with the motorcar in mind; the fact that many survive today is perhaps testimony to their tremendous resilience and adaptability. The old streets cannot, with increasing discomfort, accommodate the cars that are driven into them. The discomfort is affecting the people in the cars and the people trying to get about outside them. The cars in both, being driven or parked obstruct the views of the town as well as the movement about it.

Various attempts have been made to accommodate the movement of the motor vehicle in the old streets such as: widening, new roads are driven disruptively through old localities, gaps are made in street frontages and elsewhere to provide parking places. The effects of the motorcar are

not just a visual chaos, but more than that: the noise of their engines afflicts the ears, the exhaust fumes rasp the throat and nostrils, and they threaten mutilation and sudden death.

In addition to that, the more poeple travel by car in the centre of towns, the slower and less comfortable they travel. Motor-cars crowd the strees to such an extent that frequently, and especially at peak hours, they can hardly move at all. The Spanish urbanist, 'Arturio Soria Y Mata' envisaged a city where the street is conceived as a carrier of traffic, he eliminated all the quality and function that the street used to have before. Soria Y Mata like so many of his predecessors based his conception of the city on an analytic diagram of urban functions, dominated by transport. (5) Such analytic diagrams, translated into vertical or horizontal schemes, underlie every concept of zoning. The results of this modern conception of the city where the aspect of the street is entirely changed are very obvious: modification of the streets functions, loss of daily human contact and exchanges, social stress and it generates wasted space and therefore urban blight.

Because of the conflict between the car and the pedestrian, traffic segregation arises as a solution to the problem - Le Corbusier was one of the first to demonstrate the practical possibility of segregating traffic at different vertical levels according to the speed of travel, a concept which has found favour with planners in recent years as a solution of separating people and vehicles. The planners think then that the conflict between man and vehicle can be resolved if each is given a separate fitting environment. This segregation can be achieved in a number of ways - used singularly or combined - both in old and new areas, there are three basic ways in which pedestrian and vehicles can be given a separate environment. (Fig. 17)

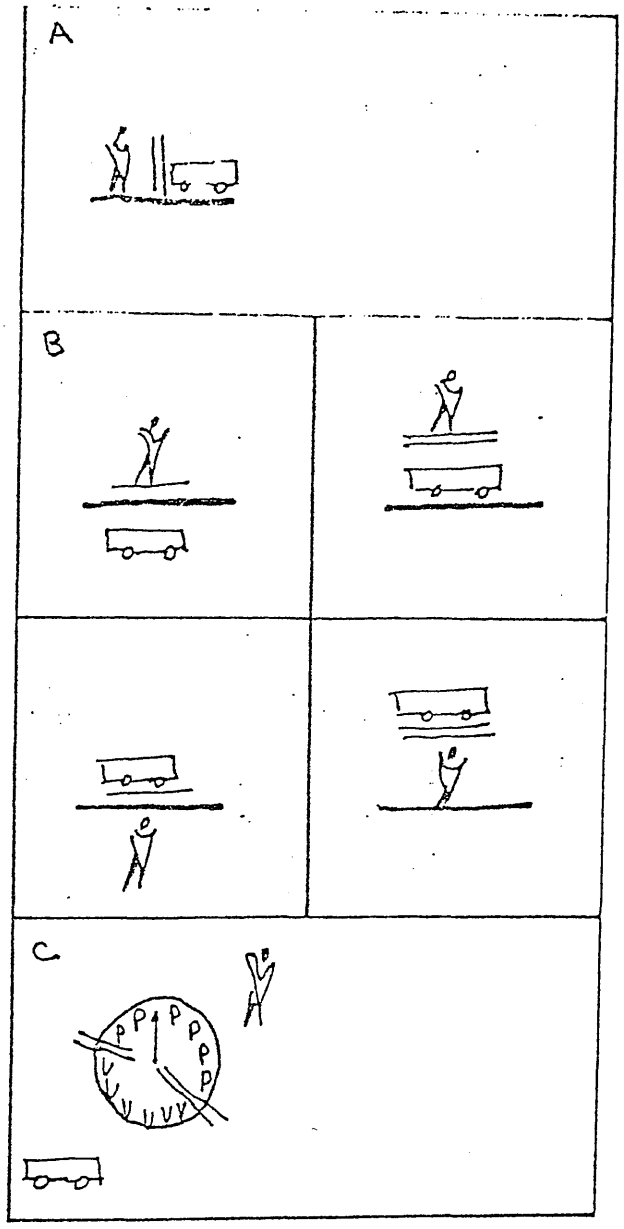


Figure I7. Diagram of traffic segregation.

A. Horizontal segregation

B. Vertical segregation
   1. Pedestrian above vehicles, pedestrians on ground or on deck.
   2. Vehicles above pedestrians, cars on ground or on deck.

C. Segregation by time
   Vehicles (or pedestrians) allowed at certain times only.

In the sixties, Colin Buchanan the English planner looked at cities in relation to traffic and attempted to analyse the effects of traffic on towns . (6) His solution was to transfer the bulk of pedestrian traffic, especially around major vehicular routes, to raised concrete decks or platforms at higher level to preserve what Buchanan interpreted as "community districts". This would have had the effect of transferring the traditional role of the street to first-floor level above the ground. The vestige of this conception, conceived in the sixties, can be seen in many recent buildings in the hearts of many historic centres.

This model of the street has removed the street - base plane and the activities on it which used to give to the street its essential Character. Modern technology has undoubtedly added other functions to the street, the case of multiplicity of use has been established and in many cases it has brought total confusion to the built environment.

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CHAPTER II : SPATIAL STRUCTURE OF STREETS

To understand any spatial structure of streets in an urban environment is to look at the physical relationship between buildings and open spaces which could be reduced to a basic state of solids and voids. This way of analysing an urban space is supported by a conceptual component of perseption; therefore it helps us to deal with what we know as well as with what we merely see. Also, it generates typological images without which it could be impossible either to represent or to understand most formal relationship between streets and buildings. William Ellis examines the structure of streets and in his essay he goes on further and compares the physical conceptions of cities: a traditional one with its streets in a system of differentiated open spaces and a contemporary one with its streets in a system of undifferentiated open spaces. (1) (Fig. 1,2) As a general rule building sites face directly on to a street. The composition and character of a townscape to be shaped from the spatial conception and design of the boundary area adjoining the street. Let us examine, then, how the relationship of streets and buildings in urban spaces determines the townscape. First we will see how that occurs in a traditional city and then in a contemporary one.

Figure I. Martina Franca. Apulia. Italy.

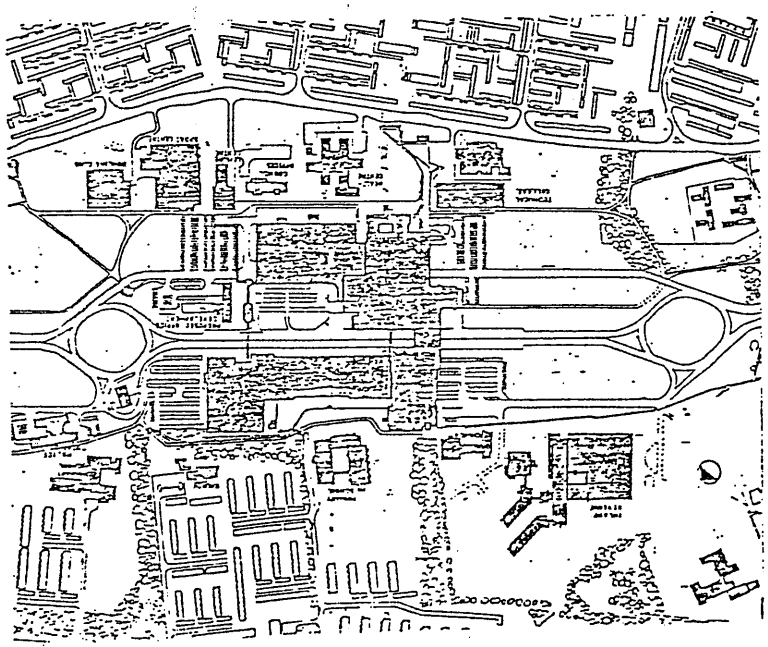


Figure 2. Cumbernauld New Town. Scotland.

1. Streets as a System of Differentiated Open Spaces

Traditionally cities could be described as the one which appears to have had its streets and open spaces carved out of what was once a solid mass of stuff. (Fig. 3) Because the spaces seem to have been given form within the more or less contigous building pattern, the organisation can be interpreted as a STRUCTURE OF SPACE. This image corresponds to the traditional city; we think of it as a datum for physical cities in many Cultures, and it can be represented by build-up cities from antiquity to the early twentieth

What is called here "STRUCTURE OF SPACE", is a conception referring that more often than not have begun with the simple placement of few isolated building on the ground. Their evolution into a complex arrangement of more or less contigous buildings, which seem to form the spaces between them, has resulted from growth by infill rather than by expansion, reflecting such factors as their need remains small and compact for efficient communication and crusially defence.

The traditional city, a structure of space, as described by William Ellis, produces an elemental street whose basic spatial characteristic is felt volume. (2) It is generated by and responds to the characteristics of the vertical wall plans that bound it on either side.

Speaking of the Medieval city, Francoise Choay observes that the buildings and the streets are inseparable; they define each other (3). (Fig. 4) The elements of such a street - roadway, pedestrian way, flanking building, exist interdependently with one another. Because of their well defined characteristics of felt volume of their interdependent mix of elements and functions, these streets tend to act to both literally and metamorphorically as

exterior rooms in the city. They function as places as well as links; they incorporate various social and operational activities into an integrated and somewhat unspecified mix, much as do the volumes interior to buildings. This condition is often elaborated into a complex of interior and exterior spaces of different configurations and uses, both public and private, linked together by a circuit of streets, itself a part of the differentiated system .

Choay's description of streets and building defining each other comes very close to the solid/void image being used here. But because of our familiarity with solid objects we find it difficult to conceive a voids generating or defining solids. In any organisation of solids and spaces, including the streets, seem to have been generated by the buildings and thus resist interpretation as mere residue, we tend to interpret them as elements equivalent to the solids, is a sense they can be considered spatial objects. We attribute qualitative equivalence to the buildings and urban spaces of this kind of organisation indepdendent, within limits, of their actual ratio. For instance figure (3) and (5) have substantially different ratios between their buildings and spaces; but in each, the spaces seem to be configurations equivalent to the buildings.

Unity and equality between buildings and spaces, differentiated exterior space, and different condition between fronts and backs and all characteristics which form the very basis of the traditional spatial street those characteristics define the city as a structure of space.

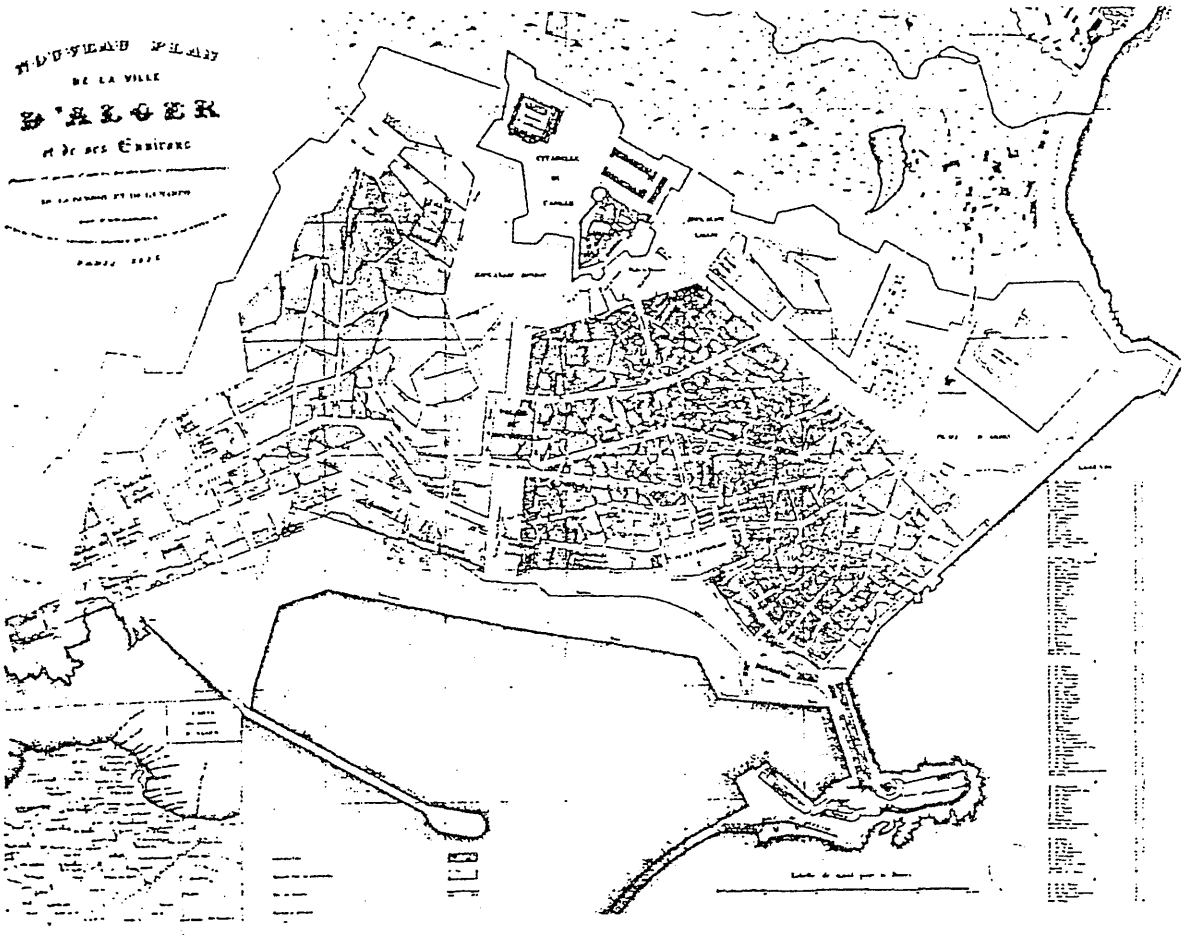


Figure 3. Algiers Development. Algeria.

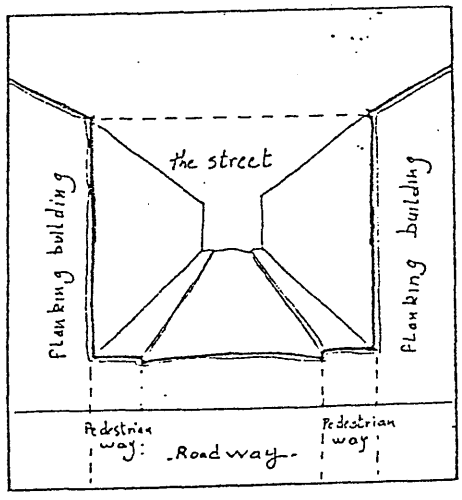


Figure 4. Diagram of street Cross-section.

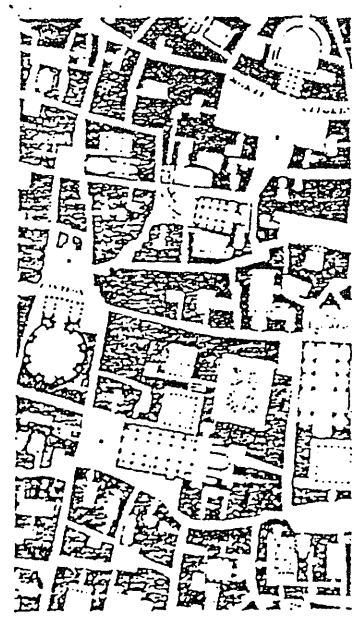


Figure 5. Rome - area of the Pantheon.

2. Streets as a System of Undifferentiated Open Spaces

On the other hand the other conception of contemporary city, appears to be open land - a park or a meadow - into which buildings are clearly the "generated" elements, the organisation can be interpreted as a STRUCTURE OF SOLIDS. This image also corresponds to cities throughout time, but as an ideal it is usually thought to be a contemporary conception. In its most didactic form it can be represented by any of Le Corbusier's urban proposals. (Fig. 6, 7, 8)

What is called here a "STRUCTURE OF SOLIDS" includes that early simple arrangement of isolated buildings; but it is also a reaction against the traditional city. The pavilion building, free on all sides, became an ideal which replaced the traditional standard of contigious urban buildings. Urban space came to be thought of ideally as providing Light, Air and Greenery, not only as a necessity which in most older cities has come to be in short supply. (Fig. 9)

Alternatively, the contemporary image of the city, interpreted as a structure of solids, produces an elemental street with few characteristic of felt volume: the street as road. The space between buildings is neither object or residue but rather is part of continuum. (Fig. 10) We tend to attribute to this kind of organisation, as inequality between the buildings and the surrounding space. The site covered by the building is comparatively small. But, the inequality here is more a function of configuration than of actual ratio, mainly because the space is not generated by the buildings.

For instance, figure (11) and (12) have substantially different ratios between their buildings and the surrounding space, but they can both be interpreted as organisations of objects in a spatial continuum. Moreover, in both these

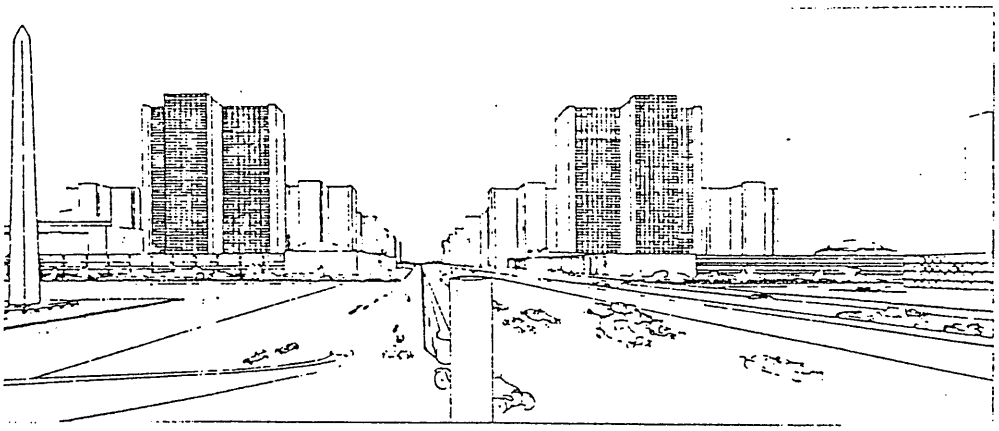


Figure 6. "Ville Contemporaine. I922.
Le Corbusier.

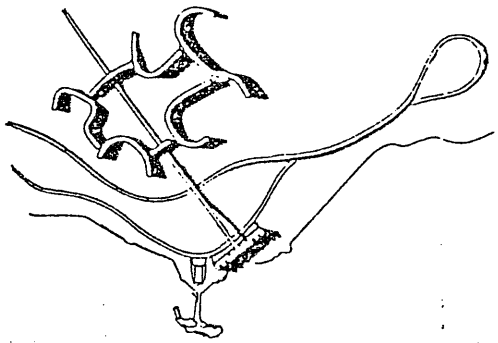


Figure 7. Algiers proposal. Le Corbusier.

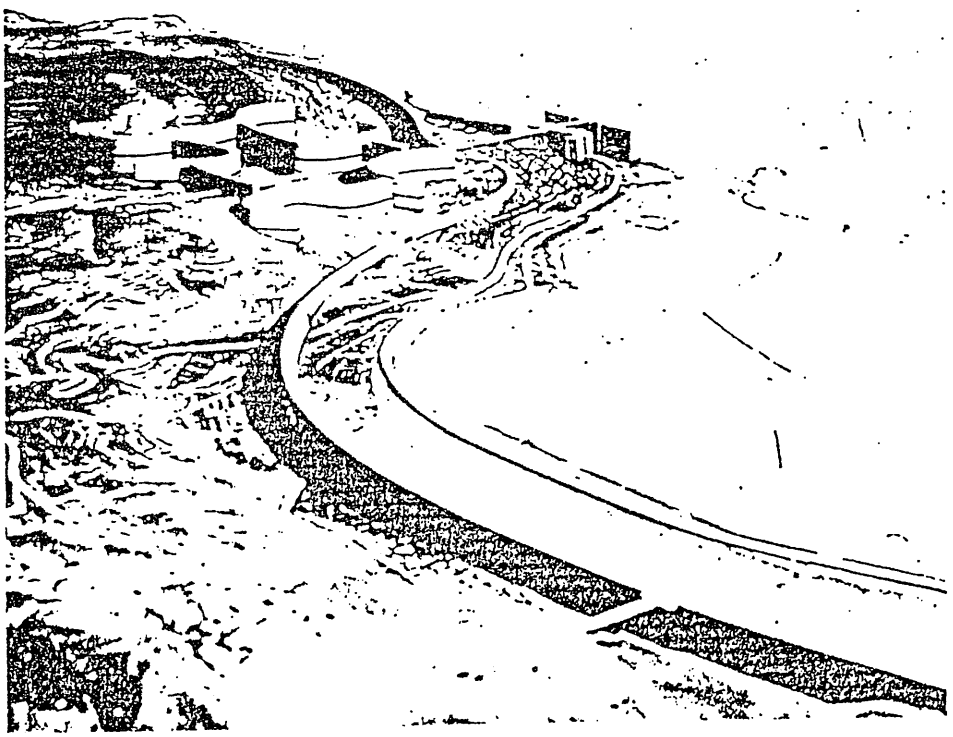


Figure 8. View of the proposal. Algiers.

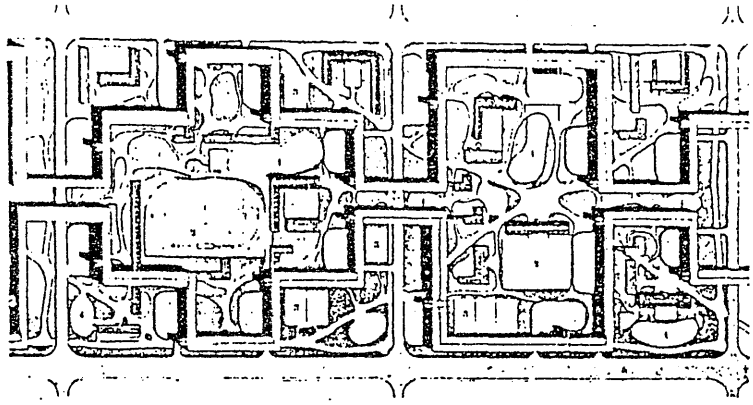


Figure 9. "La ville verte" I930.
Le Corbusier.

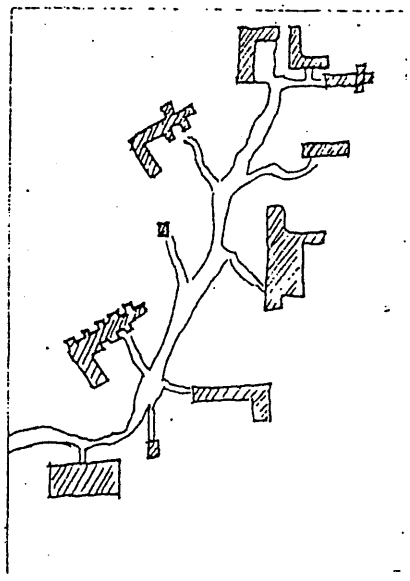


Figure IO. Diagram of Building/Street.

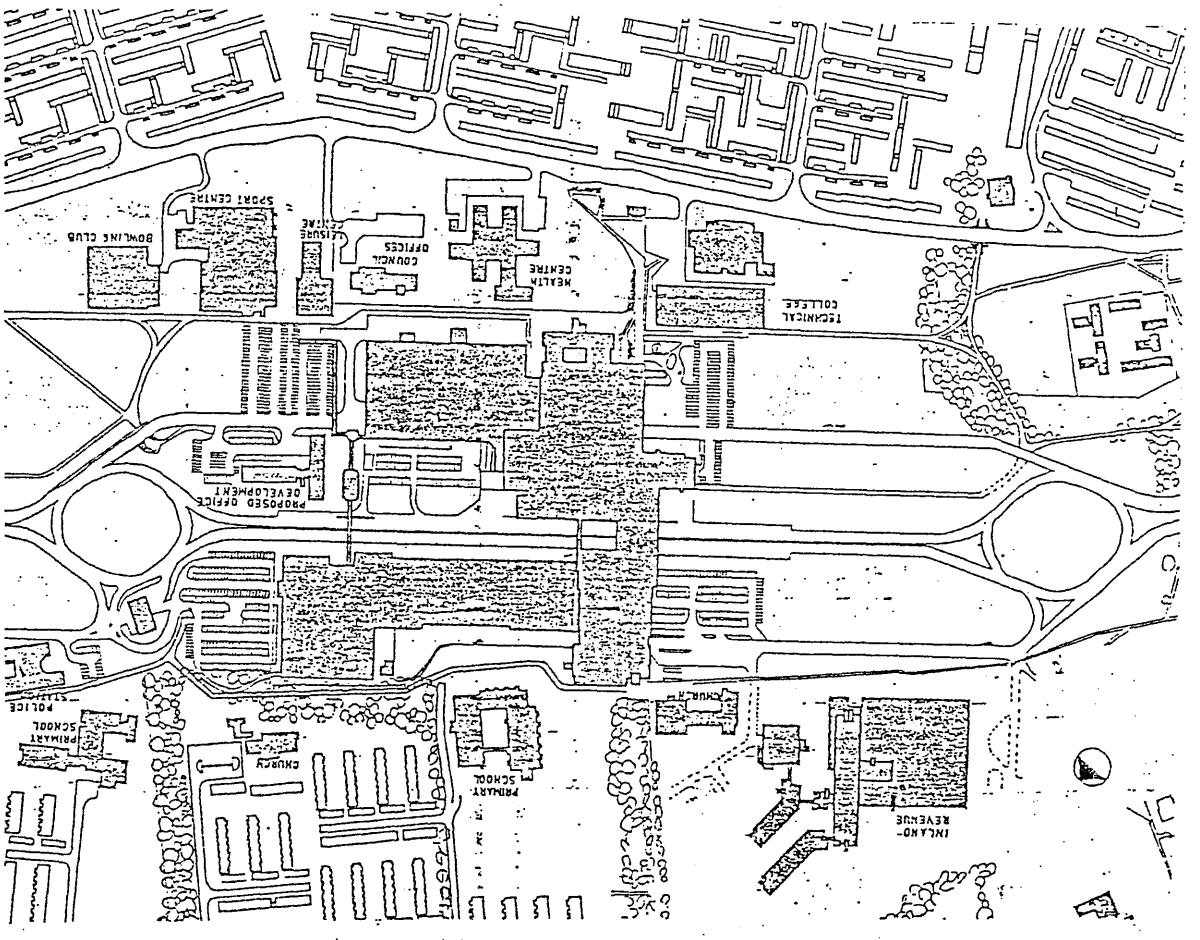


Figure II. Cumbernauld. Area of the town centre.

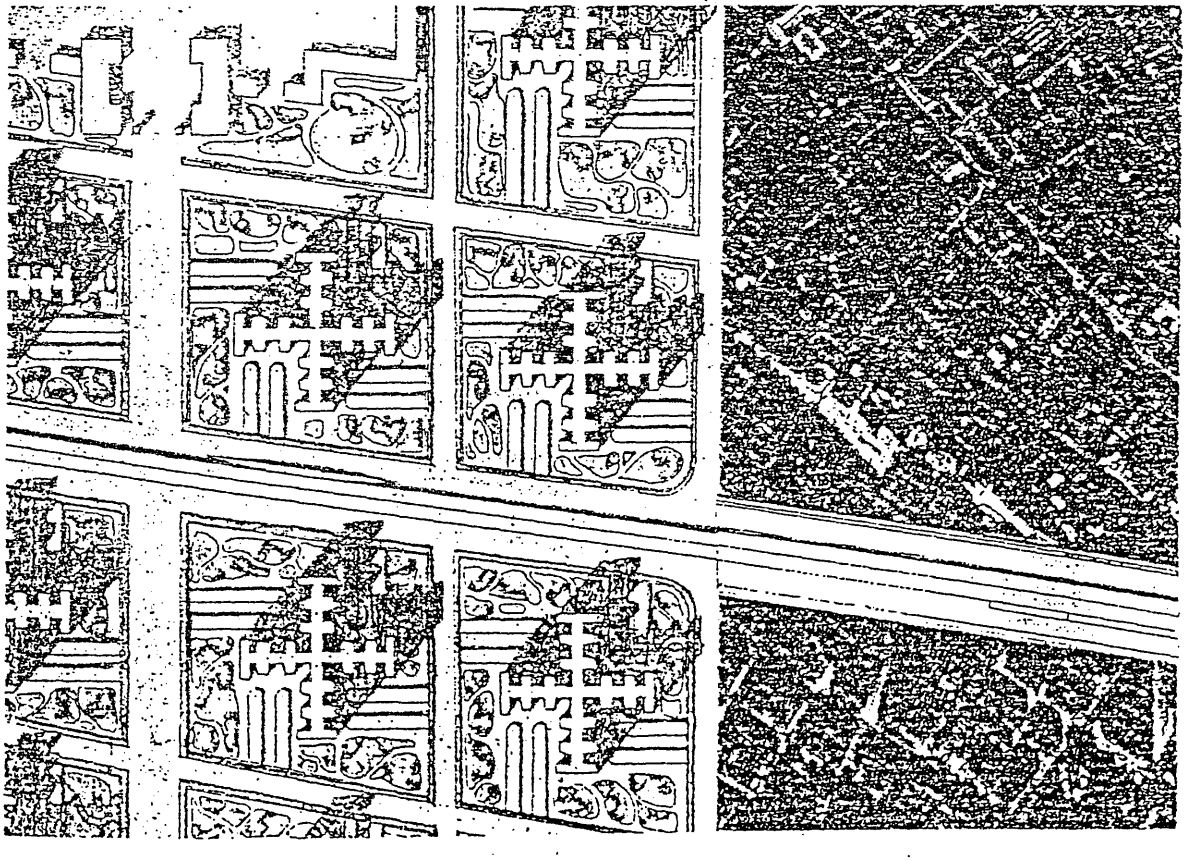


Figure I2. Plan voisin. I930. Le Corbusier.

examples the roadway, pedestrian way, and flanking building are not only stretched apart, but exist independently of one another.

The functions of place and link have been separated. This represent the reduction of the idea of the street to the concept of road marked out on the ground, a division between collective urban space and public road as bearer of traffic.

> "One product of this schism has been the progressive movement of public urban space into the interior of buildings themselves, beginning in the nineteenth century with the great railroad terminals and department stores and the corresponding increase in importance of private domestic space, as people were driven off the street by the huge increase in vehicular traffic. (4)

Nevertheless, for architects in the early part of this century, the separation of road, pedestrian way and flanking building developed into an intellectual programme with a corresponding formal vision of the way things should be. This is well illustrated by the differences in Le Corbusier's earlier and later urban proposals: they exemplify the role of the vertical wall plane as the active, shared surface between solids and spaces. In his early scheme, A City for Three Million Inhabitants, he manipulated as a basic building type the Immeubles Villa. (Fig. 13) This type in many ways similar to the traditional city block in that its vertical planes form two kind of open space, between which it functions as both barrier and linking screen; in other words, on its exterior it articulates the street, on its interior it develops a kind of courtyard space.

When replicated, it produces an idealized version of a system of traditional differentiated urban spaces. But in his later proposals this building type seems to have been consciously discontinued. He favourised two other types; the "Linear redant" evolved from Immeuble Villa, figure (14) and (15) and the "point tower ".

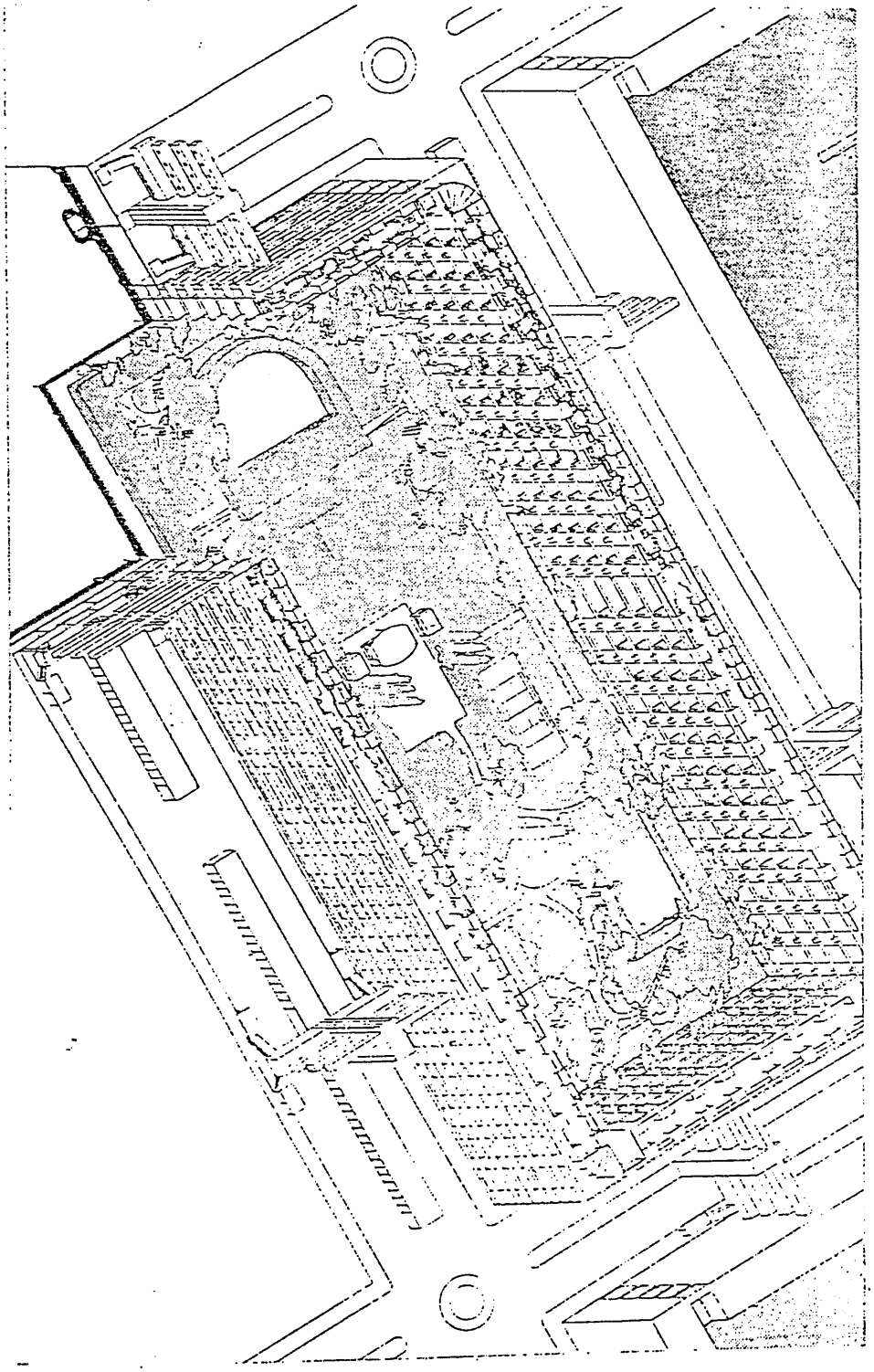


Figure 13. Blocks of dwellings on the "Cellular" system. Le Corbusier.

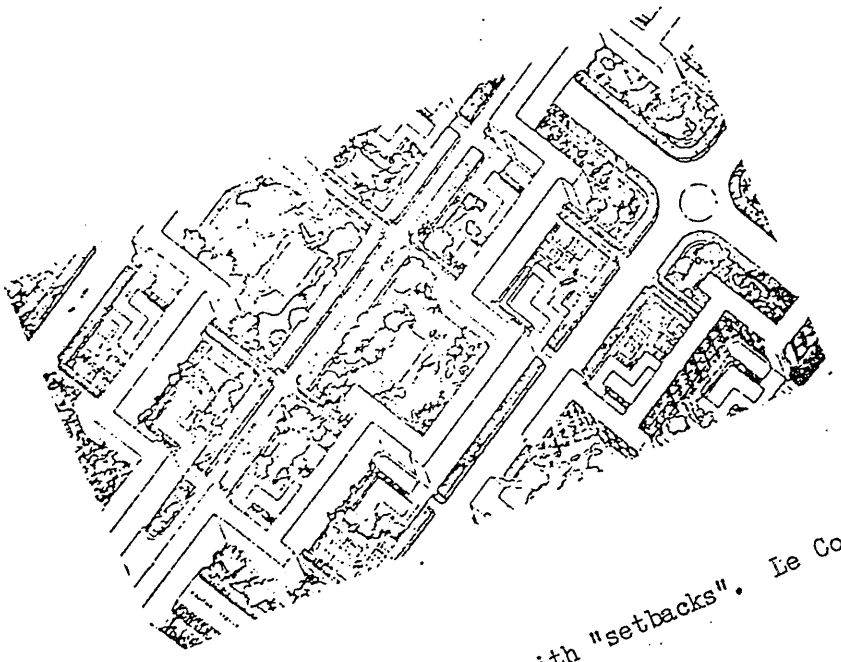


Figure I4. Dwellings with "setbacks". Le Corbusier.

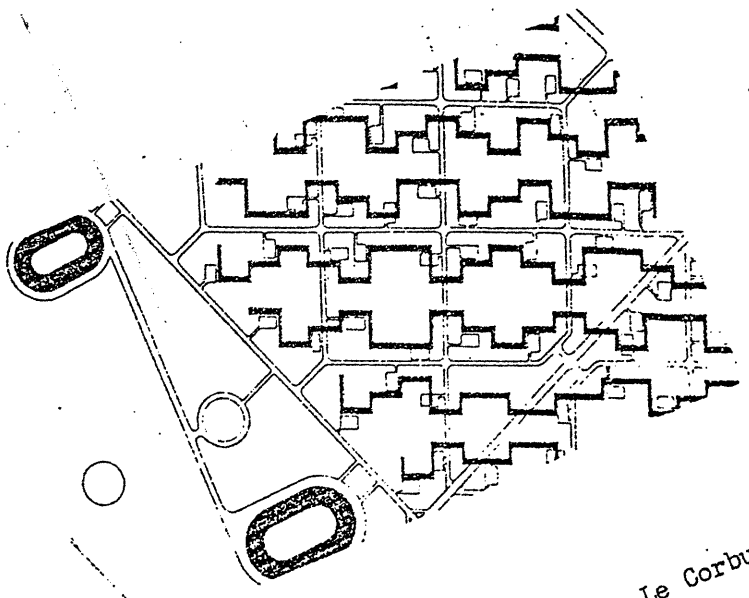


Figure I5. Antwerp project 1933. Le Corbusier.

Apparently they represented for Le Corbusier the means for transforming the city into a green park in which the inhabitants would live in a natural and healthful setting that all at the same time would accommodate the automobile.

These two prototypes comprise a radically changed relationship to the streets and space around them. They no longer define the street in space. This segregation between building systems and street systems is the main characteristic of the contemporary street. There is no doubt these prototypes represent a grand vision, aspiring to accommodate both technology and a certain idea of nature. But this conception of an urban environment lacks distinction, because these prototypes embody a second, problematic distinction: they can only displace space; there is no means for their enclosing surrounding or shaping space, and thus they lack the capacity to produce differentiated exterior spaces.

Unity and equality between buildings and spaces, differentiated exterior space, and different condition between fronts and backs are all characteristically absent from the city as a structure of solid and its roadlike street.

3. Street as Space Between Buildings

We have seen now, that the relationship between streets and buildings in urban spaces determine the townscape. This separation of buildings creates therefore a sense of enclosure. In Urban Design courses I have learned to think of the spaces between objects as well as the objects themselves.

The elements which do the enclosing are normally vertical and may be flat expanses such as walls or they may create the illusion of surface by rhythm. An avenue of trees or a row of columns will do this especially if the rhythm is regular and the elements appear to be similar, the rhythm is the essential constituent in the Character of streets. The use of the rhythm as an architectural device for articulating space is common throughout history but more recently it's significance seems to have been lost.

The flanking vertical elements are connected by a base plane which is formed from a series of pavement. The treatment of the ground plane is of great importance since it connects the vertical elements both physically and visually, and yet contains the activities which take place on the street. The final enclosing element is of course the sky, over which we have no control and which may hang heavy over the rooftops or stretch the street upwards to infinity. Except arcades, any street can be broken down into these very elemental forms: vertical plane, base plane, and sky. (Fig. 16)

We experience any street through these very elemental forms where a sculptural if not an abstract picture emerges where vertical planes occur at almost any angle to enclose the space and the base plane rises and falls with the ground. The feeling of enclosure experienced here is undoubtedly a function of the cross-section of the street at any particulat point along. It is also important to note that the sense of enclosure may con-

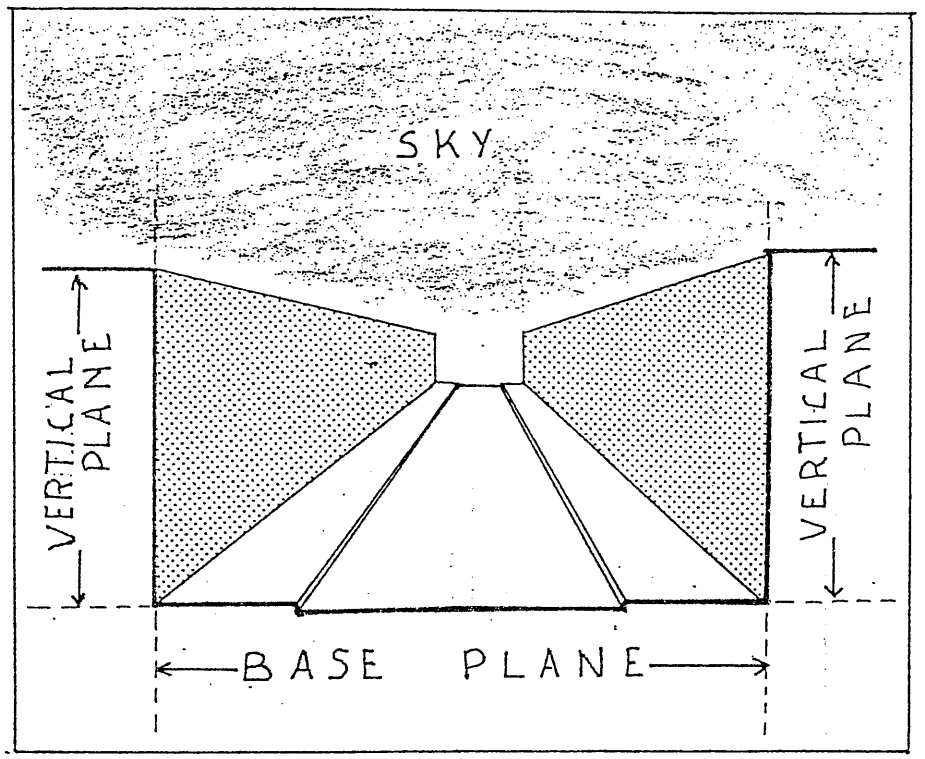


Figure I6. Diagram of street into three elemental forms.

siderably modified by the events taking place at ground level and at end points of the street. The effect of the cross-section is then an important aspect of the enclosure which depends on the ratio of street width and building height.

Inside a building, if size and proportion are suitable for it's intended use, a person feels comfortable in the space when it is being used for it's specific purpose. For example, a couple of people would not feel comfortable having their meal in a hall designed for a hundred people. For both these numbers there is an optimum size of room: if the space is too small people will feel cramped, if it is too large, a lack of intimacy will result and people will feel being in an improtected environment. Similar considerations could be extended to the outdoor spaces, therefore to the streets.

Let us now examine the proportions between, street and buildings and see how enclosure is achieved, using W for the width of the street (which is a distance between buildings on both sides of it), and H for the height of the adjacent buildings.

The Japanese architect Yoshinobu Ashiharu has looked at these proportions in his book : "The Aesthetic Townscape".

His observation shown that,

> "W/H may be taken as a kind of median from which spatial qualities vary depending on whether W/H is greater or less than 1"

and he notes:

> "as W/H rises above 1, the space open up, and, as it passes 2 gradually becomes expansive or vast. When W/H falls below 1, space grows increasingly intimate, until eventually it is simply cramped when W/H equals (1) a balance is achieved". (5) (Fig. 17)

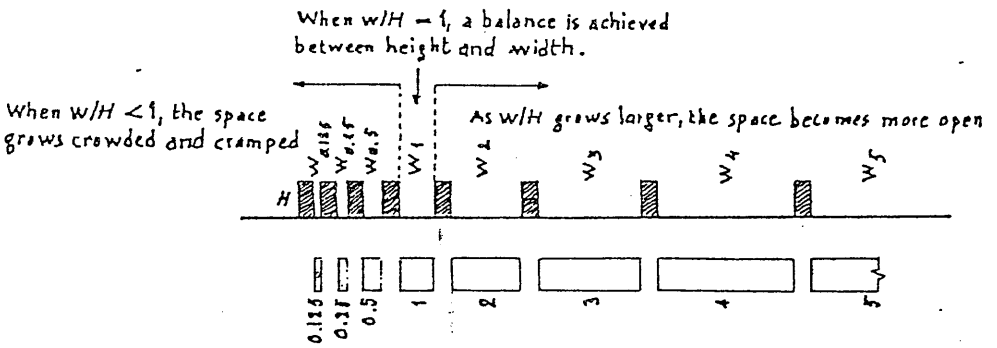
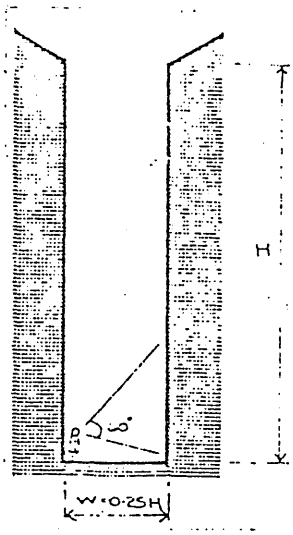
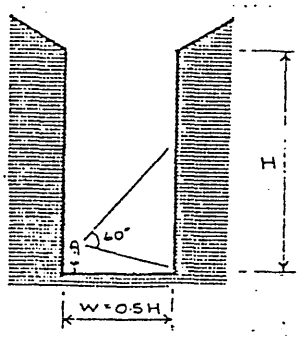


Figure I7. Diagram of proportions between width and distance of streets.

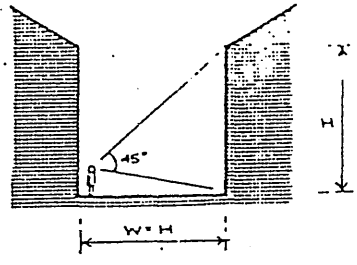
From my own experience, I have learned to eliminate any subjectivity in this kind of observation where the felt enclosure is expressed differently from one person to another. To do so then, it will be necessary to determine how the human eye can perceive space. As we know, the human eye has a normal field of vision of about 60° although 45° is about the limit of the range in which any degree of detail can be seen. In the following example of cross-section done by: Jim McCluskey, in his book " Road Form and Townscape", we will see how the space is perceived and experienced by an observer contained in the street . (6) (Fig. 18)



When W/H I, a canyon effect begins to be experienced and when W/H=0.25, a person on ground level at the opposite side will only perceive about a quarter of the height of the elevation.

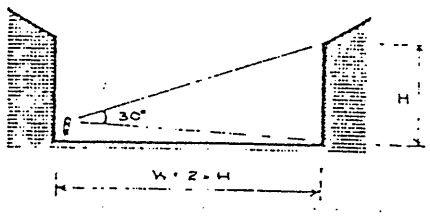


When W/H=0.5, the observer will see easily about half of the opposite elevation.

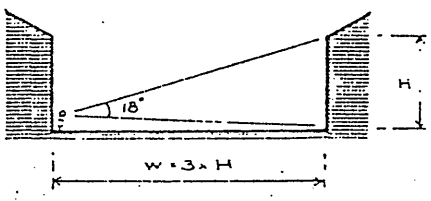


When W/H=I, there is a good harmony between building height and the space between, a comfort space is created. A45° cone of vision extends from the bottom to the top of the opposite elevation from the far side, but it is still difficult to see the elevation over its full height. A high sense of enclosure is still felt.

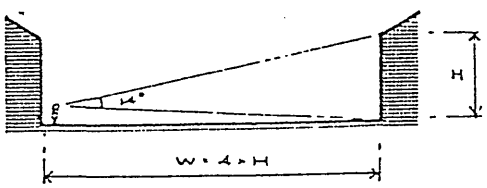
Figure I8a. Proportion of streets.



When W/H=2, it is easy to see the opposite side of the street over its full height. The entire elevation and its details are perceived clearly and the elevation will almost fill the field of vision.



When W/H=3, at this stage the cone of vision encompassing the elevation is reduced to I8° and the sense of enclosure begins to loose detail because the space opens up.



When W/H=4, the cone of vision is reduced to I4° and the sky dominates the field of vision. Here the sense of enclosure starts to become attenuated.

Figure I8b. Proportion of streets.

The various height to width ratios are summarised in the following diagram. (7) (Fig. 19)

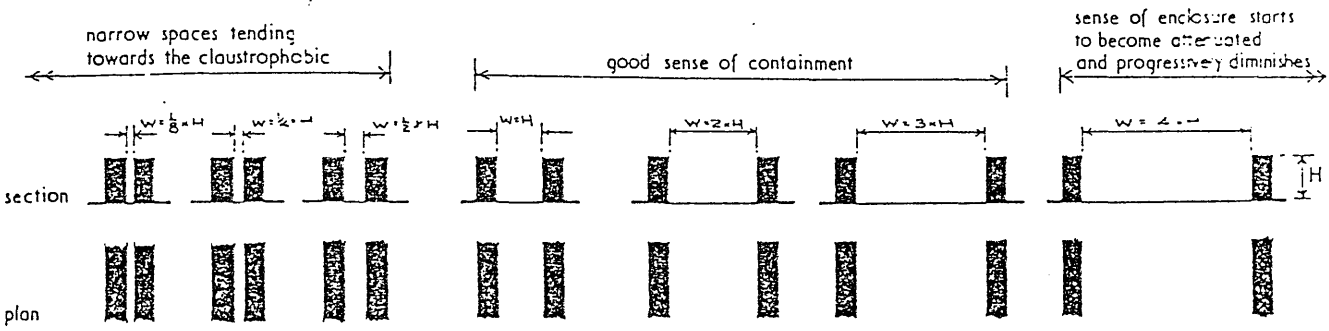


Figure I9. Proportion of streets.

I have to note that the nature of the enclosure and the position and shape of the buildings in relation to one another determine the amount of light and air circulation that the street and therefore the buildings will receive.

The following drawings show how the degree of enclosure changes according to the height, the built form, and the detailing of the external wall. (Fig. 20,21, 22, 23, 24)

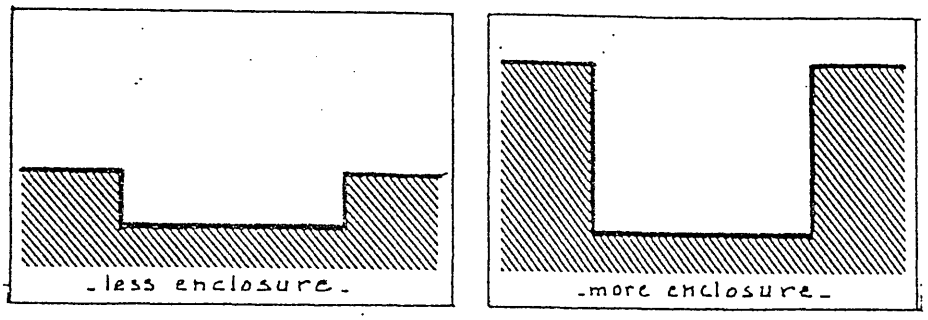


Figure 20. Street enclosure. Function of cross-section.

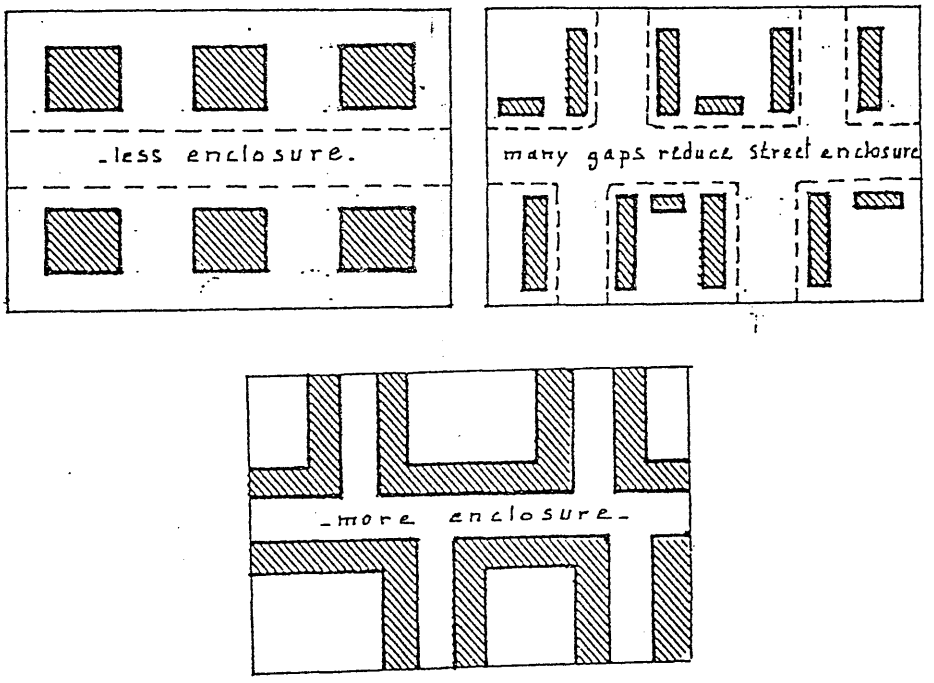


Figure 2I. Street enclosure. Function of built form.

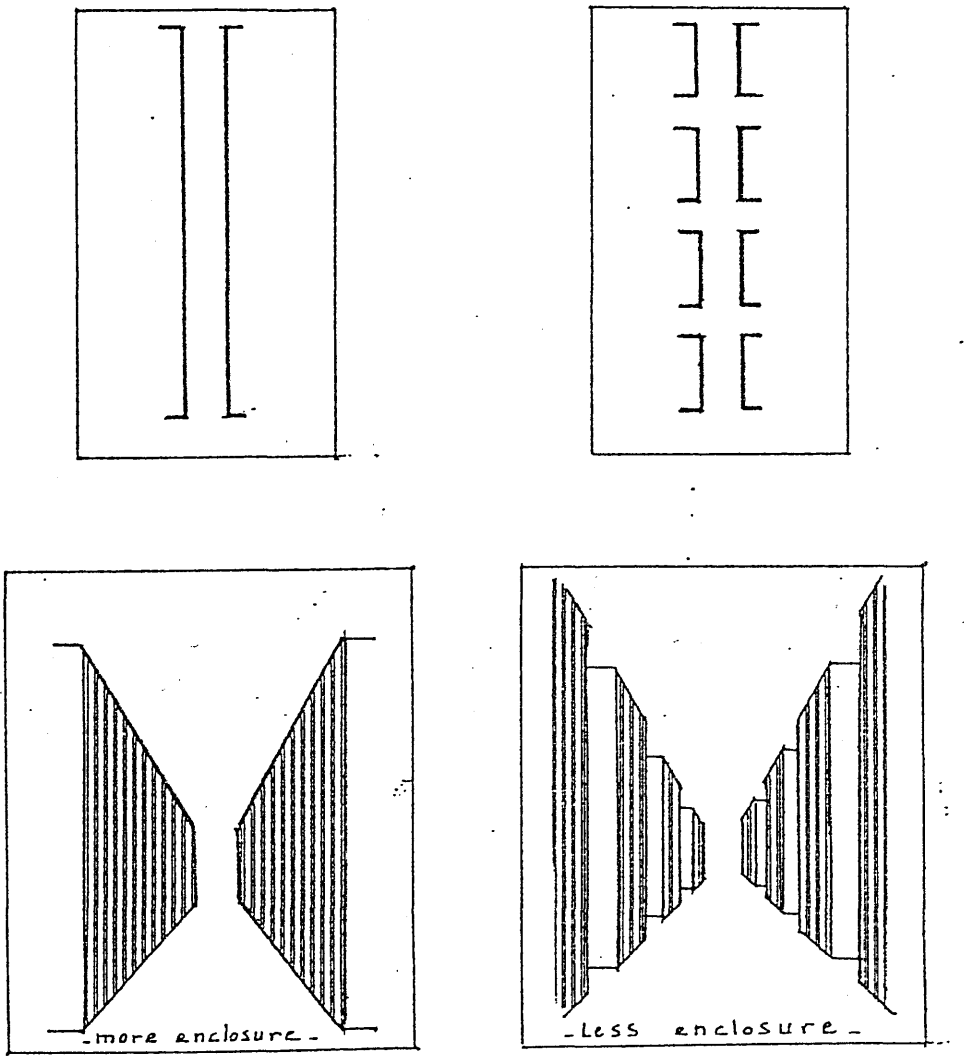
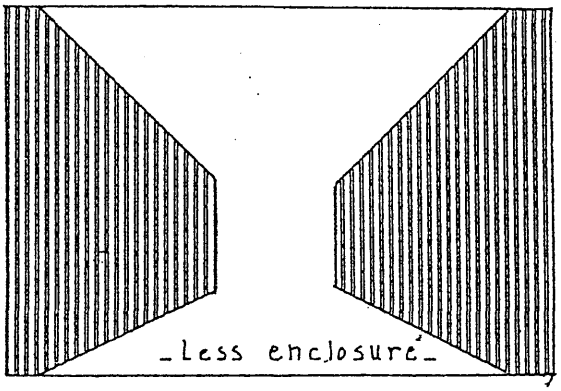


Figure 22. Street enclosure. Function of length.



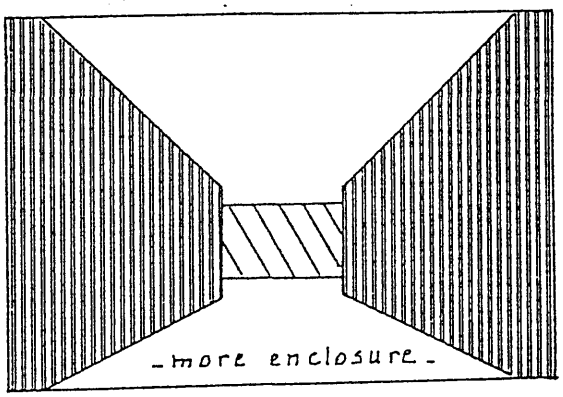
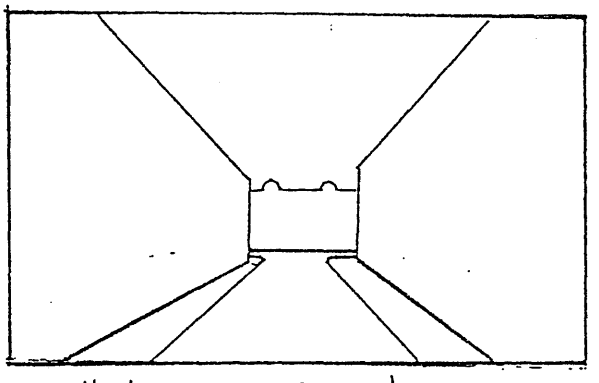
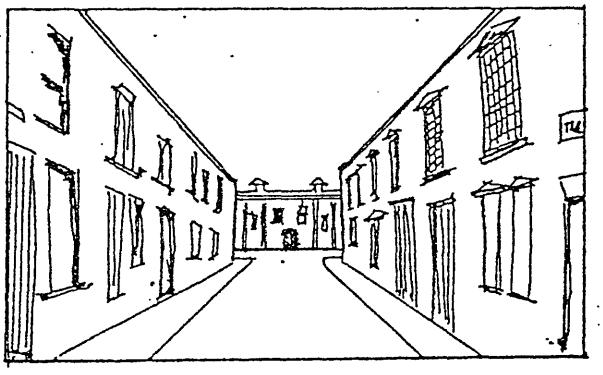


Figure 23. Street enclosure. Function of visual termination.



-High sense of enclosure-



-The sense of enclosure is no more high but balanced-

Figure 24. Street enclosure. Function of bits.

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Essou sur l'evolution de l'espace urbain en France, privately published, 1969

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CHAPTER III : ANALYSIS: FORM AND SPATIAL COMPOSITION

1. Formal Compostion: Edinburgh New Town

The Castle was the earliest settlement. During that period, Old Edinburgh remained compact and limited in spatial extent. The economical and physical growth was confined within the Medieval Site along High Street, between the Castle and Holyrood Palace. It was an expression of diffuse pattern of Social Class and an absence of marked spatial segregation. However, a vertical segregation was seen as a distinctive feature of the medieval city.

In the 1760's a rapid change commenced with the decision to erect a New Town to the north of the burgh. The cause of all the planning was the increase in population as the Scot's economy was improving. It was to be built on the open lands to the north of the crowded medieval city, beyond the valley which at the time had a loch. The site was chosen. It's topographical features were the main reasons of the choice, the dominant view towards the water of Leith, the sea, and the dominant view of the Castle.

In 1766 a competition was organised so that a layout plan could be selected, on which the New Town would develop. It was to be built on the north side ridge of the loch roughly parallel to the old city High Street. The winning plan was of James Craig in 1767 (Fig. 1). It took the form of the oldest of all town planning patterns: The Gridiron.

It was designed as a formal symmetrical masterpiece. It was the clarity of geometry against the irregularity and complexity of the organic forms.(Fig 2)

Edinburgh New Town spread over 192 acres, it is laid

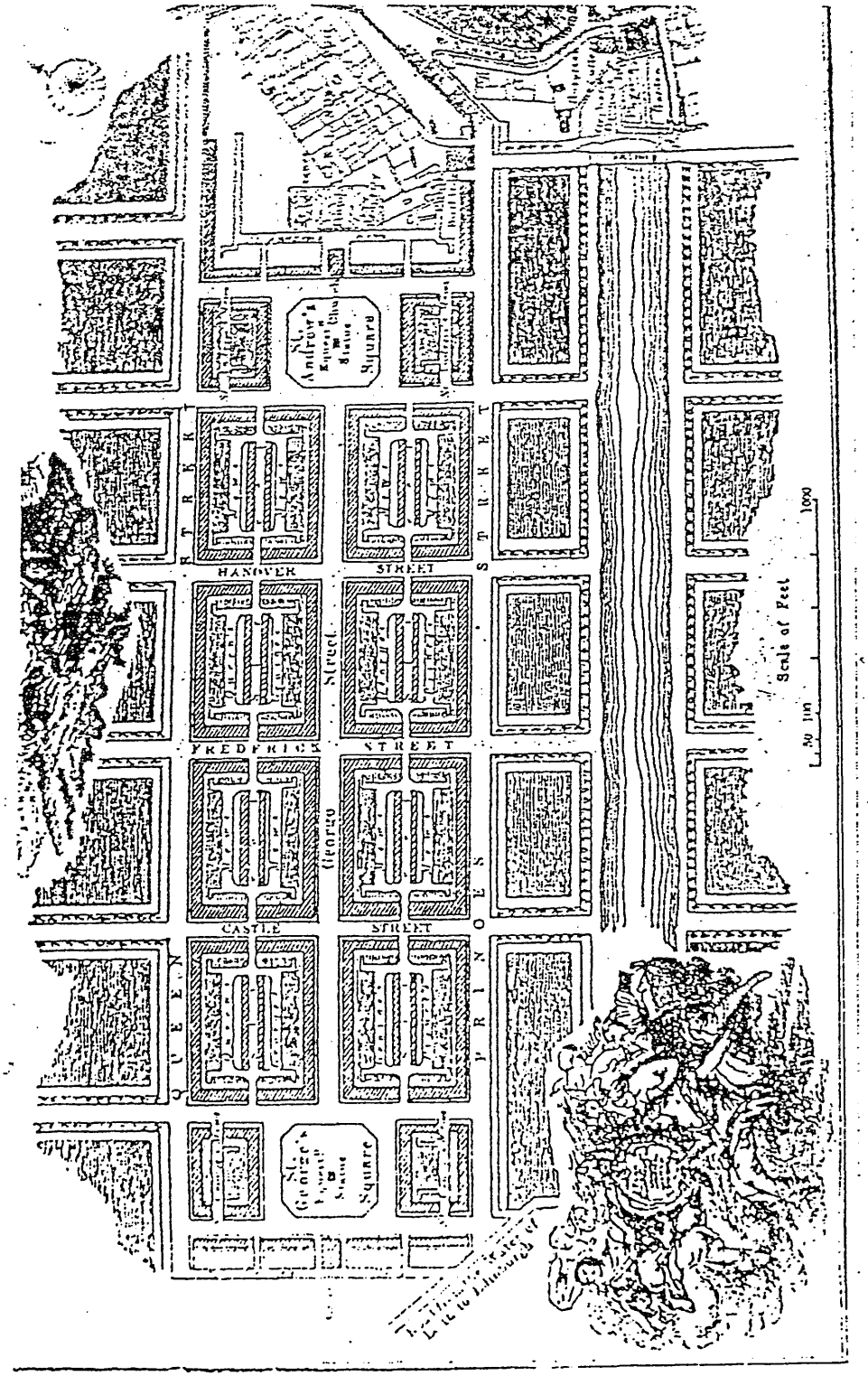


Figure I. James Craig's plan.
Edinburgh New Town. 1767.

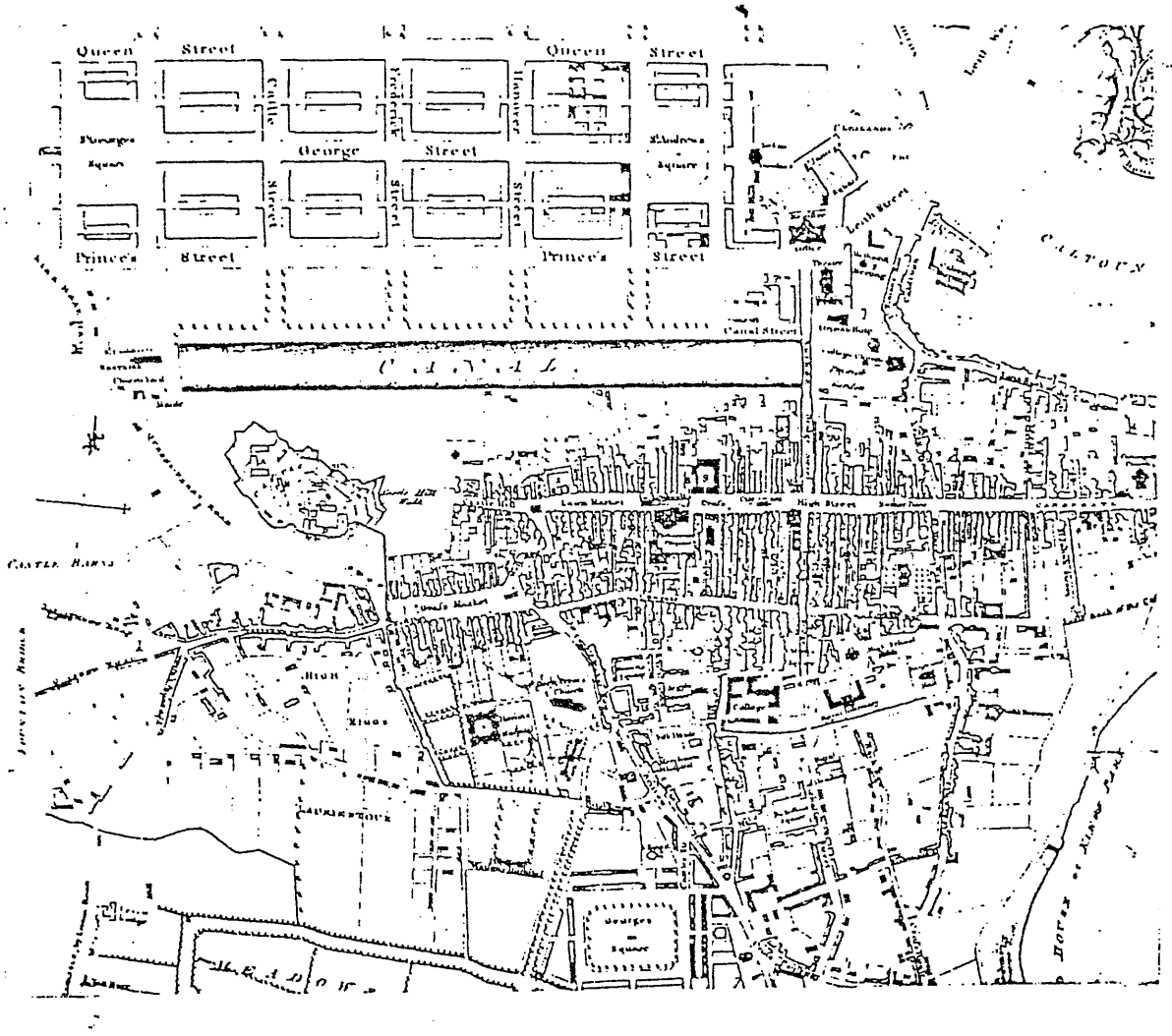


Figure 2. Plan of the New Town of Edinburgh 1776.

out on a symmetrical plan which consists of two squares interconnected by three long, parallel streets, and seven shorter streets crossing them at right angles. A total of eight large building blocks results from this gridiron pattern. This layout differs however from the normal gridiron pattern in that it was conceived as a finite composition and is largely inward looking. (Fig 2, 3, 4) Its spatical structure derives from the baroque planning tradition of axes and focal points.

The plan can be described as a formal organisation along one main axis ended with two events. (Fig. 5) Each event was materialised by a square of five hundred feet square as a public open space. The nothern and southern boundaries confronted, respectively by open landscape and the irregular prospect of the old town. On each end of the spine a church was intended as a focal point to terminate the grand vista (Fig. 6); therefore the tension was not only set up by the interconnected open spaces but also by the public buildings. However the church planned at St. Andrew Square never took place on the axis. (Fig. 7) Today only St. George's Church designed by Robert Adam stands at the West end on the George Street axis.

The urban form resulting from this gridiron is the block on which classical architectural devices were used. There are eight similar blocks, each being a complex grouping of housing on the main frontages with smaller houses and service lanes in the interior. The layout of each block was based on the idea of the town houses forming a part of the overall block. It had a relatively narrow frontage and was designed on four floors high, the entrance floor being at first floor slightly above street level. The basement is accessible by a stair directly from the street. Each house forming the block was identical to the others within the block in terms of built

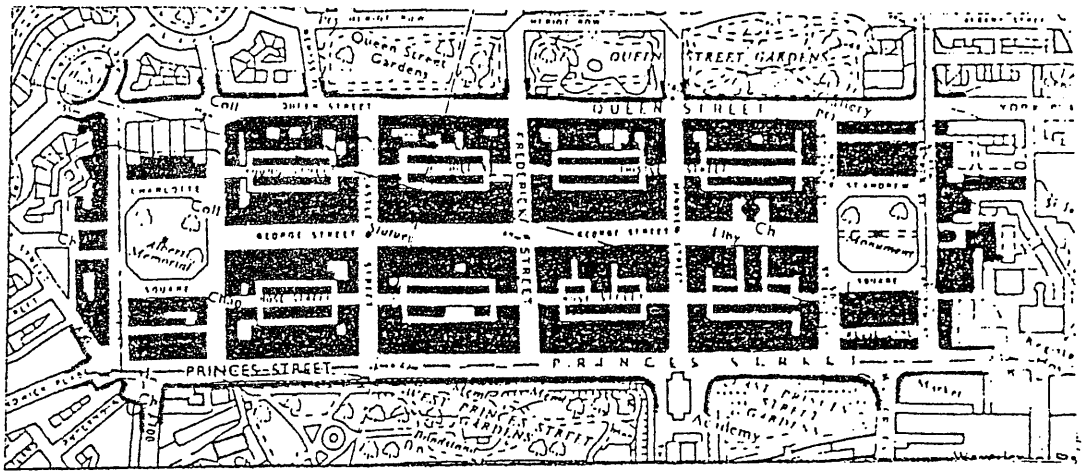


Figure 3. Plan of Edinburgh New Town. scale. I/I0,000.

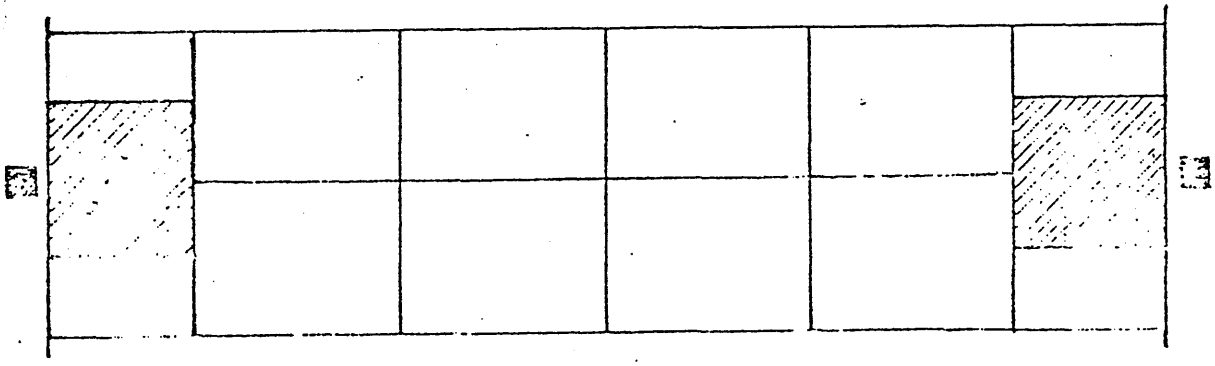


Figure 4. Diagram of Edinburgh New Town.

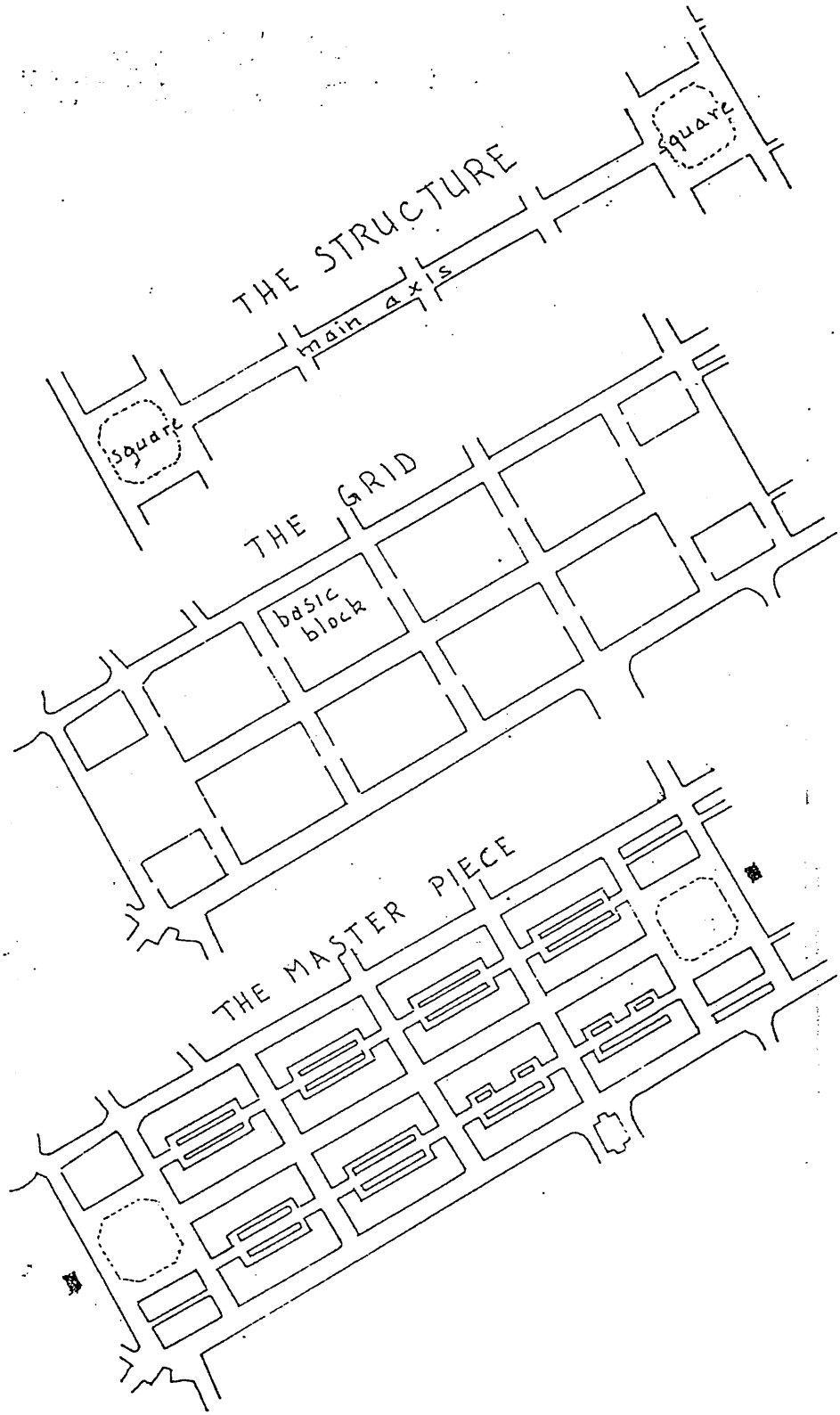


Figure 5. Diagrams showing the formal composition.

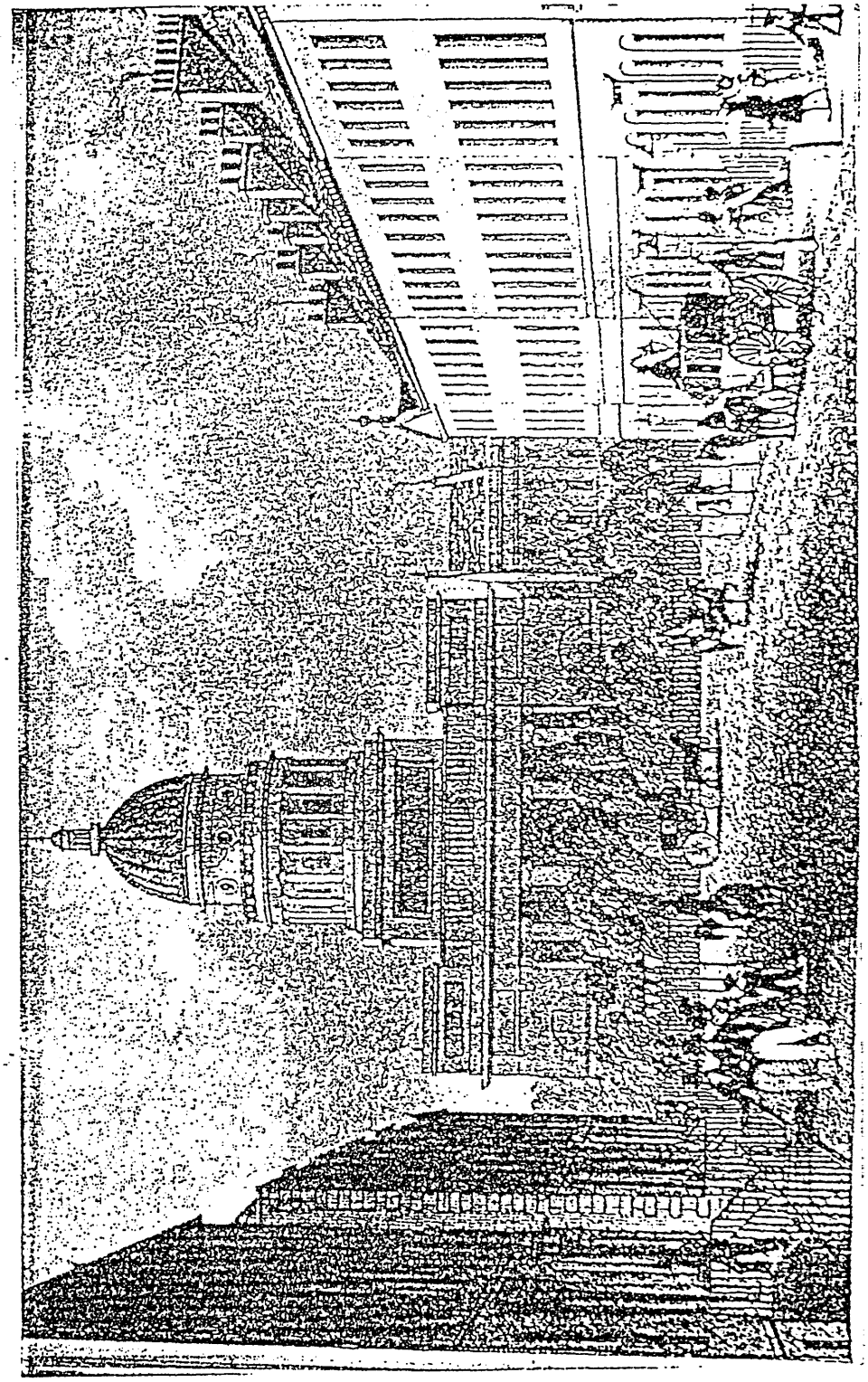


Figure 6. George Street, looking towards Charlotte Square.

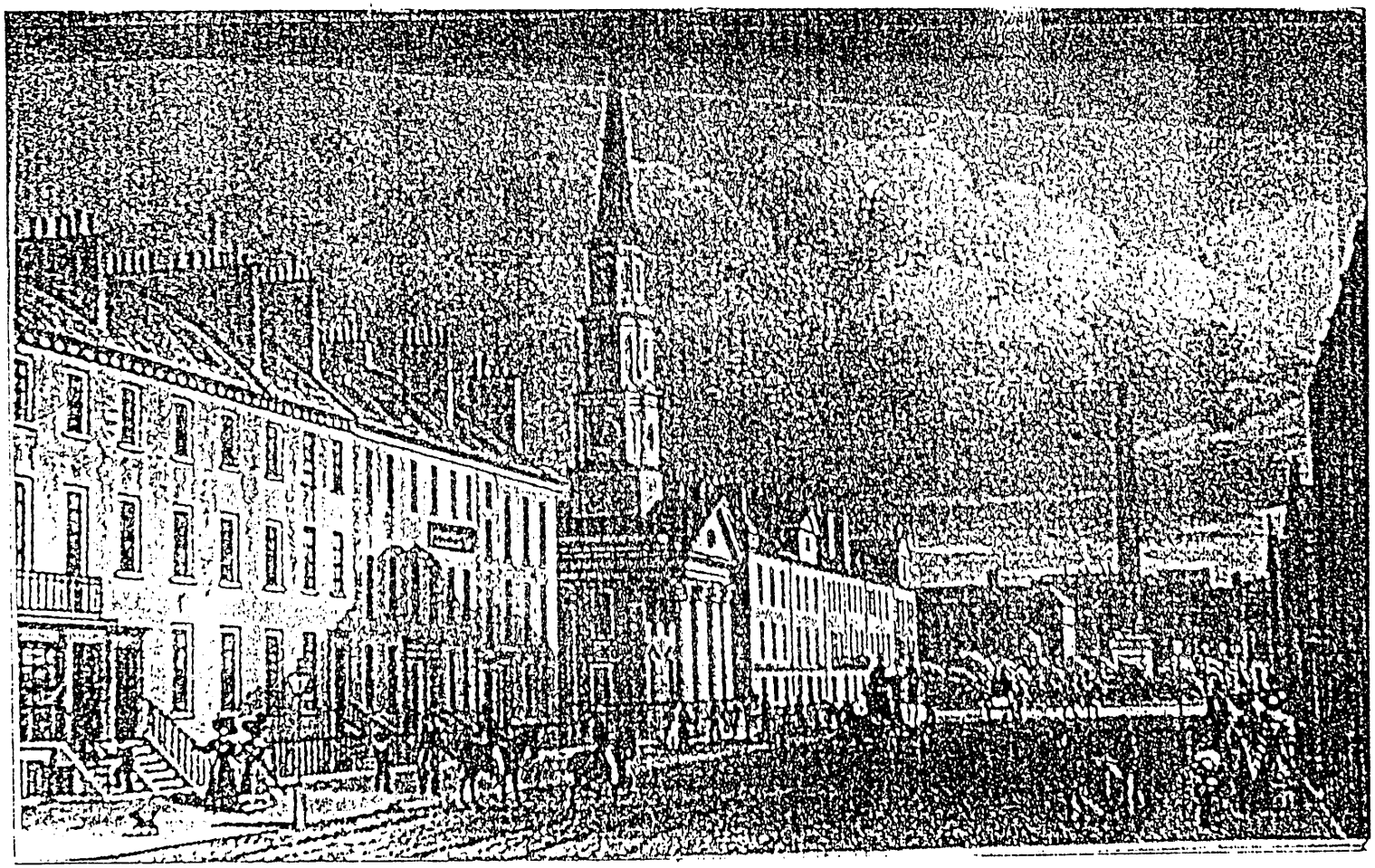


Figure 7. George Street, looking towards Saint Andrew Square.

In Edinburgh New Town, James Craig came with new rules of urban design, and his range of urban motifs can be described as follows:

- The "rue corridor" of the principle East-West axis and the paved North-South crossings.

- The Eastern and Western squares, five hundred feet square.

- The Northern and Southern boundaries confroned respectively by the castle and the green spaces.

His urban motifs seemed to be limited, but his main idea was to create a grand vista along a main axis, terminated by two churches enclosing two squares. However, it is believed that Craig gained his inspiration as Young son said from Here's Plan in Nancy (1752) (1) (Fig. 8). In both plans we can notice the strong influence of the renaissance ideas such as:

- The long vistas terminated in large formal squares.

- The sense of connection with regional countryside.

- The segmental architectural experience as one moves along the main axis.

- Along with the former comes the burst of space mixing in a climatic experience the built and the green open space.

- And finally, the minutest deployment of the details in the design of the facades.

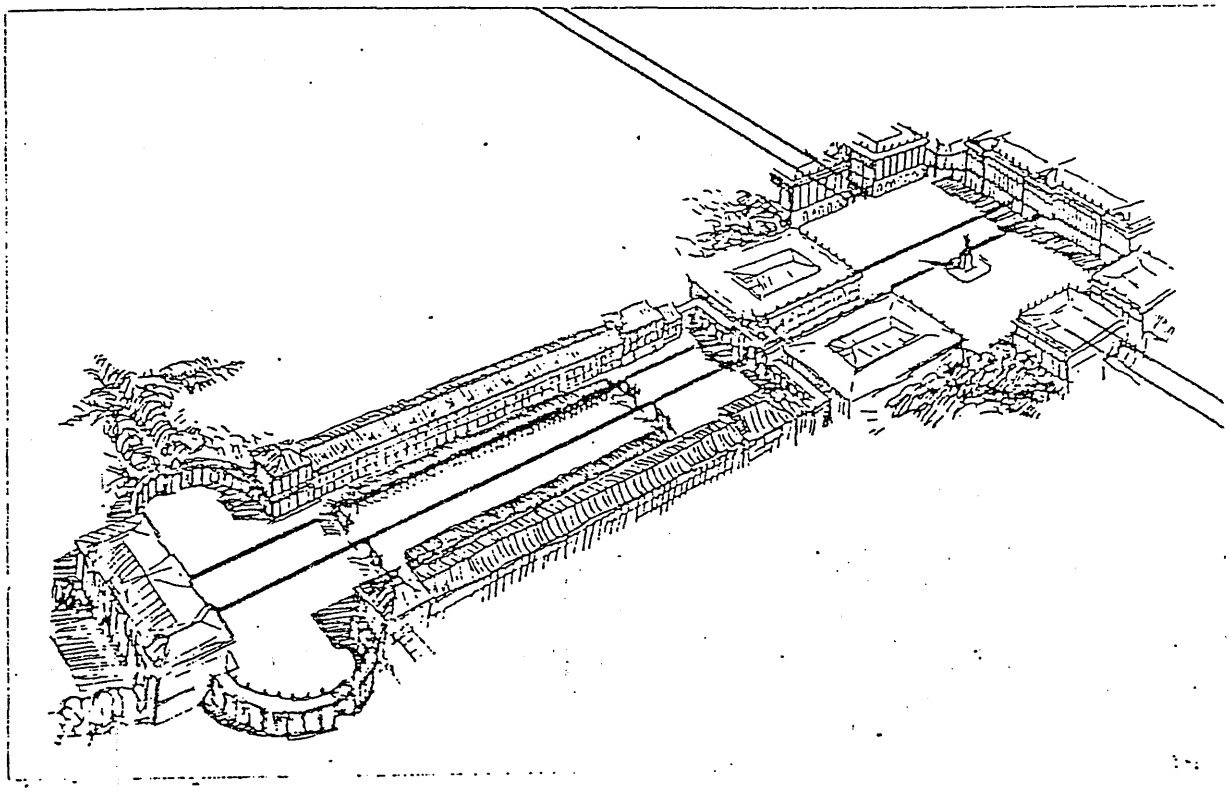


Figure 8. Plan of Nancy. France.

form, height, and certain critical details. Thus every block had a uniform facade arising from a set of architectural rules governing such things as cornice height, sash windows etc... The resulting uniformity is to be seen in the elevations throughout each block composing the New Town; thus all blocks are similar. (Fig. 9)

However, around the square slightly different blocks were designed as a complete composition within Graig's overall plan. There is one exception to this formation of the whole town, which occurred when Robert Adam was commissioned by the town council to prepare a complete design for Charlotte Square. He designed Charlotte Square as a complete layout with George Church as the main feature facing George Street. (Fig. 10) The facade of the blocks enclosing and defining the Square are highly rich and were designed as a classical palace with symmetrical openings, columns and ornamentations (Fig. 11), there the blocks were designed to be seen as a complete classical facade subscribing to the scale of the square. Each house forming the block was different than the others in term of facade, in the other blocks the houses were similar and reflected a high sense of uniformity. Here, Robert Adam had changed the rules, he designed a classical frontage which did not reflect the individual houses behind it, ie. each house is subservient to the symmetrical composition of the whole elevation.

As can be seen the New Town is mainly composed of almost standard blocks similar in layout and composition. (Fig. 12) When the New Town was completed, any observer standing at George Street, looking towards the other end of the vista would have seen the street with a limited range of fenestrations and might have had a feeling of monotony; except where the Church rises as a focal point, attention is attracted.

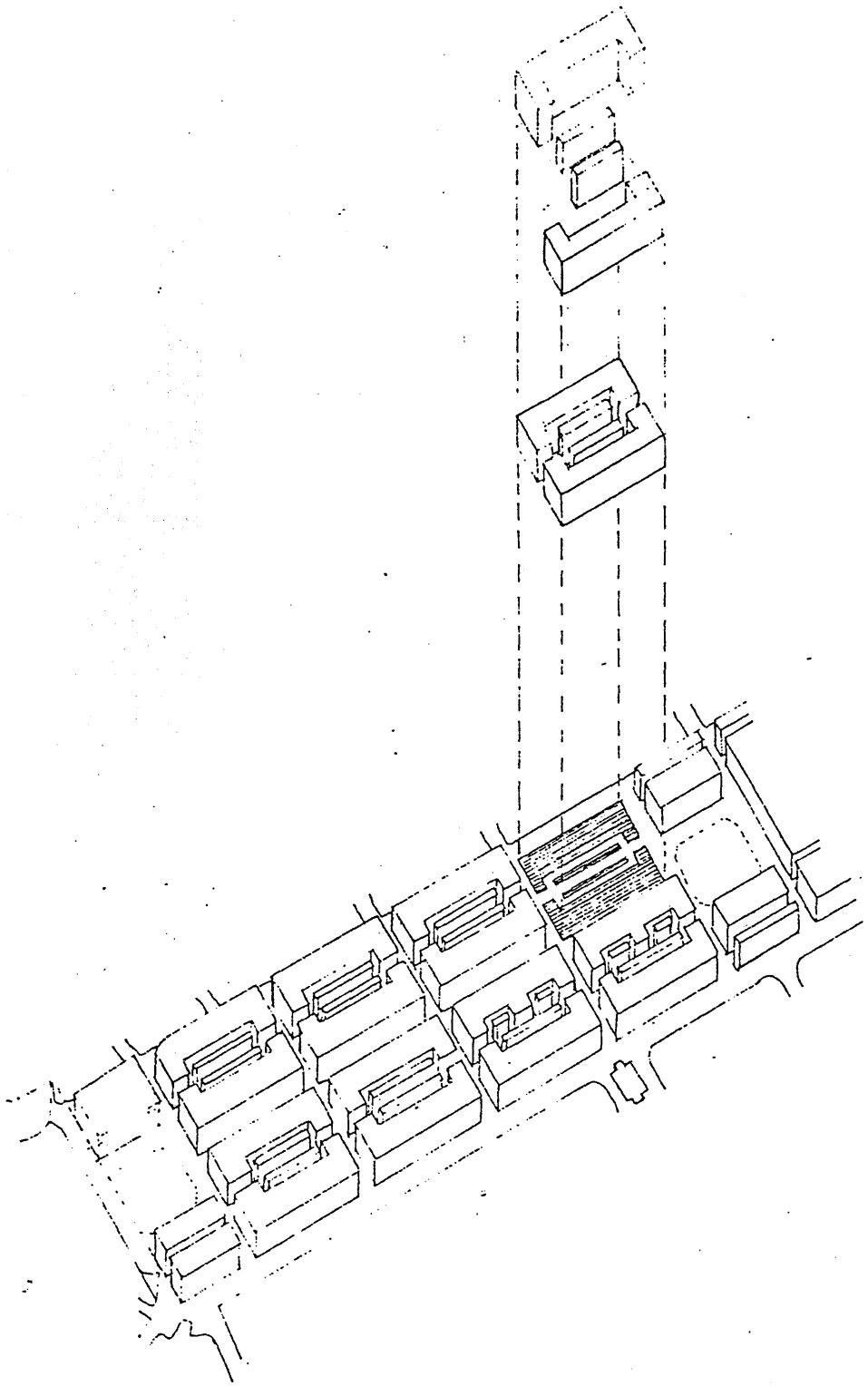


Figure 9. Axonometric of Edinburgh New Town showing the composition of the block.

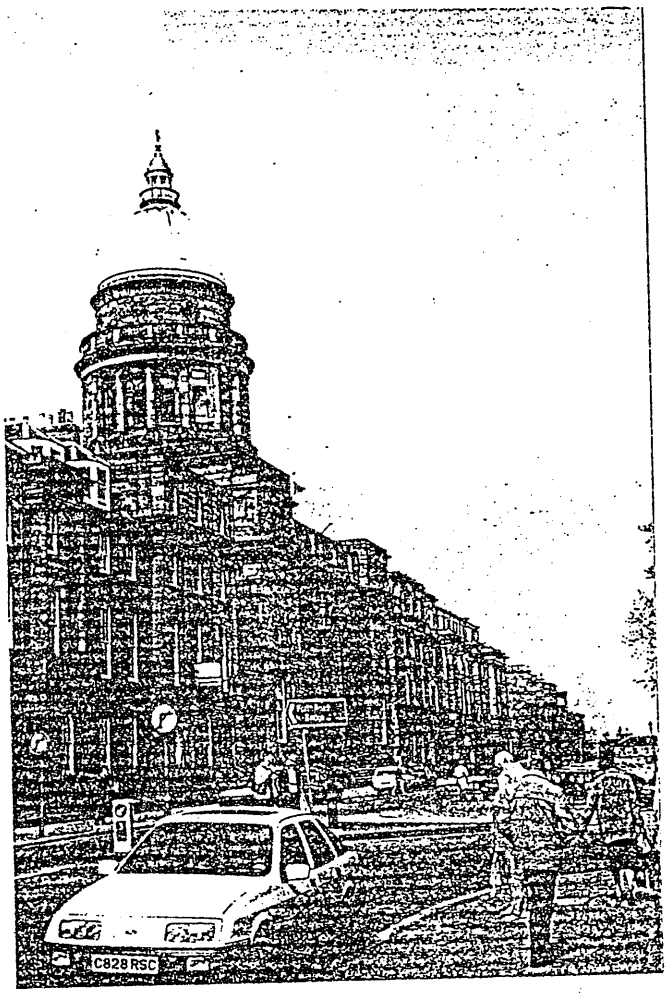


Figure IO. George Church in Charlotte Square.

Figure II. The classical block enclosing Charlotte Square.

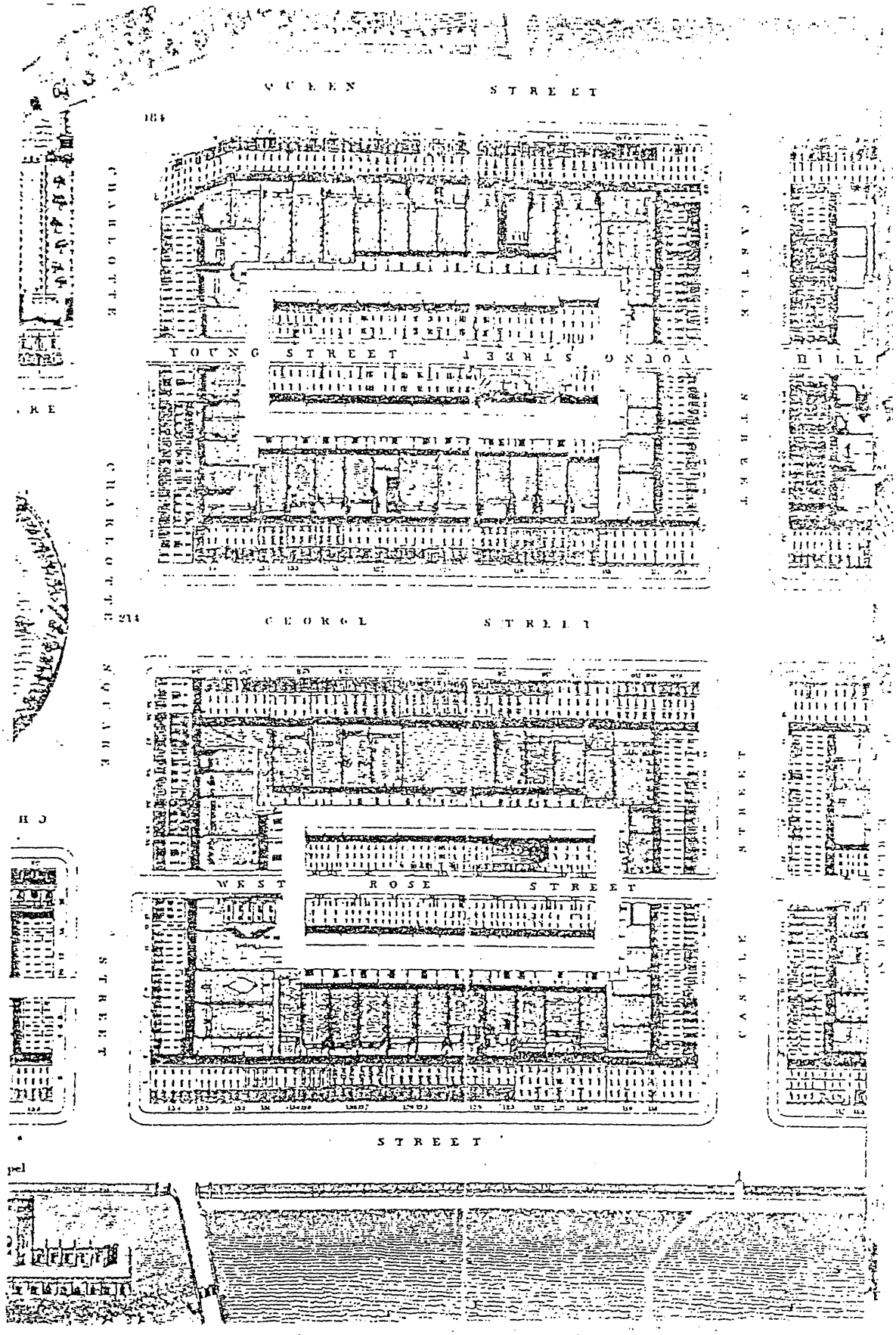


Figure I2. Part of Kirkwood's plan and elevation of the New Town.

This monotony was very strong along main axis like for instance George Street. This was due to the high sense of uniformity of the building forming the block arising from:

- the uniformity of the plot width
- the uniformity of the block's height
- the uniformity of the building line
- the uniformity of the roof-scape
- the uniformity of the sash windows

But once the eye is turning down to look at a short segment of the street, distinction between buildings would have emerged because of the detailing of the external walls. These "bits" which compose the facades such as ornaments, thresholds, railings, doors and porches were differentiated enough in terms of design to enable the observer to appreciate a certain richness of the facades, and to make distinction of the details and the articulation of the individual units of the building.

As a result of this differentiated minutest details the observer will recognize and identify a particular street while moving in the New Town.

In the following years on the main axis of George Street, at each crossing with the secondary streets, opportunity was taken to erect magnificant statures to mark the space. Each statue adds an identity to the crossing where it stands and it articulates different segment of George Street, whithin the overall axis. On both ends of this axis stands a monument right in the middle of the square as a landmark to accentuate the event. The statues and the monuments are characteristics of George Street and mark the sequence through the street. (Fig. 13, 14, 15, 16)

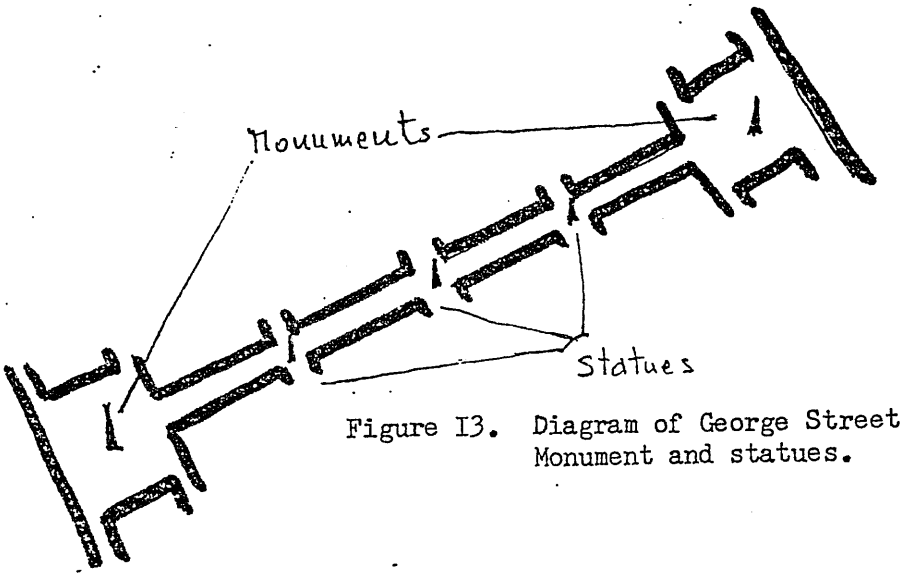


Figure I3. Diagram of George Street.. Monument and statues.

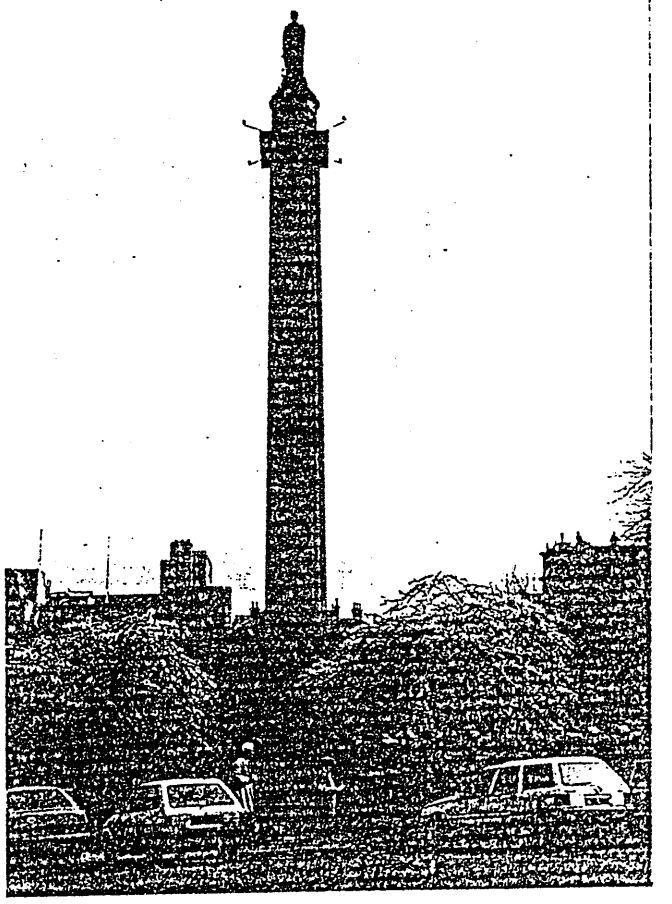


Figure I4. Saint Andrew Square: The Monument.

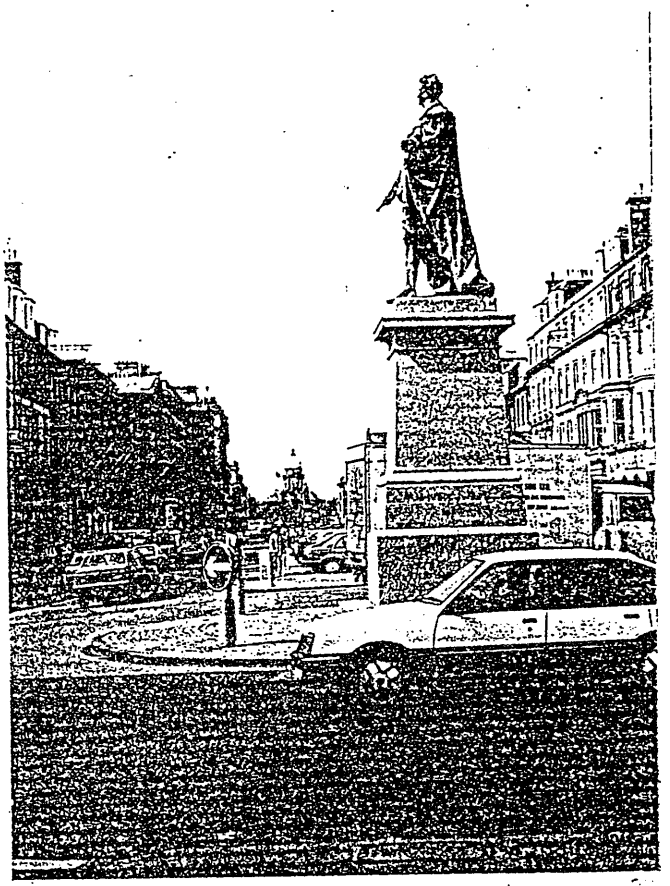


Figure I5. Statues along George Street.

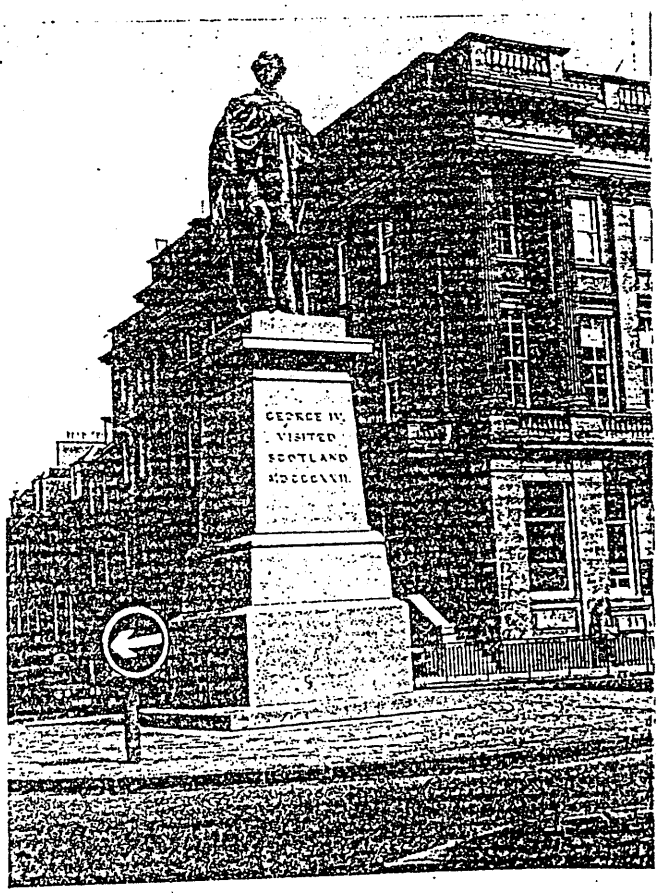


Figure I6. Statue along George Street.

On Princes Street, (Fig. 17) the appearance of the Castle on the hill with the old organic settlement dominate the view; from Princes Street it is seen as an old painting revealing history. Along this street a few public buildings were built apart on the open garden and facing the perpendicular streets of the New Town; on those streets they fulfill a function of focal point, but on Princes Street they mark the sequences and give a sense of place. Those buildings of public relevance are The Royal Scottish Academy, The Scot's Monument, The Tower of the North British Hotel and at the west end, St. James Church (Fig. 18). In addition to this, recently Waverley Market incorporates an abstract sculpture as a marker on Princes Street opposite to St. Andrew Street. These markers thus enhance the sequences created by the previous buildings of Princes Street (Fig. 19).

In fact there is more to say about Princes Street; at a relatively early age it became the more dominant street to that of George Street because of its commercial importance, it has thus surpassed George Street as the principal street of the New Town. Its activity being changed from residential to commercial producing a huge variety of shops and it is seen as the most interesting and pleasant street of Edinburgh.

It will be noticed that it is a one side shopping street facing south, receiving the maximum day light in the area. The other side of the street is dominated by the landscape, it is a very quiet side walk comparing to the opposite one and it has many benches where people can sit and enjoy the activities of the scene. All these qualities make Princes Street, the most enjoyable and interesting of all the streets of the New Town; it is a very memorable street.

The New Town and the Medieval Town face each other across a wide valley, the effect is very dramatic whether

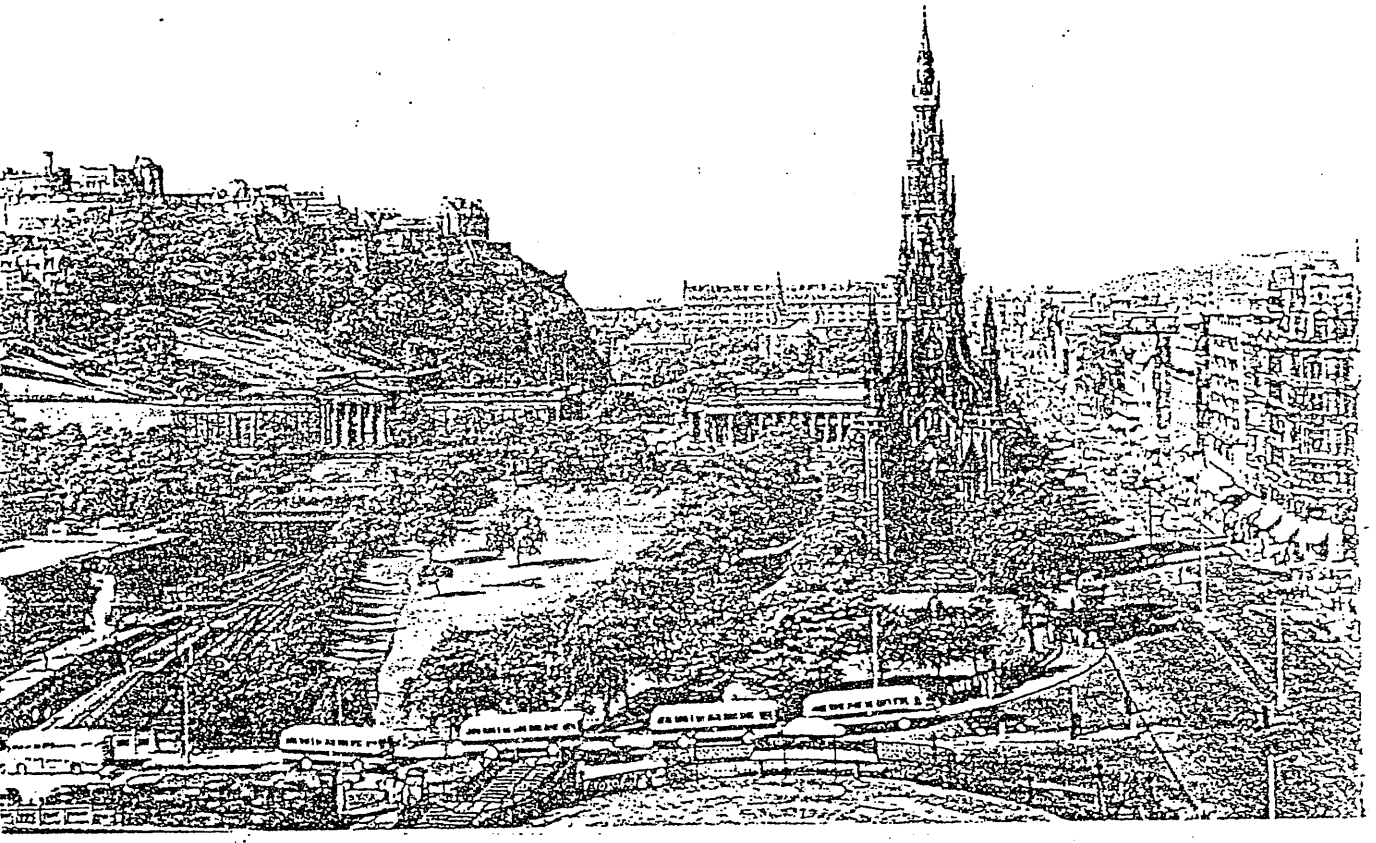


Figure I7. Princess Street looking westward.

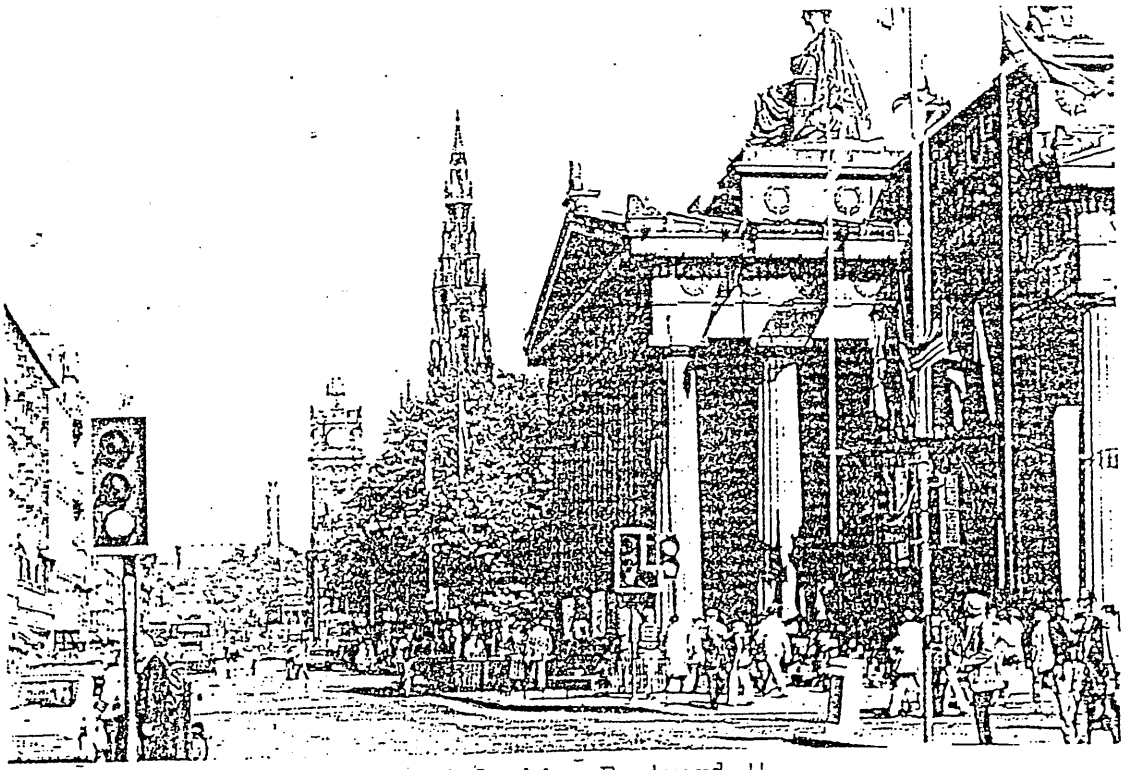


Figure I8. Princess street looking Eastward. H

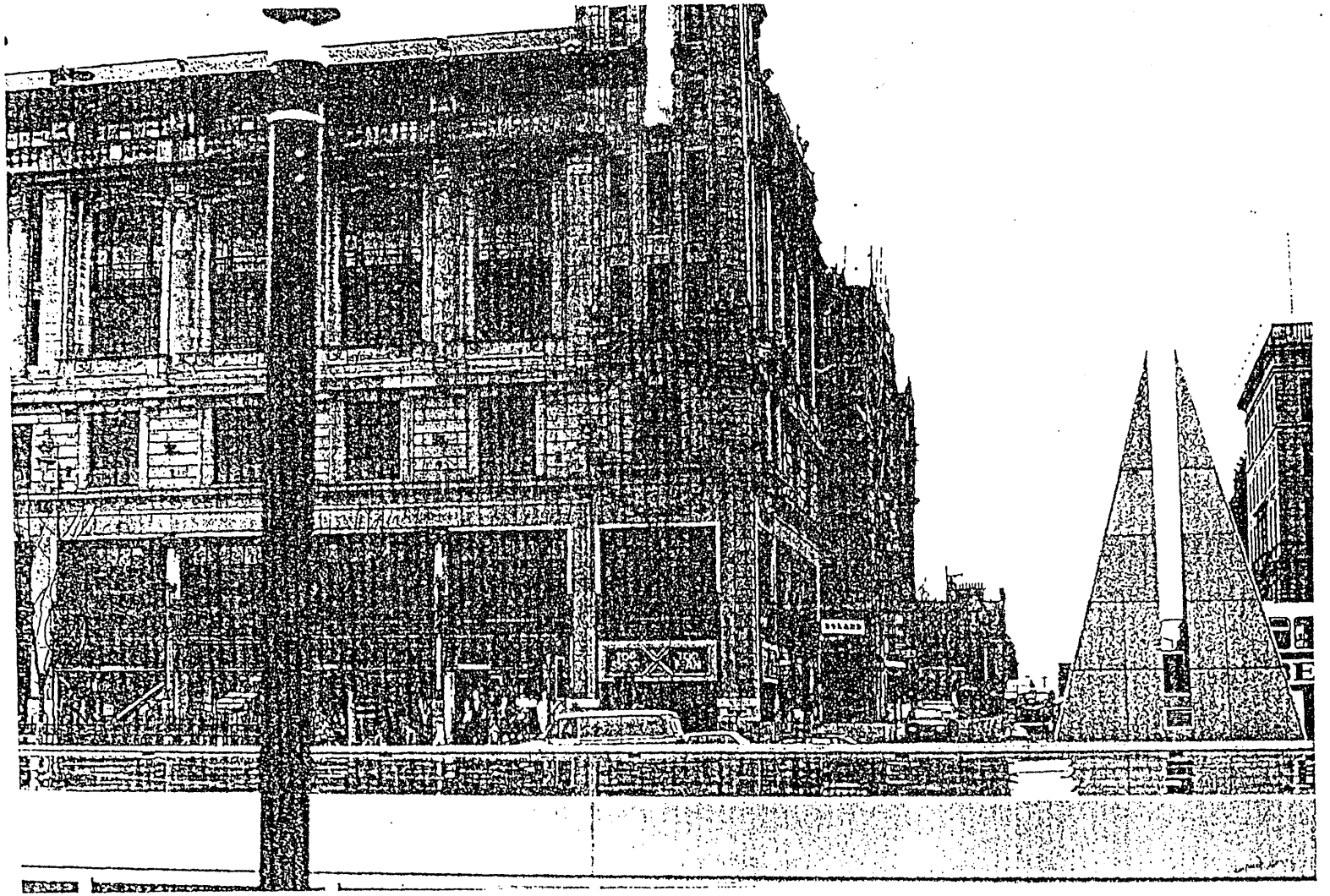


Figure I9. Modern Sculpture rising on the top of Waverley Market.

one is on the Calton Hill or North Bridge, on the Castle ramparts on the broad terrace of Princes Street, the strength and grandeur of the architecture generally combined with the bold natural features, produce an intensely satisfying prospect. (Fig. 20, 21)

In Edinburgh New Town, the hierarchy of the streets layout is very distinct and obvious, therefore the streets can be classified into four categories:

1. Major or main streets such as Princes Street

2. Secondary or crossing streets such as Hanover Street

3. Minor streets such as Hill Street

4. Service lanes such as Rose Street lane

This hierarchy is evident and consistent throughout the layout. (Fig. 22)

In general, the main streets are over thirty metres wide (30m), the crossing streets are just under thirty (30m), the minor streets and the lanes are comparatively narrow and their width is about ten metres (10m). This hierarchy of the streets is efficient in terms of easily accessible and comprehendable. The traffic flow is kept around the blocks on main streets and crossing streets whereas the minor streets and the lanes are kept away from the busy traffic and fulfill a task of servicing within each block of the New Town.

In one case, a minor street namely, Rose Street Lane, has been kept in recent years as a pedestrian precinct with boutiques, pubs and restaurant. It is worth noting that, Rose Street Lane is perhaps the living heart of the area, the only continuous line of life in the New Town after 5.30 pm. in the evening.

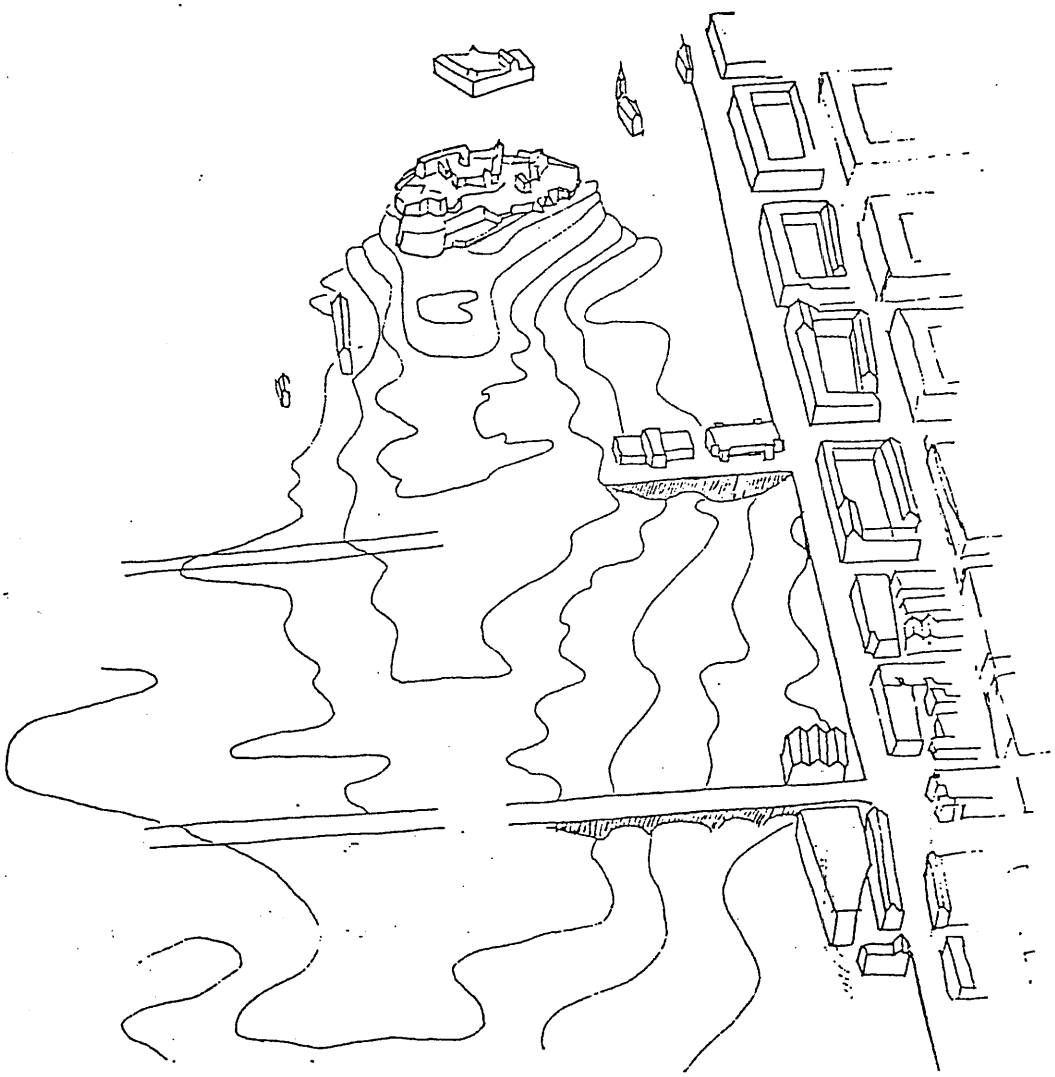


Figure 20. Topgraphical location of the New Town.

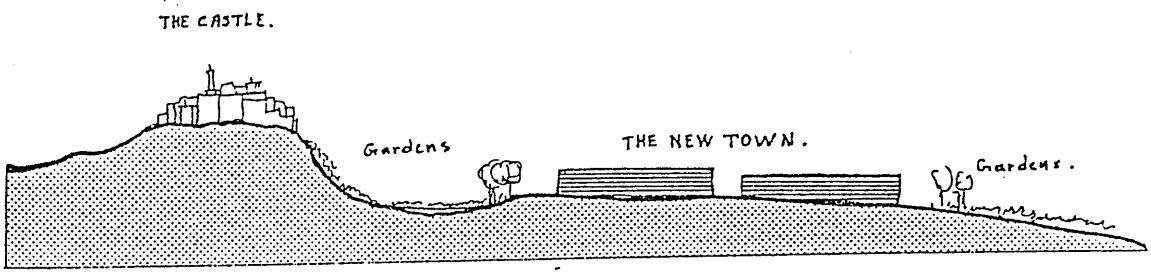


Figure 2I. Cross- Section showing the eminence and exposure of the site on which The New Town settles.

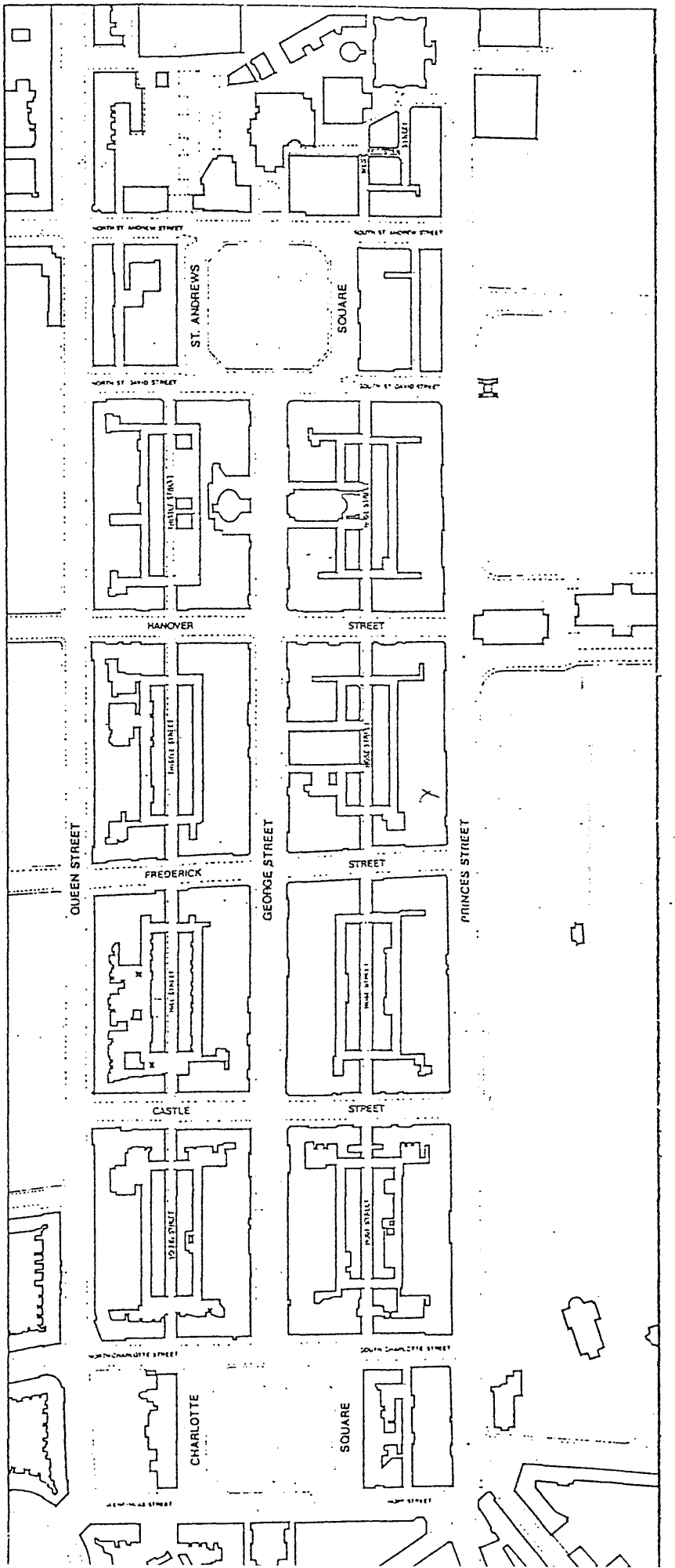


Figure 22. Plan of the New Town. scale. I/5,000.

As I have mentioned before orginally the height of the blocks was uniform, it was one of the rules imposed by James Craig. Today the height of the blocks is no more uniform they vary between three stories and six stories, this densification happened with the change of the residential activity to commercial and business activities. Even so, a balance still exists between the width of the streets and the height of the adjacent buildings. If we take the narrowest street which is here the lane with the maximum building height of six stories, the proportion between width and height of the lane is:

$$W = \frac{1}{2} H.$$

By contrast, a wide street like George Street and taken with a minimum building height of three stories the proportion is relatively bigger;

$$W = 3 H.$$

These proportions were calculated by using a standard storey height of 3.5 metres. The lane and George Street are respectively 10 metres, and 32 metres wide. It appears that in both streets there is a good sense of containment, however, the lane has a high sense of enclosure; George Street is more open because it was planned as long vista with emphasis at the terminating point, ie. public buildings and squares.

Hierarchy and order have made Edinburgh New Town a comprehendable and functionable Urban area. It has worked and has adapted well to changes after two hundred years.

In the following pages, plans, cross-sections and photos of main and secondary streets are illustrating the character, scale and townscape of the New Town. (Fig. 23 to 32)

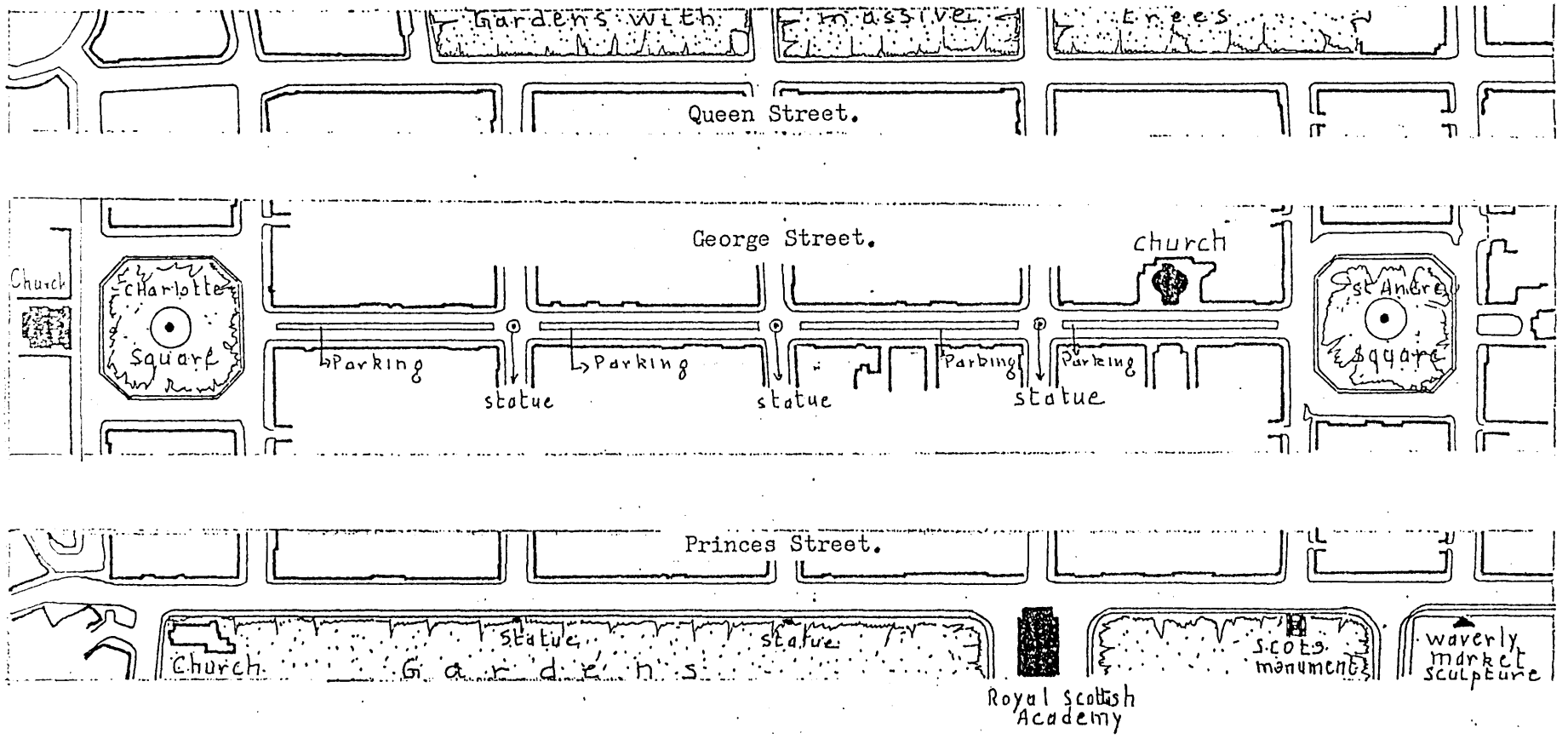
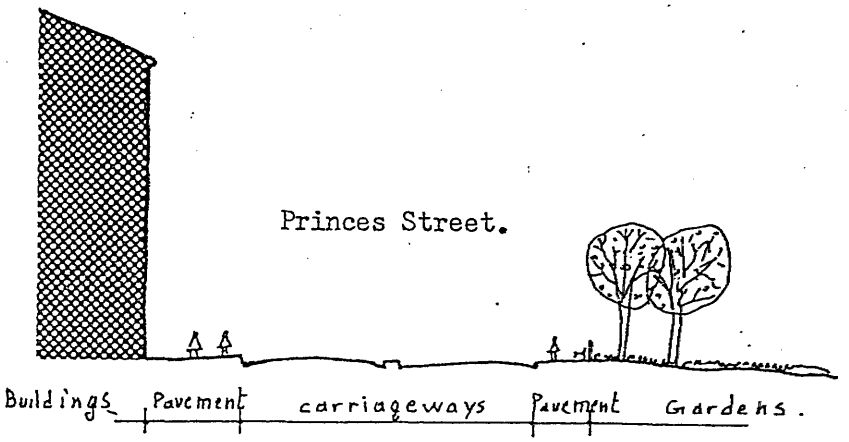
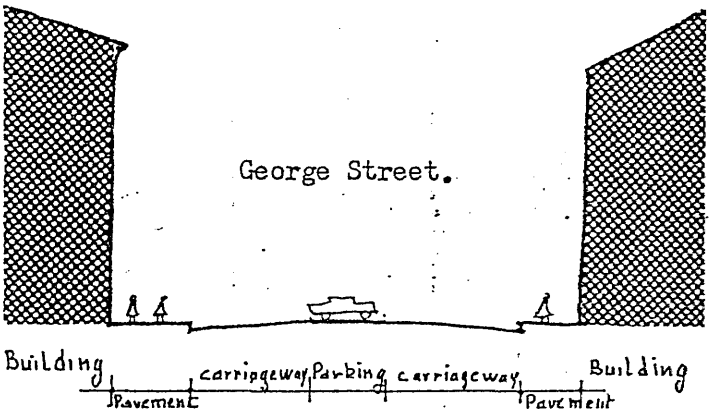


Figure 23. Plans of the main streets.
scale I/5,000..





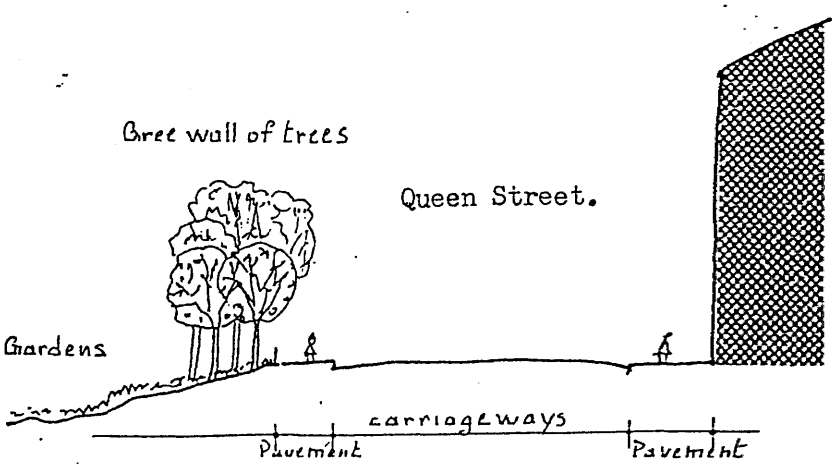


Figure 24. Cross-Sections of the main streets.
scale I/5,00.

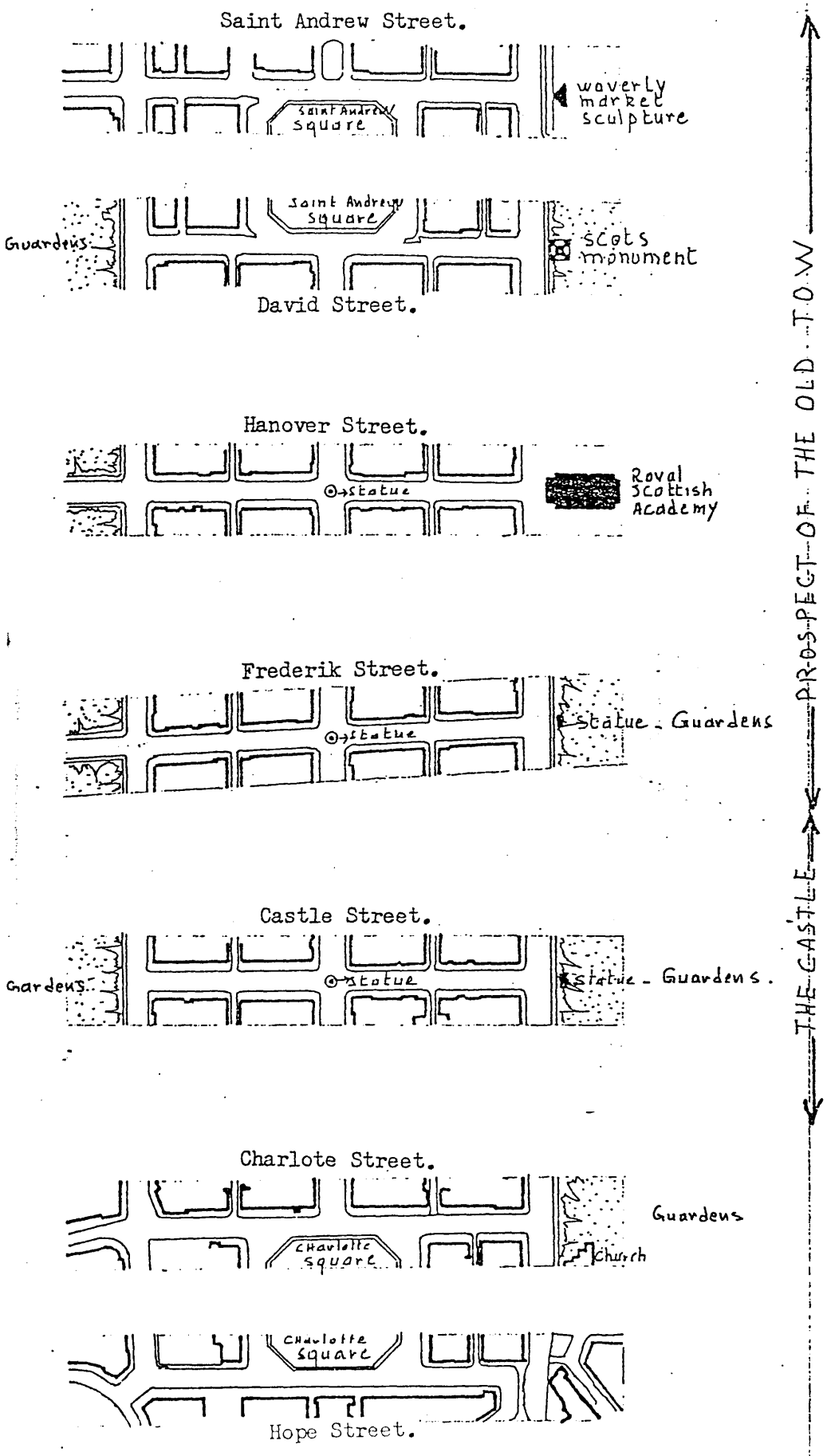


Figure 25. Plans of the crossing streets.
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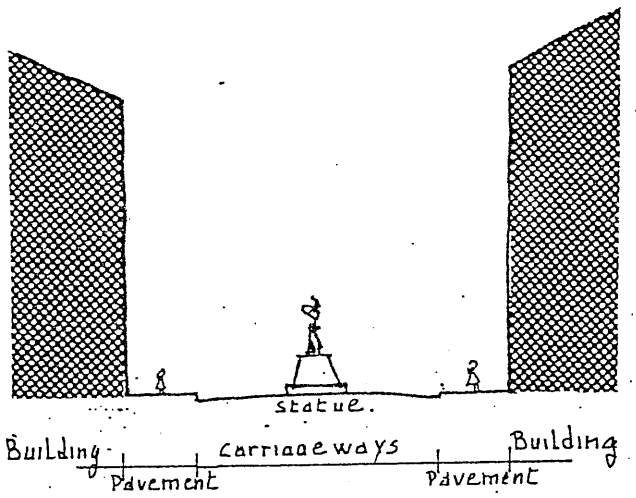


Figure 26. Cross-Section of the crossing street. scale I/5,00.

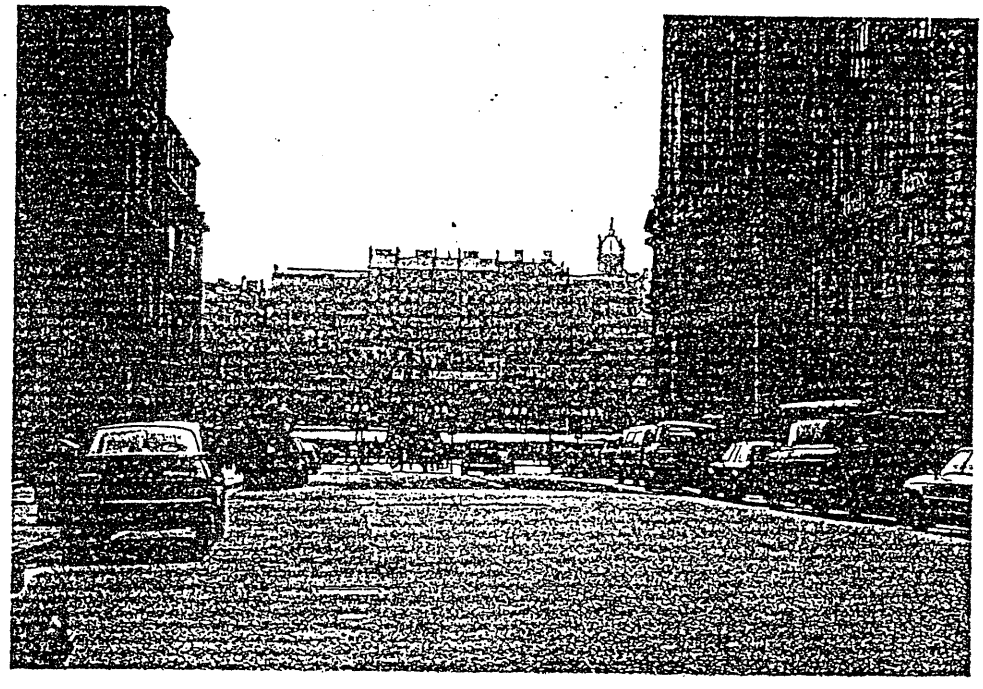


Figure 27. Saint Andrew street looking South: Waverley Market

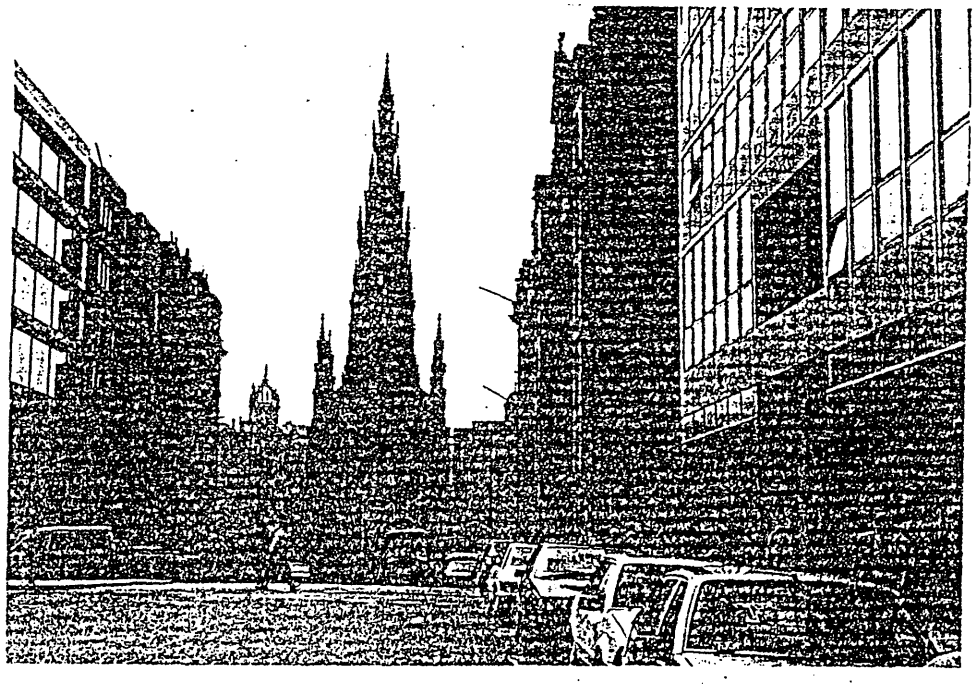


Figure 28. David Street looking South: Scot Monument

Figure 29. Hanover Street looking South: Royal Scotish Academy.

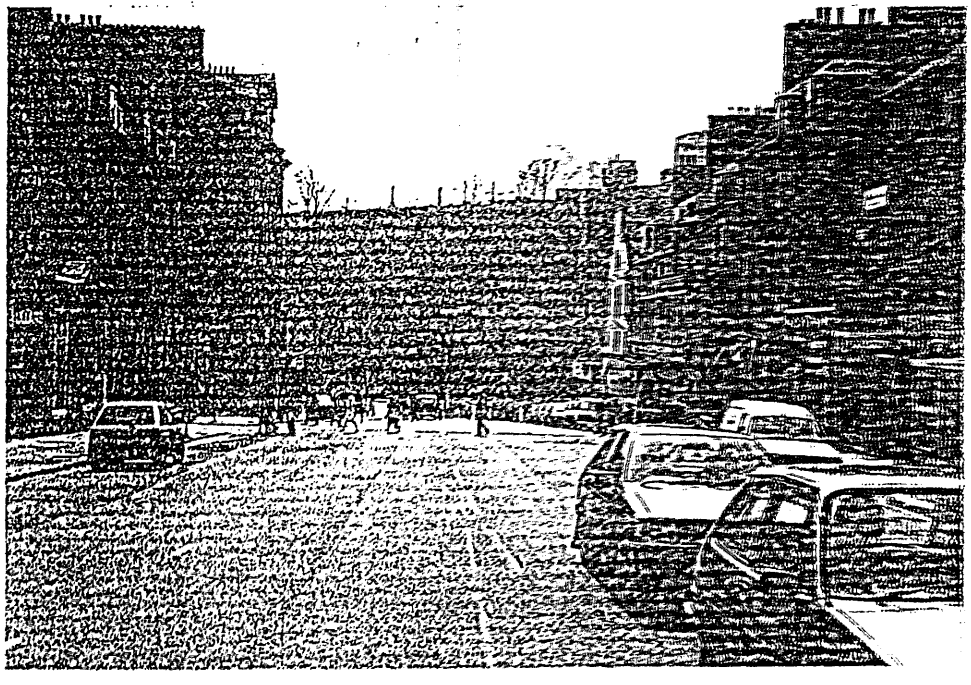


Figure 30. Frederik Street looking South: Sculpture.

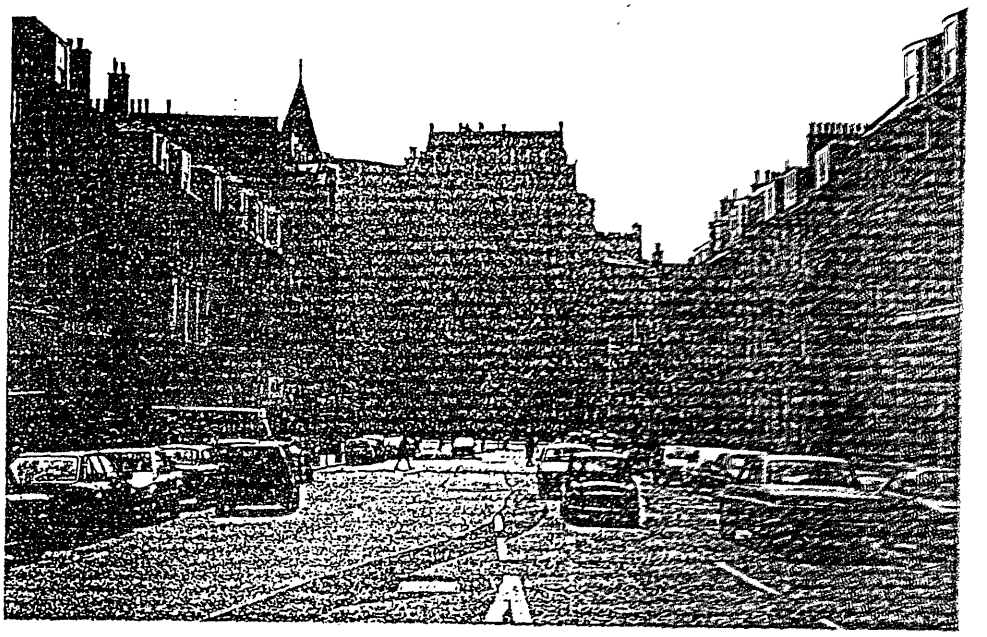


Figure 31. Castle Street looking South: Sculpture.

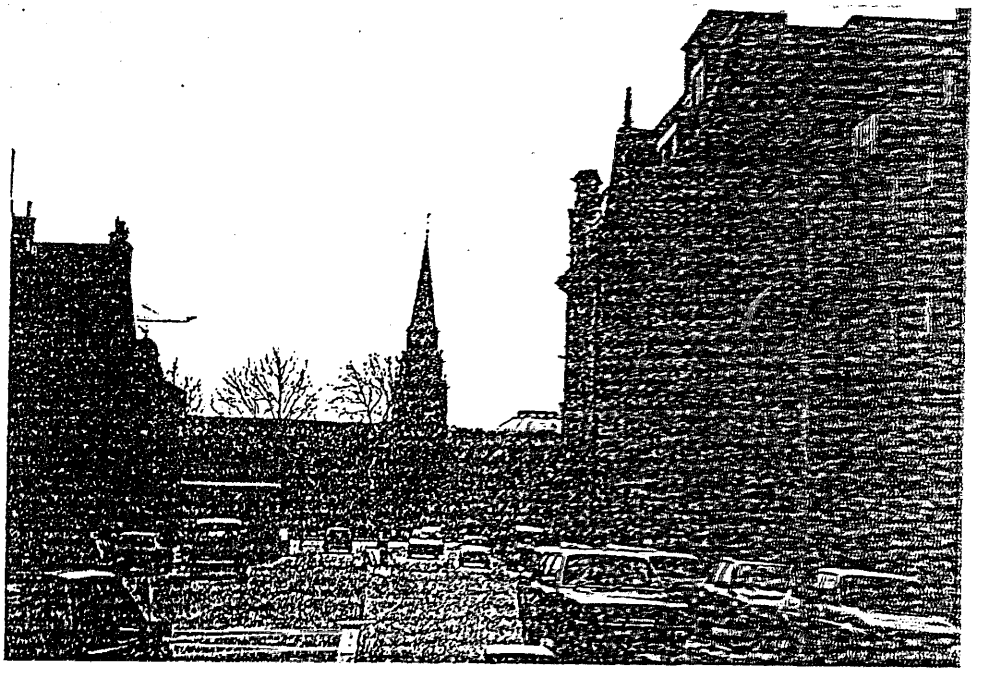


Figure 32. Charlote Street looking South: Church.

2. Non-formal Composition: Glasgow Merchant City

Glasgow Merchant City occupies a flat area of ground and represents the first phase of Glasgow's westward expansion from the old medieval town around High Street and Glasgow Cross.

During medieval period, old Glasgow remained compact and limited in spatial extent. It's physical growth was confined within the medieval site along High Street between the Cathedral and the Cross. The Cathedral was built on the hill, it was a focal point of the town and it's scale was in contrast to the small dwellings nearby.

At the beginning of the 18th century the built-up areas in Glasgow were still contained within the old medieval outline, and the urban form differed little from the early medieval period. (Fig. 33) To a large extent, it was during the 18th century that the city was fully developing her capacities as a major industrial centre. During that period the growth of Glasgow was spectacular, and it's morphological changes were most significant.

In a wide historical context it was in fact during the late Georgian period that the most dramatic transformation occurred, that is, the metamorphosis of the small medieval town into a prosperous industrial city. (2)

By the mid Eighteenth century commercial success was soon reflected in new extensions to the built-up areas and new streets were opened up. This development was due to

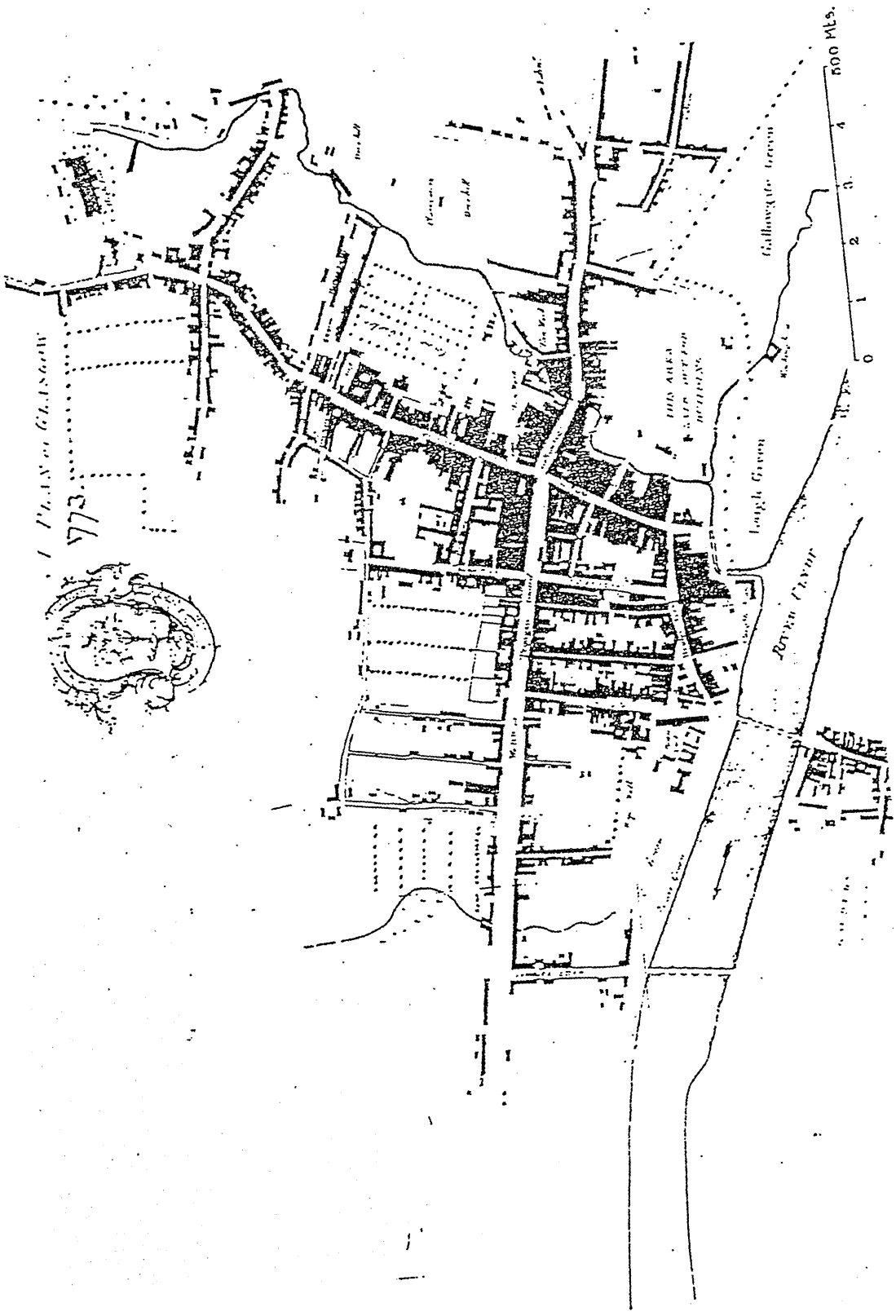


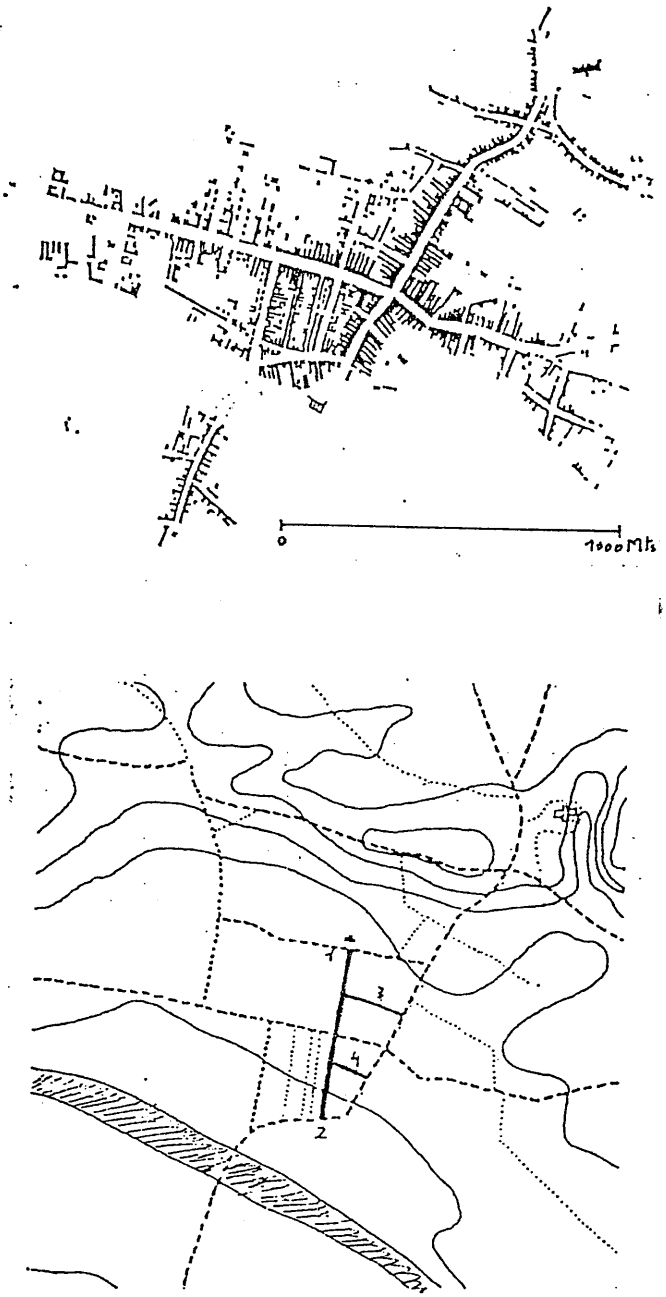
Figure 33. Mac Arthur map. Glasgow 1773.

the great trade between Glasgow and England's American colonies. In 1724, two important streets were opened, namely Candleriggs and King Street, followed by Bell Street and Princes Street, both connected to High Street. (Fig. 34)

These streets were altering for the first time the urban form of the city, because they were designed on new principles never before seen in Glasgow. They were planned as a unit, contrasted with the organic irregularity of the medieval forms. This rectilinear network of streets was beginning to push the city marches westwards, in fact the whole scheme marked a significant turning point in the history of Glasgow's urban form. Besides providing new accommodation for the growing number of wealthy merchants, this scheme being the first modern addition, was intended to beautify the city.

In 1751 the west part, the last remnant of medieval fortification, was demolished. Subsequently, the road beyond this point was improved and renamed Argyll Street, later Argyle Street and the city began to expand westward. (3) It is important to note that all streets opened after that period, were branched northward and southward off Argyle Street.

Axial approaches to important buildings reflected to some degree Baroque planning principles. Although it is not known with certainty where the idea came from, there was in Glasgow at that time an important building which might have been influential in the design of the Ramshorn Kirk of the end of Candleriggs. This was the Shawfield mansion,



Streets opened between 1550 and 1750.
Key: 1 - Candleriggs, 17124. 2 - King Street, 1724.
3 - Bell Street, 1710. 4 - Princess Street, 1724.

Figure 34. Street opened in I750.

a magnificant villa situated in Trongate Street, facing Stockwell Street, which provided an interesting perspective that may have appealed to the city's magistrates. (4)

The Mansion was highly regarded and very influential in the development of Glasgow's domestic architecture. During the second half of the eighteenth century, whole streets like, Dunlop Street, Virginia Street and Miller Street came to be based upon the Shawfield Mansion's style. (5) (Fig. 35)

These new villas (Mansions) became important components in the design of Central Glasgow and necessary symbols of the wealthy merchants of the tobacco trade. They were fundamental constituents of Glasgow's Townscape. Very little remains nowadays of the magnificent mansions created in Glasgow during the age of tobacco trade; there are only the Cunninghame Mansion unrecognisably transformed into the Stirling Library and a comparatively modest villa situated in Miller Street.

By the end of the 18th century as buildings went ahead in and around George Square, the final portion of what is known today as the "Merchant City", was completed.

Buchanan Street was one of the last streets opened during the age of tobacco trade, it was intended to have residential character and to be kept private but soon it turned to be the most fashionable shopping street in Scotland. (6) Its success as a trading city and subsequently as an industrial city brought about, new standards of living emerged, and over-crowding in the area reached

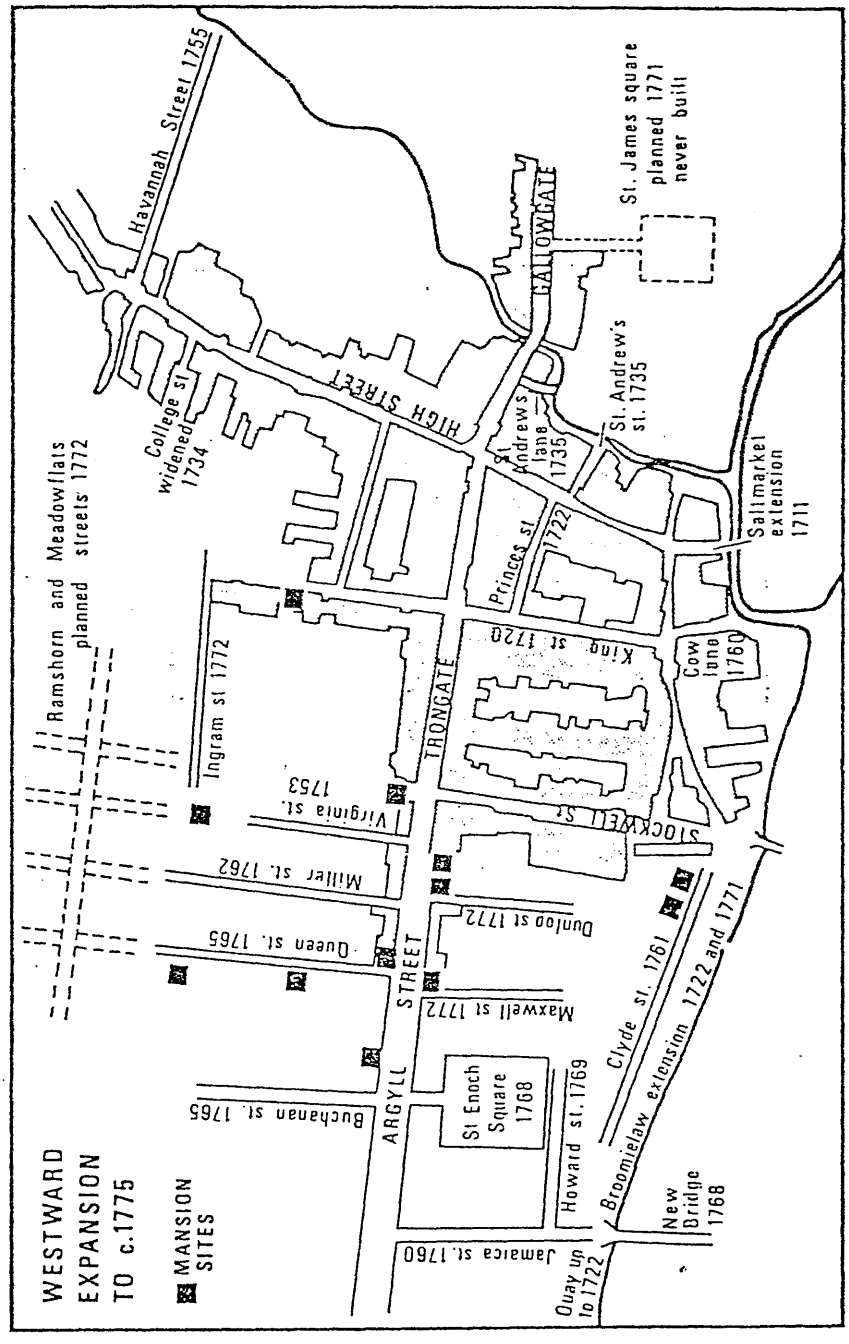


Figure 35. Map showing the Mansion's sites. 1775.

its maximum. To accommodate this rapid growth expansion was required towards the west of the early settlement.

In 1782, James Barry proposed the first New Town; the layout was logically the extension of the existing street pattern such as Queen Street and Ingram Street. (Fig. 36) The new Streets of his proposal have formed with the existing streets - which he extended as well - a new rectangular blocks.

This new extension was based on a grid, for the first time it appeared in Glasgow (Fig. 37). It was the most ambitious and the largest extension ever planned in the city. The use of the grid layout was a gesture towards social democracy in the subdivision of land and ownership. In addition to its efficiency of producing an equality, it has also the beauty of geometry and regularity in the art of urban design.

Street blocks were designed as whole units. Here and there the grid was closed on "points de vue". The scale was three to four stories, there were warehouses of course, but the dominant use, to begin with at least was residential. Comparing to Edinburgh New Town, here the grid is not rigid or finite but has enabled an orderly expansion to continue all over the city centre of Glasgow in the following years.

The character of this extension of the Merchant City was exemplified by George Square which is the finest element of Barry's design. (Fig. 38)

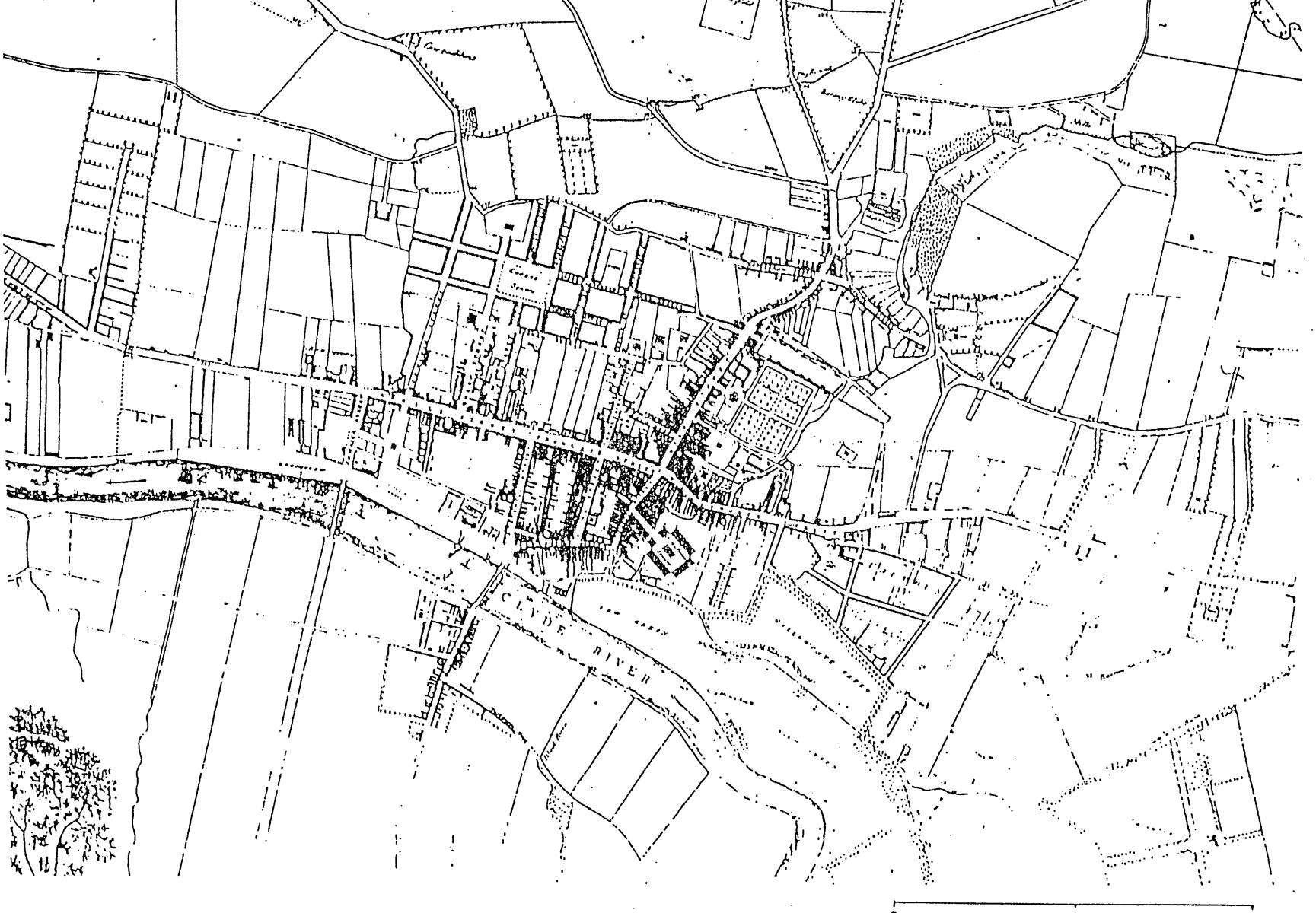


Figure 36. Barry's Map 1782.

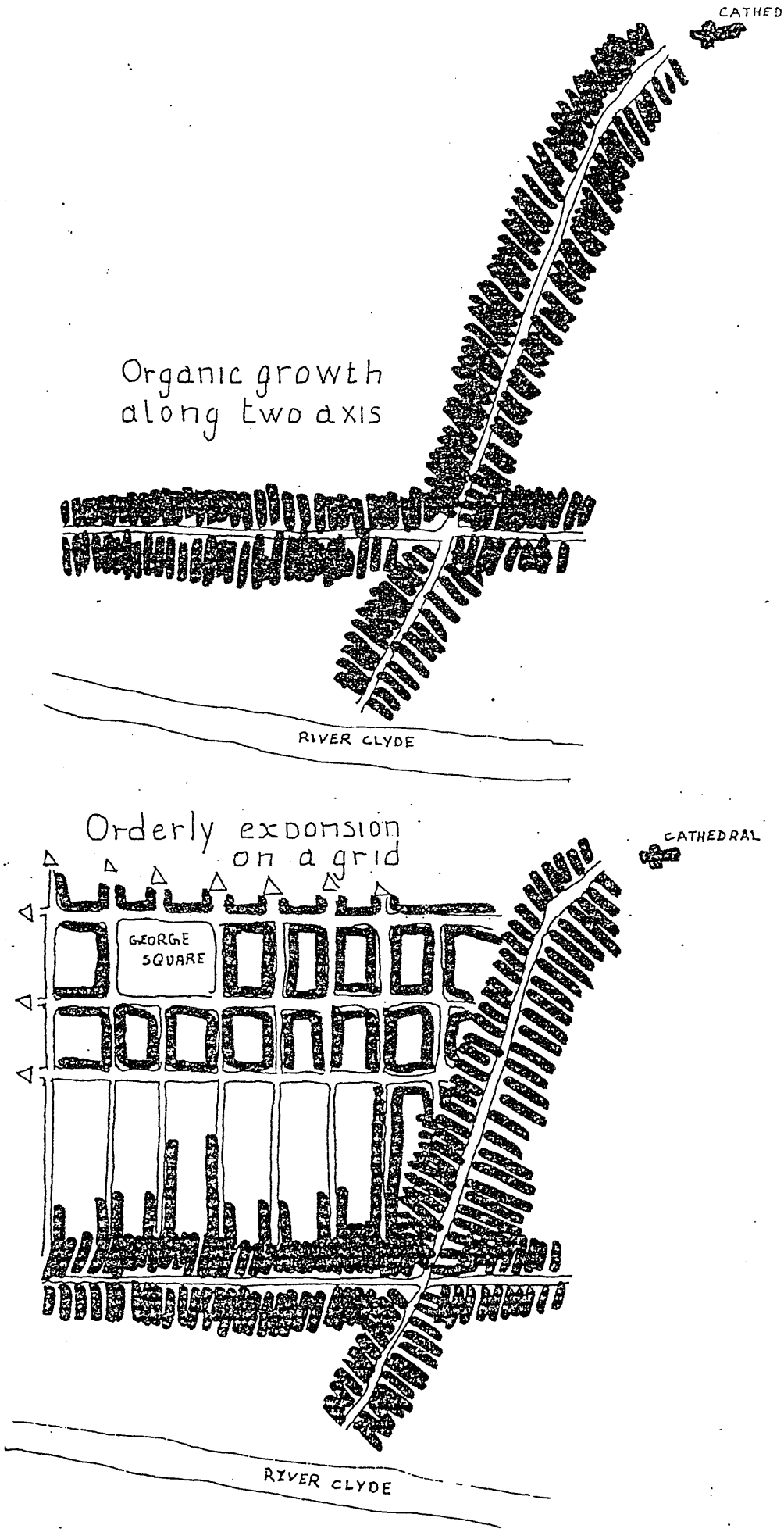


Figure 37. Diagram of Glasgow Merchant City.
a. Medieval urban form.
b. New extension.

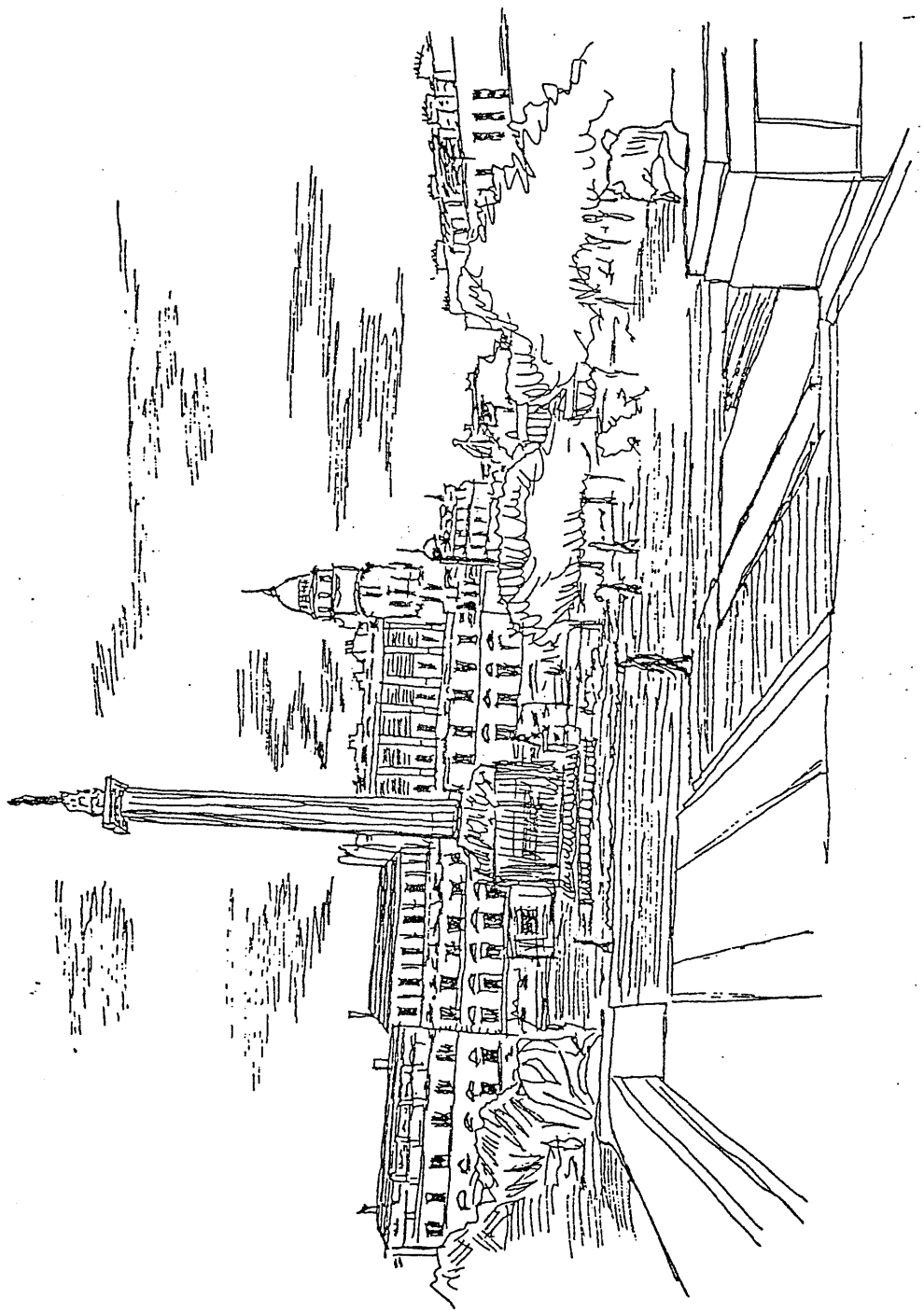


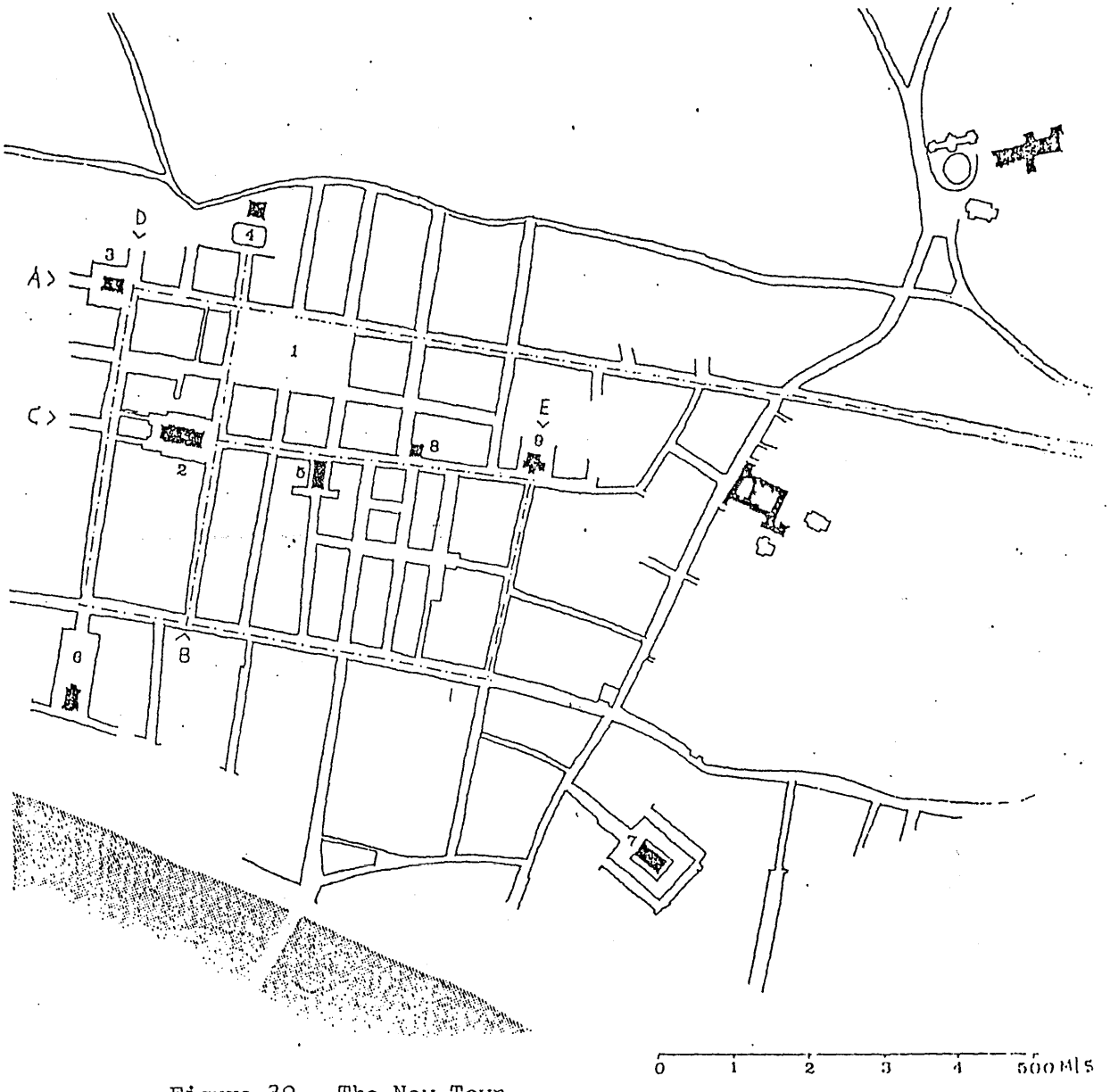
Figure 38. George Square 1986.

It was for the first time that the city had a major public square intended for public meeting and arranged around important buildings. It has added an important element in the urban form of Glasgow and indeed the administrative heart of the Merchant City has moved from the Cross to George Square. Advantage has been taken of this street pattern to provide numerous terminal vistas whereby major buildings were used to close off the ends of streets, like Hutcheson's Hospital and Stirling Library. (Fig. 39)

The public buildings are the main characteristic of Glasgow grid, they create a series of focal points throughout the area. George Street and Ingram Street both became major streets terminated respectively by Saint George Church and Royal Exchange, the former Cunninghame Mansion. In keeping with the other principal streets of central Glasgow, a distinctive building was erected at the south end of Buchanan Street closing the vista; this was Saint Enoch's Church, designed by J. Jaffrey in 1780 in the centre of a fashionable residential square. (7)

The picture of the Merchant City would not be complete without mentioning the Trongate and Argyle Street which are strong attractive urban scenes of central Glasgow with the Tron Church and the Tolbooth being the main element of their street-scape. (Fig. 40)

As it is now, the Merchant City represents about one quarter (¼) of the city centre of Glasgow which is bounded by the River Clyde and the motorway. (Fig. 41) It is a constricted core, in which the Merchant City - oldest



Key: I- George square. 2- Royal Exchange,former Cunninghanme Mansion. 3- St. George Church. 4. Crawford Mansion. 5- Royal bank, former Virginia Mansion. 6- St. Enoch s square. 7- St. Andrew s square. 8- Hutchison s hospital. 9- St. St. David Church. A - George street. B - Queen street. C - Ingram street. D - Buchanan street. E - Candleriggs.

Figure 39. The New Town.

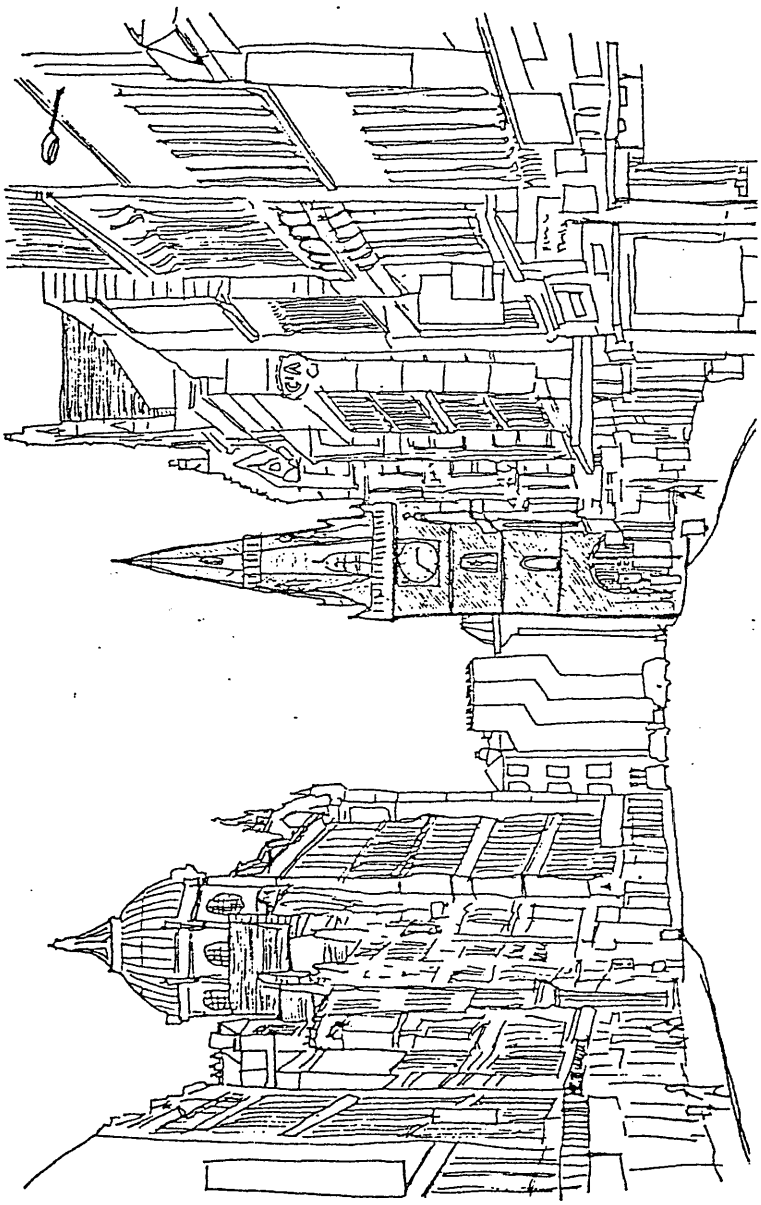


Figure 40. Trongate looking East. 1986.

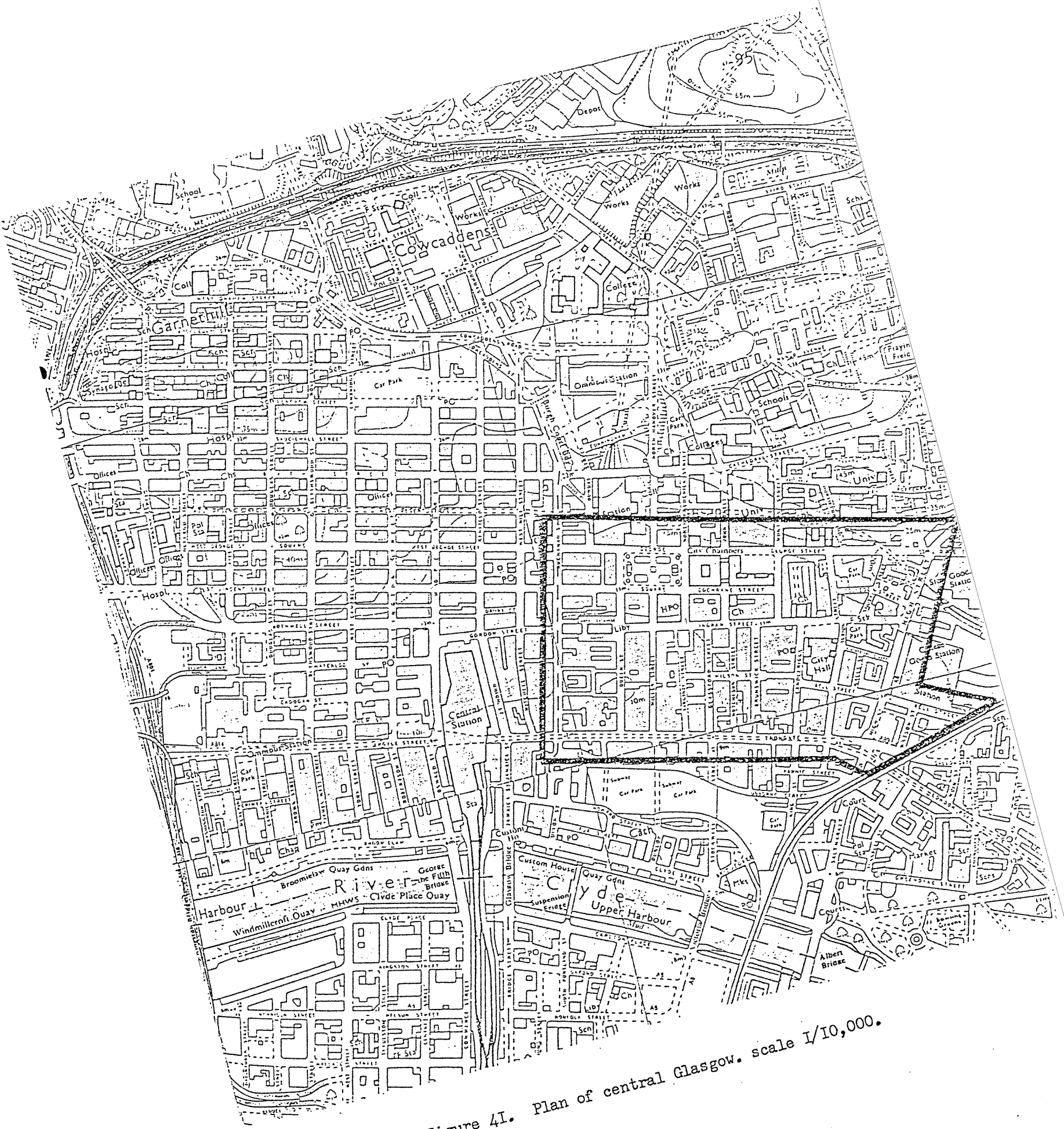


Figure 4I. Plan of central Glasgow. scale I/I0,000.

identifyable part - consists of a small compact and dense area of largely four to five storey buildings.

As the Merchant City expanded northward, a more regular pattern emerged, like an informal grid, following the same urban form laid out in the eighteenth century. This area is bounded by Argyle Street and Trongate to the south, George Street to the North, Buchanan Street and High Street respectively to the West and East.

Today, the urban form of the Merchant City is still visible and the features previously referred to, eg. terminations, vistas and the unlimited movement of the grid is still apparent. (Fig. 42)

On one hand James Barry seemed to reflect Edinburgh New Town by using the grid layout and on the other hand, it would appear that his grid has no strong structural element except that he organised George Square around almost regular blocks and took opportunities where public buildings stand apart to enhance and provide vistas. He knitted his plan on to the existing layout of the Merchant City, enhancing it with somewhat greater geometric order at the same time as exploiting such features as terminations.

The spatial organisation of the Merchant City is a non-limited expansion, non finite; it does lack strong generator elements. There are no evident main axis to which the composition does hold. In addition to that, the size of the building block which form the grid is

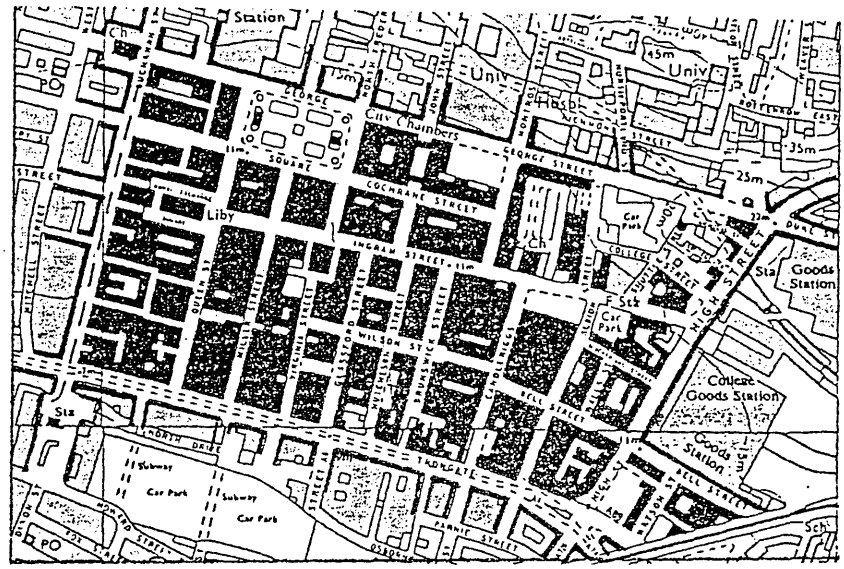


Figure 42. Built form of the Merchant City. scale I/I0,000.

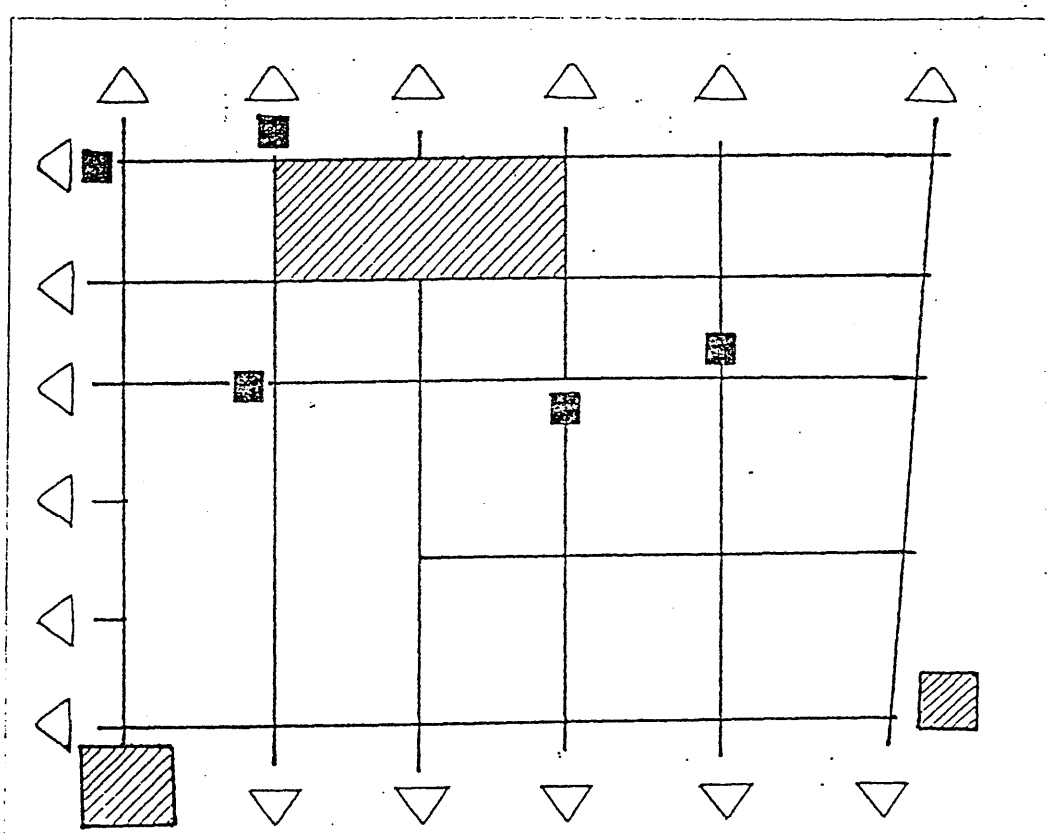


Figure 43. Diagram of the Merchnt City grid.

irregular: thus, the composition of this urban layout is non-formal with therefore no particular hierarchy.

At a glance, the open spaces resulting from this irregular grid are, here and there, spread on the ground, they do not subscribe to a particular structure in which main axis could link those open spaces and therefore make them an important element of the structure. For instance, George Square, which is an unique civic space in Central Glasgow, lacks a bit of cohesion, because it does not subscribe to an overall structured pattern. Its location could be changed to any other building block within the grid and still do not affect the spatial organisation of this area.

In simple terms a diagram of this urban composition will be reduced to one major public square (city scale), surrounded by irregular blocks forming a grided street pattern interrupted from time to time by public buildings or open spaces. (Fig. 43)

All the streets forming the grid seem to have similar character, except where public buildings stand to close off the view, the street becomes exception and therefore distinguished from the others. Those public buildings are very significant in determining the character of Glasgow Merchant City Townscape, but they do not define a structured framework within the grid. In fact the parts of this area do not hold together as a whole, because each street has been designed as an individual unit. (Fig. 44, 45, 46, 47, 48) It represents a kind of incremental development with some set of order emerging at each stage of growth.

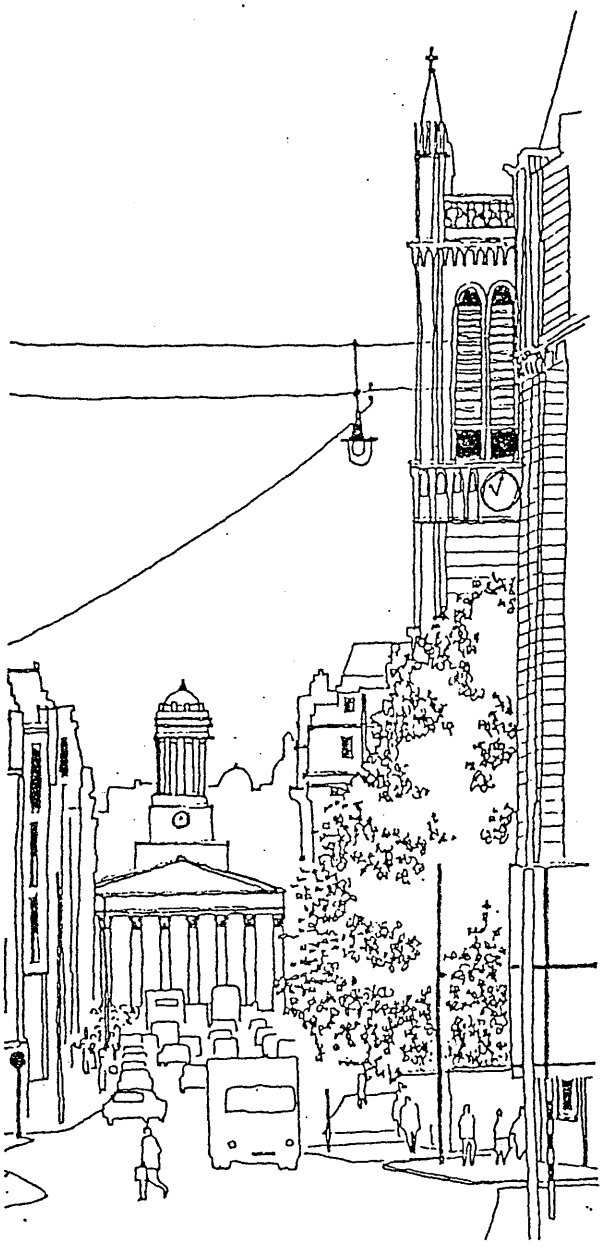


Figure 44. Ingram Street.

Figure 45. George Street.

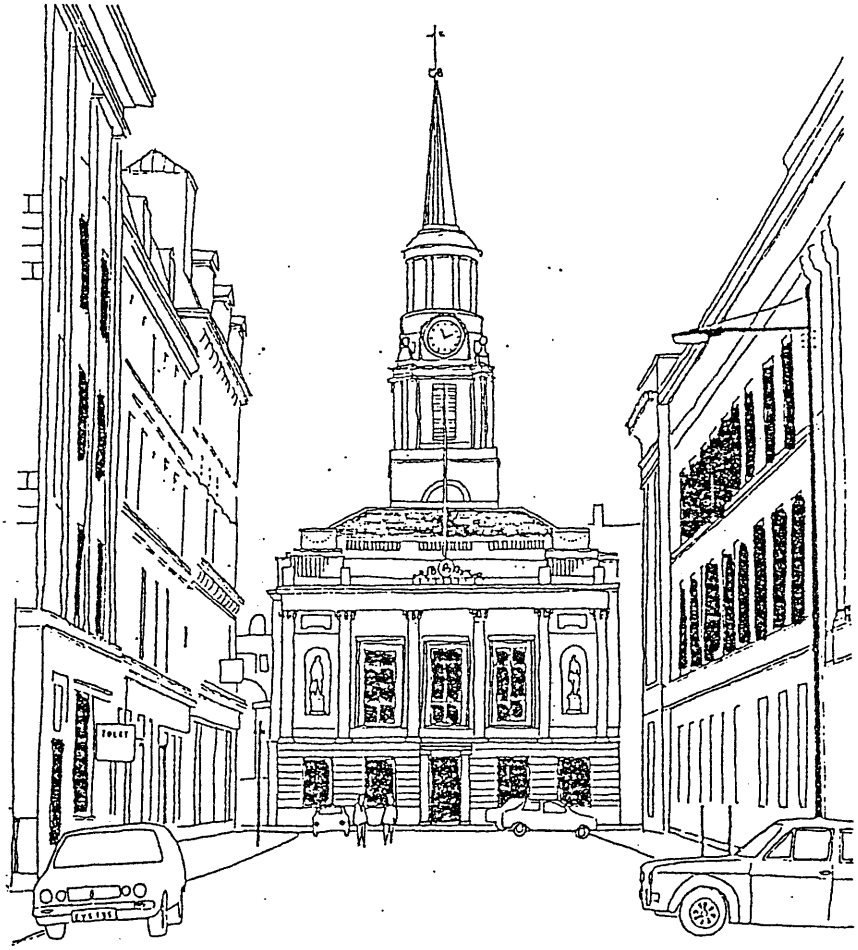


Figure 46. Hutcheson Street.

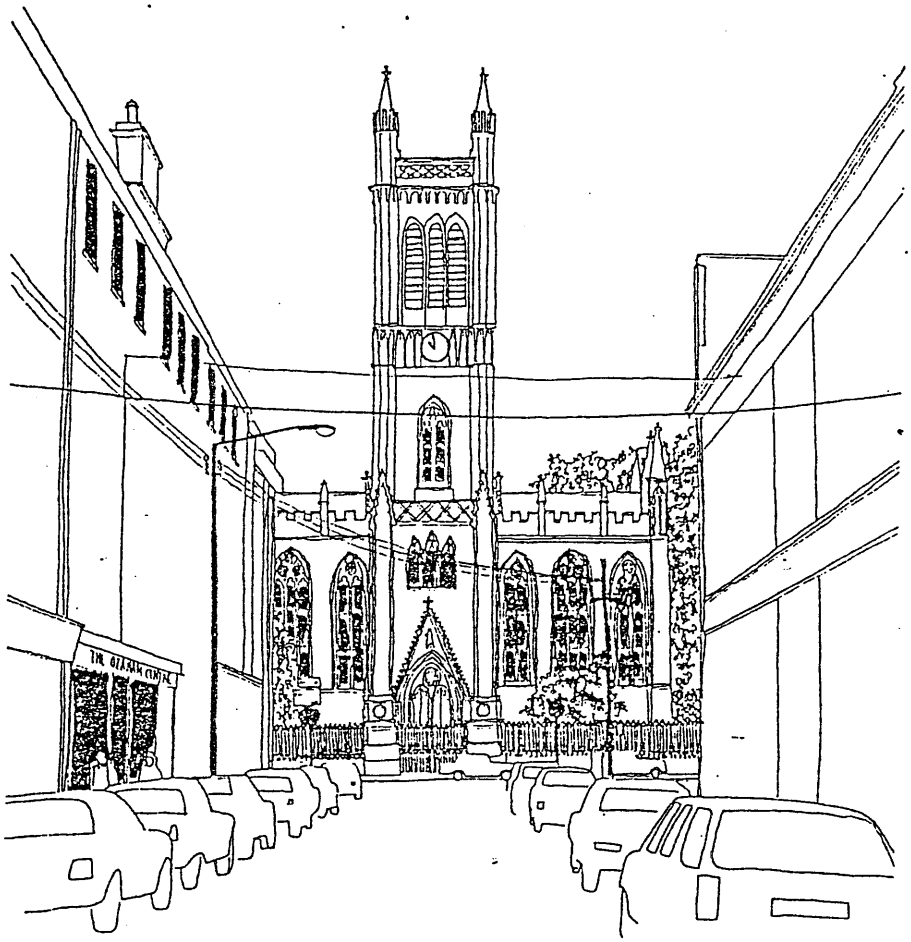


Figure 47. Candleriggs Street.

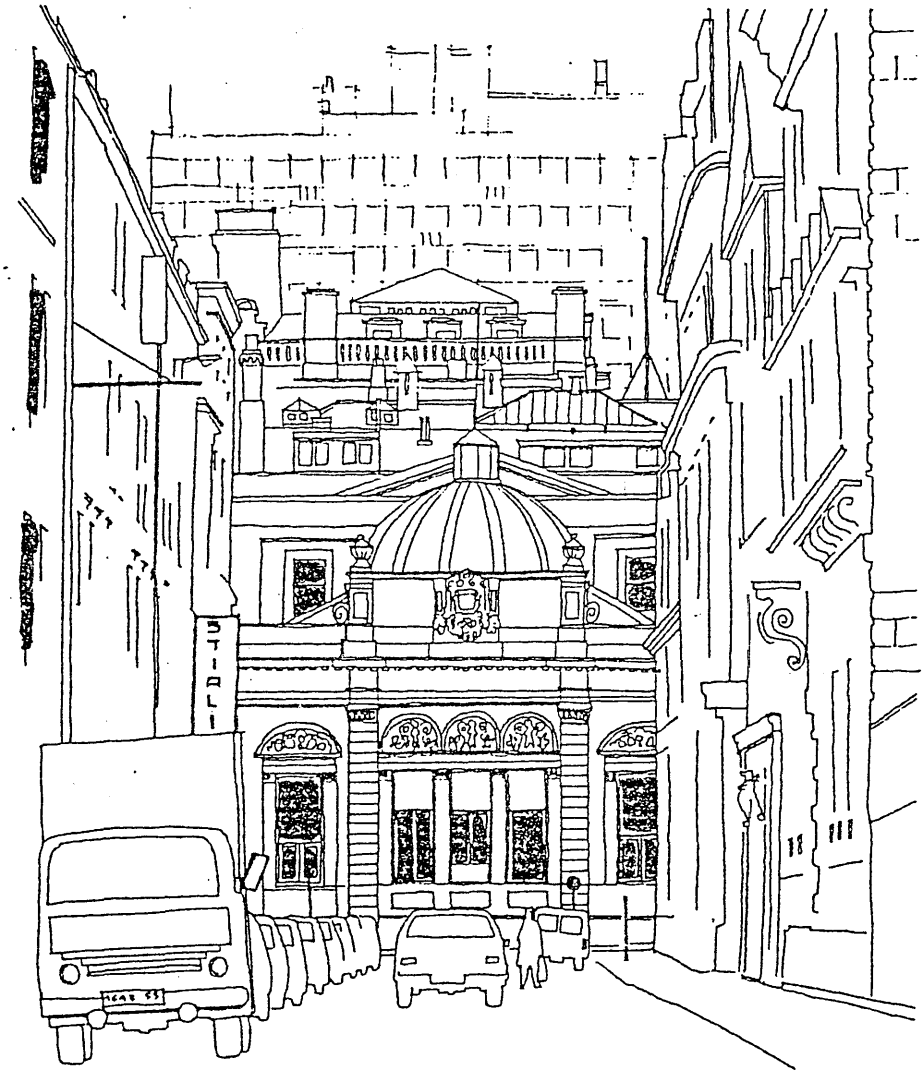


Figure 48. Virginia Street.

Nevertheless, this mainly eighteenth century street layout comprises a rectangular grid staggered to keep individual street layout fairly short resulting in an intimacy of scale in the external spaces. Of all the streets of late eighteenth century, Glasgow's Wilson Street was the most calculated; deliberately narrowed at each end, it houses were symmetrically designed to flank these constructions and to balance the street scene by reflected forms. (8)

The slight irregularities in the grid pattern of the Merchant City results in variations of the typical block. The difference can be summarised as follows: (Fig. 49)

1. Courtyard block or perforated block

2. Single building block

3. Composed block or internal serviced block

4. Extra large block

The courtyard block is the most frequent in the area. It is a result of many building plots built in a dense and compact way; because of the accessibility to different parts of the block, courtyards were created to assume a link between public and private space, these perforations are usually shared by two to four buildings. As a result, every building in this type of block has one facade on the street.

The single building block is occupying one single plot with single use designed with classical architectural principals, the facade which flanks the street is given a

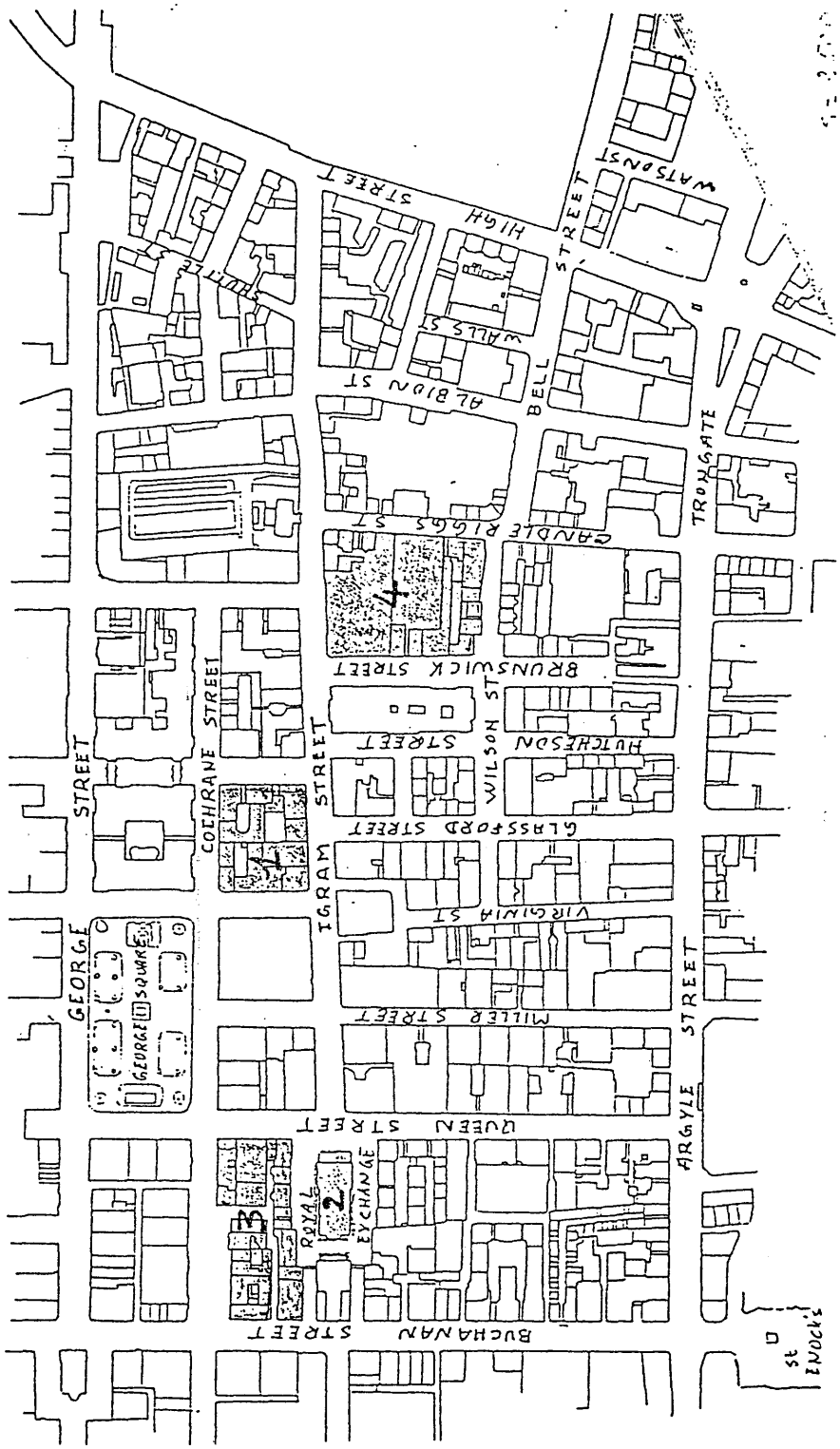


Figure 49. Different types of block.

priority as a classical palace, with symmetrical openings, columns and ornamentations. These blocks were designed to be seen from a distance and that is why we find them located on the exis of the street. They are magnificant visual termination, the most important of them is the Stirling Library and the finest element reflecting this high quality of architecture is testimony of the City Chambers. (Fig. 50)

The composed block is a result of accessibility from street to private space within the block. This access is materialized by service lanes turning through the block. The lanes divide the block into different parts, they are very narrow and assume a functional task within the block.

The extra large block is resulting from an infill of numerous variable plots and with no gaps. It is totally built and therefore it is very dense block. This is the most complex block in term of built form and height. Each building within this block occupies a particular plot and has one street-frontage. These two characteristics have given an irregular width resulting from the building line which bounds the street.

These four types of block have given a dense and compact character to the Merchant City. (Fig. 51)

In the Merchant City, the original development of four to five storey commercial buildings had largely been replaced by a wide variety of building types in multiplicity of materials. Many are exceptionally handsome warehouses which, however, typically make no concessions

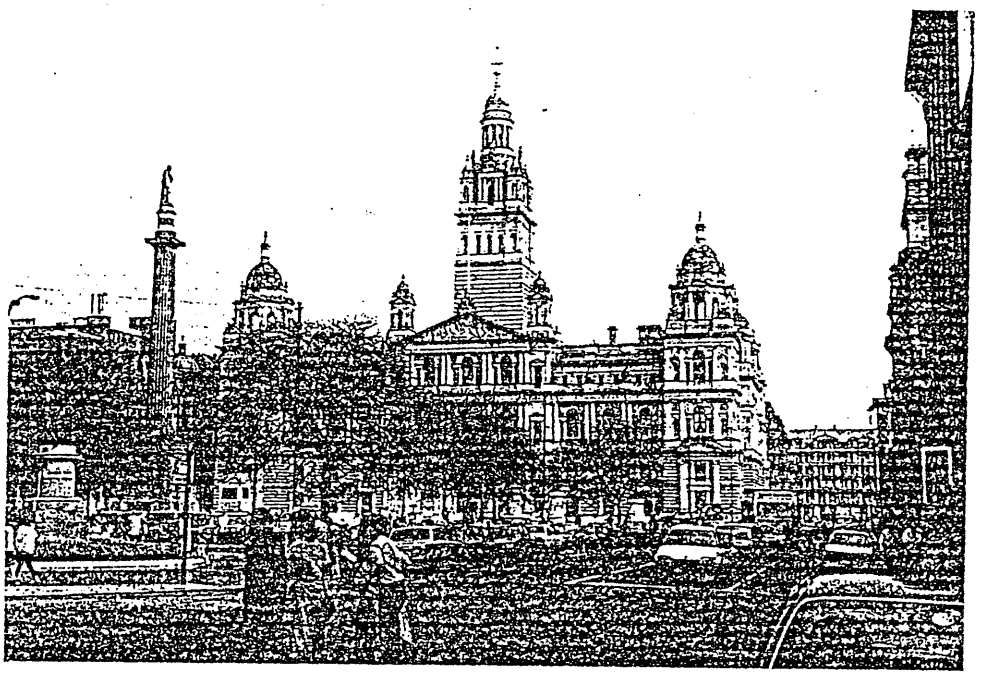


Figure 50. George Square. City Chambre.

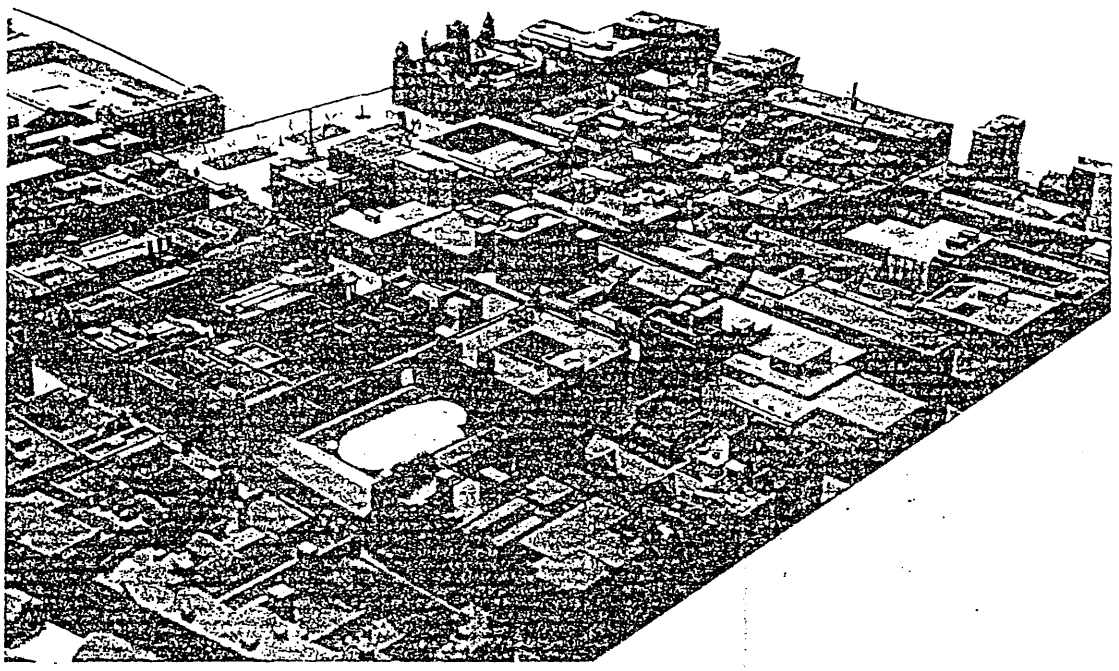


Figure 5I. View of model showing the variety of Glasgow.

to their neighbours in height, colour, material and style. This results in a very rich texture of shapes and colours unified by the continuity of frontages rising sheer from a consistent building line at the heel of the pavement.

The variations in material in broken roof-lines, in irregular building line and form, is within an established rhythm of unity. Fig. 52) It is a variety, as a basic unity, variety within similarity, within a broad unity of character. The unity here is established and maintained through an overall rhythm operating within a broadly common form.

The physical character and appearance of this area is a result of continuous built form of different blocks at different periods. These blocks are generating a vital urban component of the townscape of this area; this important component is the street. It is down the street where the townscape is revealed, the streets made this identity area and as Professor MacMillan said "It is a city of streets" (9) The pattern is clearly of street architecture, all open space is defined and enclosed by buildings and is tightly organised on the basis of use. These streets which are determining the character of the Merchant City are providing a sense of enclosure by being bound on either side by the blocks, and indeed, they are enhanced by focal points, by important public buildings.

One important element of the street is the corner where the building is visually given a little emphasis. For example,

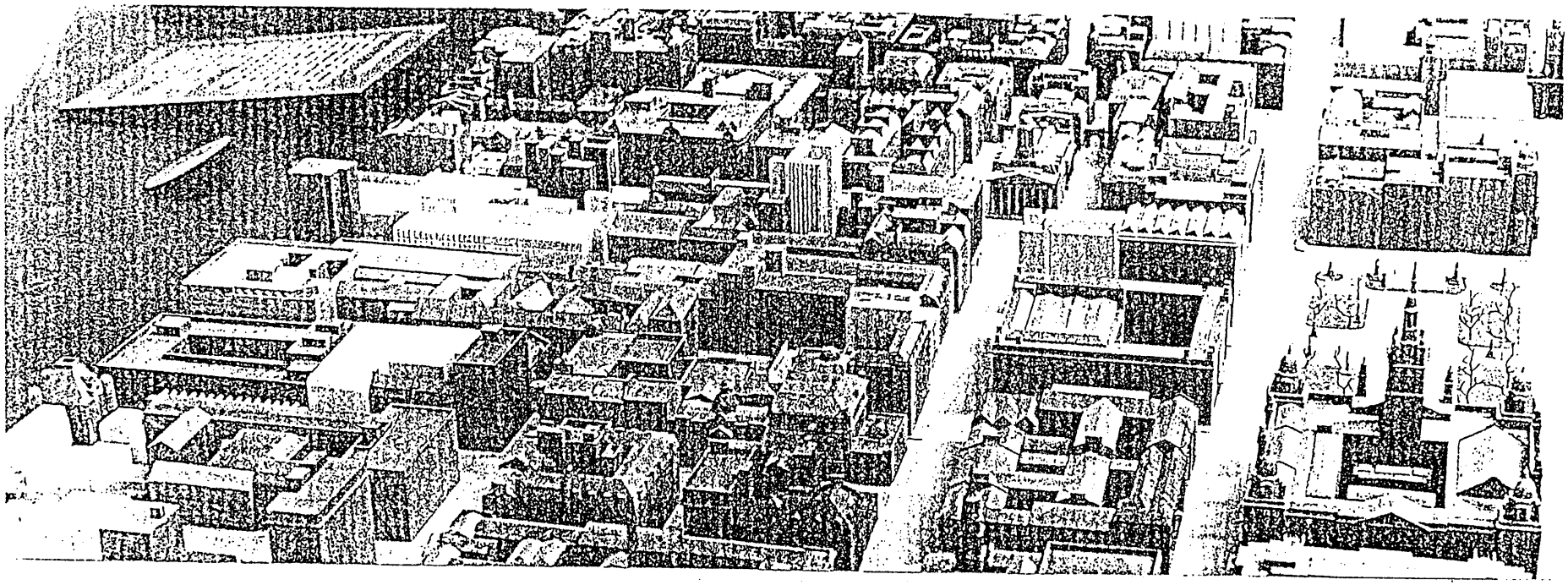


Figure 52. View of model showing the variety of Glasgow Merchant City character.

at major junctions, the corners are highly distinguished in their form and decorations. This way of bending the block corner was exploited by using facetted bays, raised pediments, chimney's turnets and domes. It is not expressed only on the plan form but in three dimentional way. The corners then are given a special significance as an architectural expression and in some way, their visual exposure is remarkable in creating a sense of orientation throughout main routes. (Fig. 53). This characteristic of the block at major junctions accentuates a sense of place on the street. (Fig. 54)

In Glasgow Merchant City, the result of the diversity of block and the irregular grid, both have produced a non-evident hierarchical street pattern. This abscence of hierarchy is evident throughout the layout, however, a distinction between them still can be possible regarding to their width and function.

In this area Classification can be made as follows:

1. Main streets

    a. longitudinal streets
    b. crossing streets

2. Service lanes

In general, the main streets have similar physical character derived from the blocks, however, the longitudinal streets differ from the crossing streets, their width is between 18m and 24m and are running East West. The crossing streets width is between 12m and 20m and are relatively shorter, they run South North. The service lanes are situated within com-

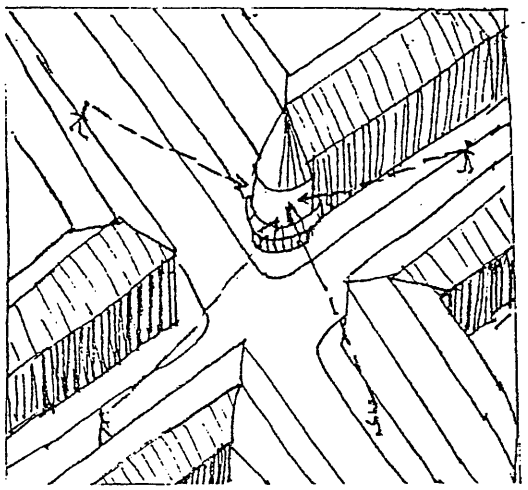


Figure 53. Corner as an element of orientation.

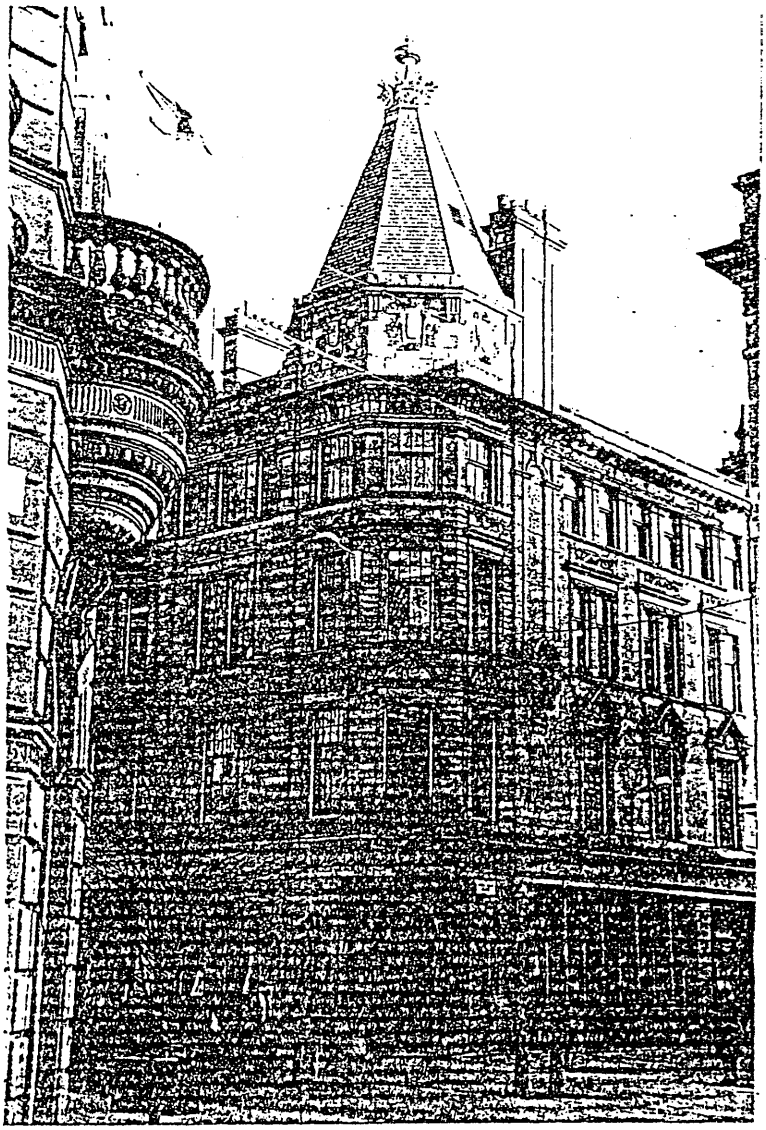


Figure 54. Type of corners in the Merchant City.

posed blocks. They divide each block into several different parts and fulfill a task of servicing, their width is between 3m and 8m. This organisation of the street pattern is in some way functional but it is not sufficient enough in terms of traffic and movement because traffic problems are almost at the junctions.

In one particular crossing street, namely Buchanan Street, it has been kept in recent years as a pedestrian precinct regarding to its commercial success. (Fig. 55) Another pedestrian precinct was atributed to a short segment of Argyle Street, where shops and super-stores took place. (Fig. 56) In both pedestrian streets an attempt of urban furniture was added like for instance, plants and benches; however, in both streets, wideness is dominant (Argyle Street is about 24m and Buchanan Street is 21m); therefore the user when walking along those streets cannot at a glance see both sides of the street where shop windows are exposed. Because of their commercial activity and their crowd, both streets are more distinguished than the others.

As mentioned earlier, the height of the buildings forming the block was almost uniform. Today, those buildings vary considerably in height, but with the majority being four to seven storeys high. This densification happened because of the dense and compact commercial development. As a consequence of this densification, the proportion between height and width of the streets has been disrupted into disorder. In a same street like for instance Argyle Street, the height of the adjacent buildings along the street is changing considerable and therefore disrupting the rhythm of the street. Those tall buildings are creating a high sense of enclosure, along the

Figure 55. Buchanan Street. pedestrian precinct.

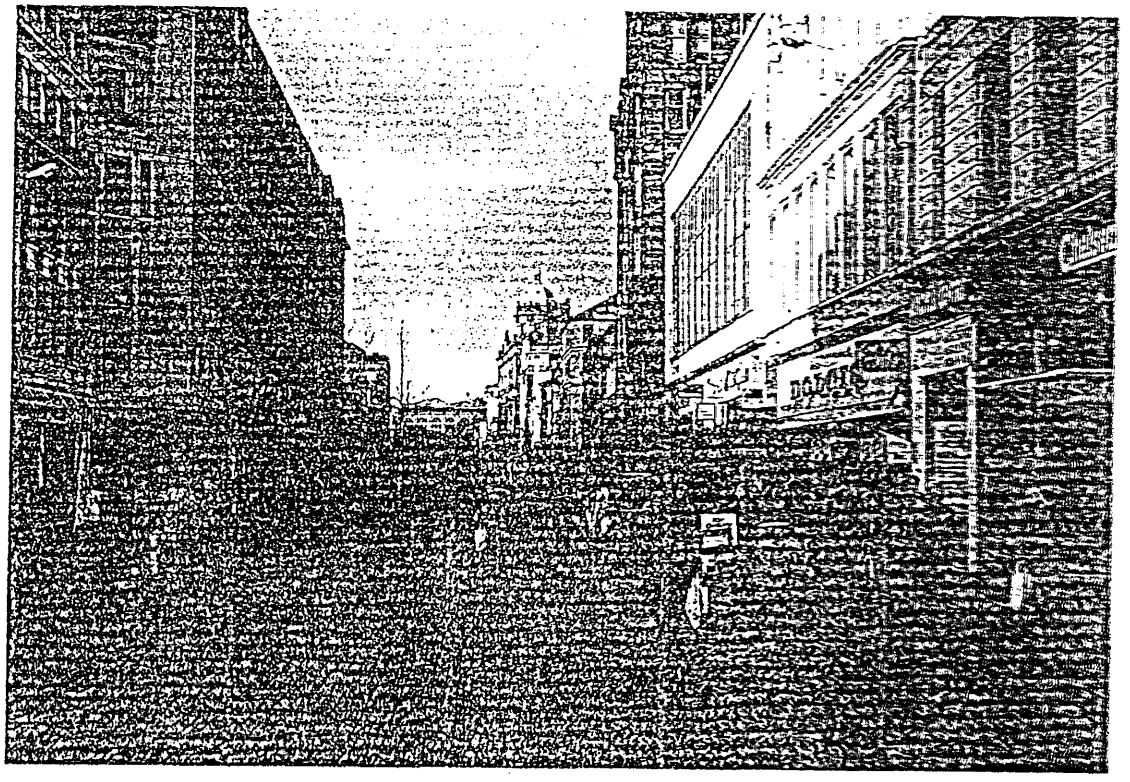


Figure 56. Argyle Street. pedestrian precinct.

streets; a canyon effect is experienced and the space grows crowded and cramped. This effect of canyon is well illustrated along the lanes where the proportion between its height and width is: W = 1/5H or W=1/3H, (Fig. 57, 58). Along the main streets these proportions are relative lower and varying from W=1 H to W=½H. It is worth noteing that these proportions are not the same along any street. They differ from one point to another within the same street.

This system of streets, which is following any kind of order in terms of formal or physical hierarchy, has made the Merchant City operate in a non-coherent way. In this system, focal points and landmarks are the most important element of orientation. However, they do not subscribe to an orderly street pattern, this conflict has produced in a way, confusion.

In the following pages, drawings illustrate character, scale and townscape of the Merchant City. (Fig. 59 to 77)

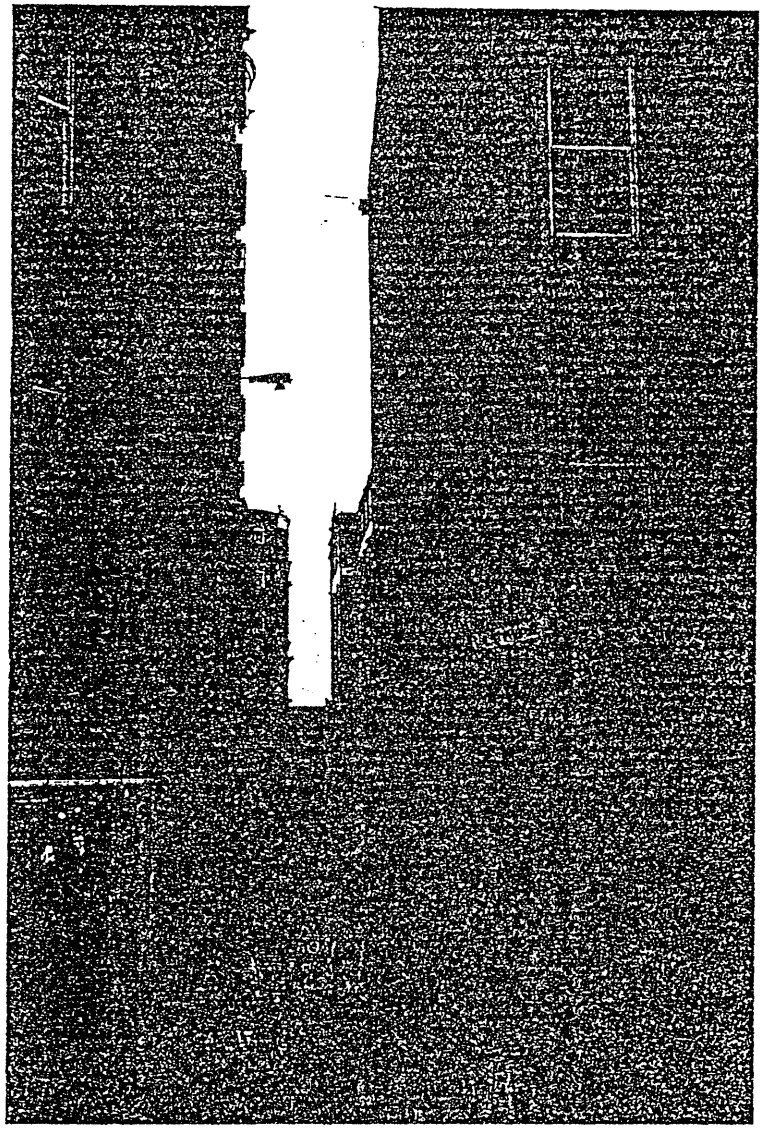


Figure 57. The lane: Canyon effect.

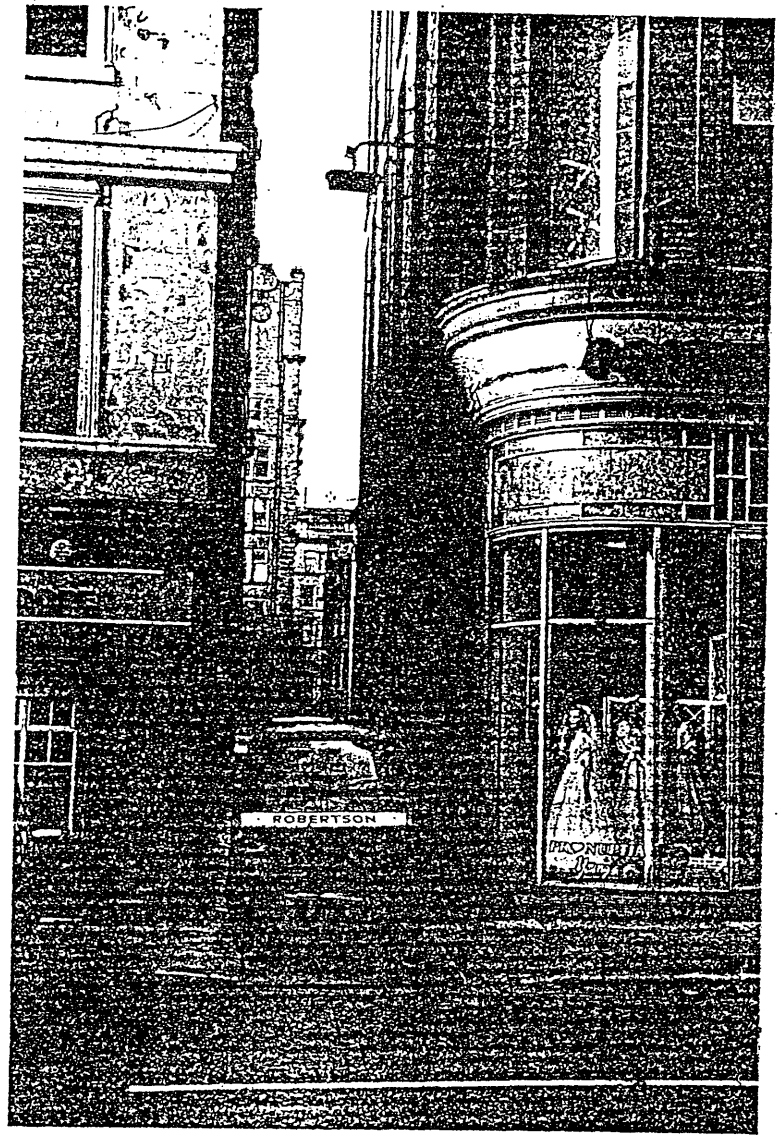


Figure 58. The lane : Canyon effect.

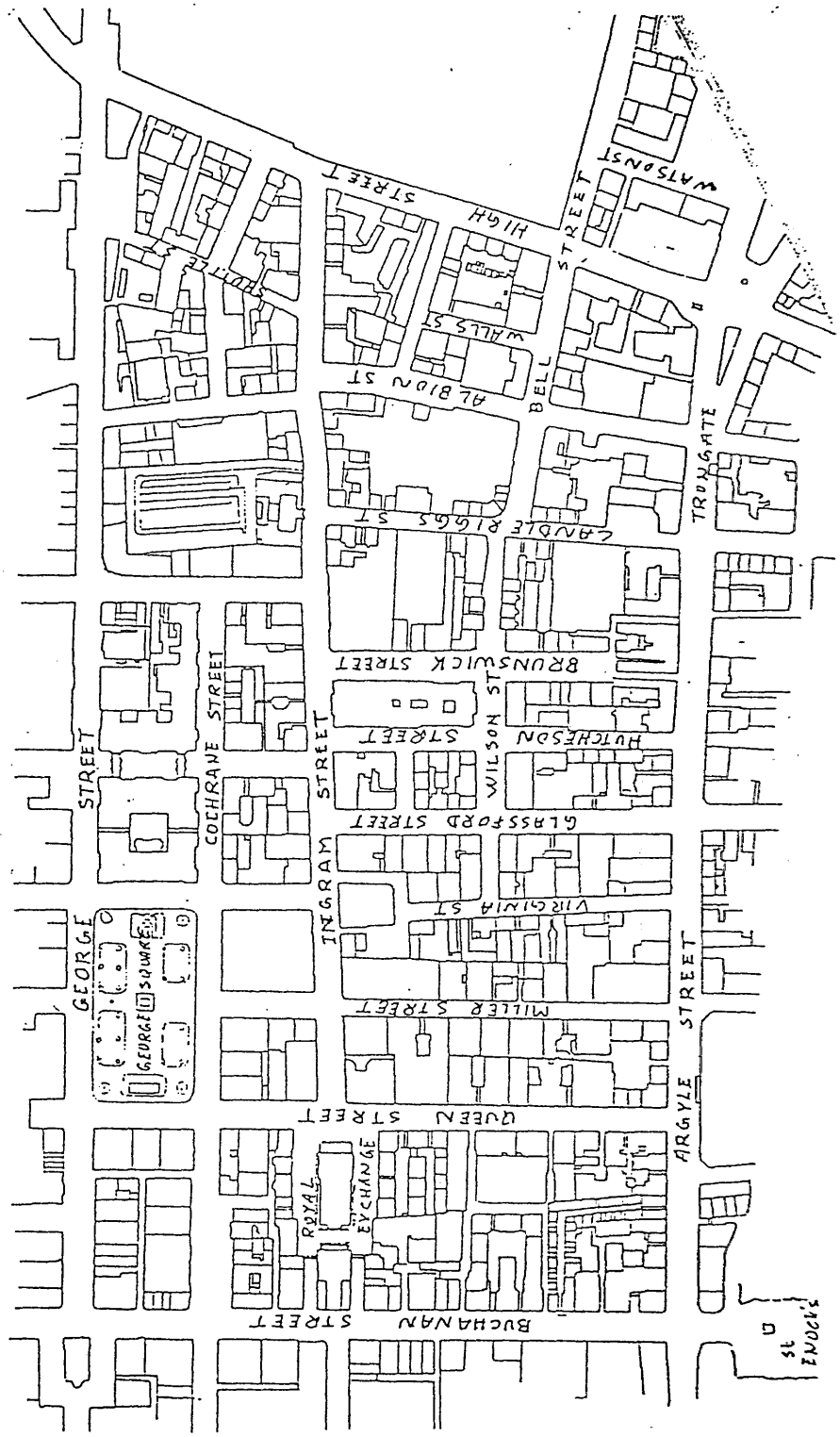


Figure 59. Plan of the Merchant City.
scale. I/5,000

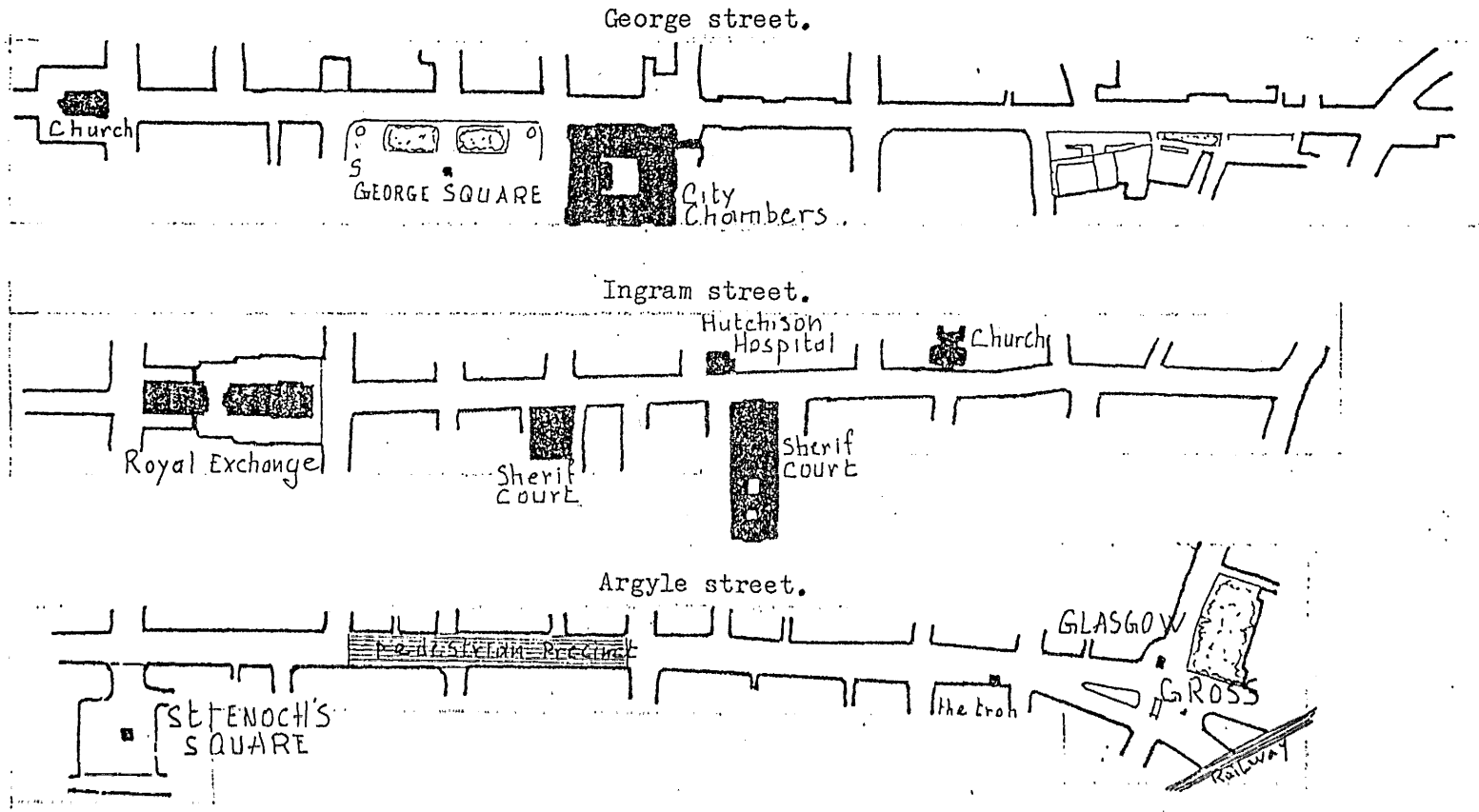


Figure 60. Plan of the longitudinal streets.
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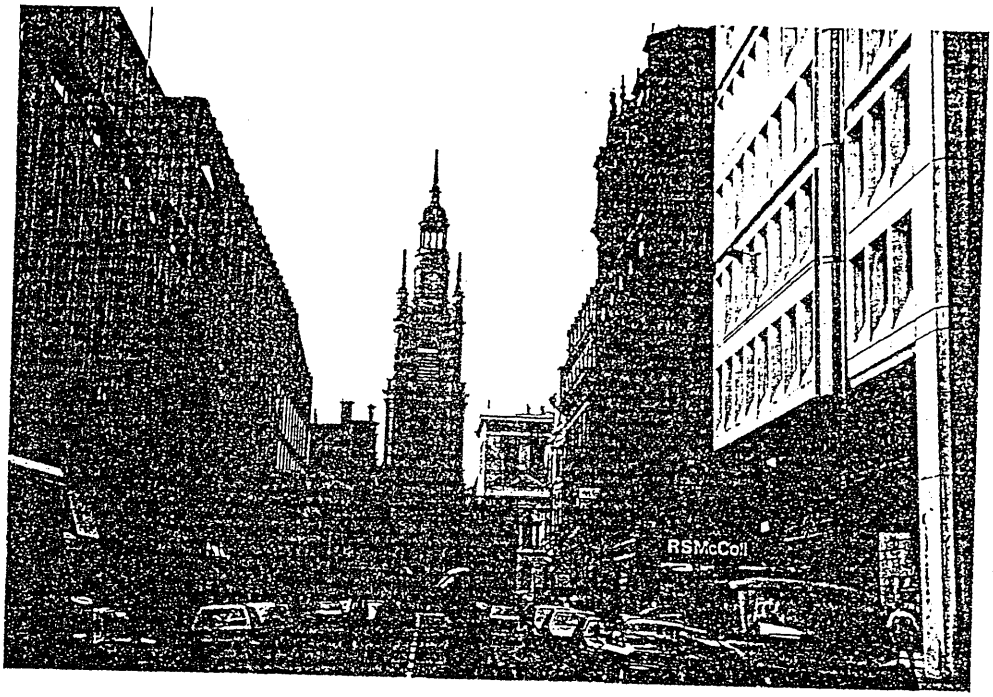


Figure 61. George Street looking West.

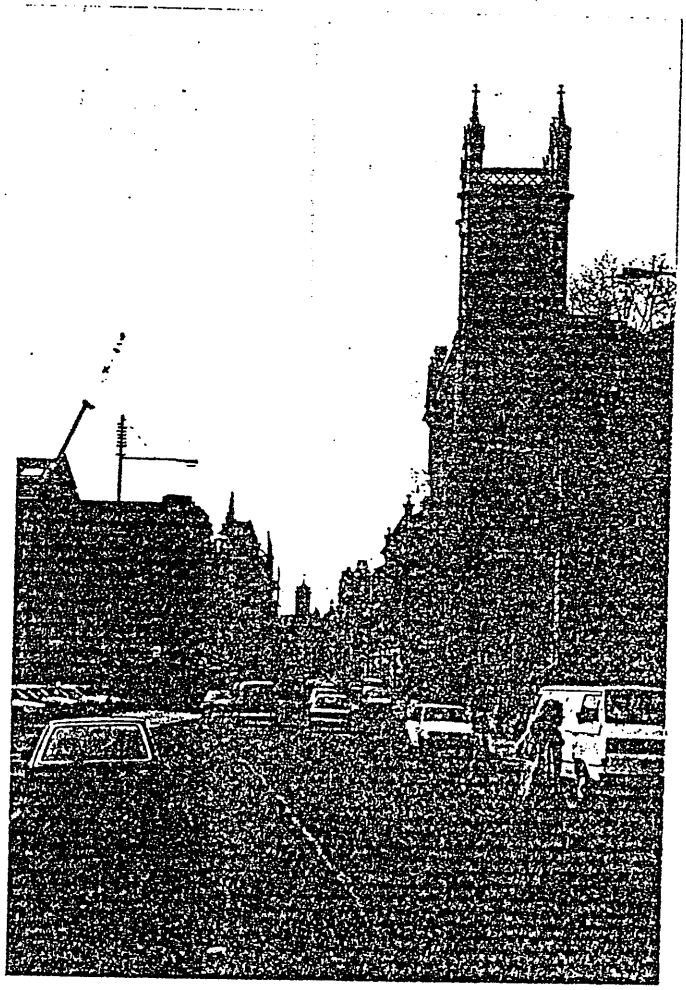


Figure 62. Ingram Street looking West.

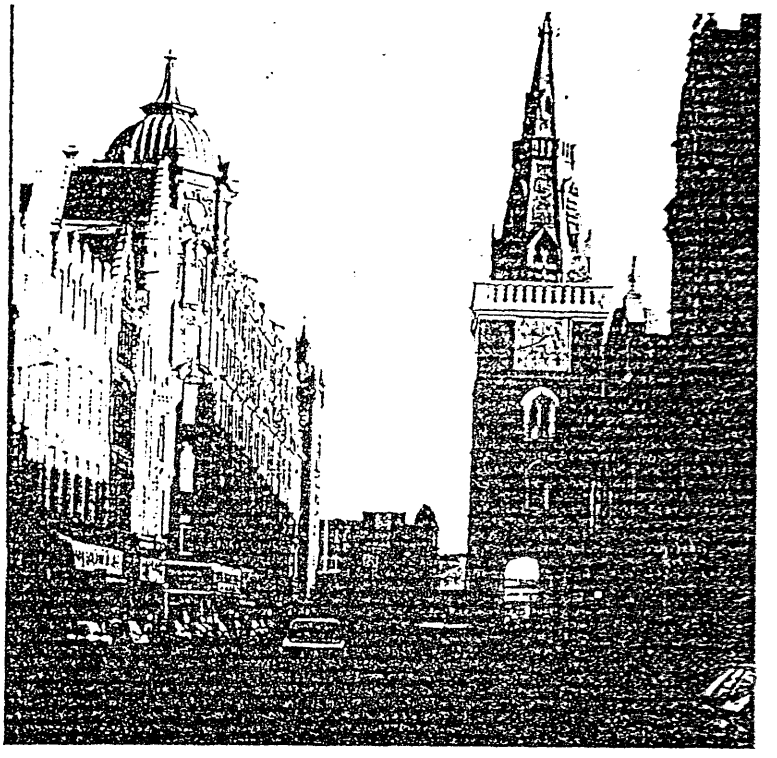


Figure 63. Trongate looking East.

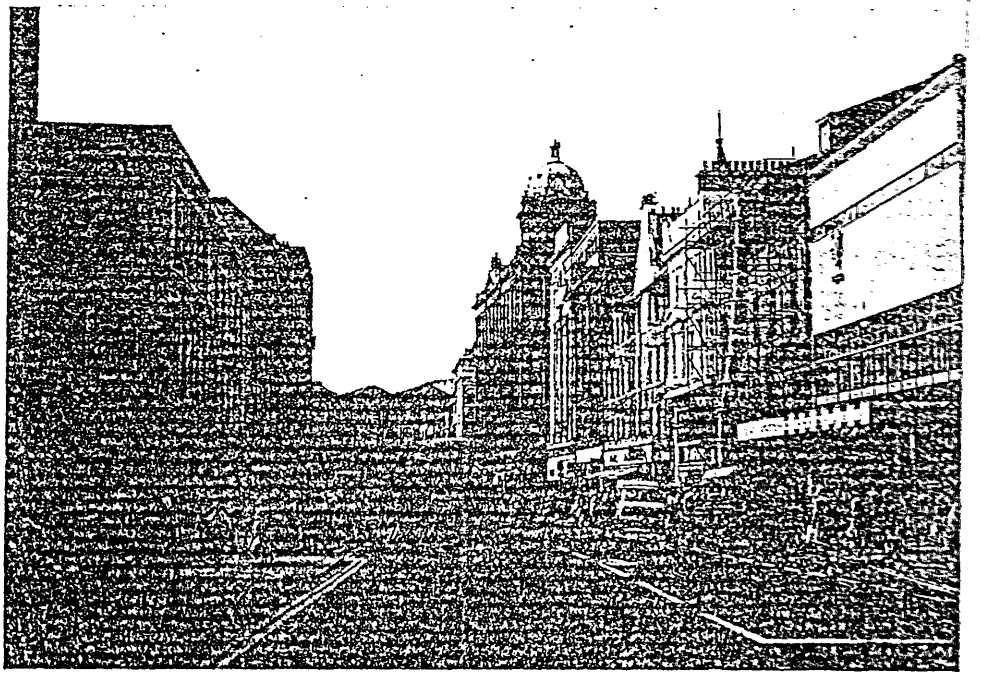


Figure 64. Argyle Street looking West.

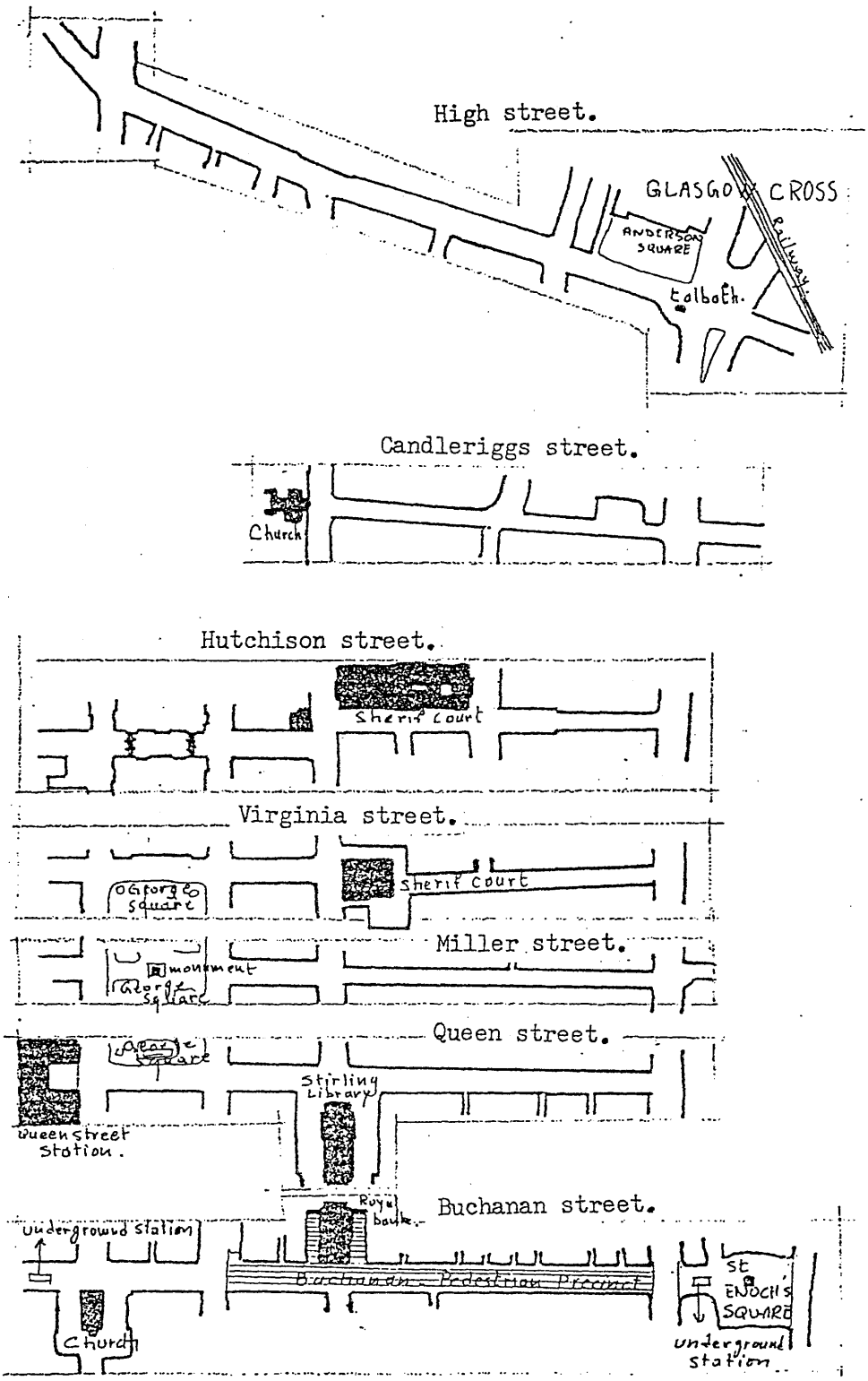


Figure 65. Plan of the crossing streets.
scale. I/5,000

Figure 66. High Street

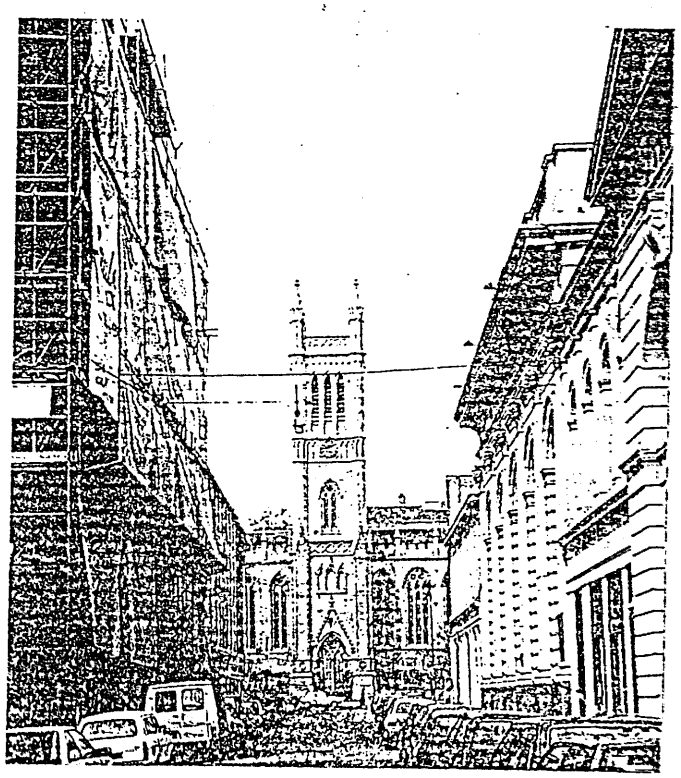


Figure 67. Candleriggs street.

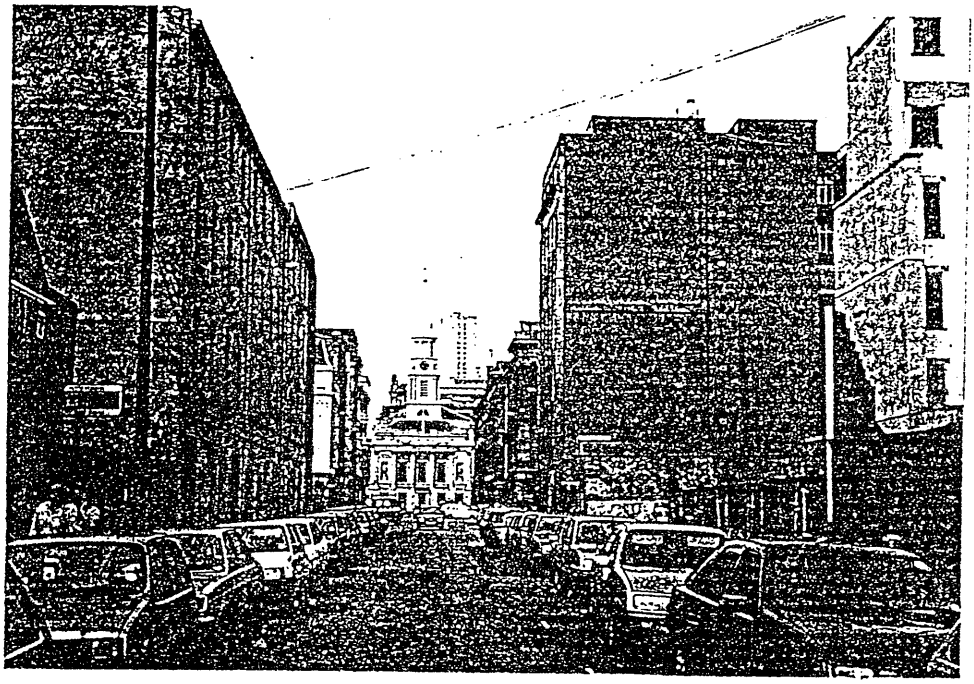


Figure 68. Hutcheson street.

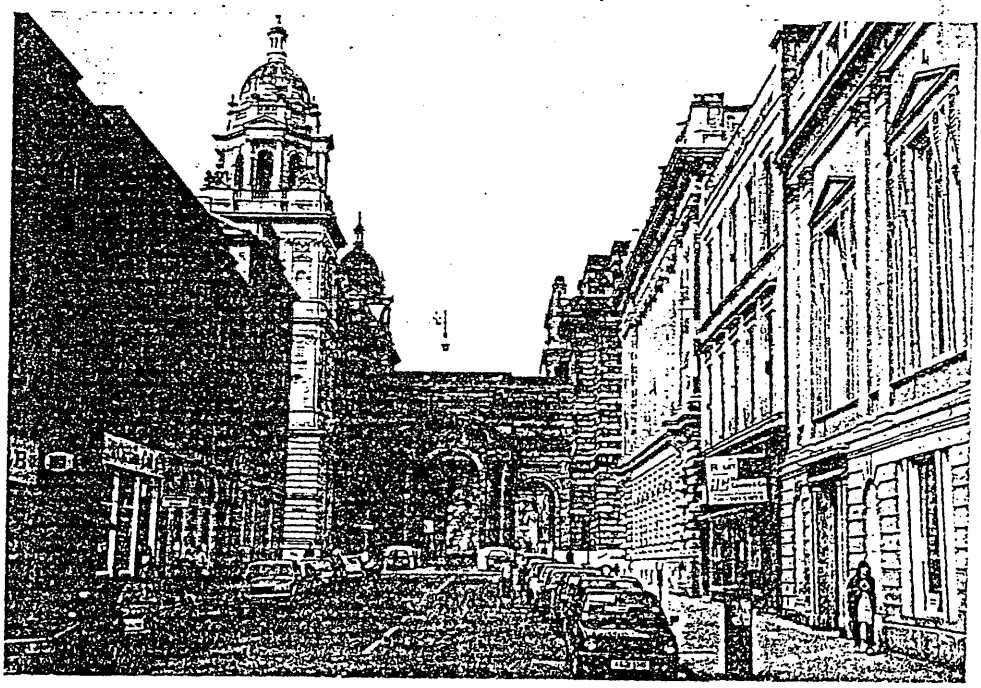


Figure 69. John Street.

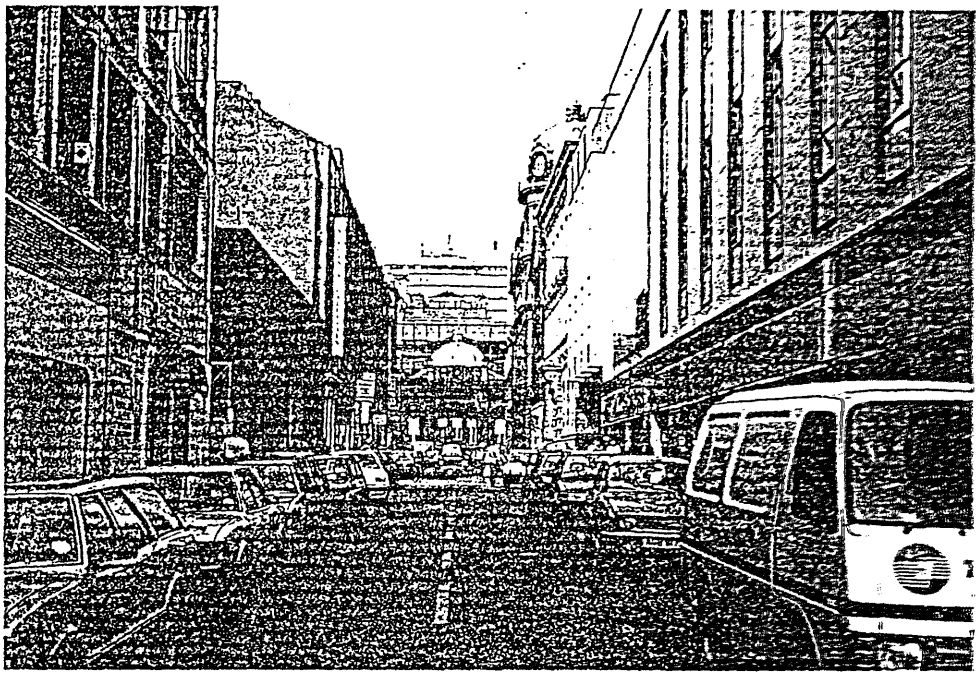


Figure 70. Virginia Street.

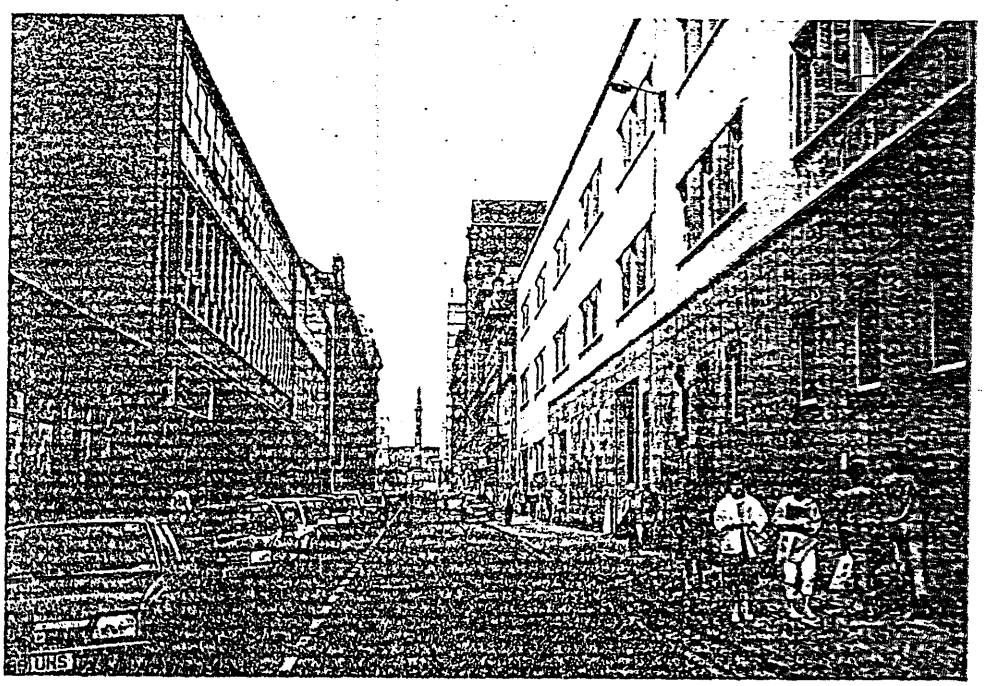


Figure 7I. Miller Street.

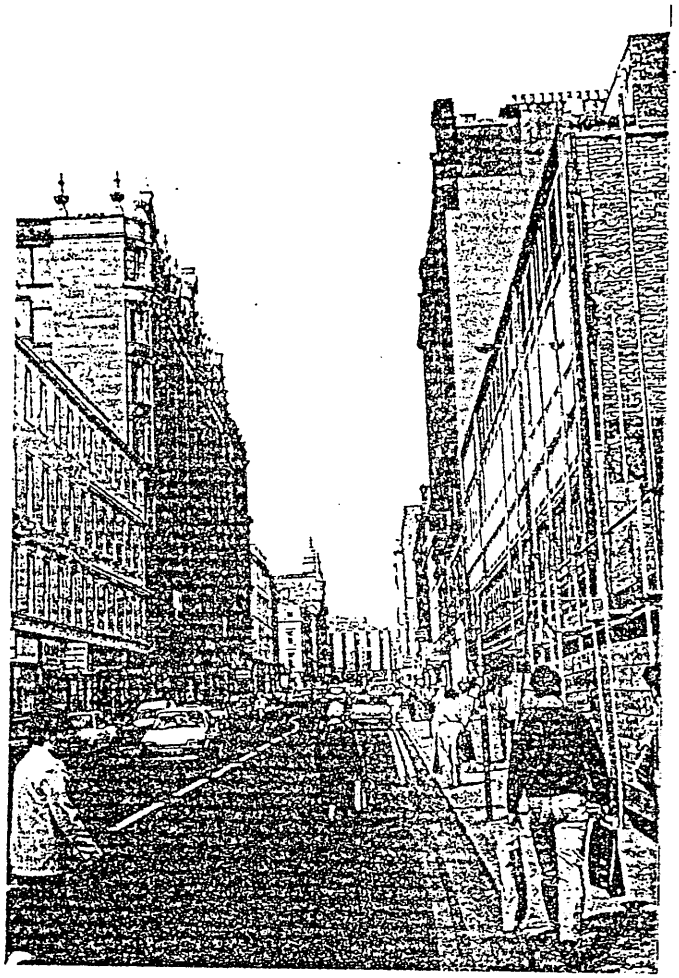


Figure 72. Queen Street.

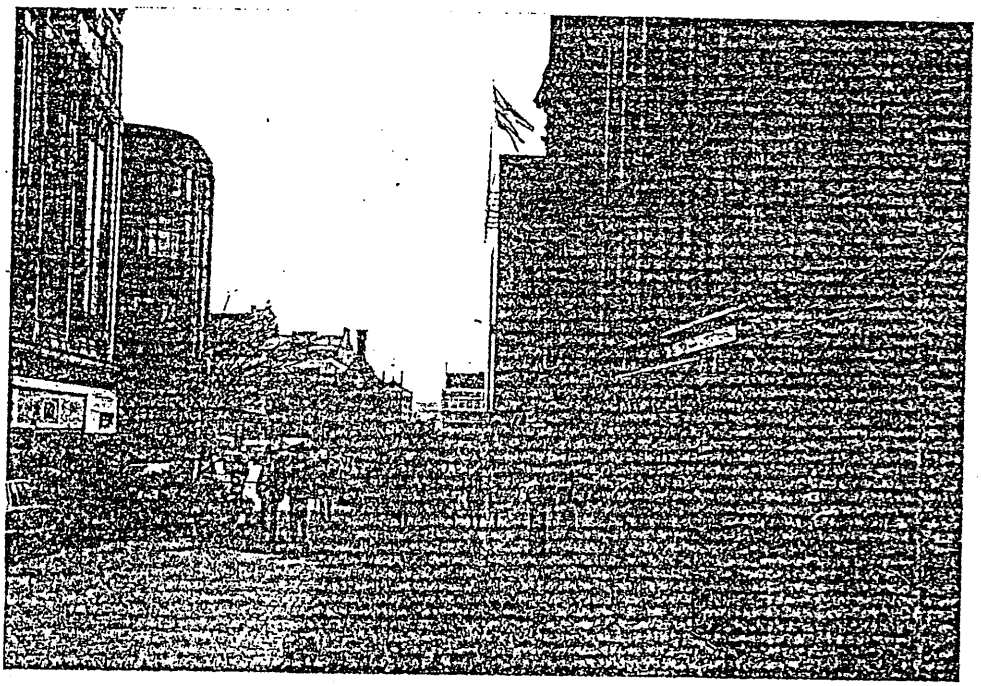


Figure 73. Buchanan Street.

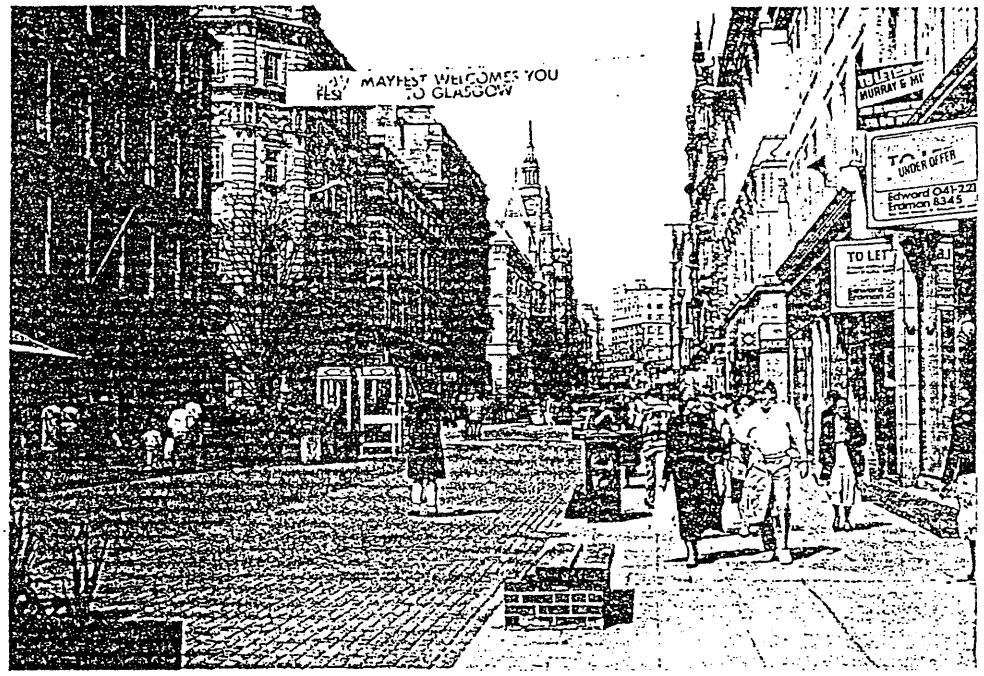
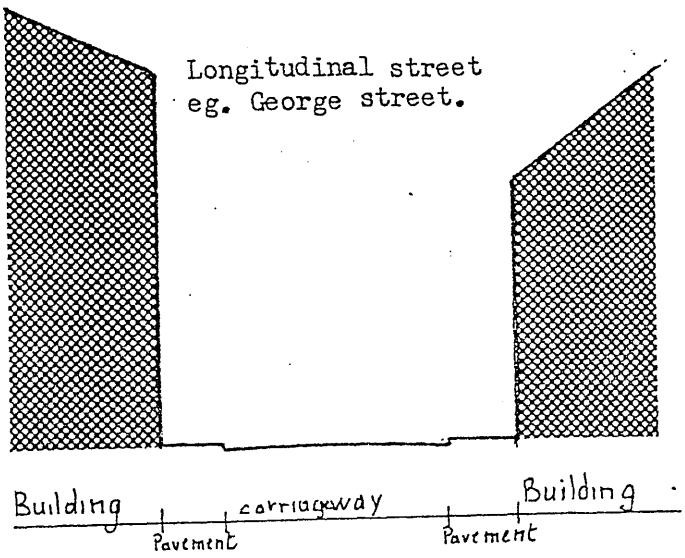
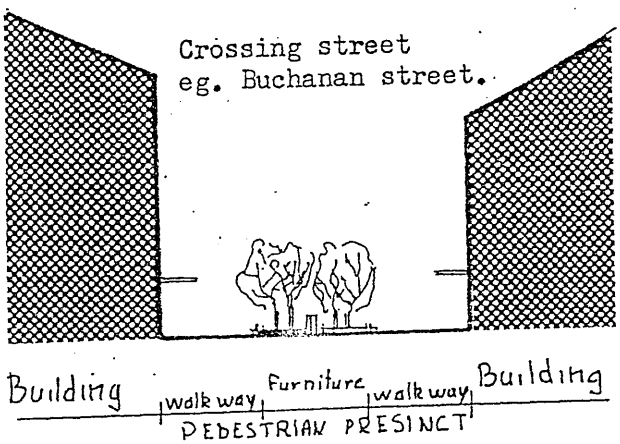


Figure 74. Buchanan Street.





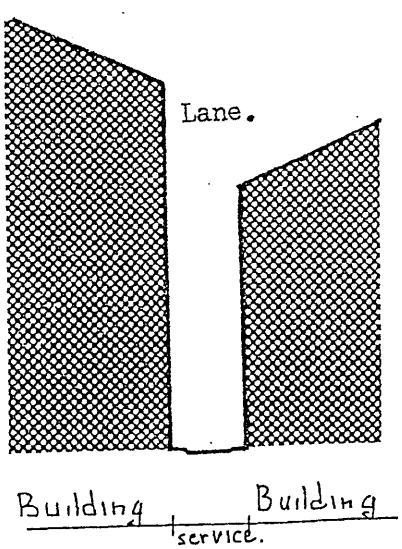
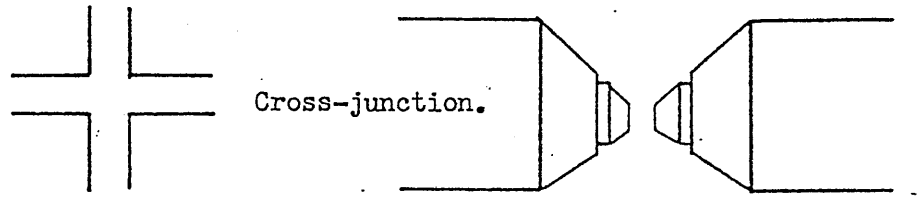
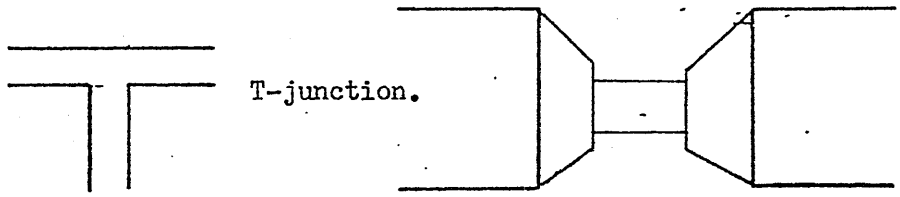
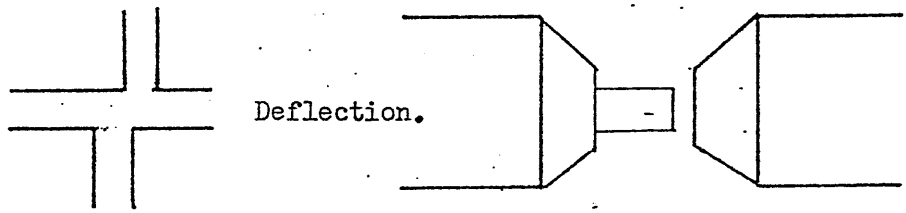


Figure 75. Cross-Sections of streets.
scale. I/5,00.







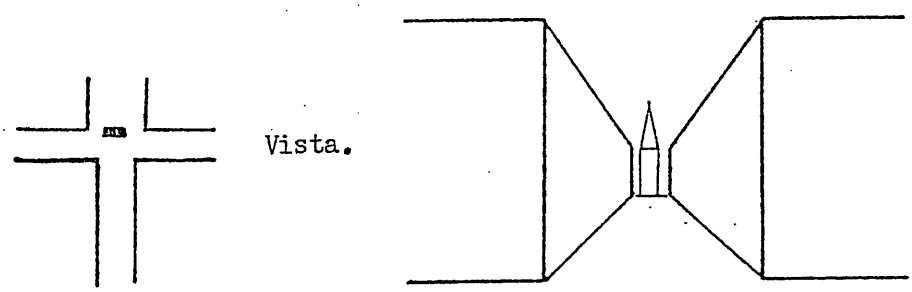
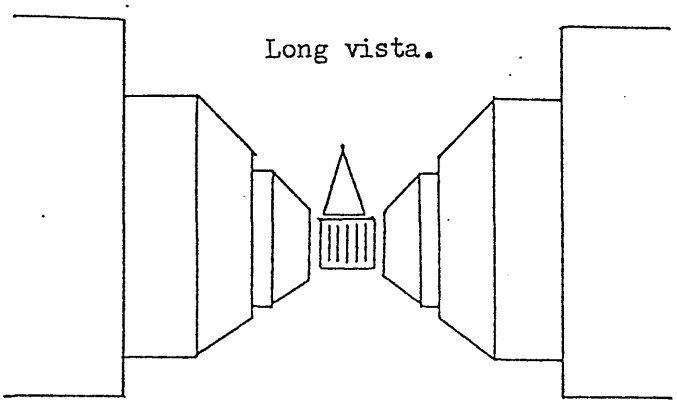
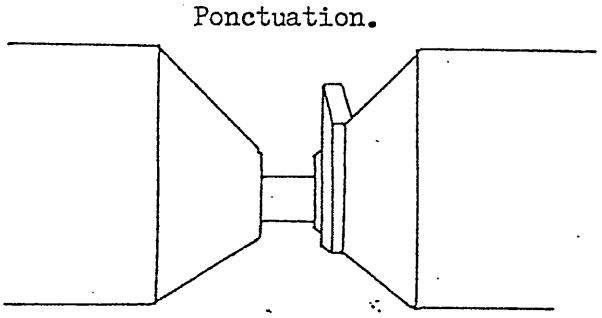
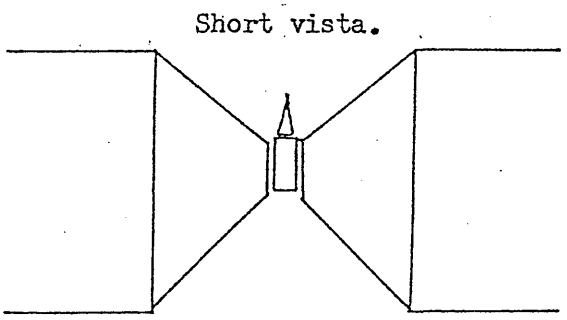


Figure 76, Charateristic of Glasgow Merchant City junctions.







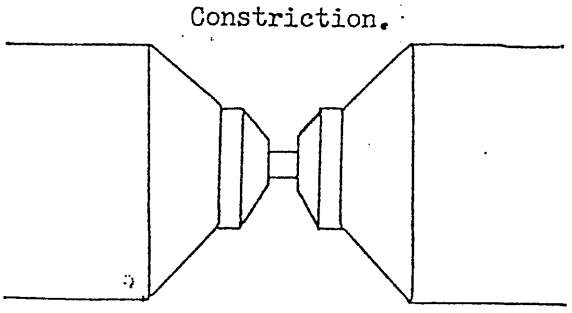


Figure 77. Charateristics of Glasgow Merchant City streets.

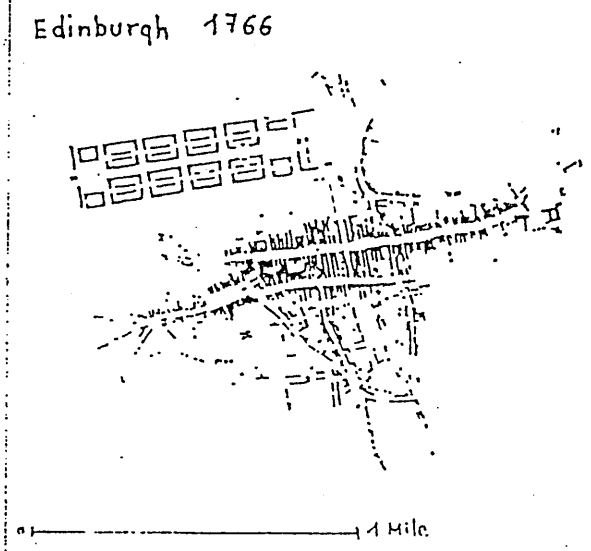


Figure 78. Edinburgh New Town I766.

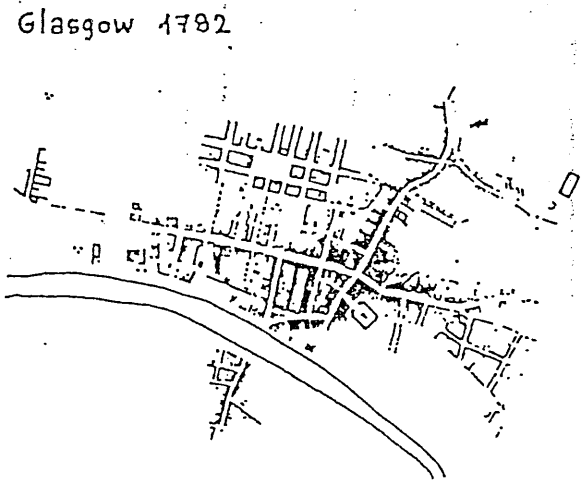


Figure 79. Glasgow Merchant City.I782.

3. General Characteristics

After looking to the two eighteenth century developments, common and different characteristics have emerged. Common because, both Edinburgh New Town and Glasgow Merchant City, were laid down on grided street pattern. Different because both have developed a specific Townscape. (Fig. 78,79)

Before attempting to summarise the main differences between Craig's design and the design of the Merchant City, it is worth noteing one key difference between the two places. Edinburgh New Town was designed primarily for residential use whilst Glasgow Merchant City was developed as a collection of merchant houses integrated with the merchants stores, offices and living accommodations.

The physical differences can be stated as follows:

(1) Topography

Edinburgh New Town is laid out on a "greenfield" site with strong topographical features; whereas Glasgow Merchant City is on a relatively flat site. (Fig. 80,81)

(2) Grid

The "grid" of the New Town was intended as part of a "formal closed" composition. The "grid" which emerged in the later stages of growth in Glasgow Merchant City is part of a "flexible expanding" system of growth. (Fig. 82, 83)

(3) Structure

Edinburgh New Town was designed as a finite structure laid

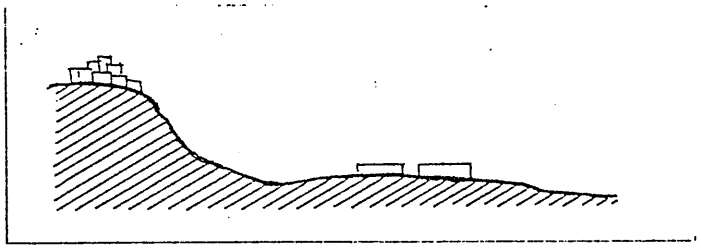


Figure 80. Topographycal location of Edinburgh New Town.

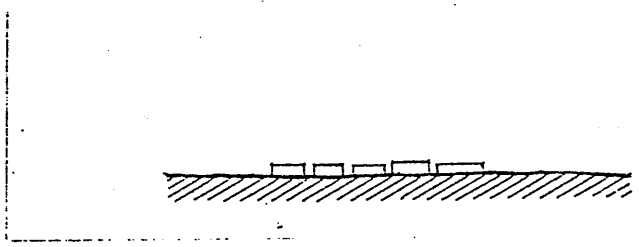


Figure 8I. Topographycal location of Glasgow Merchant City.

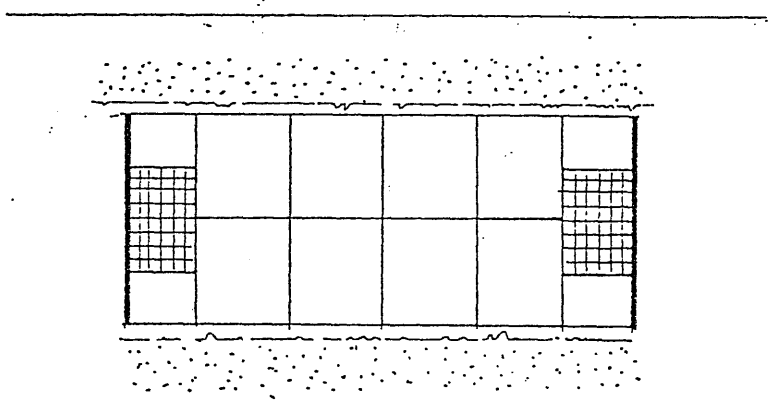


Figure 82. Diagram of Edinburgh New Town grid.

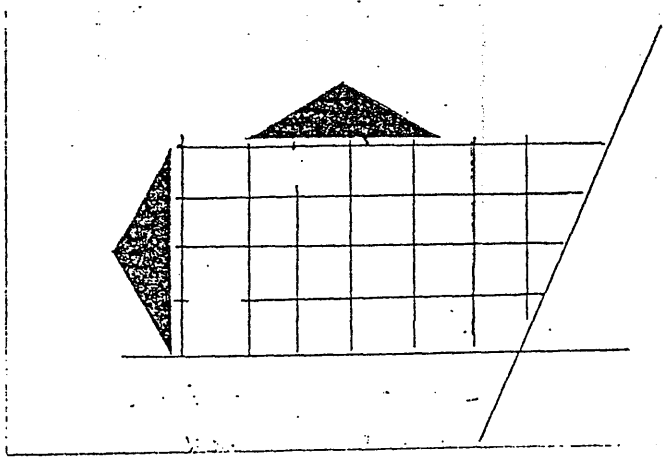


Figure 83. Diagram of Glasgow Merchant City grid.

out on the basis of a single strong axis, curtailed on either side by events. Glasgow Merchant City is a reflection of growth responding in an incremental way to its commercial success. Its structure has no emphasis on any strong axis, and therefore it is much less evident. (Fig. 84, 85)

(4) Principal Elements

The principal of Baroque design evident in Craig's New Town found feint echoes in the later stages of Glasgow Merchant City. The latter however remains essentially an urban statement based on growth and architectural "incidents" ie. special buildings at key location and landmarks. (Fig. 86, 87)

(5) Block

Edinburgh New Town has developed one unique and complex block which reflects the strong character of "uniformity". Glasgow Merchant City block is variable and improvised, it has produced "variety and diversity" of character. However, this character is kept within unity by the continuum built form at the heel of the street. (Fig. 88, 89)

(6) Corners

The corners of the block in the New Town are not identified as an architectural element, it is a plain corner. Whereas in the Merchant City the corners are usually given "special significance" as an architectural expression, and in some way they add to the visual language of the place. (Fig. 90, 91)

(7) Hierarchy

Hierarchy is "dominant" in Edinburgh New Town. The

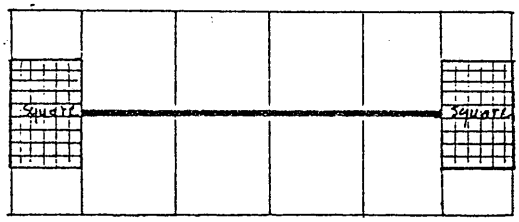


Figure 84. Diagram of the structure of Edinburgh New Town.

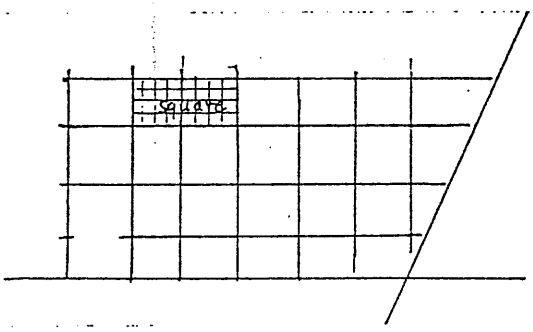


Figure 85. Diagram of the structure of Glasgow Merchant City.

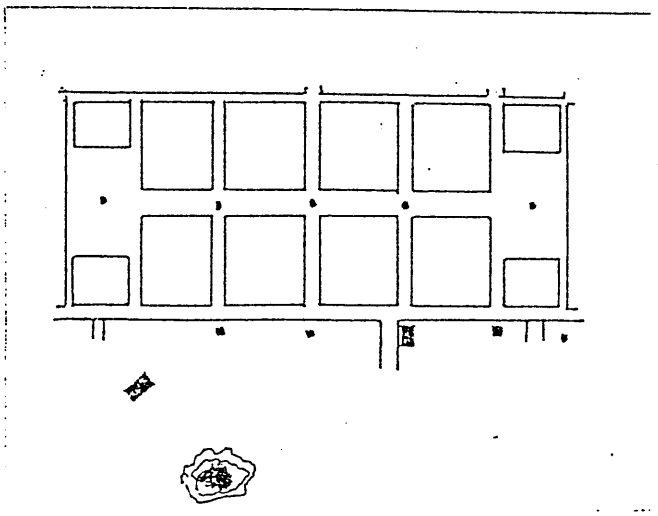


Figure 86. Diagram of the principal elements of Edinburgh New Town.

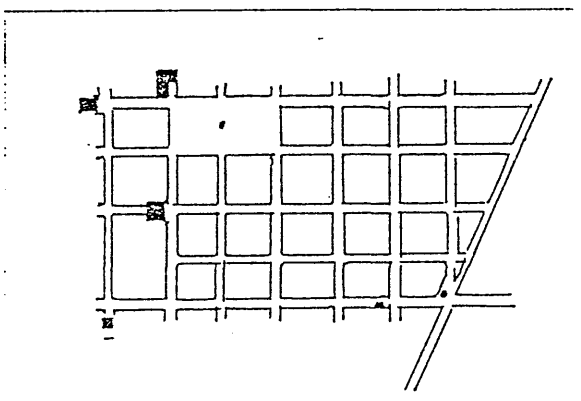
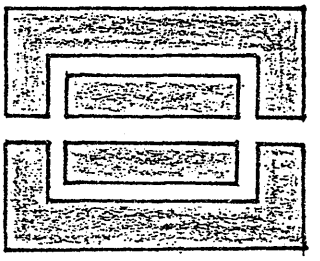
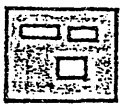


Figure 87. Diagram of the principal elements of Glasgow Merchant City.

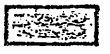


One regular block.

Figure 88. Diagram of Edinburgh New Town block.

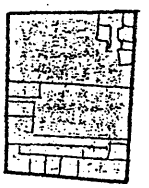


Courtyard block.



Single building block.

Composed block.



Extra large block.

Several varied blocks.

Figure 89. Diagram of Glasgow Merchant City blocks.

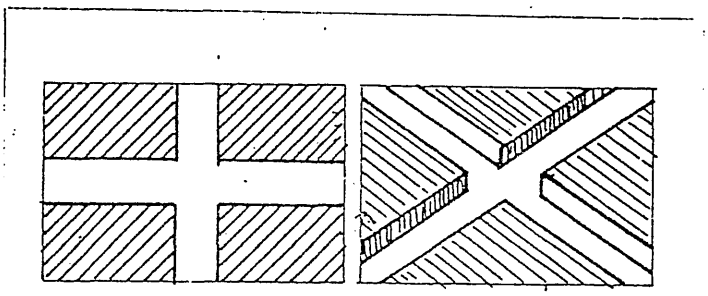


Figure 90. Diagram of Edinburgh New Town corners.

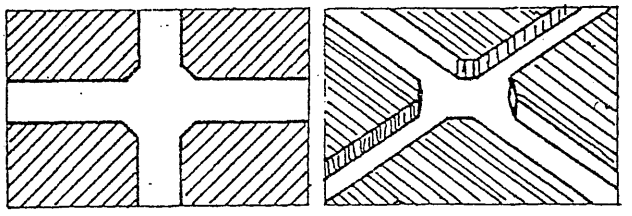


Figure 91. Diagram of Glasgow Merchant City corners.

uniformity and complexity of the block have produced a formal and functional hierarchy. Hierarchy is a basic idea of orderly streets in Craig's plan in Glasgow Merchant City, this hierarchy is "much less Evident" and not effient in terms of traffic control. (Fig. 92, 93)

(8) Scale and Proportions

In Edinburgh New Town the proportions between width and height of the street, which are determining the scale, are generally well "balanced". They differ from: W = 1 H to W = 2.5 H. This proportion produce a satisfying enclosure. However, on main axis the streets are opened up a bit to accentuate the sense of vistas. These proportions are relatively lower in Glasgow, they differ from W = 1/5 H to W = H with the majority being $0.5 < W < 1$. Here the sense of enclosure is higher and a "canyon effect" begins to arise; it is dominant along the service lanes. (Fig. 94, 95)

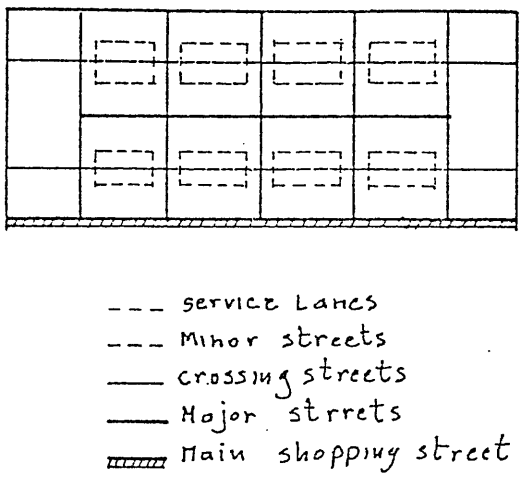


Figure 92. Streets hierarchy of Glasgow Merchant City.

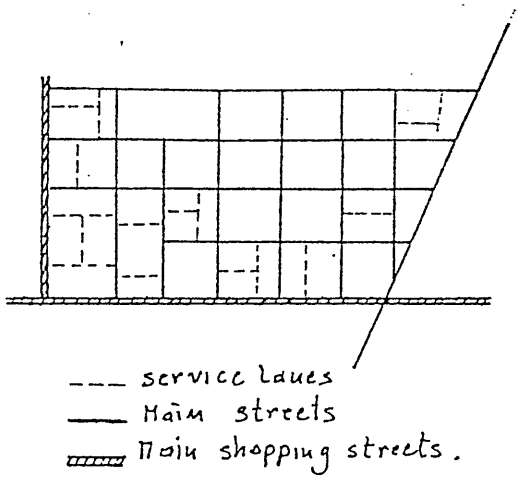
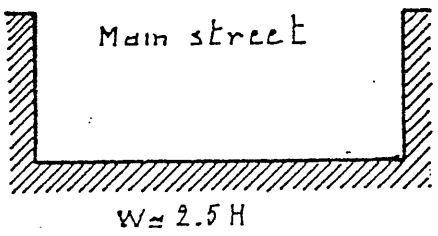
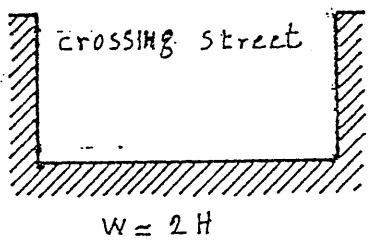


Figure 93. Scale and proportion of Edinburgh New Town streets.





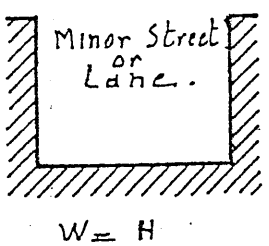
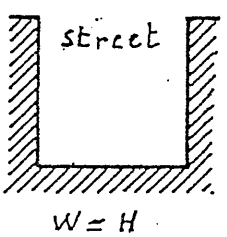
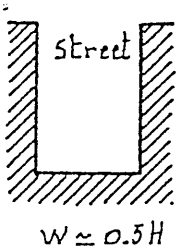


Figure 94. Streets hierarchy of Glasgow Merchant City.





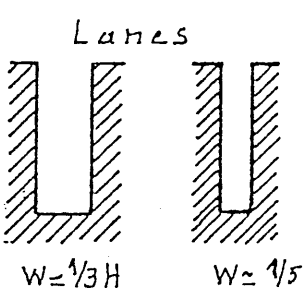


Figure 95. Scale and proportion of Glasgow Merchant City streets.

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CHAPTER IV : CONFLICT AND FAILURE

Arising from the general characteristics of Glasgow Merchant City, the townscape of its development seems to have many important elements; those elements such as open spaces, public buildings, vistas and landmarks, are determining the character of this area. However, these components do not subscribe to an evident structure. The result of this conflict between components and structure has failed in terms of clarity and legibility. To understand this problem, is to look at how this townscape is operating.

1. Townscape

The townscape of the Merchant City consists of series of elements, identified earlier. These elements are not working all together in a regular relation. The components of this urban area which determine the townscape are operating as different isolated systems. However, each system, defined as "group of things or parts working together in a regular relation (1) is revealing certain characteristic of the Townscape. This failure derives from the fact that; there is no strong emphasis in the way, components are put together on the site. Every component is giving character and identity to its own context but not always related to other components to form a real structured Townscape.

In Edinburgh New Town, all the streets possess that strong architectural quality which derives from Craig's concept of urban design: formal structure and therefore a clear organised Townscape. In Glasgow, however, only certain streets begin to assume an architectural quality, not from any general concept but from buildings and landmarks of special quality.

To measure and enhance this character of the Merchant City, legibility seems to be the key issue, because it reveals how people perceive the visual quality of this area.

2. Legibility

The legibility is the visual quality which makes a place comprehensable. A legible town or city centre is the one whose visual qualities are easily recognisable and structued in an ordered mental image. Legibility is important at two levels, it depends on physical forms and activity patterns. Places may be read at either level separately. For example, it is possible to develop a clear sense of the physical form of a place and appreciate it at an aesthetic level without regard to activities in the place. Equally, patterns of use may be grasped without much concern with the physical form. But to use a place's potential to the full, awareness of physical form and patterns of use must complement one another. (2) The legibility of both form and use is particularly important to the outsider, who needs to grasp the place quickly.

Continuity of organised and interconnected images in the mind of people of any urban environment is the process of "Imageability". The concept of "Imageability" represents an attempt to perceive the city or townscape not in terms of concrete features such as buildings, but as images of the structure of those perceived forms. "Imageability" is not the impression of one single individual, but the image of a city or a townscape shared by many people.

The sense and type of enclosure is closely related to the image of the street as we travel through it. Kevin Lynch refers to the "Imageability" of the city as a hierarchy of scales and texture and defines "Imageability" as "That quality in a physical object which gives it a high probability of evoking a strong image in any given observer". (3) Continuity of visual image is what Lynch

appears to be advocating. The more continuity is achieved through the process of imageability the more the townscape becomes apparent, legible and visible and will invite the eye and the ear to greater attention.

Appreciating any townscape will depend on how its apparent clarity or legibility is grasped by its users. If this townscape is legible, it can be grasped as a related pattern of recognizable features. The public image of any city or townscape is the overlap of many individual images. A shared image is what Kevin Lynch seems to be interested in, because it reveals much of the essential of any given city or townscape.

Certain sorts of physical features play a key role in the content of these shared images. Kevin Lynch - The American planner who pioneered studies of this topic in 1960's - has suggested that these features can be grouped into five key elements.

1. Paths: Paths are amongst the most significant of these elements, they are channels of movement such as: alleys, streets, motor-ways, railways and the like. Many people include them as the most important features in their images of the townscape.

2. Nodes: Nodes are focal places, such as junctions of paths, roundabouts or market squares. Most of them are strategic elements in the city.

3. Landmarks: In contrast to nodes, which can be entered, landmarks are points references which most people experience from outside. They are often seen from different angles, at great distance.

(4) Edges: Edges are linear elements and different than paths, they are the boundaries which break the continuity between two different layout. Such edges may be barriers like River or City walls.

(5) Districts: Districts are comparatively large areas in the city and are recognisable as having some particular identifying character.

These five physical key elements are illustrated in figure 1.

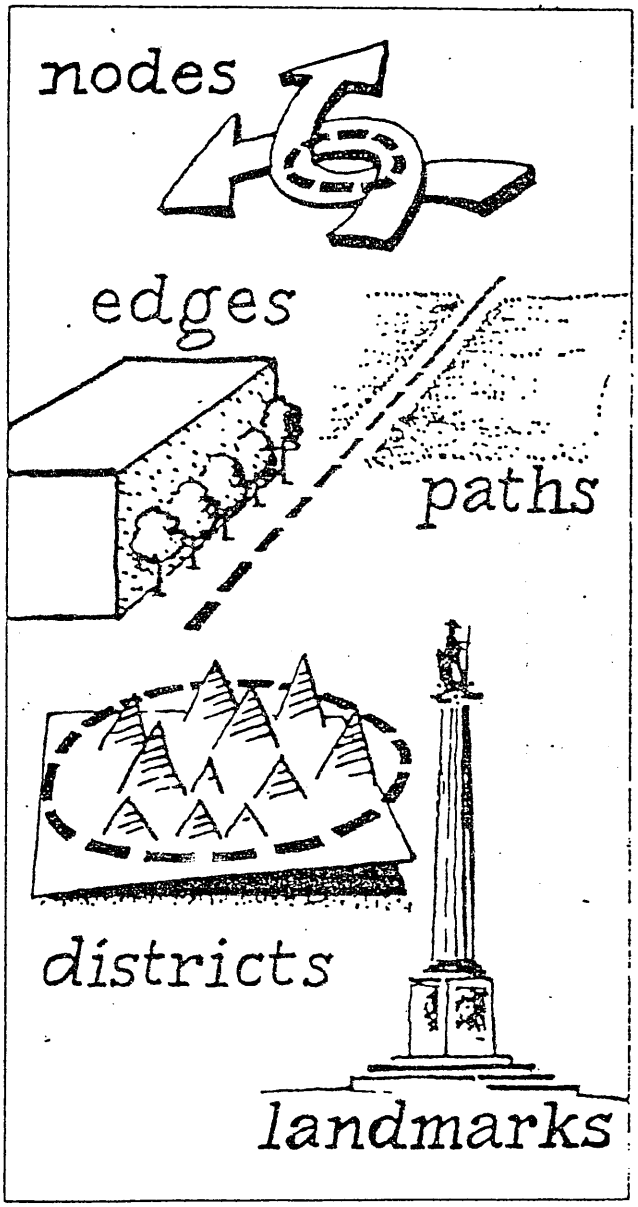

Figure I. The physical key elements.

The five key elements are then the main components of the shared image of any townscape. In applying the basic concept of imageability to Glasgow Merchant City, I will find out to which level this urban area is legible. With the basic use of Kevin Lynch's questions set up for his request to interview people and therefore gain some rough public images, I have prepared a specific questionnaire adapted to the field area of the Merchant City. (3) The questionnaire consists in it essential request for a basic sketch map of the area, with detailed questions concerning their descriptions while travelling in the area and listing and briefing the parts felt the most distinctive in their mind.

To carry out this investigation, I invited the first year students of Mackintosh School of Architecture. They were concerned as a general public because their involvement with architecture and urban design as a whole was limited. Some 29 students then were involved with the request survey, 10 of them were familiar with the area, 13 others had visited it occasionally and the other 6 hardly knew it at all.

The resulting sketch maps drawn by the students were very varied and different in term of accuracy. Few of the maps were more or less precise but the others were confusing and had unrelated elements or not placed at the right location. (Fig. 2, 3) However, in many of the sketch maps, similar and identical elements were mentioned, like for example, George Square and Royal Exchange Square. In most of the cases these elements identified in their images were physical like for instance, landmarks, open spaces, and streets, and therefore can

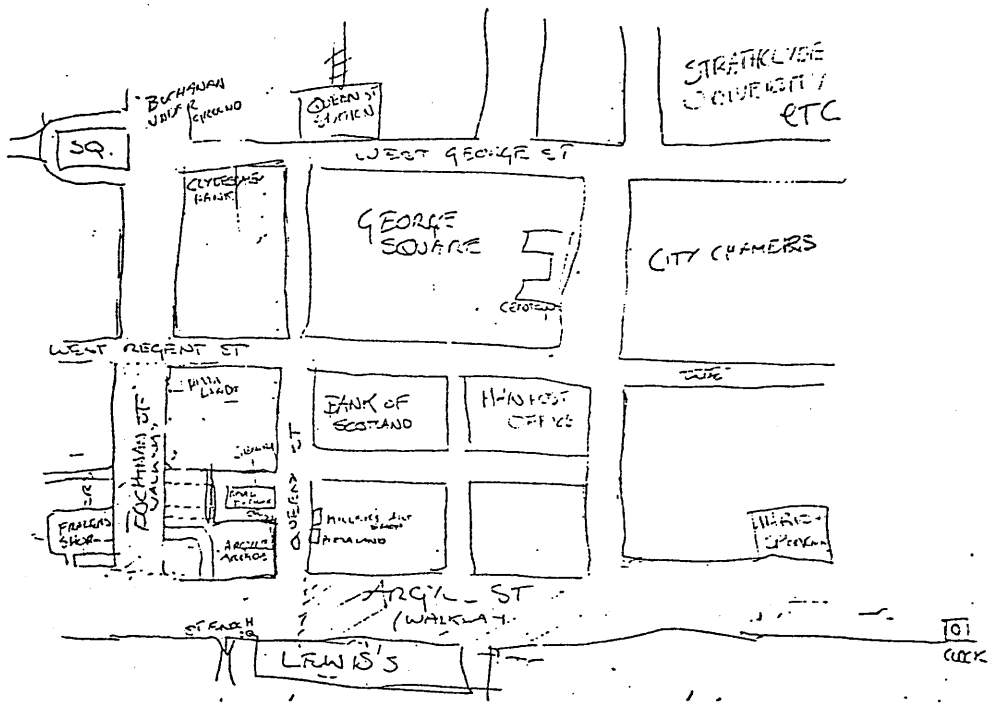

Figure 2. Example of an accurate sketch map.

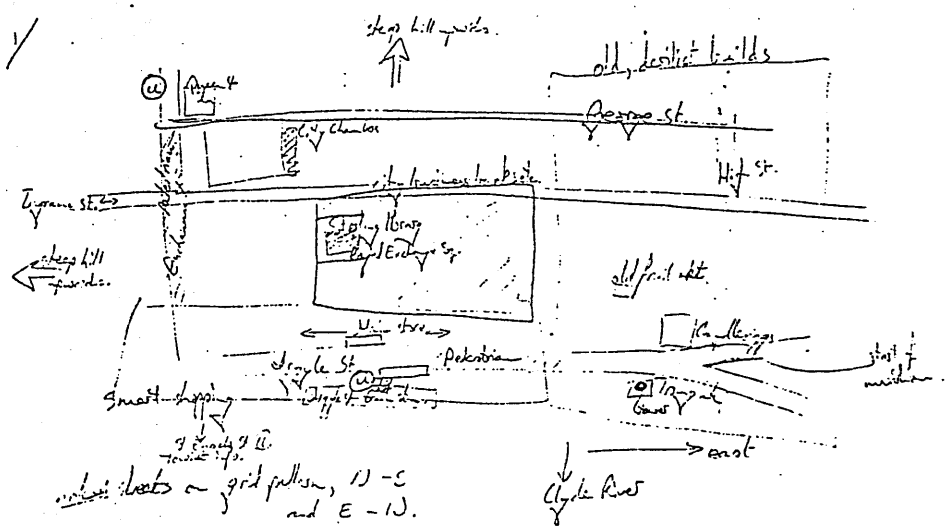

Figure 3. Example of a non accurate sketch map.

be classified according to Kevin Lynch's method to form a shared image.

After studying the various individual images and recording the main elements of each one, I have drawn a visual form of the Merchant City as seen by the group of people. It is a diagrammatic representation of its major visual elements as derived from the sketch maps illustrated by different students. (Fig. 4)

To do so, I had to use the physical key elements defined by Kevin Lynch to group the physical feature composing the townscape of the Merchant City. However, I have eliminated one key element, namely "District" because the area is relatively small and consists of one common character, this element "Districts" had to be left out. In other words, the Merchant City consists of one unique district. In this study area paths are only symbolising streets, therefore, I have used the word street to abstract any other meanings.

A close analysis of this visual form shared by 29 students shows that, the townscape of the Merchant City has three different degrees of legibility. As can be seen from the diagrammatic representation, the area can be divided into three parts with different readings. (Fig. 5)

1. Part one is the area around George Square and the Royal Exchange Square, it appears as a highly legible part of the whole image.

2. The second part in the area is along Argyle Street and the South Eastern part of Buchanan Street. This part appears to have a good legibility; however, confusion

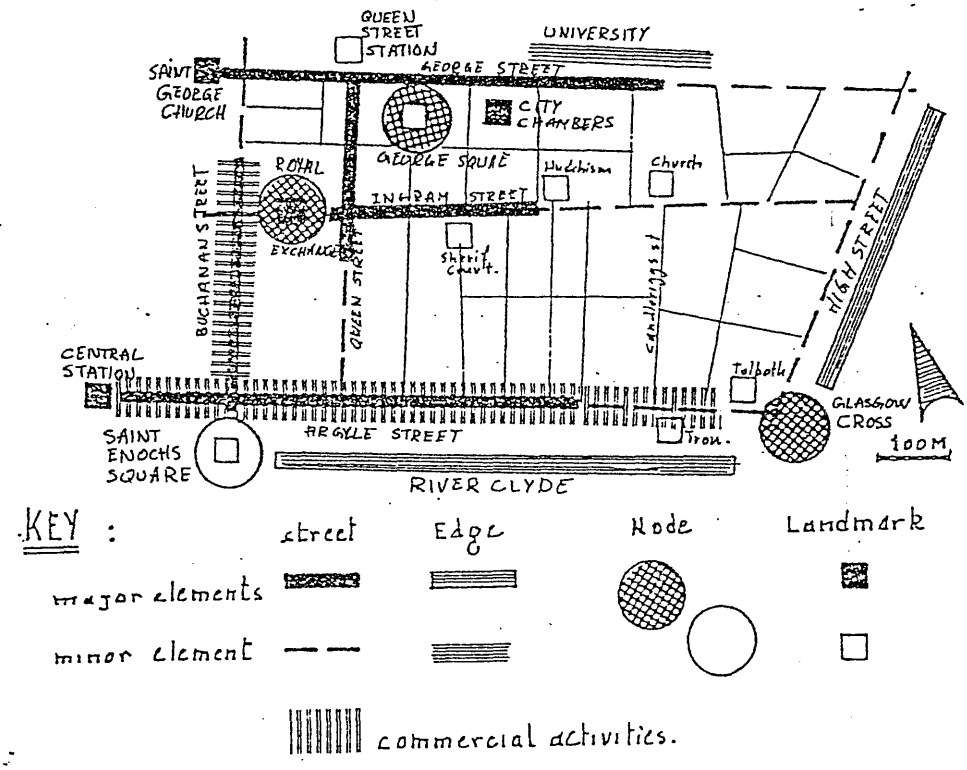

Figure 4. The visual form of Glasgow Merchant City.

of the layout seems to be the problem because crossing streets are lacking in differentiated character and therefore distinction between them is difficult.

3. The third part of the area is North East where the layout is the most irregular and lacking of key elements. This part seems to have a weak legibility.

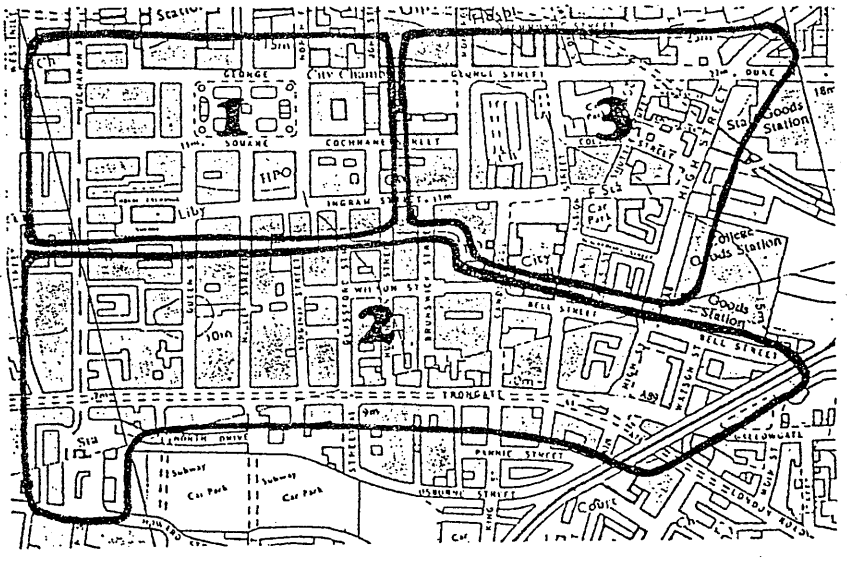

Figure 5. Degree of legibility of the Merchant City.
part I. Strong and vivid legibility
part 2. Good legibility, but a little confused
part 3. Weak legibility.

3. Legibility and Response

The result of the request survey shows that, for most subjects, streets were the predominant element of townscape in their mental images, and their importance varied according to the level of familiarity with the area.

Because of the non-evident structure in the area, the sketch maps were not precise and in most cases did not cover the whole area. Gaps and unrelated elements were common in everyone's image. However, the layout of the Merchant City was considered mentally as a regular grid in which the crossing streets ie. (North-South) were lacking in differentiated character. By contrast, the longitudinal streets, ie. (East-West) were sharply differentiated from the crossing streets in everybody's mind, because their number is limited just to a few, and in most of the case their origin or destination - as referred by Kevin Lynch (5) - were known as a specific feature, like for instance, Ingram Street ending at the Royal Exchange Square, or Trongate ending at the Cross.

In the Merchant City, elements like, landmarks, nodes, edges and streets are not sufficient to make up a good mental image of the entire area. These elements which are simply the raw material of the environment image are not connected together to provide a satisfying visual form of the whole area. However, certain parts of the Merchant City still are legible and can be comprehended. These parts are in most of the case organised around or along major elements, such as public buildings, squares and landmarks, which make these parts distinctive and vivid.

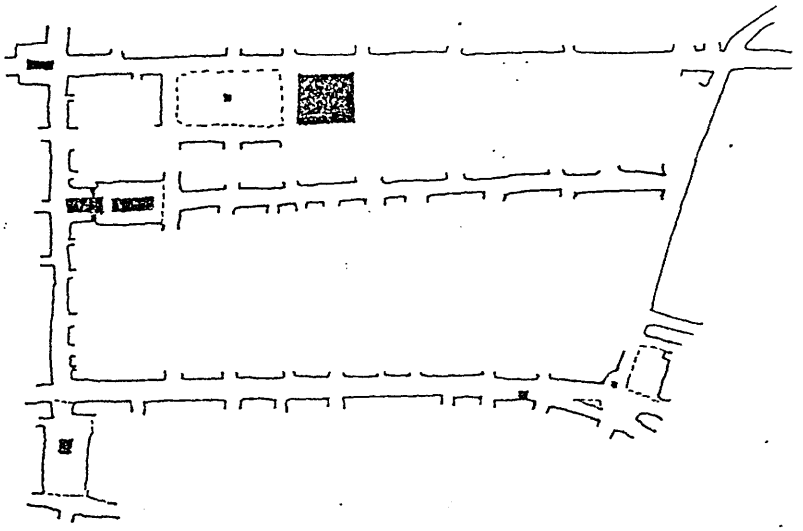

Figure 6. Major key element of the structure of Glasgow Merchant City.

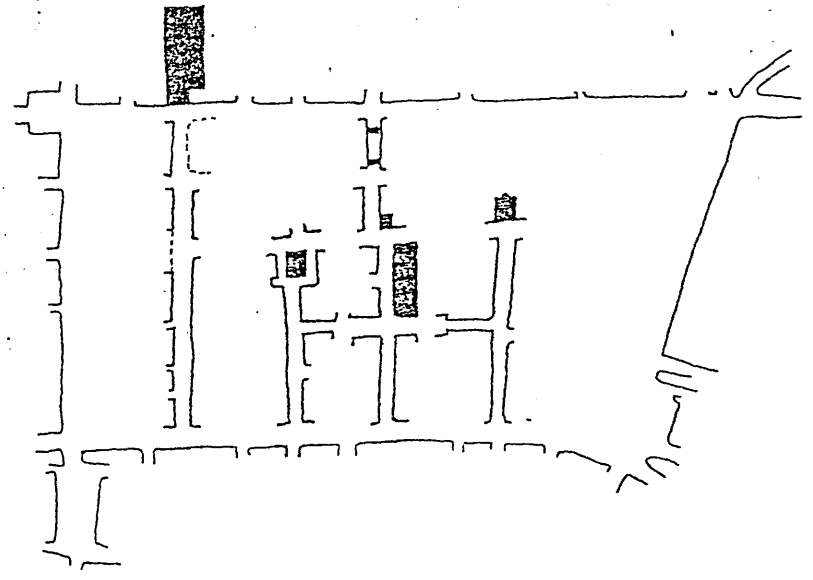

Figure 7. Minor key elements of the structure of Glasgow Merchant City.

The elements which are contributing to the legibility in the area can be classified into two types.

The first type is the "Major" elements such as George Square, Royal Exchange Square, George Church, Saint Enoch's Square and the Cross. They are mainly located along the longitudinal streets, and are very distinctive in terms of physical form. (Fig. 6)

The second type is the "Minor" elements, such as Queen Street Station, the Sheriff Court, Hutchison Hospital, and Saint David Church. They are mainly located along the crossing streets and are materialised as important buildings on the visual axis of the streets. (Fig. 7)

As demonstrated earlier, the visual form of the Merchant City is divided into three parts with respective degree of legibility. The first part has appeared with a high legible quality, the second part has a good sense of legibility but its layout still is confused. The third part has appeared to have a weak legibility, because of the abscence of the key elements. However, people seem to find their way throughout the whole area, and this is true with the people who are familiar with the Merchant City.

According to the request survey, most people are using very often symbols, signs, special entrances of buildings, special shop windows, typical corners, and even special pavements and names like for example, Lewis's Warehouse or Fraser's to describe their route when they travel in the Merchant City. Such elements of wall materials or ground surfaces were among the most memorable elements of this urban area: These elements

are the "bits" (6). The bits illustrate the image of any street, its detailing, proportions and form help to give some visual clues as to the position of the building in the hierarchy of street pattern. The identity of a shop window - which is an example of the bits - may be structured into a pattern of facade, which is the clue for identification of a building; the buildings themselves are inter-related so as to form an identifiable street and so on.

In my opinion, the problem of recognition at close quarters is essentially related to the way in which the buildings meet the ground and to the nature of the first couple of storeys. The bits which also reveal the activity of any street, seem then to complement the physical key element to provide a sense of legibility in different parts of the Merchant City. However, continuity of visual image throughout the whole area is not maintained because there is no evident structure which supports and connects all the parts of this area.

To enhance legibility over the whole area and make it more comprehendable and memorable, it is necessary to find a framework which can knit the whole Merchant City together.

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2. Steinitz, C. "Meaning and Cougruence Urban Form and Activity" Journal of the American Institute of Planners Vol. 34, pp. 233-247

3. Lynch, K "The Image of the City" The Mit Press, 1960, p.9

4. See Appendix

5. Lynch, K op. cit

6. See Chapter I

CHAPTER V : NEW ORDER

How an urban area works is no less important than how it looks. The apparent clarity or legibility of the townscape means the ease with which its parts can be recognized and can be organised into a coherent pattern. Therefore a legible townscape would be the one whose key elements (streets, landmarks, nodes or edges) are easily identifiable and are grouped into an overall pattern. This overall pattern is the framework of streets upon which the quality of the townscape is supported. In the Merchant City this framework can be made by restoring the dominant streets.

Just like a sculptor, when he begins to model his figure, he starts by constructing an "Armature", (iron framing used to consolidate a building, as defined in the Shorter Oxford English Dictorionary. (1)) By this means he creates the underlying structure upon which the finished work, be it dynamic or otherwise, is modelled. The look and balance of the finished work will reflect, like the human figure, this hidden frame. An analogy can be drawn between the hidden structure of a piece of sculpture and the underlying framework of a town. This framework can be said to be the "ARMATURE" upon which is based the pattern of streets and the urban form.

1. The Armature as a Concept

In a settlement of any size, urban streets are a system of linear spaces on which the geometry of the city is built. It is along these linear spaces where the townscape elements are arranged and related as to form a strucured urban environment. Therefore, the street network which generates the strucutre can be recognised as "an armature of the public open space."

Up to this point townscape has been discussed as a series of linked spaces, each possessing a particular quality and each related to the other. Awareness of an armature affects people who use it, and in a townscape composition the effect is a continuous unbroken flow of impressions that stimulate the senses as one moves through it. In simple terms the role of the armature is to strengthen the legibility of any area; by such means the main ingredients of urban quality and character of any townscape will thus be comprehendable and enjoyable.

How does one identify the appropriate streets which form the armature and which at the same time support the public open space. Lynch considers that a strongly visual environment will depend upon the ability to maintain the image through successive scales of perception and that features capable of being landmarks are required at intervals along the streets so that recognition is maintained and identity is preserved. However, the distance between successive landmarks is critical because once a particular focus has been assimilated, attention is drawn to the next.

The critical distance depends largely on the role of the "bits" which act as subsidiary markers and sequences and help to maintain the image between one landmark and the next. The bits therefore assist the visual continuity between the major element of the townscape. The streets which form the basis of the armature should be then chosen so as to link important features - such as, landmarks, open spaces and nodes - of the townscape. However, the "bits" of the entire armature should be distinguished and specific so as to be easily recognisable.

Kevin Lynch indicated that

> "Paths with clear and well known origins and destinations had stronger identities, helped to tie the city together and gave the observer a sense of bearings whenever he crossed them" (2)

Since junctions are often important nodes in the streets armature they can then assume important roles as origin and destination and must display a distinctive quality in terms of form and physical aspect; they should be highly perceptible.

All of the above mentioned qualities of the armature do not work in isolation. Where one quality is present alone, or the qualities are in conflict, the entire result may be weak, as for instance in Glasgow Merchant City. The sense of the whole depends on how the armature exposes the quality of the townscape and the continuity of images and forms. The armature has certain functional qualities but its main purpose is to enable people to comprehend and enjoy their urban environment.

2. The Armature of Glasgow Merchant City

As seen in Chapter IV the townscape of the Merchant City is operating as different isolated systems, because those systems are not generated by any clear structure. As a consequence, the image of this area is not maintained all over. To bring a new order to the Merchant City is to achieve a high legibility and therefore enhance the visual form of its townscape. To reinforce this townscape is to find out an armature which can knit all the different parts of the Merchant City, and all the elements which are regarded as the essential ingredients for an armature.

First, let us begin to select the physical key elements of the area.

The physical key elements:

A simple interpretation of the Diagram (Fig. 4 Chapter IV) of the visual form of the area illustrates the nodes and the major landmarks which are connected by the dominant streets; these are the physical key elements of Glasgow Merchant City townscape.

These physical key elements are: (Fig. 1)

In part 1: (part with strong and legible character)(Fig. 2)

- George Square area
- Royal Exchange area
- Saint George Church
- Queen Street Station

In part 2: (part with good legibility but a little confused)

- Saint Enochs Square
- Glasgow Cross (Fig. 3)

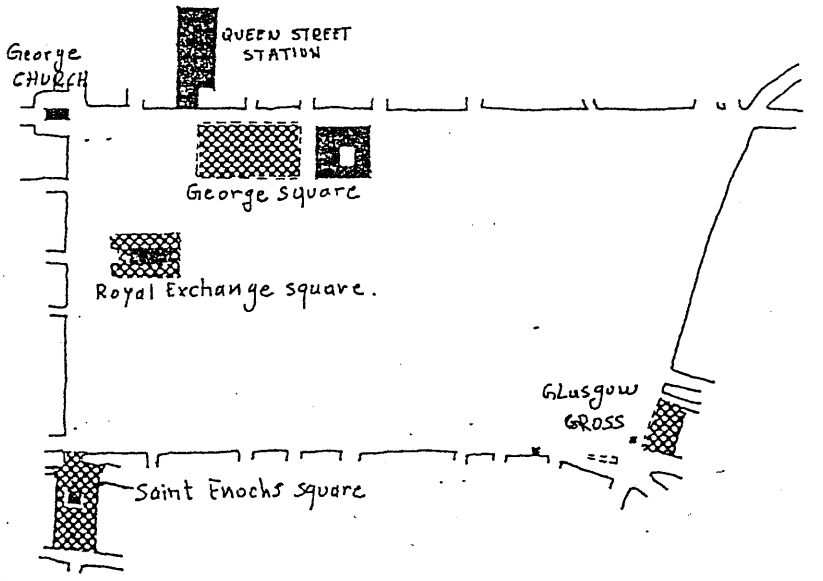

Figure I. The physical key elements
of the armature.

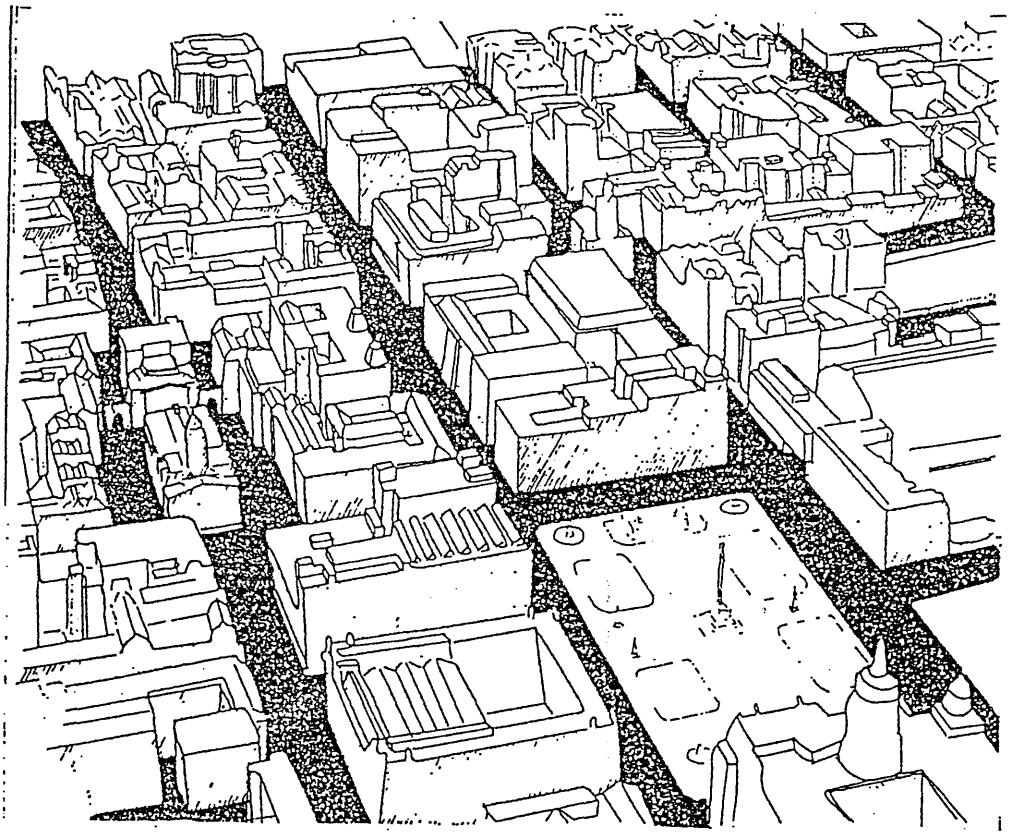

Figure 2. Axonometric of the strong legible area.
(George square and Royal Exchange square area.

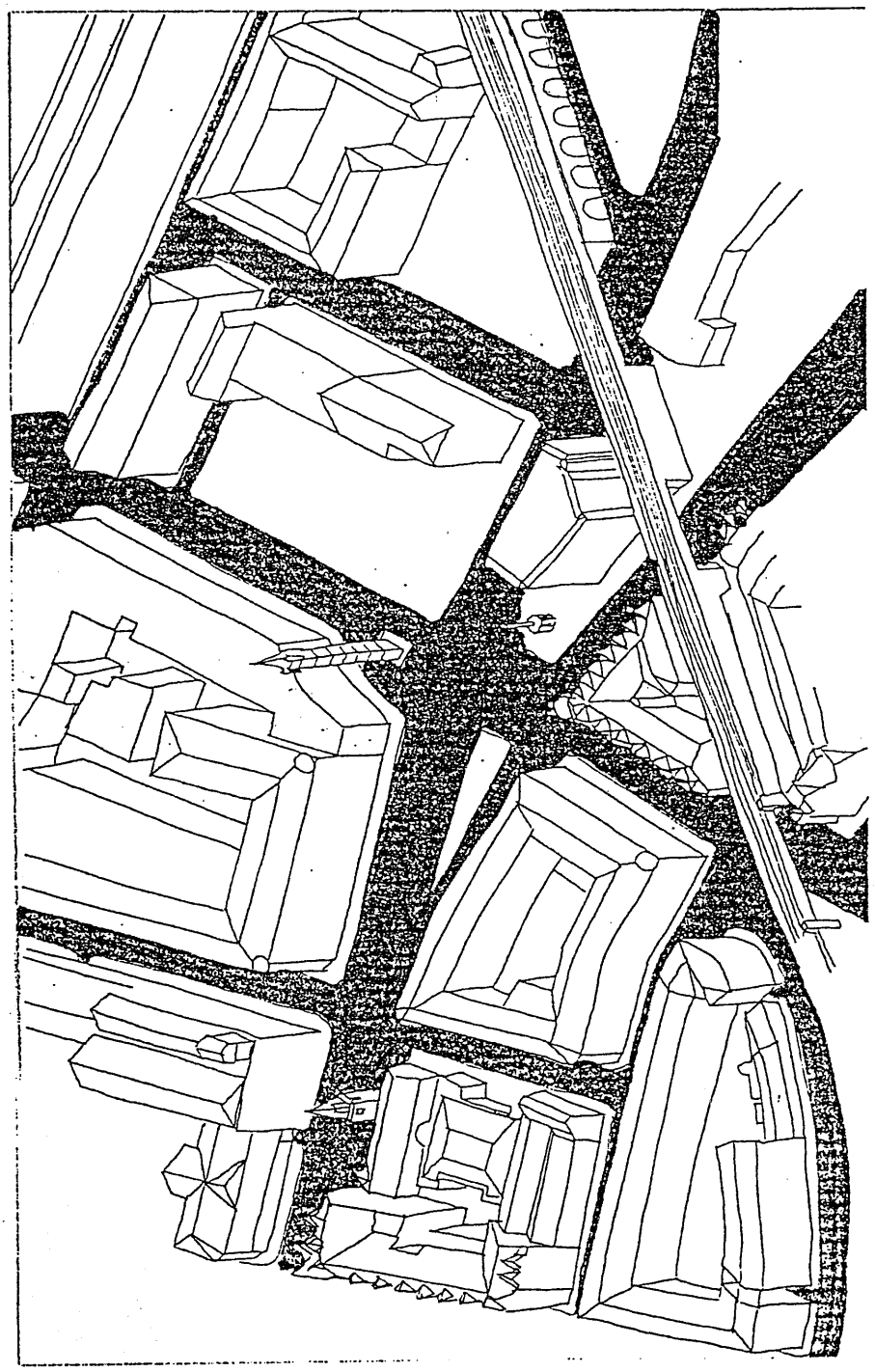

Figure 3. Axonometric of Glosgow Cross.

It is then also necessary to select the streets which link these physical key elements which are spread all over the area.

The Appropriate Streets

To select these streets is to choose the major streets identified in the diagram of the visual form of Glasgow Merchant City (Fig. 4, Chapter IV).

The Streets are: (Fig. 4)

Among the longitudinal streets (east - west)

- George Street
- Ingram Street
- Argyle Street with Trongate

Among the crossing streets (north - south)

- Buchanan Street
- Queen Street
- High Street

It will be noted that High Street is selected because it is the only distinguished crossing street which connects the three longitudinal streets on the east side. It is also the orginal "base line" from which the Merchant City expanded westwords.

All the physical key elements can be connected with the appropriate streets, for instance, George Church is connected to Saint Enoch's Square by Buchanan Street. At this stage all these streets are highly distinguished because their origin and destination are well-known and contain public buildings and places of special character. As will be seen in the diagram, there is one element namely High Street which is without the necessary key

elements at two important junctions -- Ingram Street and George Street. The neglect of High Street once the spine of the medieval town, is a point of failure on the eastern edge of the Merchant City. It is necessary therefore to articulate the junctions of High Street with these two major streets of the armature. This in itself will enhance the physical form of the Merchant City and will give greater definition.

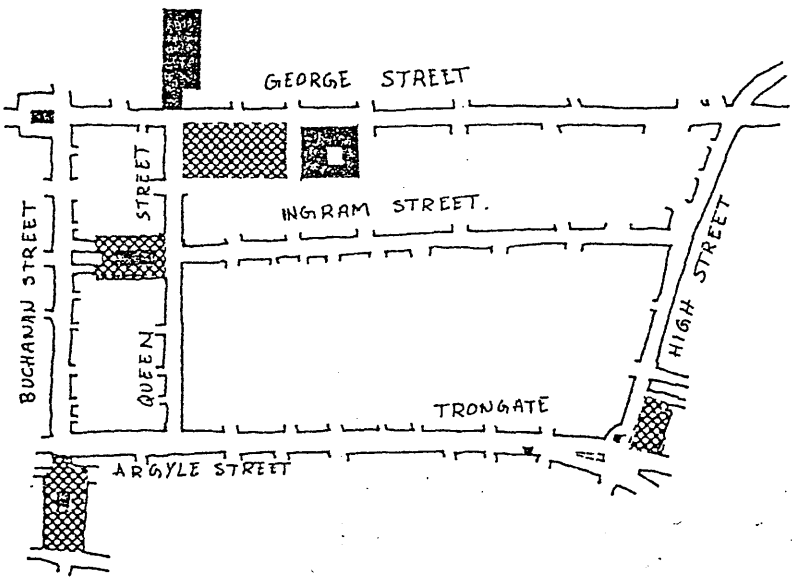

Figure 4. The appropriate streets of the armature.

It is noteable that the physical key elements are not balanced all over the Merchant City; they are mainly around George Square which plays the key structural role of the armature together with Argyle Street and Trongate. By contrast, there is no physical key element on the eastern part of the area. (Fig. 5) It is a vacuum which is required urgently to be improved, particularly at the junctions of High Street with Ingram Street and George Street. (Fig. 6) These two junctions must be very precise and distinguished physical key elements so that the continuity of sequences is still vivid.

By identifying the appropriate streets and the physical key elements we have then established the armature of Glasgow Merchant City. (Fig. 7) At this stage we need to consider how to use this armature to achieve a higher legibility throughout the whole area. This would be achieved as follows:

1. By reinforcing the visual importance the appropriate streets so as to give each one a stronger character, easily distinguished by the users.
2. By encouraging greater relative use of these streets.
3. By strengthening the physical key element at junctions.
4. By defining the nodal points of the armature.
5. By encouraging greater variety of architectural elements.

It will be seen that legibility of each node depends on three factors:

1. The functional roles of the linking streets, their scale, enclosure and visual richness.
2. The level of public relevance of the activities in the adjacent buildings.
3. The physical uniqueness of the node.

It will also be seen that the bits may need to be reinforced into visual sense of their role as markers as to be comprehended.

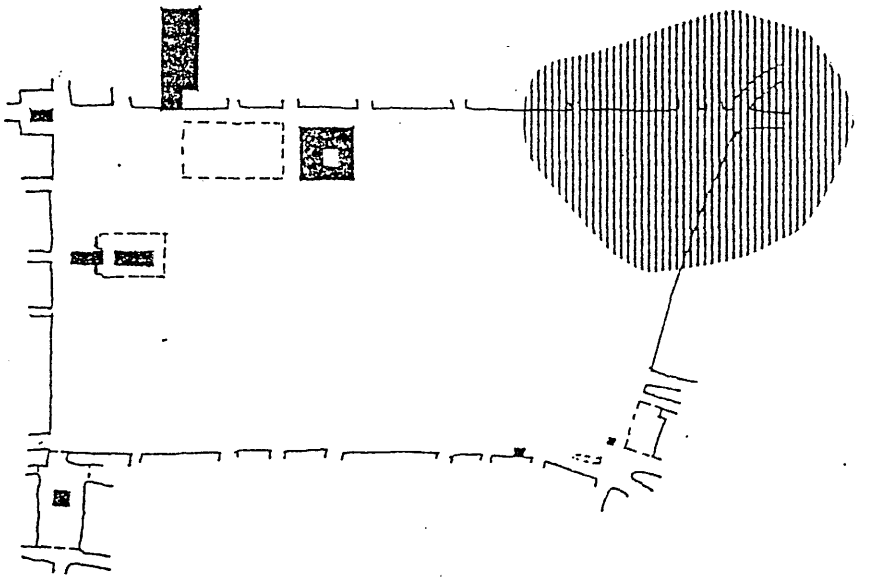

Figure 5. Diagram showing the vacuum of the area.

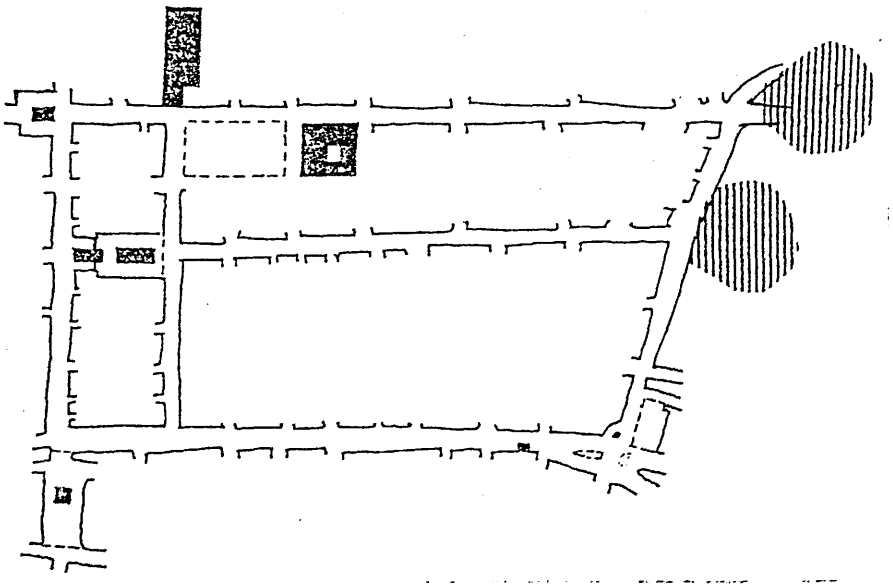

Figure 6. The vacuum at the junctions of the armature.

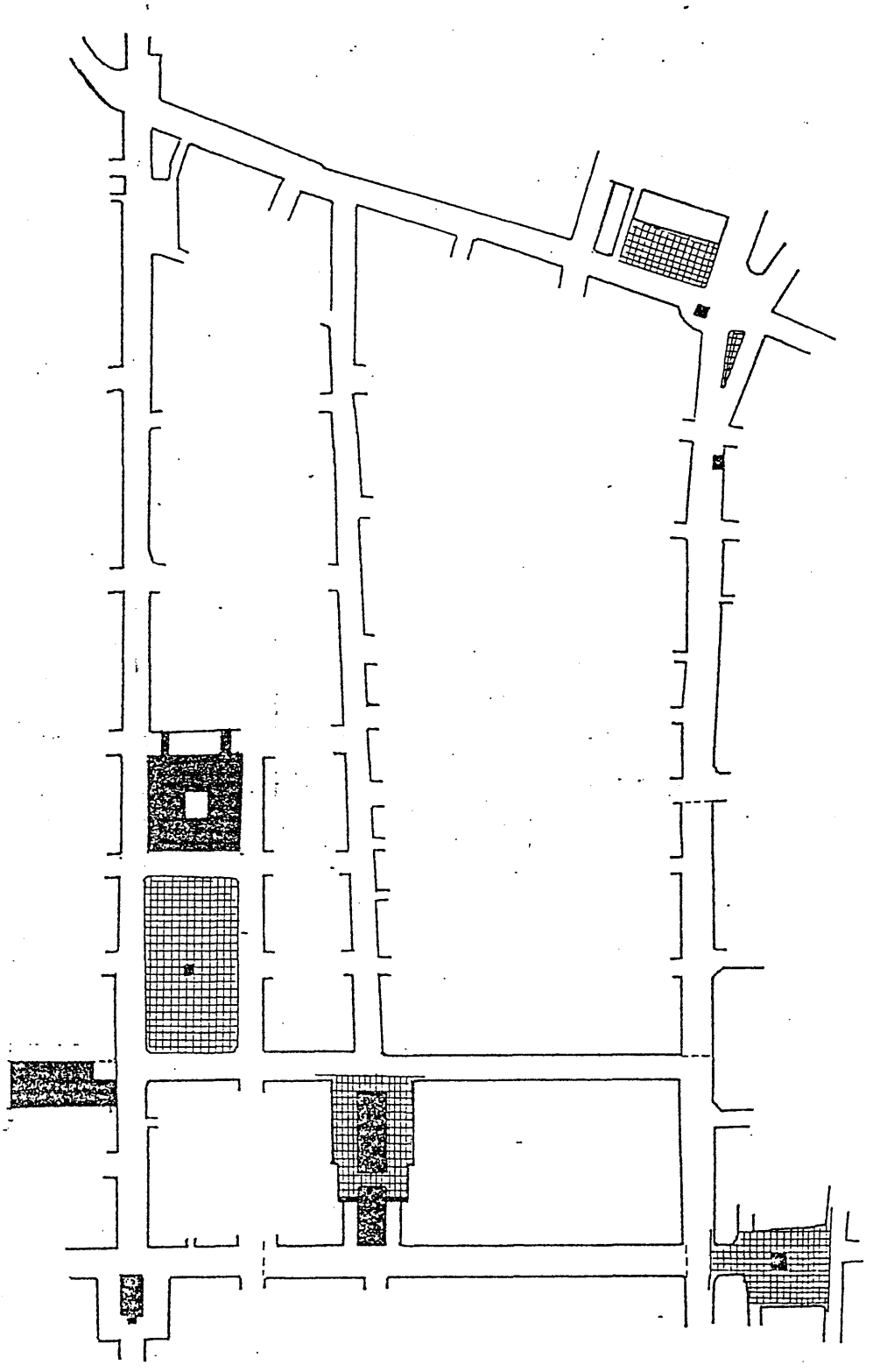

Figure 7. The identified armature of Glasgow Merchant City.

A diagram of the identified armature of this area shows that the junctions A and B are relatively weak in terms of legibility, and therefore need to be enhanced so as to be places of special character and assuming their function within the armature (Fig. 8).

Of all the requirements mentioned earlier, the strength of the physical key element at junctions seem to be having priority. First of all, let us define the activity pattern and the form of those nodal points.

1. NODE A

This cross intersection is a four way node; it is halfway between the Cathedral and Glasgow Cross and it joins two areas of different character. George Street and High Street run through this node, therefore it seems to be reasonable to suggest a kind of entry point to the Merchant City. This entry point could be a gateway (Fig. 9). It will also connect the area within the armature with other areas. Many other alternatives could also distinguish this node like for instance - a. A monument and an exhibition hall (Fig.10)
b. A monument and a crescent (Fig. 11)

2. NODE B

This T-junction is a three way node with High Street running through it. However, Ingram Street stops at this junction and is incased within the armature. Ingram Street is the central piece of the armature, therfore, it seems that any alternative for this node will emphasis the termination point of Ingram Street. This could be achieved by creating an important event on the east side of High Street facing the axis of Ingram Street. This event could be an important public building with a small public open space as a setting, essentially it would form a termination vista. The building could be for example an industrial museum, illustrating the industrial

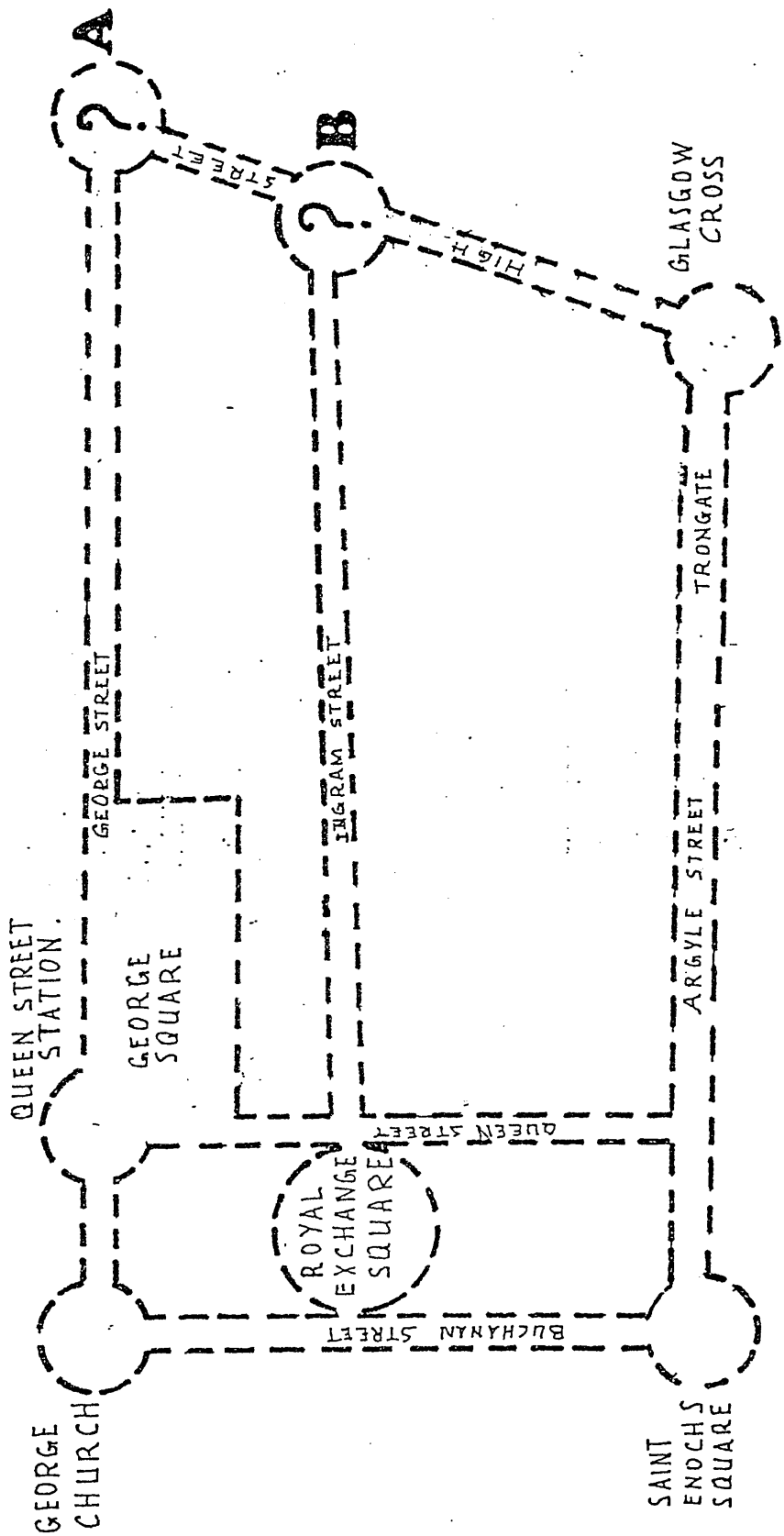

Figure 8. Digram of the armature.

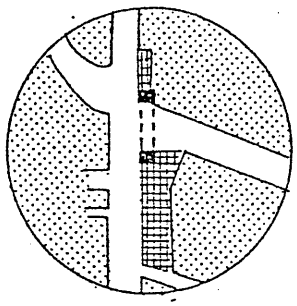

Figure 9. Proposal: A gateway.

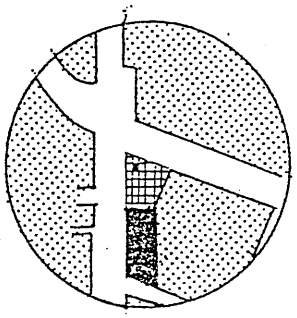

Figure IO. Proposal: A monument and an exhibition hall.

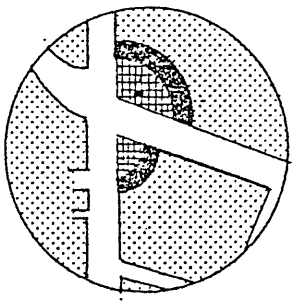

Figure II. Proposal: Amonument and a crescent.

success of Victorian Glasgow. (Fig. 12, 13, 14)

It is worth noteing that these propositions are not taking account of any other factors such as economy or planning policy of the area. They are only formal alternatives to enhance the armature and not intended to be specific architectural solutions.

By using any alternatives for these two junctions, the armature will be structured and therefore achieving a higher sense of legibility and continuity of sequences throughout the Merchant City. Figure 15 shows how these alternatives take place on the site. The new physical key elements which are reinforcing the notal points of High Street are:

High Street gate and Ingram Square.

By such means, the armature could be given strongly defined elements with each street having a distinguished and distinct origin and destination. Again we have to remember that origin and destination of the streets are very important elements of the street's legibility.

This armature will reveal the essential visual form of the Merchant City. We can thus arrive at an illustration of the primary elements of the armature of the area. One can however, recognise secondary elements in an armature namely those sub-sidiary streets which have a visual importance derived from certain important buildings, or articulations in the form of the street. Thus we can identify, Virginia Street, Hutcheson Street, Candleriggs Street, John Street and Wilson Street as secondary elements of the armature. (Fig. 16)

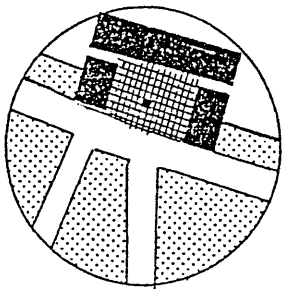

Figure I2. Proposal: Ingram square and an industrial museum.

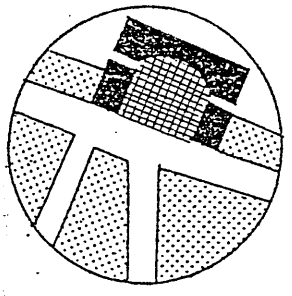

Figure I3. Proposal: Ingram square and a railway museum.

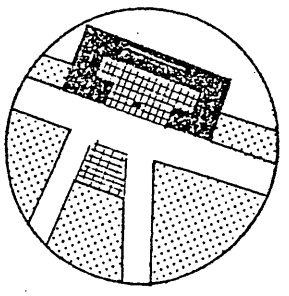

Figure I4. Proposal: Ingram square and a culturel centre.

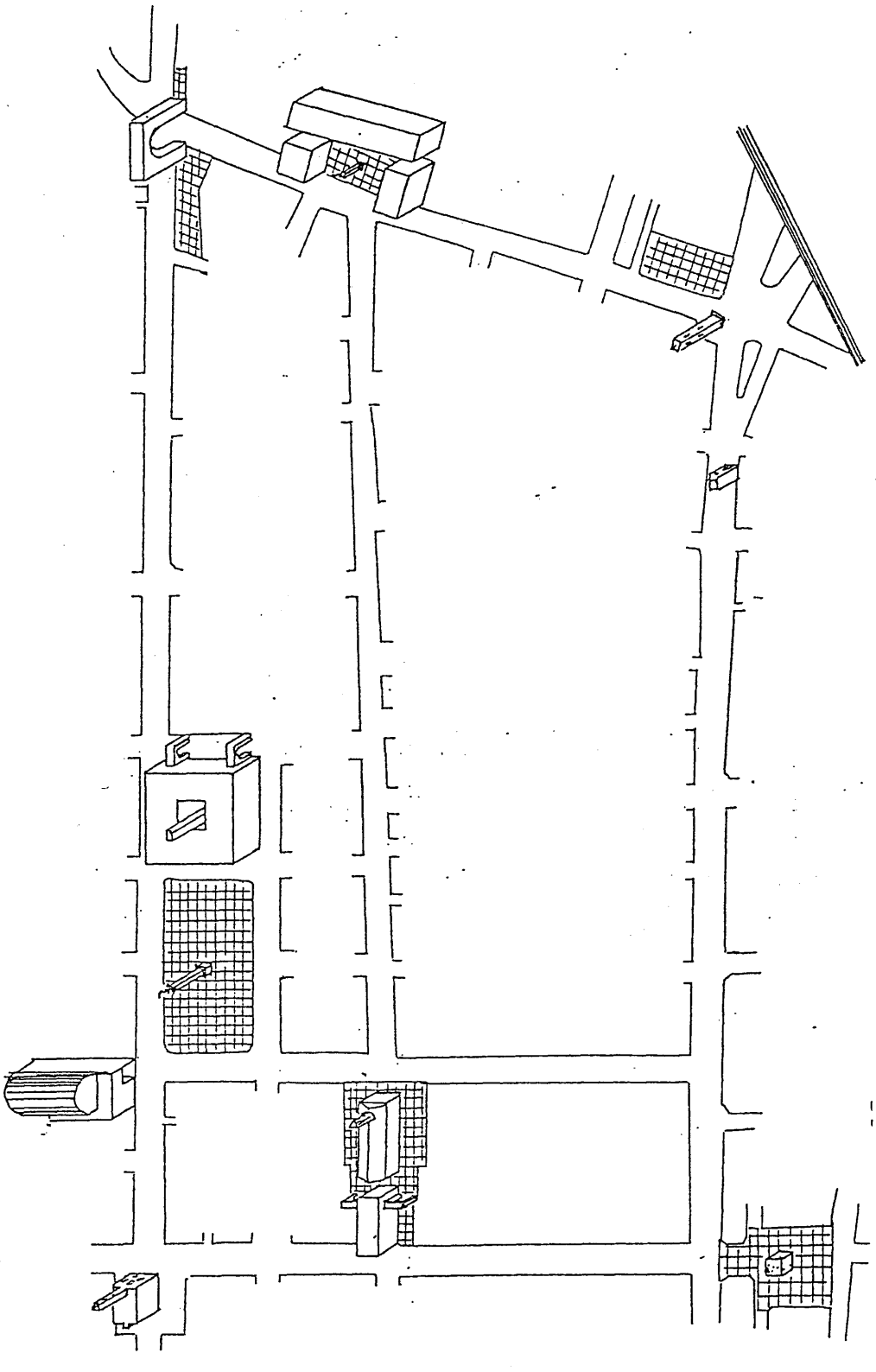

Figure 15. The armature with the primary elements.

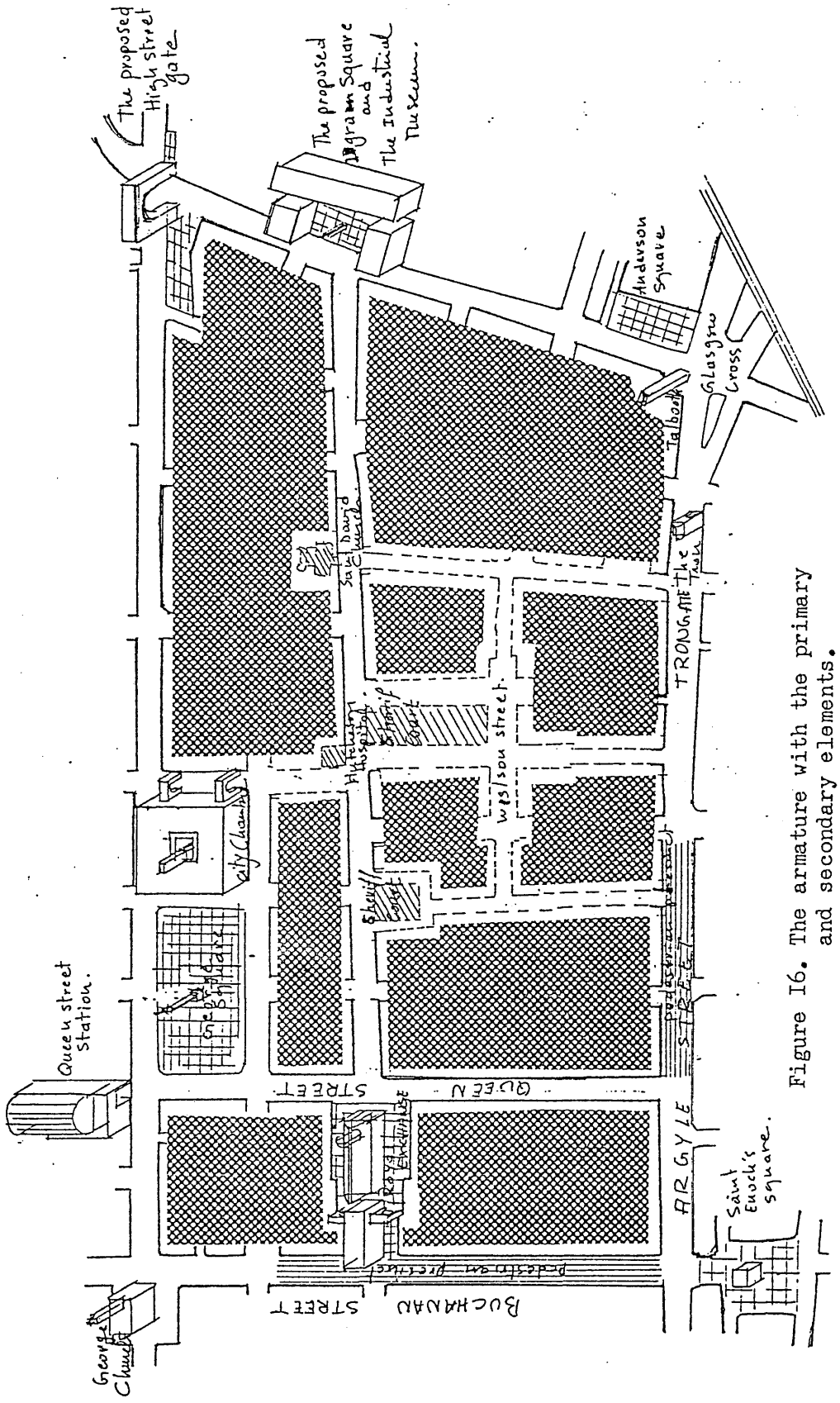

Figure I6. The armature with the primary and secondary elements.

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The Mit Press, 1960, p. 54

CHAPTER VI : CONCLUSION

Think of a city and the images which come to mind in recalling it as a particular city. At the simplest level these images can be of special buildings, those which express political, cultural or social aspirations. Other distinguishing features can be superimposed on these images, for example, topographical features, architectural qualities, climatic influences, etc... At a deeper level however, ones response to the urban qualities of a city or town depends on ones comprehension, consciously or unconsciously, of its scale and structure or what Kevin Lynch calls, the "grain" of the city.(1) In such comprehension the street is the constituent element. This must be so because it is the most important part of the public open space, through which one moves and by which one experiences the city. Thus the street is not merely a route but a giver of form which shapes the spatial character of the city. Ones understanding of this quality derives from certain character-forming elements in the townscape, whether buildings or landscape.

The objective of this thesis is to show that ones enjoyment and response to urban quality depends on these character-forming elements being "fixed" within a matrix or pattern which helps to illuminate the form and identify the place. This matrix or pattern may have certain abstract qualities, such as "the grid", but it is visually based on essential ideas of convenience and legibility. The studies of these ideas has thus led to the concept of the "ARMATURE" of the city, how it can be constructed or strengthened not by any particular formula or creating some artificial character, but by recognising the genus locii, ie. context, and applying certain principles of urban design.

The concept of the armature is thus a tool which can be used to enhance the qualities of a place using the local ingredients of culture, climatic and social structure. It is a tool of particular importance where through rapid and insensitive growth a city, such as Glasgow or Algiers has lost some of its underlying cohesion, or has suffered from the crude surgery of reconstruction to suit greater speed or competitive aspirations.

It will be seen essentially this study is concerned with two themes. The first relates to the armature as structure of the townscape. The second is the armature as it expresses a system of public open space. Thus the first theme is about comprehension and legibility and those physical key elements which help to explain a city as an ordered system of spaces. The second theme however, is about something rather different; it is about the expression of outdoor living spaces and the city as a work of art. It is also about the enjoyment of the city, its visual excitement, its architectural character and how the streets provide the setting for its monuments and emblems, expressing the history and culture of the place.

Hence the two themes underlying the concept of the armature bring together the wholly different view of the street as a key element in the rhythm of the city and as the main expression of the public realm. In the words of Camillo Sitte, one can summarise this concept namely:

> "The character of a town lies in its public spaces, and its beauty lies in their rhythmic inter-relationship". (2)

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APPENDIX

1. Request Survey

It is important to check my own assessment of the site's legibility against the views of a wider public, as far as resources permit. To carry out this survey, I have prepared a specific questionnaire based on Kevin Lynch's method of how to interview people to gain some rough public images. The people involved in this survey were not the general public but the first year students of the Mackintosh School of Architecture. For the exercise they were concerned as a general public because their involvement with architecture and urban design in general was limited.

The questionnaire essentially is a request for a basic sketch map of the area, with detailed questions concerning their descriptions while travelling in the area and listing and briefing the parts felt the most distinctive in their mind.

Some 29 students then were involved with the request survey.

- 10 students were very familiar with the area.
- 13 students visited occasionally the area.
- 6 students went to the area once or being there for the first time when the whole group had to visit the field area shortly before giving them the questionnaire.

After a short visit to the field area, without being told about the purpose of the exercise, the 29 students were back to School where they had to answer the questionnaire for about one hour. The questionnaire is composed of 8 questions which are as follows:

QUESTIONNAIRE

1. We would like you to make a quick map of the area contained between Argyle Street, Buchanan Street, George Street and High Street. Make it just as if you were making a rapid description of the city centre to a stranger, covering all the features. Please give names to the features and streets. We do not expect an accurate drawing; just a rough sketch.

2. Which is the place within the study area which you visit most often and which route do you use to ge to it? The place could be a building, a street, square etc.

3. a) Picture yourself actually making the trip, and describe the sequence of things you would see, hear or smell along the way, and the clues that a stranger would need to make the same decisions that you have to make. (We are interested in the physical picture of things.)

   b) Where a choice exists, are you conscious of choosing one route rather than another?

   c) Do you have any particular emotional feelings about the various parts of your trip?

4. Now, we would like to know what elements of this area you think are the most distinctive. They may be large or small but let us know which are the easiest to identify and remember?

5. We would like you to tell us which streets are the most important and why?

6. a) What importance do you place on 'orientation' and the 'recognition' of the city elements?

   b) Do you feel any pleasure from knowing where you are or where you are going?

7. Do you find this area an easy part of Glasgow City Centre to find your way in, or to identify its parts, and why?

8. Most people would associate the Eiffel Tower with the city of Paris. Which element do you think symbolises this study area?

The main results of the survey request are as follows:

1. The sketch maps drawn by the students did not cover the entire area, and were very varied and different in terms of accuracy. However, the majority of the students have noticed the grid layout. In everybody's mind the grid of the Merchant City was considered regular, because of the rigidity of George Square area.

2. The common elements which were grasped and listed as important features of this area were the public buildings (eg. City Chambers, Royal Exchange..). The public open spaces (eg. George Square...) and the landmarks (eg. The Tron...)

3. The main streets which were distinguished and listed were Buchanan Street (because of its pedestrian precinct) George Street, Queen Street, Argyle Street. Trongate and High Street were not always mentioned. These streets were distinguished and connected with main elements such as public buildings or squares, however, other streets were mentioned, like John Street or Wilson Street, but they were not co-ordinated with other elements.

4. Two-thirds of the students said that the area is easy graspable but three-quarters of the two-thirds were very familiar with the area. However, this is not revealed from their sketch maps, the only area they seem to understand its organisation is the Western part of the Merchant City. The Eastern part of this area is confused in everybody's mind because it lacks of special places and buildings of public relevance. One third of the students then said it is a very confused area because the layout and the nature of the streets are indistinguishable.

5. It is true, that the area of the Eastern part of Glasgow

Merchant City is confused, but some students seem to find their way around and that by using elements of reference such as names of pubs or superstores, corners of buildings, special facade of buildings and spatial entrances. These elements are the bits, and people seem to use them very frequently to describe their route in the Merchant City.

For example, Mr. X said:

"I remember a modern marble faced Clydesdale Bank and Burton's the Tailors".

Miss Y said:

"at your right hand side is Lewis's warehouse marked with big letters" and later "the red brick house".

Miss Z said:

"Candleriggs Market, very old cobbled streets".

By identifying the bits the students were able to describe parts of this area, unfortunately, the students did not mention those bits in their sketches.

5. Finally, this area was symbolised by the City Chambers and George Square, which is not surprising because again it is the most vivid area of this urban environment.

I have picked up three different sketch maps to give an idea about how these students illustrated this urban area in an abstract form. (Fig. 1, 2, 3)

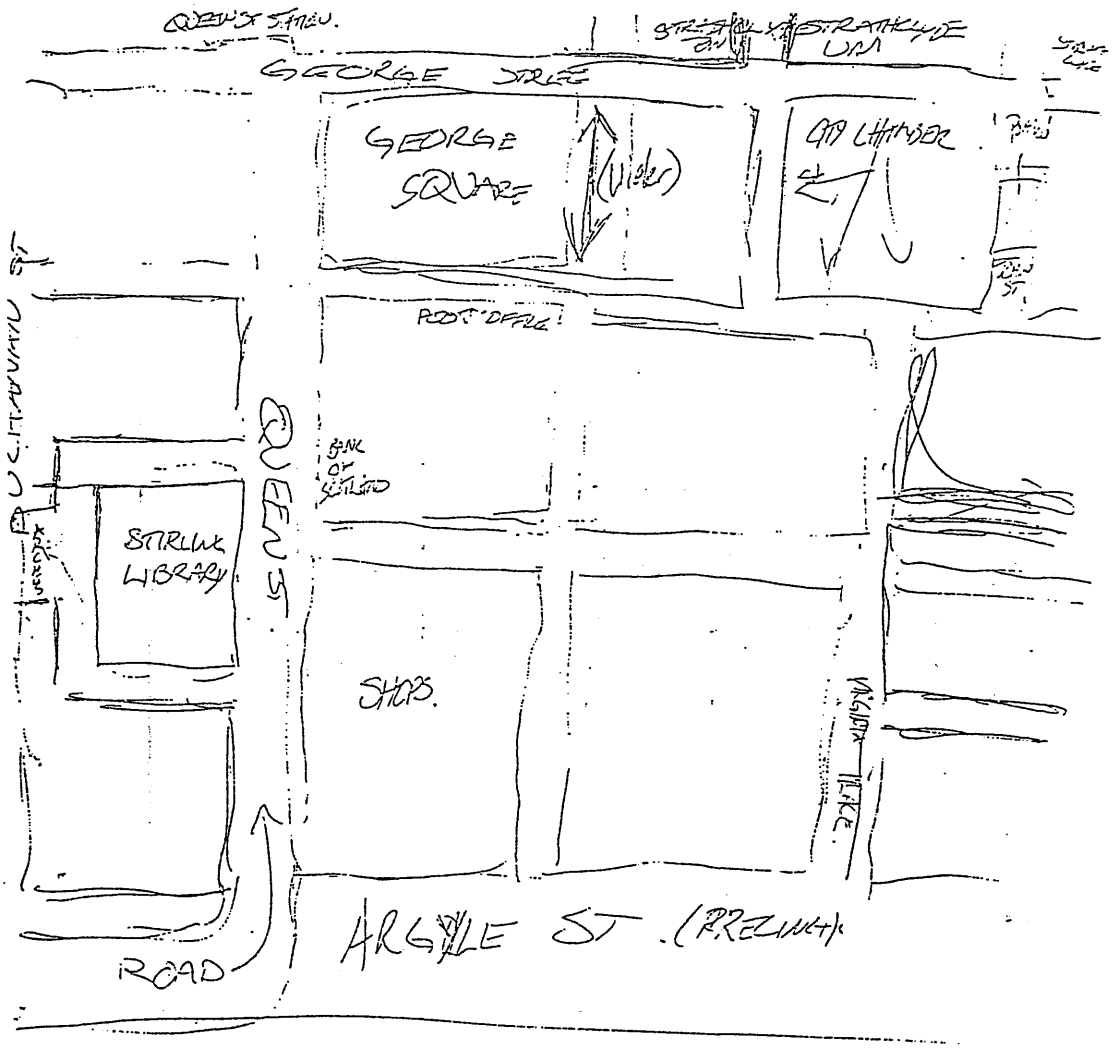

Figure I. Example of a sketch map of the Merchant City.

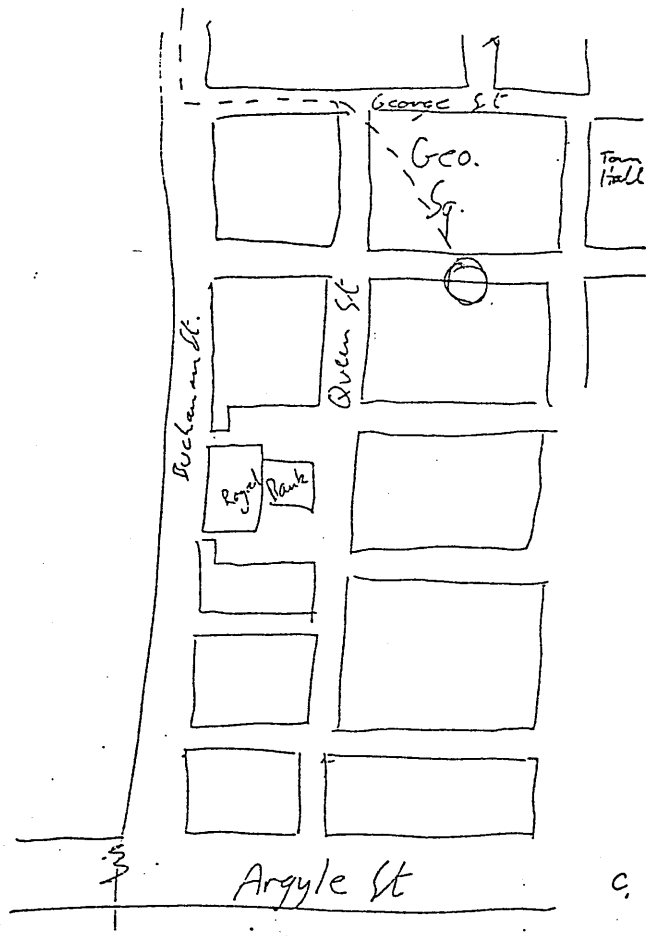

Figure 2. Example of a sketch map of the Merchant City.

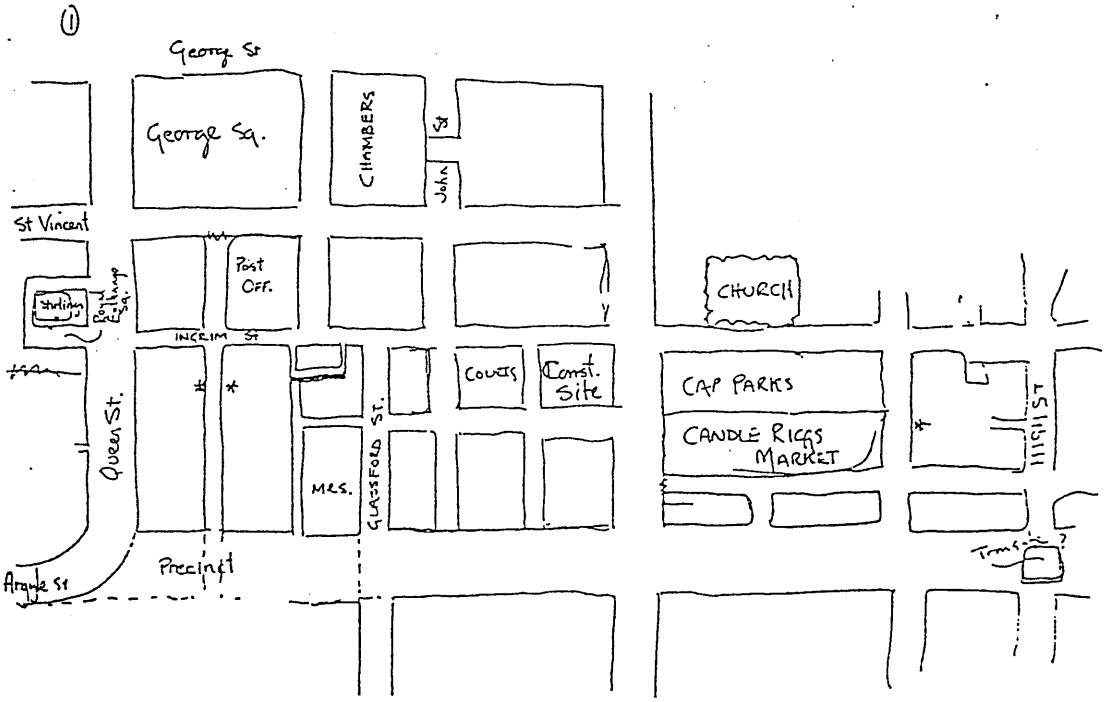

Figure 3. Example of a sketch map of the Merchant City.

2. Characteristics of Different Types of Streets.

1. ALLEY

According to Chambers Dictionary; an alley is "a passage".. "a narrow lane" and later "a narrow passage". It is thus a pedestrian way with two firm edges; these two edges could be buildings or - as Chambers mentioned at the beginning of the definition, "a walk in a garden" - greenery (trees). Mechanical movement is normally impossible, hence its functions as a pedestrian walk.

2. LANE

Chambers define lane as "a narrow passage or road: a narrow street: a passage through a crowd or among obstructions: a channel" Sometimes a lane is a narrow passway between buildings; it often functions as a means of vehicle access or servicing the buildings in the lane.

3. STREET

As defined before: "a street is a paved road lined with houses..." According to Chambers, human movement is institutionalized to the street. In simple terms the street is the people, a street has side walks and a carriage way. A street is comparatively wide as opposed to lane or alley.

4. AVENUE

According to the Chambers English Dictionary, the avenue is "a double row of trees with or without road: a wide and handsome street with or without trees:. The main difference between a street and an avenue is the width, ie. a wide street with one or more lines of trees.

5. BOULEVARD

According to Chambers: "boulevard is a broad road, walk or promenade bordered with trees originally applied to those formed upon the demolished fortifications of a town." The original meaning of Boulevard, according to Rudofsky, was "a raised rampart surrounding a city for defensive purposes and which therefore also provided a panoramic view." The Boulevard again suggests a tree-lined street wider than an avenue where promenade and panoramic view occur.

6. MULTILEVEL STREET

A multilevel street is a super position of two or more streets at different levels, where the elevated one is almost reserved for traffic and the lower one is a mixture of a carriageway and pavements. In simple terms, the multilevel street is in fact a street within a street.

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